SOLUTIONS 4 STRUCTURES Inc.

Date: 2023 06 16
Design by: MRO

Structural Calculations for Vertical and Lateral Design of Building F

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
tom@solutions4structures.com
(253) 314 - 9822

02-20-24

Project Number: 23.007

Code / Location: 2018 IBC

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

Vertical

Building F

SOLUTIONS 4 STRUCTURES Inc.

Page #:
Project Number: 23.007
Date: 5/31/23
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ROOF LOADS:		
Rood Dead Loads:		
Solar Panels	5.00	PSF
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	1.00	PSF
Miscellaneous	0.50	PSF
Total Roof Dead Load:	22.00	PSF
Total Live / Snow Load:	25.00	PSF
Total Roof Load:	**47.00**	**PSF**

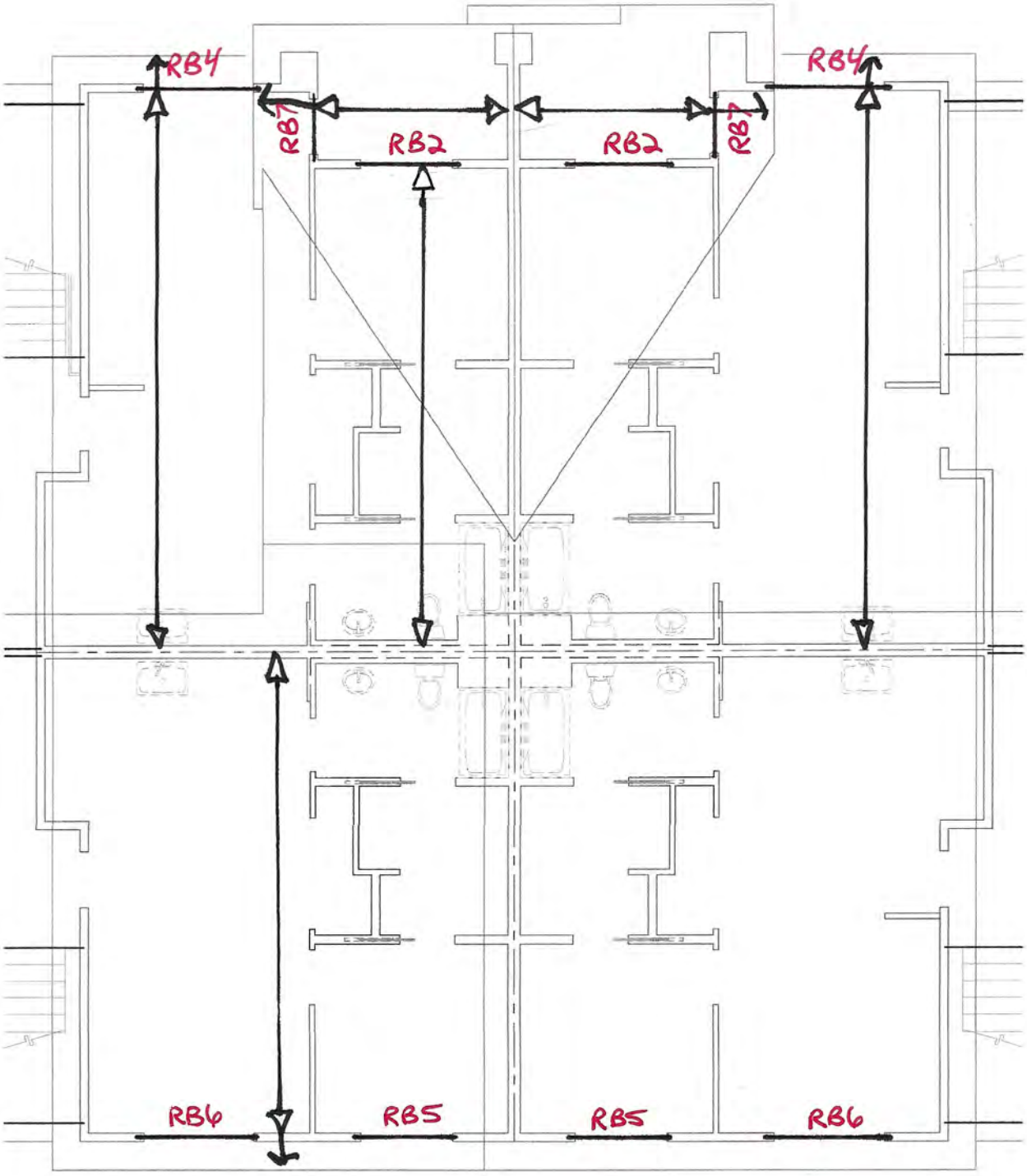
FLOOR LOADS:		
Floor Dead Loads:		
Finish Material	1.00	PSF
1.25" Gypcrete (105pcf)	10.90	PSF
APA Rated 3/4" T&G Plywood/OSB	2.50	PSF
11-7/8" TJI Joists @16" o.c.	2.80	PSF
Insulation	1.00	PSF
(2) Layer of 5/8" Gypsum Board	5.60	PSF
Mechanical & Electrical	1.00	PSF
Miscellaneous	1.20	PSF
Total Floor Dead Load:	26.00	PSF
Total Live / Snow Load:	40.00	PSF
Total Floor Load:	**66.00**	**PSF**

STAIR LOADS:		
Deck Dead Loads:		
3" Concrete Topping (145 pcf)	36.30	PSF
Waterproof membrane (per Arch)	0.50	PSF
PT 3/4" T&G Plywood	3.00	PSF
2 x 8 Joists @16" o.c.	2.00	PSF
(1) Layer of 5/8" Gypsum Board	2.80	PSF
Mechanical & Electrical	1.00	PSF
Miscellaneous	1.40	PSF
Total Floor Dead Load:	47.00	PSF
Total Live / Live Load:	100.00	PSF
Total Floor Load:	**147.00**	**PSF**

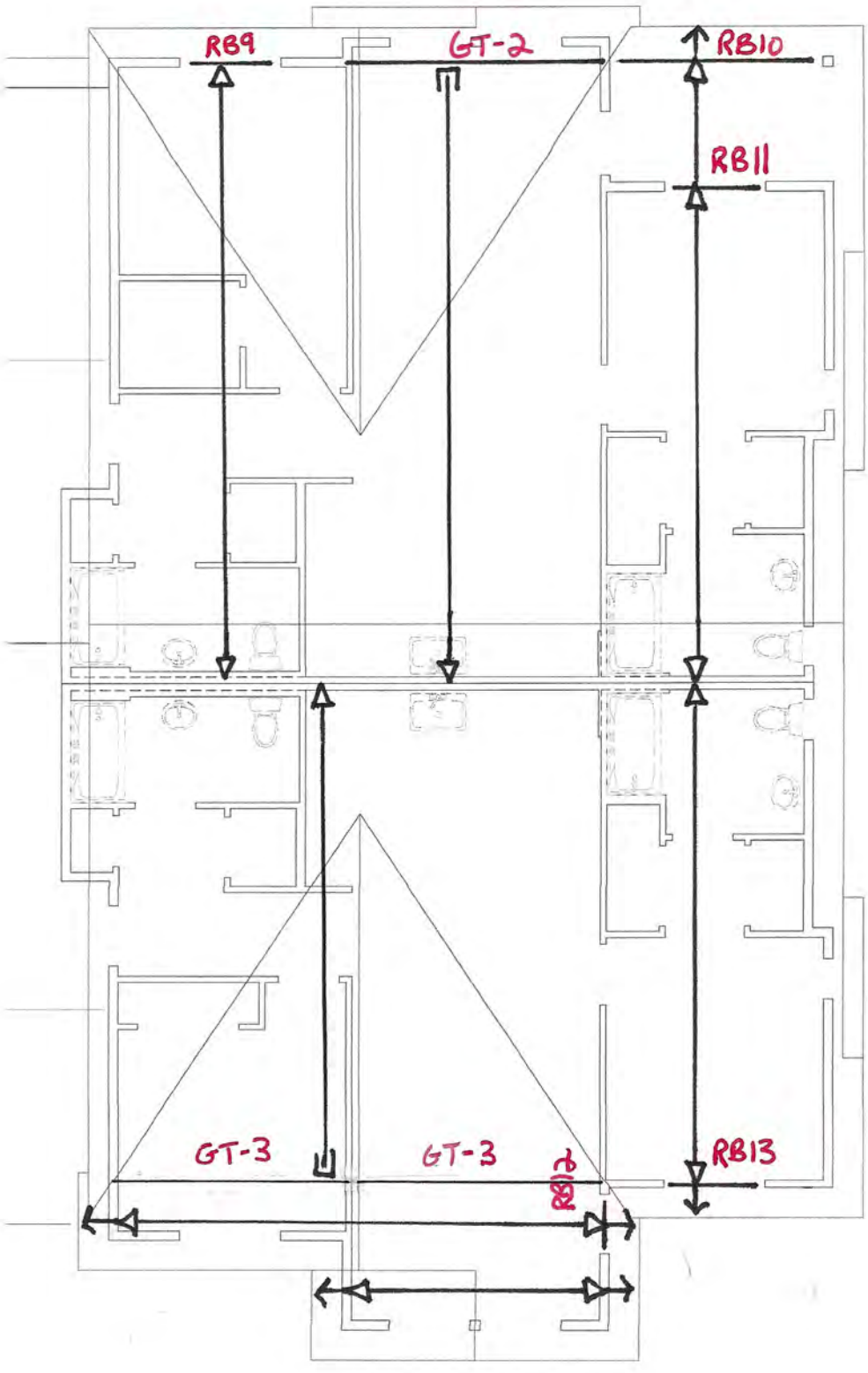
DECK LOADS:		
Deck Dead Loads:		
Decking/Ply & Topping TBD	20.00	PSF
Waterproof membrane (per Arch)	0.50	PSF
2 x 8 Joists @16" o.c.	2.00	PSF
Deck soffit	1.50	PSF
Miscellaneous	1.00	PSF
Total Dead Load:	25.00	PSF
Total Load:	60.00	PSF
Total Deck Load:	**85.00**	**PSF**

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**

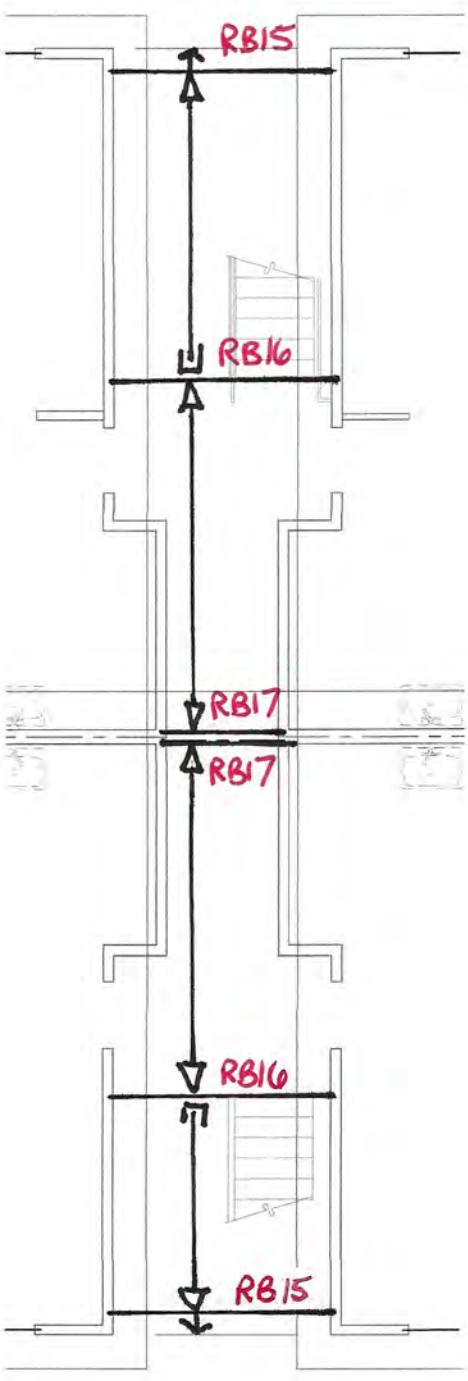
WALL LOADS:		
Wall Dead Loads: EXT. Wall Assembly		
Exterior siding	3.00	PSF
Moisture barrier	0.20	PSF
1/2" Plywood/OSB	1.70	PSF
2 x 6 or 2 x 4 Studs @ 16" o.c.	1.70	PSF
Top & Bottom Wall Plates	0.30	PSF
Insulation	1.00	PSF
(1) Layer of 5/8" Gypsum Board	2.80	PSF
Miscellaneous	1.30	PSF
Total Wall Dead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



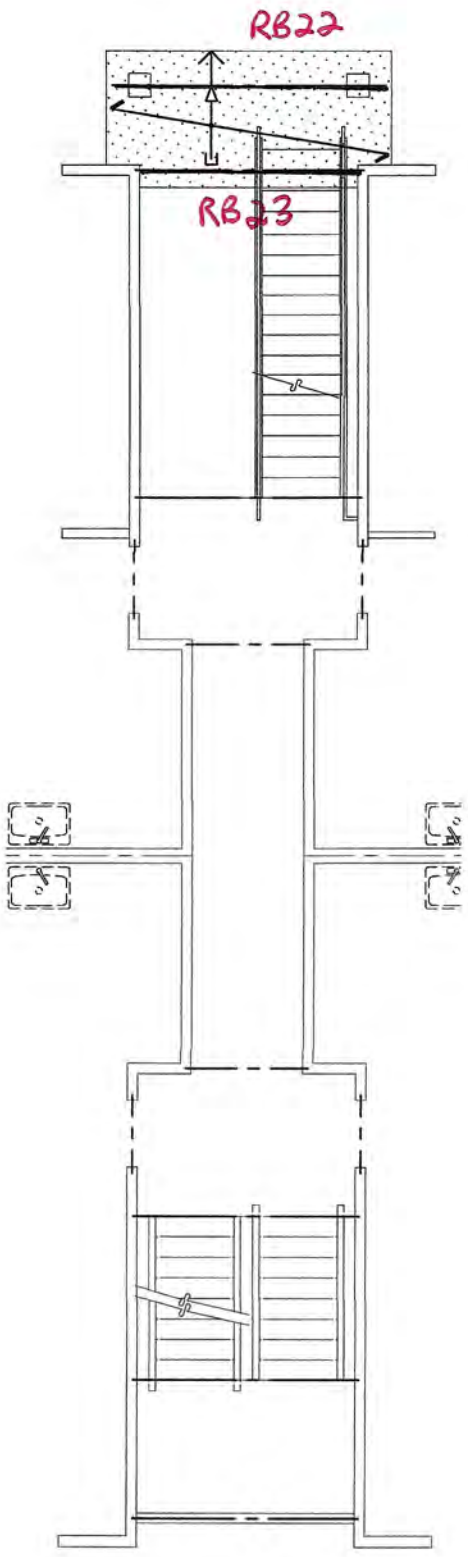
ROOF TYPE 2



ROOF TYPE 3



TYPICAL CORRIDOR ROOF



2ND FLOOR ENTRANCE ROOFS

SOLUTIONS 4 STRUCTURES Inc.

Job #:	23.007
Designed:	TLC
Date:	6/1/23

ROOF FRAMING

2018 NDS/2018 IBC

C_r =	1.15	repetetive
C_D =	**1.15**	**SNOW**
C_F =	(varies)	size

2 x 6 — Pressure Treated Incising — Hem Fir — #2

2 x 6 | Hem Fir | #2 | Incising? Yes

A =	8.25	in^2	Snow	25.00	psf	
S =	7.56	in^3	Dead	17.00	psf	
I =	20.80	in^4	Other	-	psf	
C_F =	1.30		Total	42.00	psf	
F_b =	850.00	psi				
F_v =	150.00	psi	Allowable Span	@ 12" o.c. =	11.08	ft (TL Defl.)
E =	1,300,000.00	psi	Allowable Span	@ 16" o.c. =	10.06	ft (TL Defl.)
C_i =	0.80	Incising (Fb)	Allowable Span	@ 24" o.c. =	8.54	ft (bending)
C_i =	0.95	Incising (E)				

	spacing (in)	12.00	16.00	24.00	Control	% over allowed
Lv_{allow} = {[A*F_v*C_D/(1.5*w)]+d}*2	Lv (ft) =	46.55	35.14	23.73		1.00%
Lb_{allow} =(S*F_b*C_D*Cr*Cf*Ci*8/w)$^{1/2}$	Lb (ft) =	12.08	10.46	8.54	Bending	4.00%
Ldallow =[384*E*Ci*I/(5*LL*360)]^1/3	Ld (ft) =	11.50	10.45	9.13	LL Deflection	360
Ldallow =[384*E*Ci*I/(5*TL*240)]^1/3	Ld (ft) =	11.08	10.06	8.79	TL Deflection	240
		TL Defl.	TL Defl.	bending		

2 x 8 — Hem Fir — #2

2 x 8 | Hem Fir | #2 | Incising? No

A =	10.88	in^2	Snow	25.00	psf	
S =	13.14	in^3	Dead	17.00	psf	
I =	47.63	in^4	Other	-	psf	
C_F =	1.20		Total	42.00	psf	
F_b =	850.00	psi				
F_v =	150.00	psi	Allowable Span	@ 12" o.c. =	14.85	ft (TL Defl.)
E =	1,300,000.00	psi	Allowable Span	@ 16" o.c. =	13.49	ft (TL Defl.)
C_i =	1.00	Incising (Fb)	Allowable Span	@ 24" o.c. =	11.79	ft (TL Defl.)
C_i =	1.00	Incising (E)				

	spacing (in)	12.00	16.00	24.00	Control	% over allowed
Lv_{allow} = {[A*F_v*C_D/(1.5*w)]+d}*2	Lv (ft) =	61.36	46.32	31.28	Shear	1.00%
Lb_{allow} =(S*F_b*C_D*Cr*Cf*Ci*8/w)$^{1/2}$	Lb (ft) =	17.11	14.81	12.10	Bending	4.00%
Ldallow =[384*E*Ci*I/(5*LL*360)]^1/3	Ld (ft) =	15.42	14.01	12.24	LL Deflection	360
Ldallow =[384*E*Ci*I/(5*TL*240)]^1/3	Ld (ft) =	14.85	13.49	11.79	TL Deflection	240
		TL Defl.	TL Defl.	TL Defl.		

2 x 10 — Hem Fir — #2

2 x 10 | Hem Fir | #2 | Incising? No

A =	13.88	in^2	Snow	25.00	psf	
S =	21.39	in^3	Dead	17.00	psf	
I =	98.93	in^4	Other	-	psf	
C_F =	1.10		Total	42.00	psf	
F_b =	850.00	psi				
F_v =	150.00	psi	Allowable Span	@ 12" o.c. =	18.95	ft (TL Defl.)
E =	1,300,000.00	psi	Allowable Span	@ 16" o.c. =	17.22	ft (TL Defl.)
C_i =	1.00	Incising (Fb)	Allowable Span	@ 24" o.c. =	14.78	ft (bending)
C_i =	1.00	Incising (E)				

	spacing (in)	12.00	16.00	24.00	Control	% over allowed
Lv_{allow} = {[A*F_v*C_D/(1.5*w)]+d}*2	Lv (ft) =	78.28	59.10	39.91	Shear	1.00%
Lb_{allow} =(S*F_b*C_D*Cr*Cf*Ci*8/w)$^{1/2}$	Lb (ft) =	20.90	18.10	14.78	Bending	4.00%
Ldallow =[384*E*Ci*I/(5*LL*360)]^1/3	Ld (ft) =	19.68	17.88	15.62	LL Deflection	360
Ldallow =[384*E*Ci*I/(5*TL*240)]^1/3	Ld (ft) =	18.95	17.22	15.04	TL Deflection	240
		TL Defl.	TL Defl.	bending		

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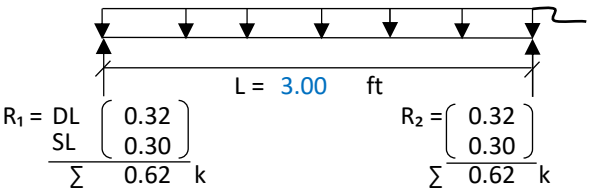
LOADS ONLY

RB1 — 4x8

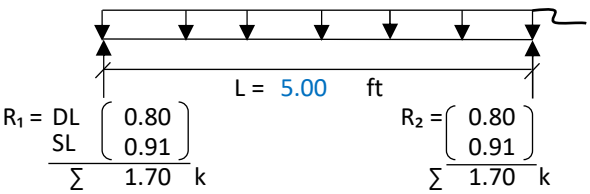


L = 3.00 ft

		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	22	8.0	+ DL 40 Wall +	DL 0	0.0	= DL	216
	SL	25	8.0		SL 0	0.0	SL	200
							∑	416

R_1 =	DL	0.32	R_2 = 0.32
	SL	0.30	0.30
	∑	0.62 k	∑ 0.62 k

RB2 — 4x8

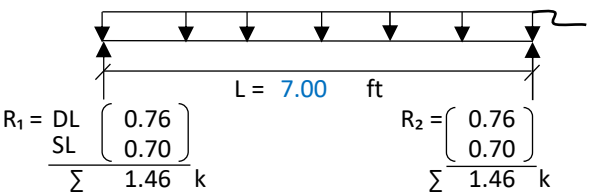


L = 5.00 ft

		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	22	14.5	+ DL 0 Wall +	DL 0	0.0	= DL	319
	SL	25	14.5		SL 0	0.0	SL	363
							∑	682

R_1 =	DL	0.80	R_2 = 0.80
	SL	0.91	0.91
	∑	1.70 k	∑ 1.70 k

RB3 — 4x8

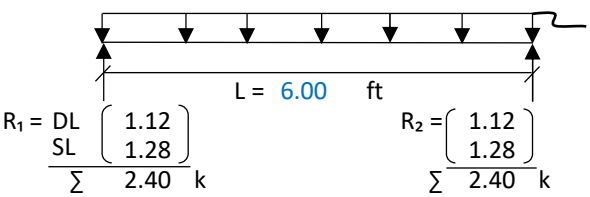


L = 7.00 ft

		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	22	8.0	+ DL 40 Wall +	DL 0	0.0	= DL	216
	SL	25	8.0		SL 0	0.0	SL	200
							∑	416

R_1 =	DL	0.76	R_2 = 0.76
	SL	0.70	0.70
	∑	1.46 k	∑ 1.46 k

RB4 — 4x10

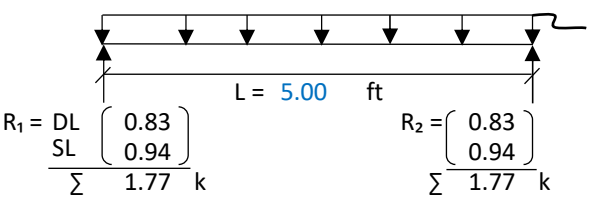


L = 6.00 ft

		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	22	17.0	+ DL 0 Wall +	DL 0	0.0	= DL	375
	SL	25	17.0		SL 0	0.0	SL	426
							∑	801

R_1 =	DL	1.12	R_2 = 1.12
	SL	1.28	1.28
	∑	2.40 k	∑ 2.40 k

RB5 — 4x8

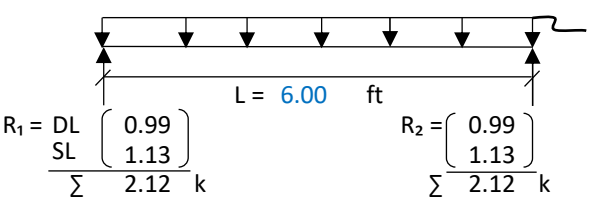


L = 5.00 ft

		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	22	15.0	+ DL 0 Wall +	DL 0	0.0	= DL	331
	SL	25	15.0		SL 0	0.0	SL	376
							∑	707

R_1 =	DL	0.83	R_2 = 0.83
	SL	0.94	0.94
	∑	1.77 k	∑ 1.77 k

RB6 — 4x10



L = 6.00 ft

		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	22	15.0	+ DL 0 Wall +	DL 0	0.0	= DL	331
	SL	25	15.0		SL 0	0.0	SL	376
							∑	707

R_1 =	DL	0.99	R_2 = 0.99
	SL	1.13	1.13
	∑	2.12 k	∑ 2.12 k

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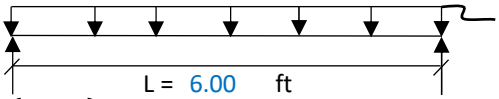
RB7 4x8

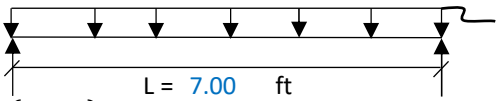


L = 6.00 ft

	R1	R2
DL	0.77	0.77
SL	0.67	0.67
∑	1.44 k	1.44 k

	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	22	8.9	+ DL 60 Wall +	0	0.0	= DL	256
SL	25	8.9		0	0.0	SL	223
						∑	479

RB8 4x10

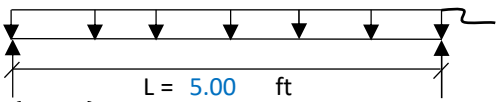


L = 7.00 ft

	R1	R2
DL	0.83	0.83
SL	0.78	0.78
∑	1.61 k	1.61 k

	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	22	8.9	+ DL 40 Wall +	0	0.0	= DL	236
SL	25	8.9		0	0.0	SL	223
						∑	459

RB9 4x8

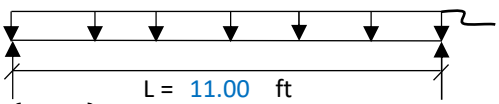


L = 5.00 ft

	R1	R2
DL	0.94	0.94
SL	1.07	1.07
∑	2.00 k	2.00 k

	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	22	17.0	+ DL 0 Wall +	0	0.0	= DL	375
SL	25	17.0		0	0.0	SL	426
						∑	801

RB10 PT 6x10 HF 1

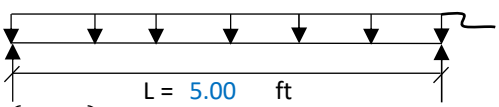


L = 11.00 ft

	R1	R2
DL	-0.71	-0.71
SL	-0.81	-0.81
∑	-1.53 k	-1.53 k

	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	22	-5.9	+ DL 0 Wall +	0	0.0	= DL	-130
SL	25	-5.9		0	0.0	SL	-148
						∑	-277

RB11 4x10

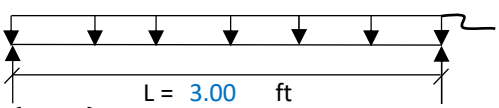


L = 5.00 ft

	R1	R2
DL	1.16	1.16
SL	1.32	1.32
∑	2.48 k	2.48 k

	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	22	21.1	+ DL 0 Wall +	0	0.0	= DL	465
SL	25	21.1		0	0.0	SL	528
						∑	993

RB12 4x8



L = 3.00 ft

	R1	R2
DL	0.52	0.52
SL	0.53	0.53
∑	1.05 k	1.05 k

	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	22	14.0	+ DL 40 Wall +	0	0.0	= DL	348
SL	25	14.0		0	0.0	SL	350
						∑	698

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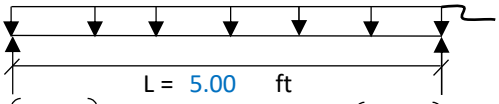
RB13 4x8

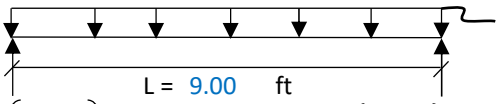


L = 5.00 ft

		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	22	14.0	+ DL 0 Wall +	DL 0	0.0	= DL	309
	SL	25	14.0		SL 0	0.0	SL	351
							∑	660

R_1 =	DL	0.77	R_2 = 0.77
	SL	0.88	0.88
	∑	1.65 k	1.65 k

RB14 PT 4x10

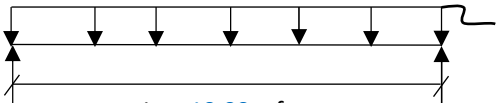


L = 9.00 ft

		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	22	-5.9	+ DL 0 Wall +	DL 0	0.0	= DL	-130
	SL	25	-5.9		SL 0	0.0	SL	-148
							∑	-277

R_1 =	DL	-0.58	R_2 = -0.58
	SL	-0.66	-0.66
	∑	-1.25 k	-1.25 k

RB15 PT 3-1/8x10.5 GLB

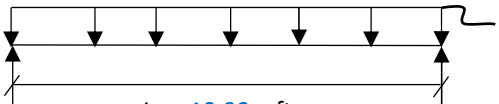


L = 10.00 ft

		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	22	8.3	+ DL 0 Wall +	DL 0	0.0	= DL	183
	SL	25	8.3		SL 0	0.0	SL	208
							∑	392

R_1 =	DL	0.92	R_2 = 0.92
	SL	1.04	1.04
	∑	1.96 k	1.96 k

RB16 3-1/8x10.5 GLB

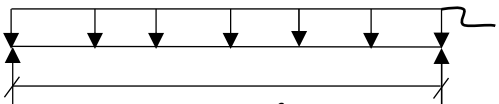


L = 10.00 ft

		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	22	14.7	+ DL 0 Wall +	DL 0	0.0	= DL	323
	SL	25	14.7		SL 0	0.0	SL	367
							∑	689

R_1 =	DL	1.61	R_2 = 1.61
	SL	1.83	1.83
	∑	3.45 k	3.45 k

RB17 4x8



L = 5.50 ft

		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	22	8.0	+ DL 0 Wall +	DL 0	0.0	= DL	176
	SL	25	8.0		SL 0	0.0	SL	200
							∑	376

R_1 =	DL	0.48	R_2 = 0.48
	SL	0.55	0.55
	∑	1.03 k	1.03 k

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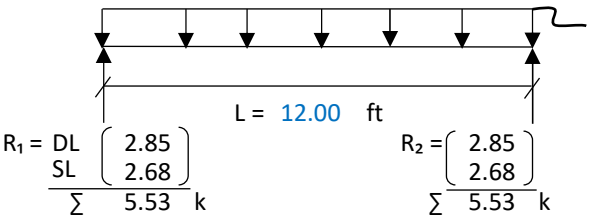
RB18 5-1/4 x 11-7/8 PSL

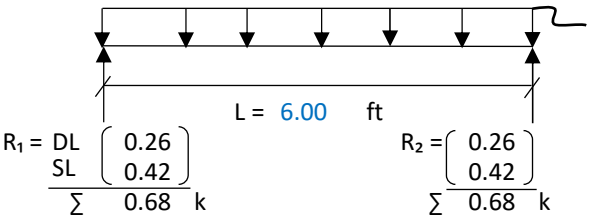


R_1 = DL 2.85, SL 2.68, ∑ 5.53 k

R_2 = DL 2.85, SL 2.68, ∑ 5.53 k

W_1 =	Roof PSF	Roof Tributary	+			Roof PSF	Roof Tributary	=	PLF
DL	22	15.0	+	DL	100	22	2.0	DL	475
SL	25	15.0		Wall		35	2.0	SL	446
								∑	921

RB19 4x8

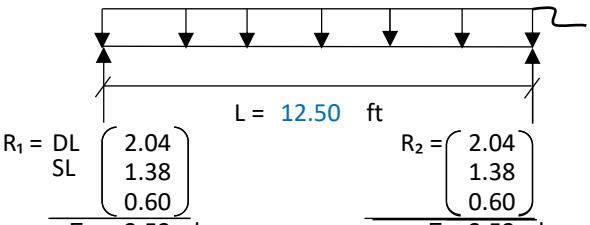


R_1 = DL 0.26, SL 0.42, ∑ 0.68 k

R_2 = DL 0.26, SL 0.42, ∑ 0.68 k

W_1 =	Roof PSF	Roof Tributary	+			Roof PSF	Roof Tributary	=	PLF
DL	22	4.0	+	DL	0	0	0.0	DL	88
SL	35	4.0		Wall		0	0.0	SL	140
								∑	228

RB20 5-1/4 x 11-7/8 PSL

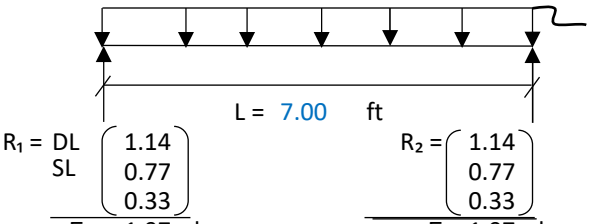


R_1 = DL 2.04, SL 1.38, 0.60, ∑ 3.52 k

R_2 = DL 2.04, SL 1.38, 0.60, ∑ 3.52 k

W_1 =	Roof PSF	Roof Tributary	+			Floor PSF	Floor Tributary	=	PLF
DL	22	3.8	+	DL	100	26	5.5	DL	327
SL	25	3.8		Wall		LL	40	5.5	LL	220
								SL	95
								∑	563

RB21 4x10

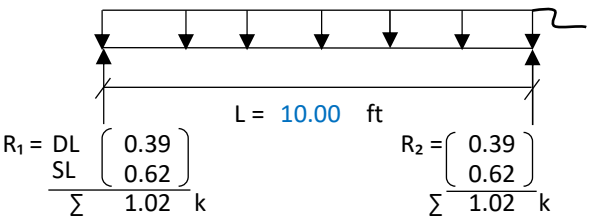


R_1 = DL 1.14, SL 0.77, 0.33, ∑ 1.97 k

R_2 = DL 1.14, SL 0.77, 0.33, ∑ 1.97 k

W_1 =	Roof PSF	Roof Tributary	+			Floor PSF	Floor Tributary	=	PLF
DL	22	3.8	+	DL	100	26	5.5	DL	327
SL	25	3.8		Wall		LL	40	5.5	LL	220
								SL	95
								∑	563

RB22 4x10



R_1 = DL 0.39, SL 0.62, ∑ 1.02 k

R_2 = DL 0.39, SL 0.62, ∑ 1.02 k

W_1 =	Roof PSF	Roof Tributary	+			Roof PSF	Roof Tributary	=	PLF
DL	22	3.6	+	DL	0	0	0.0	DL	79
SL	35	3.6		Wall		0	0.0	SL	125
								∑	203

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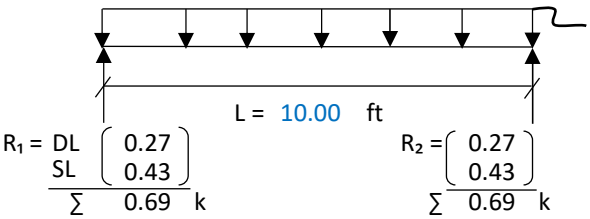
LOADS ONLY

RB23 4x8

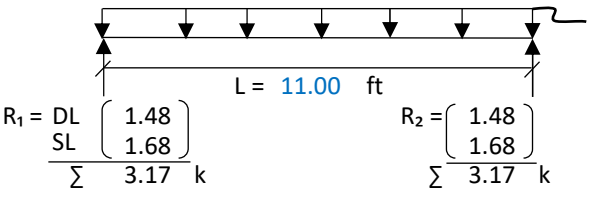


R_1 = DL 0.27, SL 0.43, ∑ 0.69 k

R_2 = DL 0.27, SL 0.43, ∑ 0.69 k

		Roof PSF	Tributary			Roof PSF	Tributary		PLF
W_1 =	DL	22	2.4	+ DL 0 Wall +	DL	0	0.0	= DL	53
	SL	35	2.4		SL	0	0.0	SL	85
								∑	139

GT-1

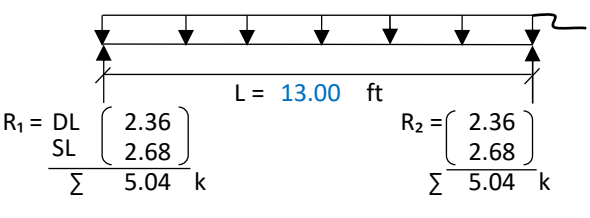


R_1 = DL 1.48, SL 1.68, ∑ 3.17 k

R_2 = DL 1.48, SL 1.68, ∑ 3.17 k

		Roof PSF	Tributary			Roof PSF	Tributary		PLF
W_1 =	DL	22	12.3	+ DL 0 Wall +	DL	0	0.0	= DL	270
	SL	25	12.3		SL	0	0.0	SL	306
								∑	576

GT-2

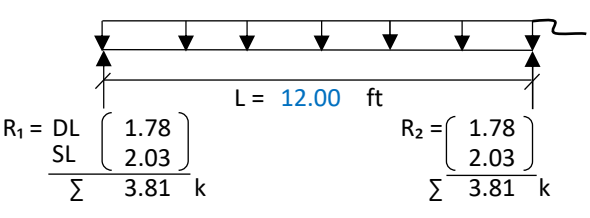


R_1 = DL 2.36, SL 2.68, ∑ 5.04 k

R_2 = DL 2.36, SL 2.68, ∑ 5.04 k

		Roof PSF	Tributary			Roof PSF	Tributary		PLF
W_1 =	DL	22	16.5	+ DL 0 Wall +	DL	0	0.0	= DL	363
	SL	25	16.5		SL	0	0.0	SL	413
								∑	776

GT-3



R_1 = DL 1.78, SL 2.03, ∑ 3.81 k

R_2 = DL 1.78, SL 2.03, ∑ 3.81 k

		Roof PSF	Tributary			Roof PSF	Tributary		PLF
W_1 =	DL	22	13.5	+ DL 0 Wall +	DL	0	0.0	= DL	297
	SL	25	13.5		SL	0	0.0	SL	338
								∑	635

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

Printed: 29 MAY 2023, 3:27PM

Multiple Simple Beam

File: Beam Designs.ec6

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 Braced**
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

Beam self weight calculated and added to loads
Unif Load: D = 0.2160, S = 0.20 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.146** : 1
fb : Actual : 185.24 psi at 1.500 ft in Span # 1
Fb : Allowable : 1,270.75 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.216** : 1
fv : Actual : 37.31 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			0.30			
Right Support	0.33			0.30			

Max Deflections

Transient Downward	0.003 in	Total Downward	0.005 in
Ratio	9999	Ratio	6747
	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 Braced**
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

Beam self weight calculated and added to loads
Unif Load: D = 0.3190, S = 0.3630 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.661** : 1
fb : Actual : 839.89 psi at 2.500 ft in Span # 1
Fb : Allowable : 1,270.75 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.588** : 1
fv : Actual : 101.49 psi at 5.000 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			0.91			
Right Support	0.81			0.91			

Max Deflections

Transient Downward	0.036 in	Total Downward	0.067 in
Ratio	1689	Ratio	892
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

Printed: 29 MAY 2023, 3:27PM

Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : RB3

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

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

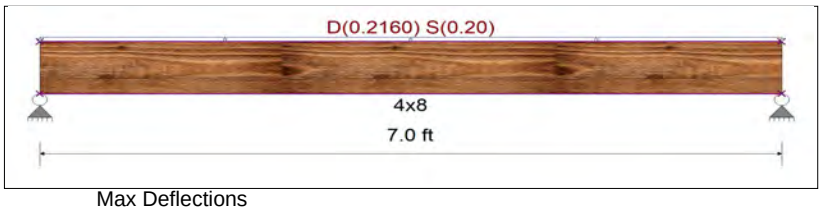
Beam self weight calculated and added to loads
Unif Load: D = 0.2160, S = 0.20 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.794** : 1
fb : Actual : 1,008.55 psi at 3.500 ft in Span # 1
Fb : Allowable : 1,270.75 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.505** : 1
fv : Actual : 87.05 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	0.77			0.70			
Right Support	0.77			0.70			



Max Deflections

Transient Downward	0.075 in	Total Downward	0.158 in
Ratio	1117	Ratio	531
	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 : **4x10, Sawn, Fully Braced**
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

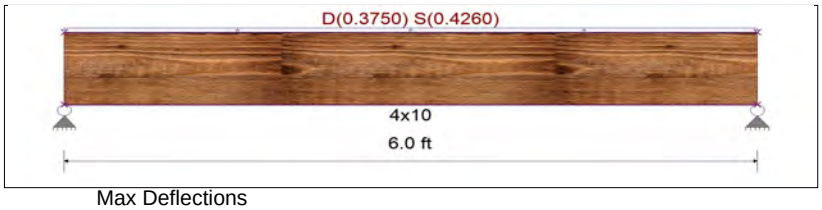
Beam self weight calculated and added to loads
Unif Load: D = 0.3750, S = 0.4260 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.744** : 1
fb : Actual : 873.14 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,173.00 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.650** : 1
fv : Actual : 112.17 psi at 6.000 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	1.14			1.28			
Right Support	1.14			1.28			



Max Deflections

Transient Downward	0.042 in	Total Downward	0.079 in
Ratio	1730	Ratio	913
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : RB5

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

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

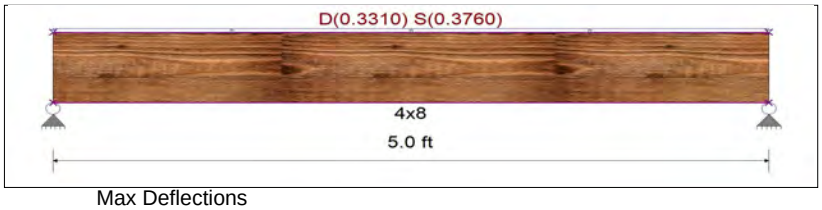
Beam self weight calculated and added to loads
Unif Load: D = 0.3310, S = 0.3760 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.685** : 1
fb : Actual : 870.47 psi at 2.500 ft in Span # 1
Fb : Allowable : 1,270.75 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.610** : 1
fv : Actual : 105.18 psi at 5.000 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	0.84			0.94			
Right Support	0.84			0.94			



Max Deflections

Transient Downward	0.037 in	Total Downward	0.070 in
Ratio	1630	Ratio	861
	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 : **4x10, Sawn, Fully Braced**
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

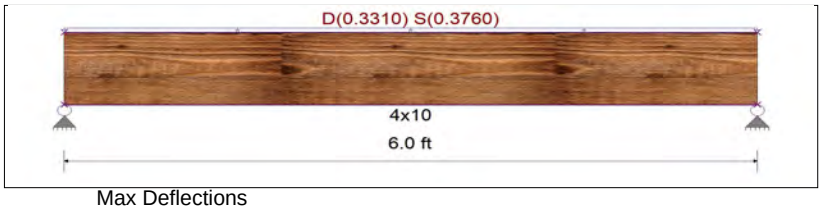
Beam self weight calculated and added to loads
Unif Load: D = 0.3310, S = 0.3760 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.658** : 1
fb : Actual : 771.44 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,173.00 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.575** : 1
fv : Actual : 99.11 psi at 6.000 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	1.01			1.13			
Right Support	1.01			1.13			



Max Deflections

Transient Downward	0.037 in	Total Downward	0.070 in
Ratio	1960	Ratio	1033
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

Printed: 29 MAY 2023, 3:27PM

Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : RB7

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

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

Beam self weight calculated and added to loads
Unif Load: D = 0.2560, S = 0.2230 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.670** : 1
fb : Actual : 851.93 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,270.75 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.497** : 1
fv : Actual : 85.78 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	0.78			0.67			
Right Support	0.78			0.67			

Max Deflections

Transient Downward	0.045 in	Total Downward	0.098 in
Ratio	1591	Ratio	733
	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 : **4x10, Sawn, Fully Braced**
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		

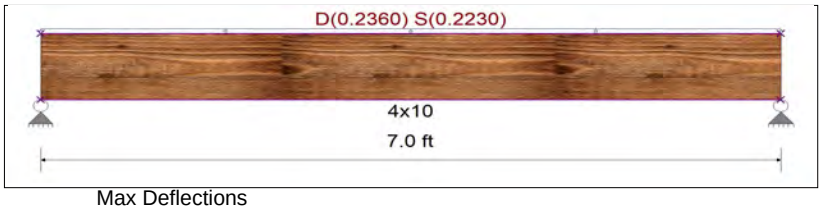
Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.2360, S = 0.2230 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.584** : 1
fb : Actual : 684.81 psi at 3.500 ft in Span # 1
Fb : Allowable : 1,173.00 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.437** : 1
fv : Actual : 75.41 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	0.85			0.78			
Right Support	0.85			0.78			

Max Deflections

Transient Downward	0.040 in	Total Downward	0.084 in
Ratio	2081	Ratio	998
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : RB9

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

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

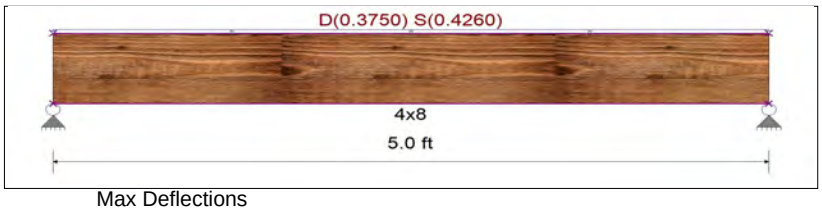
Beam self weight calculated and added to loads
Unif Load: D = 0.3750, S = 0.4260 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.775** : 1
fb : Actual : 985.43 psi at 2.500 ft in Span # 1
Fb : Allowable : 1,270.75 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.690** : 1
fv : Actual : 119.07 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	0.95			1.07			
Right Support	0.95			1.07			



Max Deflections

Transient Downward	0.042 in	Total Downward	0.079 in
Ratio	1439	Ratio	761
	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 : **6x10, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 Load Combinations, Major Axis Bending
Wood Species : Hem-Fir
Wood Grade : No.1

Fb - Tension	1,050.0 psi	Fc - Prll	750.0 psi	Fv	140.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	1,050.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

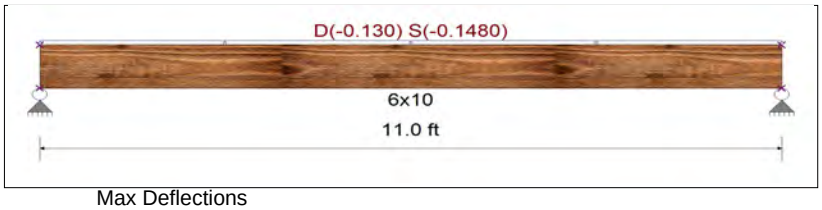
Beam self weight calculated and added to loads
Unif Load: D = -0.130, S = -0.1480 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.614** : 1
fb : Actual : 588.54 psi at 5.500 ft in Span # 1
Fb : Allowable : 958.83 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.329** : 1
fv : Actual : 42.36 psi at 0.000 ft in Span # 1
Fv : Allowable : 128.80 psi
Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	-0.66			-0.81			
Right Support	-0.66			-0.81			



Max Deflections

Transient Downward	0.000 in	Total Downward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:
Transient Upward	-0.096 in	Total Upward	-0.174 in
Ratio	1375	Ratio	759
	LC: S Only		LC: +D+S+H

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : RB11

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

BEAM Size : **4x10, Sawn, Fully Braced**
Using Allowable Stress Design with IBC 2018 Load Combinations, Major Axis Bending
Wood Species : Hem-Fir
Wood Grade : No.2

Fb - Tension	575.0 psi	Fc - Prll	575.0 psi	Fv	140.0 psi	Ebend- xx	1,100.0 ksi	Density	26.840 pcf
Fb - Compr	575.0 psi	Fc - Perp	405.0 psi	Ft	375.0 psi	Eminbend - xx	400.0 ksi		

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.4650, S = 0.5280 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.946** : 1
fb : Actual : 750.60 psi at 2.500 ft in Span # 1
Fb : Allowable : 793.50 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.719** : 1
fv : Actual : 115.72 psi at 0.000 ft in Span # 1
Fv : Allowable : 161.00 psi
Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.18			1.32			
Right Support	1.18			1.32			

Max Deflections

Transient Downward	0.029 in	Total Downward	0.056 in
Ratio	2041	Ratio	1078
	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 : **4x8, Sawn, Fully Braced**
Using Allowable Stress Design with IBC 2018 Load Combinations, Major Axis Bending
Wood Species : Hem-Fir
Wood Grade : No.2

Fb - Tension	575.0 psi	Fc - Prll	575.0 psi	Fv	140.0 psi	Ebend- xx	1,100.0 ksi	Density	26.840 pcf
Fb - Compr	575.0 psi	Fc - Perp	405.0 psi	Ft	375.0 psi	Eminbend - xx	400.0 ksi		

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.3480, S = 0.350 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.360** : 1
fb : Actual : 309.41 psi at 1.500 ft in Span # 1
Fb : Allowable : 859.63 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.387** : 1
fv : Actual : 62.31 psi at 3.000 ft in Span # 1
Fv : Allowable : 161.00 psi
Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.53			0.53			
Right Support	0.53			0.53			

Max Deflections

Transient Downward	0.005 in	Total Downward	0.011 in
Ratio	6863	Ratio	3418
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Multiple Simple Beam

File: Beam Designs.ec6

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

Description : Roof Beams RB13-RB23

Wood Beam Design : RB13

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

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

Beam self weight calculated and added to loads
Unif Load: D = 0.3090, S = 0.3510 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.640** : 1
fb : Actual : 812.99 psi at 2.500 ft in Span # 1
Fb : Allowable : 1,270.75 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.569** : 1
fv : Actual : 98.24 psi at 5.000 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	0.78			0.88			
Right Support	0.78			0.88			

Max Deflections

Transient Downward	0.034 in	Total Downward	0.065 in
Ratio	1747	Ratio	922
	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 : **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

Beam self weight calculated and added to loads
Unif Load: D = -0.130, S = -0.1480 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.717** : 1
fb : Actual : 662.05 psi at 4.500 ft in Span # 1
Fb : Allowable : 922.87 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.411** : 1
fv : Actual : 56.70 psi at 0.000 ft in Span # 1
Fv : Allowable : 138.00 psi
Load Comb : +D+S+H

Max Reactions (k)

	D	L	Lr	S	W	E	H
Left Support	-0.56			-0.67			
Right Support	-0.56			-0.67			

Max Deflections

Transient Downward	0.000 in	Total Downward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:
Transient Upward	-0.073 in	Total Upward	-0.135 in
Ratio	1475	Ratio	802
	LC: S Only		LC: +D+S+H

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : RB15

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

BEAM Size : **3.125x10.5, 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	2400 psi	Fc - Prll	1650 psi	Fv	265 psi	Ebend- xx	1800 ksi	Density	31.21 pcf
Fb - Compr	1850 psi	Fc - Perp	650 psi	Ft	1100 psi	Eminbend - xx	950 ksi		

Applied Loads

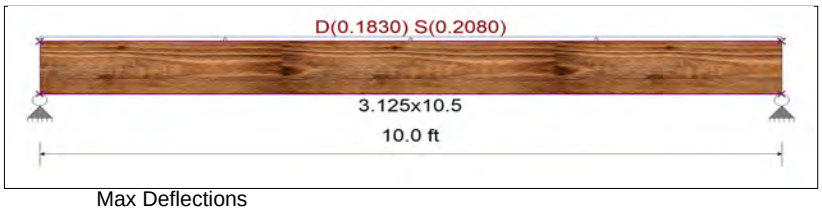
Beam self weight calculated and added to loads
Unif Load: D = 0.1830, S = 0.2080 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.377** : 1
fb : Actual : 1,039.97 psi at 5.000 ft in Span # 1
Fb : Allowable : 2,760.00 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.299** : 1
fv : Actual : 91.00 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	0.95			1.04			
Right Support	0.95			1.04			



Max Deflections

Transient Downward	0.087 in	Total Downward	0.166 in
Ratio	1383	Ratio	723
	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 : **3.125x10.5, 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	2400 psi	Fc - Prll	1650 psi	Fv	265 psi	Ebend- xx	1800 ksi	Density	31.21 pcf
Fb - Compr	1850 psi	Fc - Perp	650 psi	Ft	1100 psi	Eminbend - xx	950 ksi		

Applied Loads

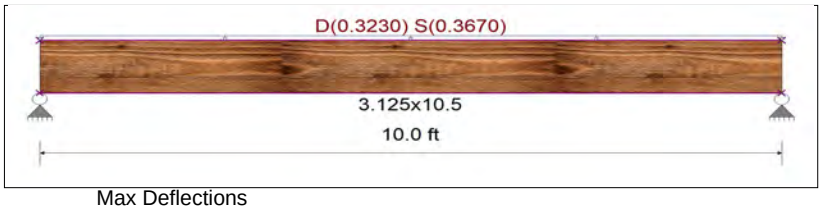
Beam self weight calculated and added to loads
Unif Load: D = 0.3230, S = 0.3670 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.660** : 1
fb : Actual : 1,821.03 psi at 5.000 ft in Span # 1
Fb : Allowable : 2,760.00 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.523** : 1
fv : Actual : 159.34 psi at 10.000 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	1.65			1.84			
Right Support	1.65			1.84			



Max Deflections

Transient Downward	0.153 in	Total Downward	0.291 in
Ratio	784	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:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Multiple Simple Beam

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

Wood Beam Design : RB17

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

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

Beam self weight calculated and added to loads
Unif Load: D = 0.1760, S = 0.20 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.443** : 1
fb : Actual : 563.43 psi at 2.750 ft in Span # 1
Fb : Allowable : 1,270.75 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.359** : 1
fv : Actual : 61.89 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			0.55			
Right Support	0.50			0.55			

Max Deflections

Transient Downward	0.029 in	Total Downward	0.055 in
Ratio	2303	Ratio	1210
	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 : **5.25x11.875, Parallam PSL, Fully Braced**
Using Allowable Stress Design with IBC 2018 Load Combinations, Major Axis Bending
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.0E

Fb - Tension	2900 psi	Fc - Prll	2900 psi	Fv	290 psi	Ebend- xx	2000 ksi	Density	45.07 pcf
Fb - Compr	2900 psi	Fc - Perp	750 psi	Ft	2025 psi	Eminbend - xx	1016.535 ksi		

Applied Loads

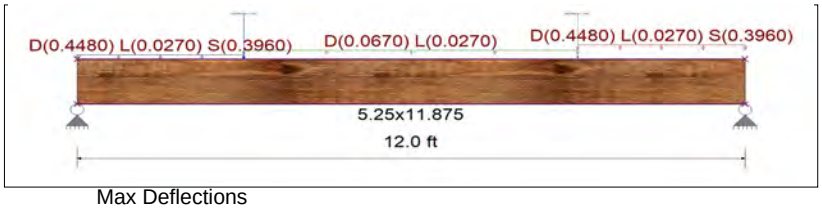
Beam self weight calculated and added to loads
Unif Load: D = 0.4480, L = 0.0270, S = 0.3960 k/ft, 0.0 ft to 3.0 ft, Trib= 1.0 ft
Unif Load: D = 0.0670, L = 0.0270 k/ft, 3.0 to 9.0 ft, Trib= 1.0 ft
Unif Load: D = 0.4480, L = 0.0270, S = 0.3960 k/ft, 9.0 to 12.0 ft, Trib= 1.0 ft
Point: D = 0.990, S = 1.130 k @ 3.0 ft
Point: D = 0.990, S = 1.130 k @ 9.0 ft

Design Summary

Max fb/Fb Ratio = **0.333** : 1
fb : Actual : 1,110.03 psi at 6.000 ft in Span # 1
Fb : Allowable : 3,335.00 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.359** : 1
fv : Actual : 119.58 psi at 12.000 ft in Span # 1
Fv : Allowable : 333.50 psi
Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	2.65	0.16		2.32			
Right Support	2.65	0.16		2.32			



Max Deflections

Transient Downward	0.103 in	Total Downward	0.224 in
Ratio	1400	Ratio	643
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Multiple Simple Beam

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Solutions 4 Structures, Inc

Wood Beam Design : RB19

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

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

Beam self weight calculated and added to loads
Unif Load: D = 0.0880, S = 0.140 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.323** : 1
fb : Actual : 409.88 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,270.75 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.239** : 1
fv : Actual : 41.27 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	0.28			0.42			
Right Support	0.28			0.42			

Max Deflections

Transient Downward	0.028 in	Total Downward	0.047 in
Ratio	2534	Ratio	1524
	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 : **5.125x10.5, 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 = 0.3270, L = 0.220, S = 0.0950 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.567** : 1
fb : Actual : 1,361.37 psi at 6.250 ft in Span # 1
Fb : Allowable : 2,400.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.360** : 1
fv : Actual : 95.30 psi at 0.000 ft in Span # 1
Fv : Allowable : 265.00 psi
Load Comb : +D+L+H

Max Reactions (k)

	D	L	Lr	S	W	E	H
Left Support	2.04	1.38		0.59			
Right Support	2.04	1.38		0.59			

Max Deflections

Transient Downward	0.137 in	Total Downward	0.350 in
Ratio	1098	Ratio	429
	LC: L Only		.C: +D+0.750L+0.750S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

Printed: 29 MAY 2023, 3:28PM

Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : RB21

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

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

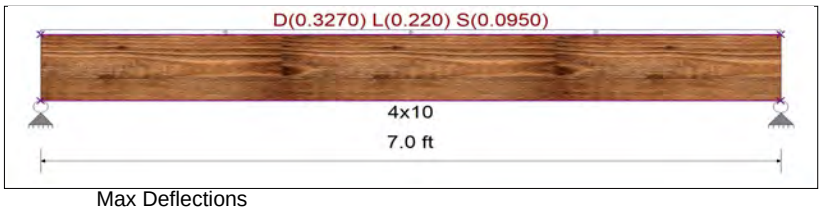
Beam self weight calculated and added to loads
Unif Load: D = 0.3270, L = 0.220, S = 0.0950 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.798** : 1
fb : Actual : 814.40 psi at 3.500 ft in Span # 1
Fb : Allowable : 1,020.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.598** : 1
fv : Actual : 89.68 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.17	0.77		0.33			
Right Support	1.17	0.77		0.33			



Max Deflections

Transient Downward	0.040 in	Total Downward	0.103 in
Ratio	2109	Ratio	815
	LC: L Only		.C: +D+0.750L+0.750S+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 : **4x10, Sawn, Fully Braced**
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

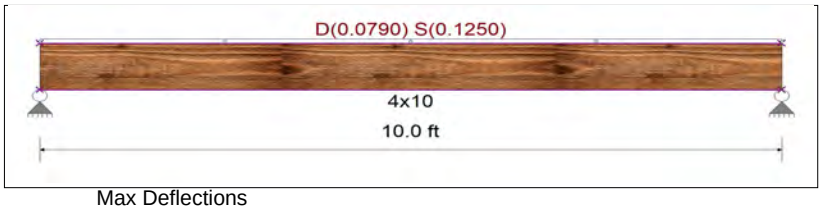
Beam self weight calculated and added to loads
Unif Load: D = 0.0790, S = 0.1250 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.538** : 1
fb : Actual : 631.22 psi at 5.000 ft in Span # 1
Fb : Allowable : 1,173.00 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.282** : 1
fv : Actual : 48.66 psi at 10.000 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	0.43			0.63			
Right Support	0.43			0.63			



Max Deflections

Transient Downward	0.094 in	Total Downward	0.158 in
Ratio	1273	Ratio	757
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

Printed: 29 MAY 2023, 3:28PM

Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : RB23

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

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

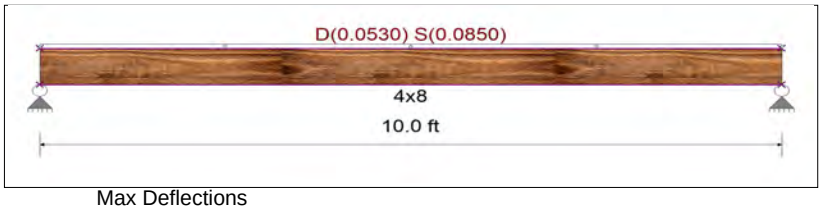
Beam self weight calculated and added to loads
Unif Load: D = 0.0530, S = 0.0850 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.549** : 1
fb : Actual : 698.25 psi at 5.000 ft in Span # 1
Fb : Allowable : 1,270.75 psi
Load Comb : +D+S+H

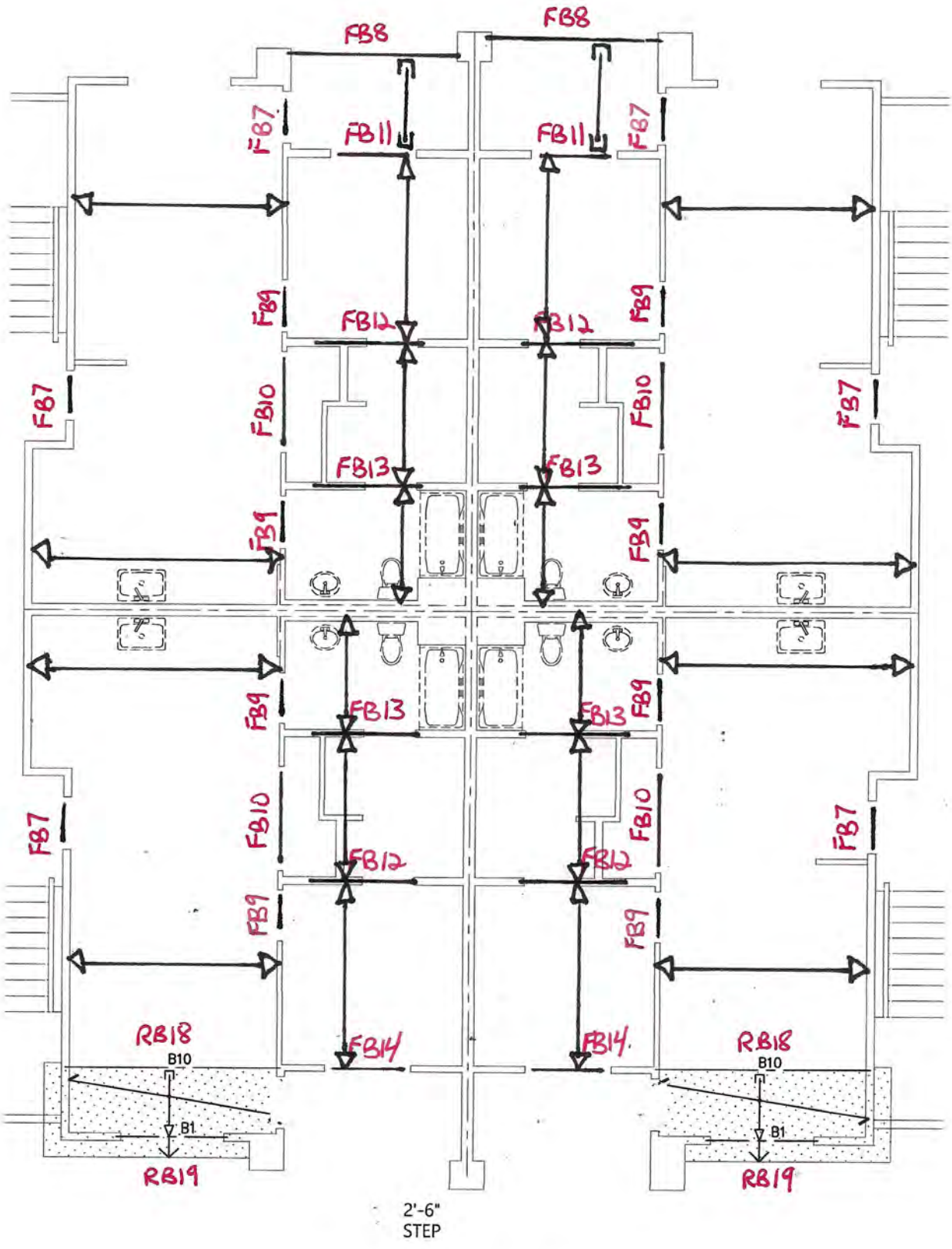
Max fv/FvRatio = **0.245** : 1
fv : Actual : 42.19 psi at 0.000 ft in Span # 1
Fv : Allowable : 172.50 psi
Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.29			0.43			
Right Support	0.29			0.43			



Max Deflections

Transient Downward	0.133 in	Total Downward	0.223 in
Ratio	901	Ratio	537
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:


FB8
FB8
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FB13
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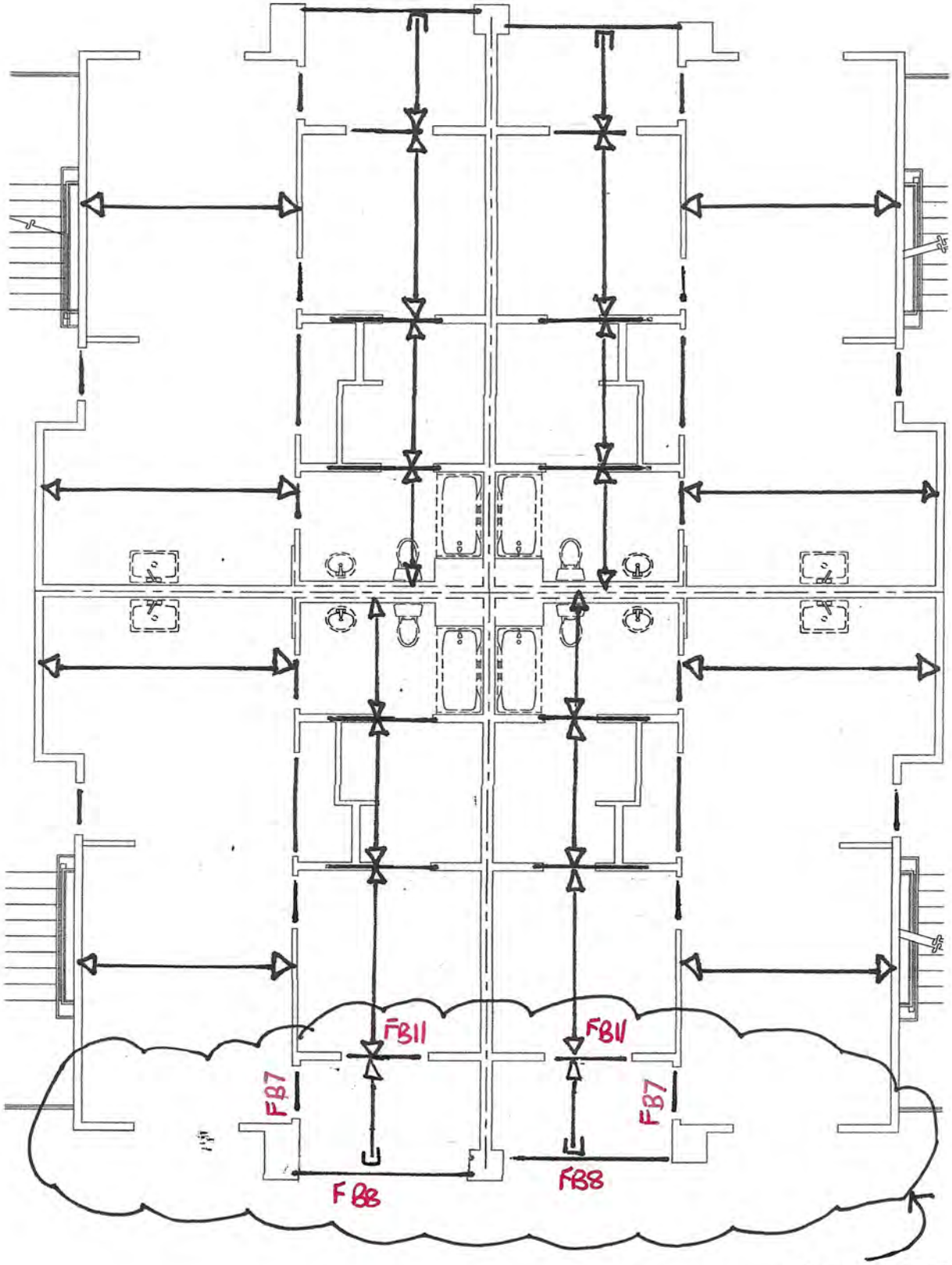
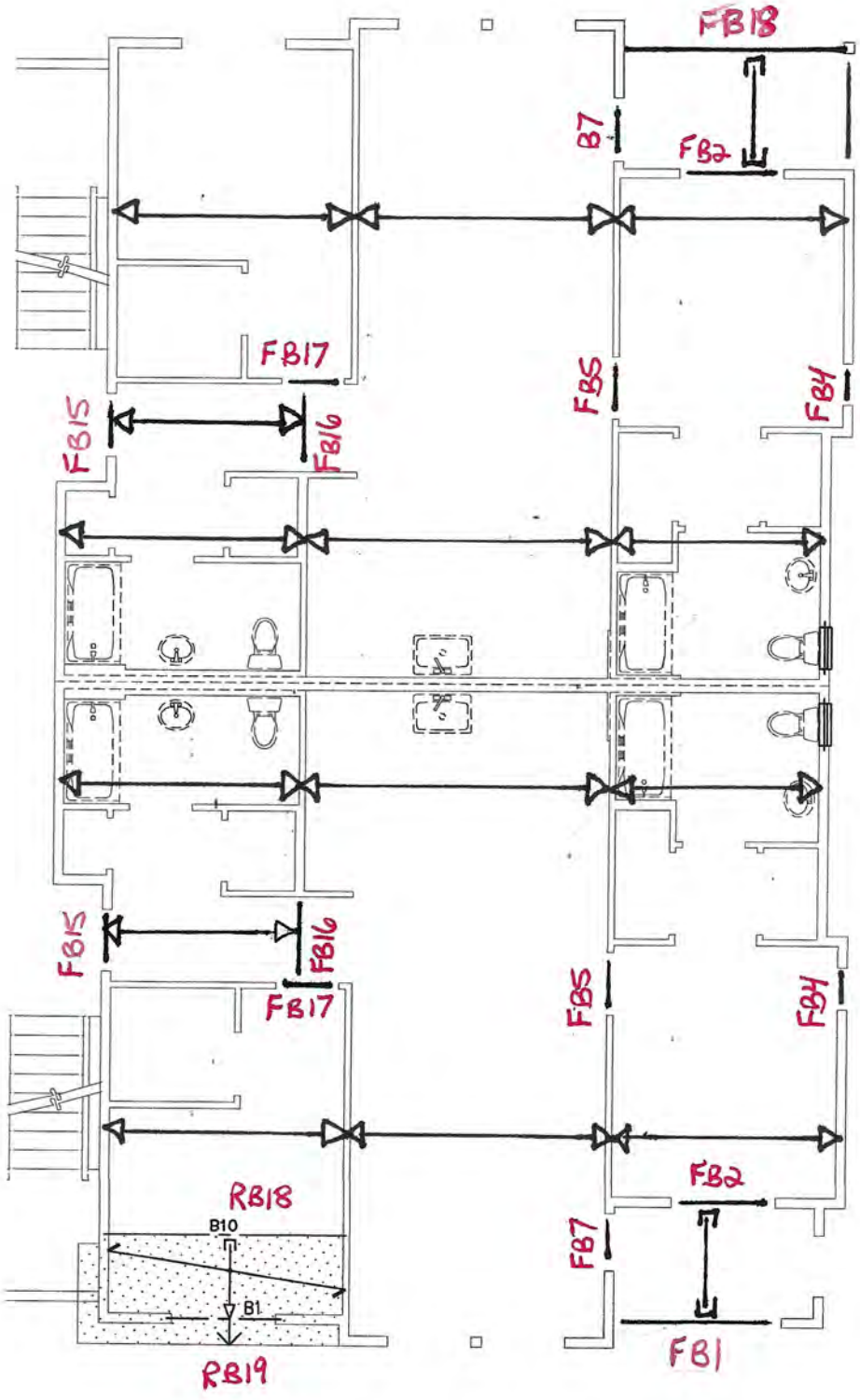
FB13
FB9
FB7
FB10
FB10
FB7
FB12
FB12
FB9
FB9
RB18
B10
FB14
FB14
RB18
B10
B1
B1
RB19
RB19
2'-6"
STEP

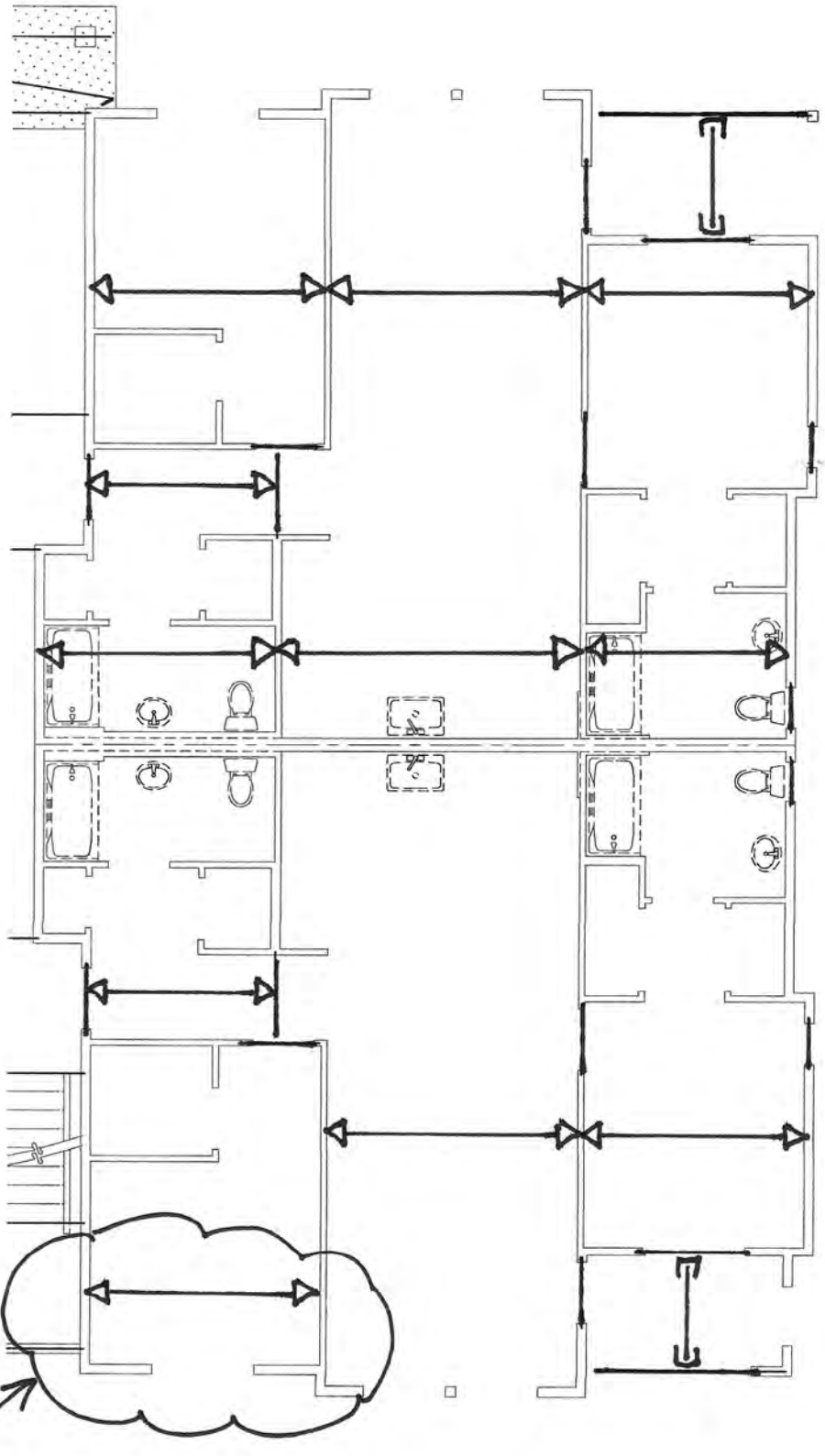
FLOOR TYPE 2



FLOOR TYPE 2B

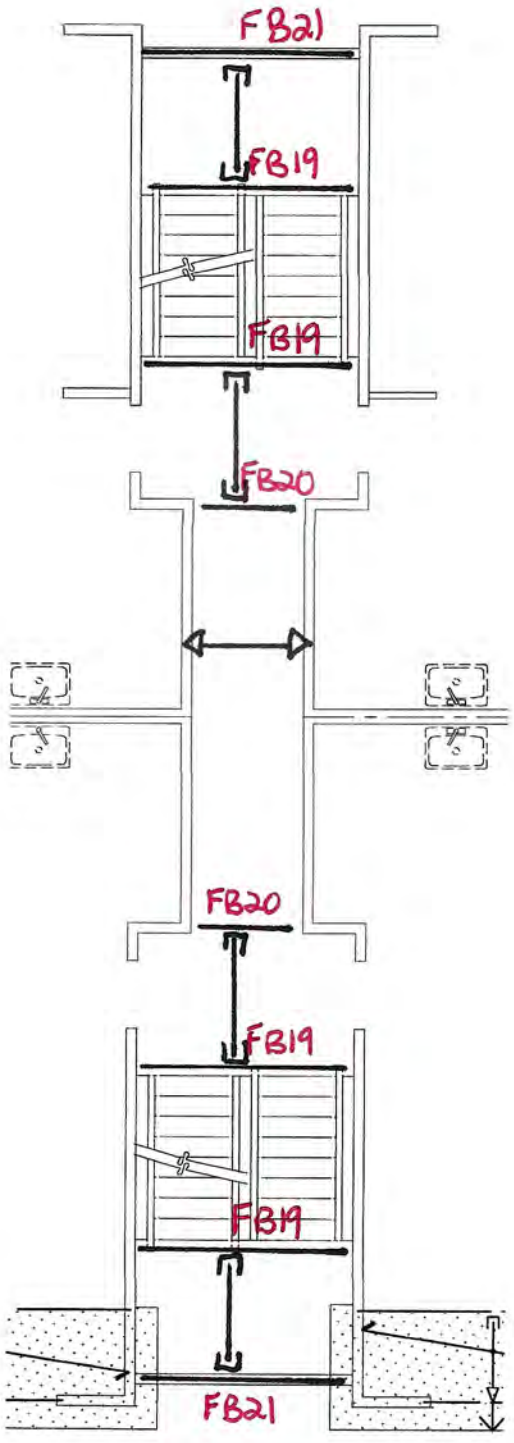

FB18
B7
FB2
FB17
FB15
FB16
FB5
FB4
FB15
FB16
FB17
FB5
FB4
RB18
B10
B1
RB19
FB2
FB7
FB1

FLOOR TYPE 3

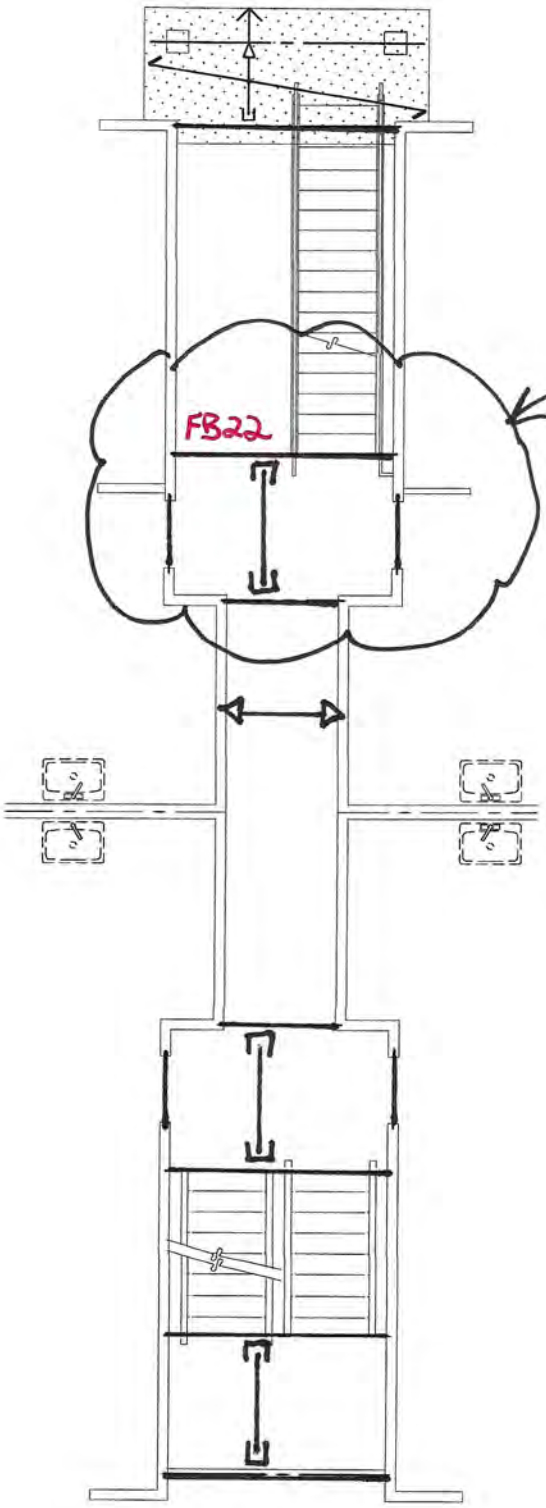


DIFFERENCE FROM TYPE 3

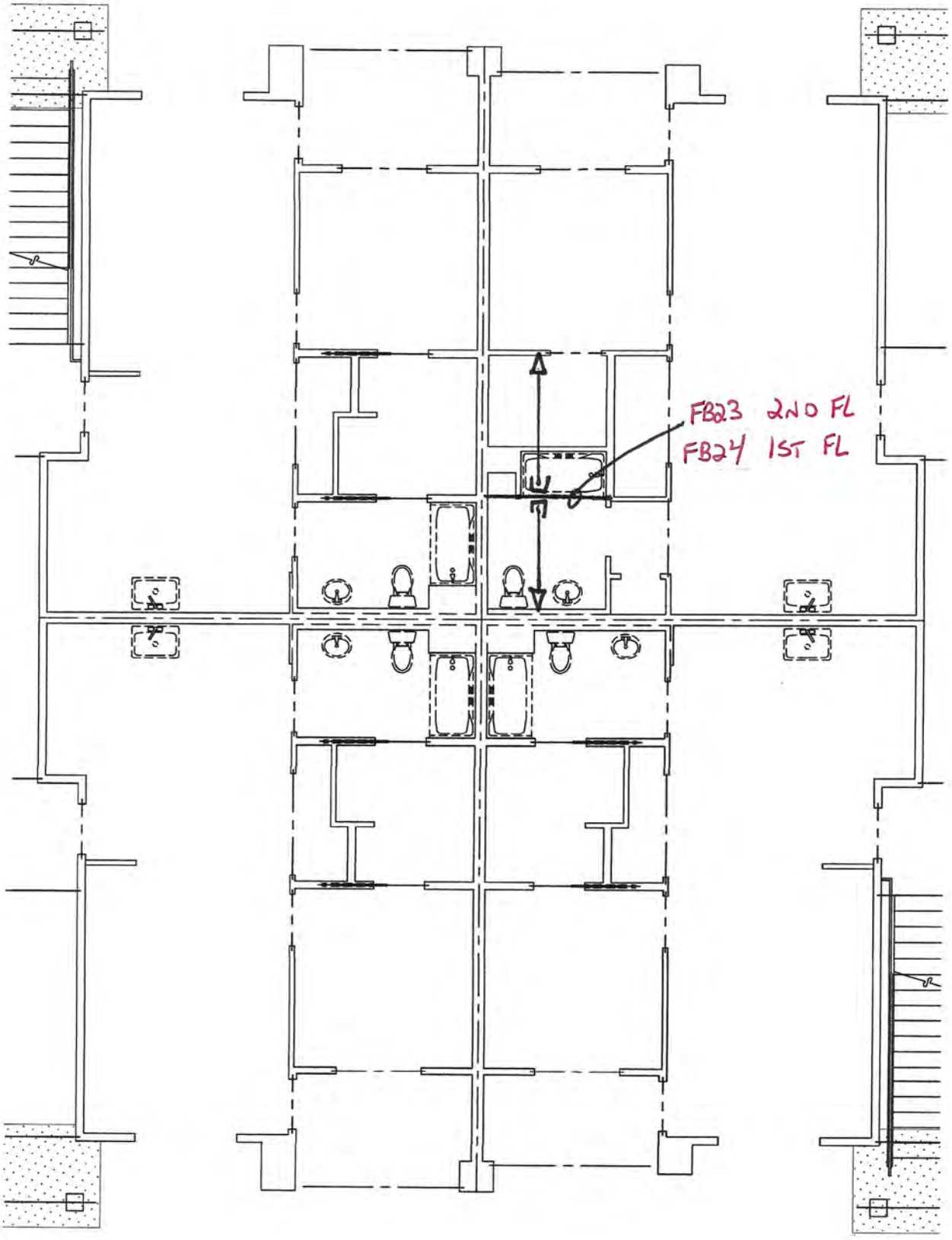
FLOOR TYPE 3B



TYPICAL STAIR/CORRIDOR

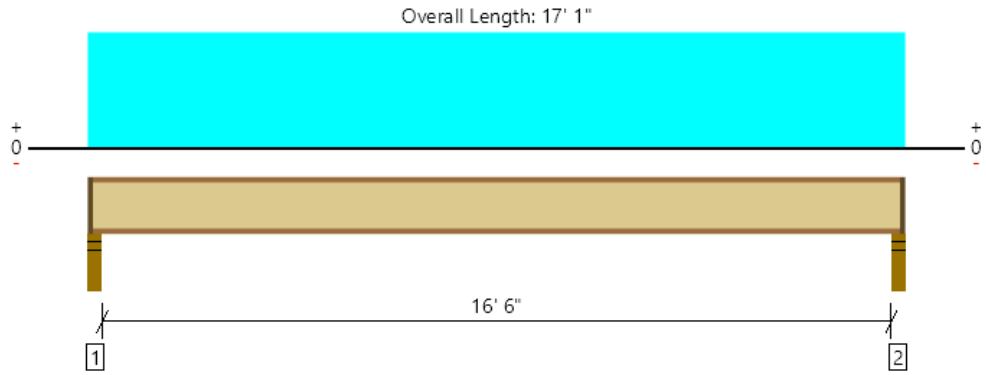


STAIR CORRIDOR (2ND FLOOR)


FB23 2ND FL
FB24 1ST FL

PASSED

Level, J1
1 piece(s) 11 7/8" TJI® 110 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	743 @ 2 1/2"	1041 (2.25")	Passed (71%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	726 @ 3 1/2"	1560	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3056 @ 8' 6 1/2"	3160	Passed (97%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.309 @ 8' 6 1/2"	0.417	Passed (L/647)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.510 @ 8' 6 1/2"	0.833	Passed (L/392)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	46	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 1/2" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - SPF	3.50"	2.25"	1.75"	296	456	752	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.75"	296	456	752	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 1" o/c	
Bottom Edge (Lu)	16' 11" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 17' 1"	16"	26.0	40.0	Default Load

Weyerhaeuser Notes

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

ForteWEB Software Operator	Job Notes
Oleg Kondratyuk Solutions 4 Structures, Inc (253) 970-3664 oleg@solutions4structures.com	

Weyerhaeuser

SOLUTIONS 4 STRUCTURES Inc.

Job #:	21.011
Designed:	OGK
Date:	6/1/23

FLOOR FRAMING

2018 NDS/2018 IBC

C_r =	1.15	repetetive
C_D =	**1.0**	**LIVE**
C_F =	(varies)	size

2 x 6 Pressure Treated Incising Hem Fir #2

2 x 6 | Hem Fir | #2 | Incising? Yes | Wet Use? No

A =	8.25	in^2	Live	60.00	psf	
S =	7.56	in^3	Dead	14.00	psf	
I =	20.80	in^4	Partition	-	psf	
C_F =	1.30		Total	74.00	psf	
F_b =	850.00	psi				
F_v =	150.00	psi	Allowable Span	@ 8" o.c. =	9.83	ft (LL Defl.)
E =	1,300,000.00	psi	Allowable Span	@ 12" o.c. =	8.49	ft (bending)
C_i =	0.80	Incising (Fb)	Allowable Span	@ 16" o.c. =	7.35	ft (bending)
C_i =	0.95	Incising (E)				

Calculations:	spacing (in)	8.00	12.00	16.00	Control	% over allowed
Lv_{allow} = {[A*F_v*C_D/(1.5*w)]+d}*2	Lv (ft) =	34.70	23.44	17.81	Shear	1.00%
Lb_{allow} =(S*F_b*C_D*Cr*Cf*Ci*8/w)$^{1/2}$	Lb (ft) =	10.39	8.49	7.35	Bending	4.00%
Ldallow =[384*E*Ci*I/(5*LL*360)]^1/3	Ld (ft) =	9.83	8.59	7.81	LL Deflection	360
Ldallow =[384*E*Ci*I/(5*TL*240)]^1/3	Ld (ft) =	10.50	9.17	8.33	TL Deflection	240
		LL Defl.	bending	bending		

2 x 8 Pressure Treated Incising Hem Fir #2

2 x 8 | Hem Fir | #2 | Incising? Yes | Wet Use? No

A =	10.88	in^2	Live	60.00	psf	
S =	13.14	in^3	Dead	14.00	psf	
I =	47.63	in^4	Partition	-	psf	
C_F =	1.20		Total	74.00	psf	
F_b =	850.00	psi				
F_v =	150.00	psi	Allowable Span	@ 8" o.c. =	12.96	ft (LL Defl.)
E =	1,300,000.00	psi	Allowable Span	@ 12" o.c. =	10.75	ft (bending)
C_i =	0.80	Incising (Fb)	Allowable Span	@ 16" o.c. =	9.31	ft (bending)
C_i =	0.95	Incising (E)				

Calculations:	spacing (in)	8.00	12.00	16.00	Control	% over allowed
Lv_{allow} = {[A*F_v*C_D/(1.5*w)]+d}*2	Lv (ft) =	45.74	30.89	23.47	Shear	1.00%
Lb_{allow} =(S*F_b*C_D*Cr*Cf*Ci*8/w)$^{1/2}$	Lb (ft) =	13.16	10.75	9.31	Bending	4.00%
Ldallow =[384*E*Ci*I/(5*LL*360)]^1/3	Ld (ft) =	12.96	11.33	10.29	LL Deflection	360
Ldallow =[384*E*Ci*I/(5*TL*240)]^1/3	Ld (ft) =	13.84	12.09	10.98	TL Deflection	240
		LL Defl.	bending	bending		

2 x 10 Pressure Treated Incising Hem Fir #2

2 x 10 | Hem Fir | #2 | Incising? Yes | Wet Use? No

A =	13.88	in^2	Live	60.00	psf	
S =	21.39	in^3	Dead	14.00	psf	
I =	98.93	in^4	Partition	-	psf	
C_F =	1.10		Total	74.00	psf	
F_b =	850.00	psi				
F_v =	150.00	psi	Allowable Span	@ 8" o.c. =	16.08	ft (bending)
E =	1,300,000.00	psi	Allowable Span	@ 12" o.c. =	13.13	ft (bending)
C_i =	0.80	Incising (Fb)	Allowable Span	@ 16" o.c. =	11.37	ft (bending)
C_i =	0.95	Incising (E)				

Calculations:	spacing (in)	8.00	12.00	16.00	Control	% over allowed
Lv_{allow} = {[A*F_v*C_D/(1.5*w)]+d}*2	Lv (ft) =	58.35	39.42	29.95	Shear	1.00%
Lb_{allow} =(S*F_b*C_D*Cr*Cf*Ci*8/w)$^{1/2}$	Lb (ft) =	16.08	13.13	11.37	Bending	4.00%
Ldallow =[384*E*Ci*I/(5*LL*360)]^1/3	Ld (ft) =	16.54	14.45	13.13	LL Deflection	360
Ldallow =[384*E*Ci*I/(5*TL*240)]^1/3	Ld (ft) =	17.66	15.42	14.01	TL Deflection	240
		bending	bending	bending		

SOLUTIONS 4 STRUCTURES Inc.

Job #:	21.011
Designed:	OGK
Date:	6/1/23

FLOOR FRAMING

2018 NDS/2018 IBC

C_r =	1.15	repetetive
C_D =	**1.0**	**LIVE**
C_F =	(varies)	size

2 x 6 Pressure Treated Incising Hem Fir #2

2 x 6 | Hem Fir | #2 | Incising? Yes | Wet Use? No

A =	8.25	in^2	Live	100.00	psf	
S =	7.56	in^3	Dead	47.00	psf	
I =	20.80	in^4	Partition	-	psf	
C_F =	1.30		Total	147.00	psf	
F_b =	850.00	psi				
F_v =	150.00	psi	Allowable Span	@ 8" o.c. =	7.38	ft (bending)
E =	1,300,000.00	psi	Allowable Span	@ 12" o.c. =	6.02	ft (bending)
C_i =	0.80	Incising (Fb)	Allowable Span	@ 16" o.c. =	5.21	ft (bending)
C_i =	0.95	Incising (E)				

Calculations:	spacing (in)	8.00	12.00	16.00	Control	% over allowed
Lv_{allow} = {[A*F_v*C_D/(1.5*w)]+d}*2	Lv (ft) =	17.92	12.25	9.42	Shear	1.00%
Lb_{allow} =(S*F_b*C_D*Cr*Cf*Ci*8/w)$^{1/2}$	Lb (ft) =	7.38	6.02	5.21	Bending	4.00%
Ldallow =[384*E*Ci*I/(5*LL*360)]^1/3	Ld (ft) =	8.30	7.25	6.58	LL Deflection	360
Ldallow =[384*E*Ci*I/(5*TL*240)]^1/3	Ld (ft) =	8.35	7.30	6.63	TL Deflection	240
		bending	bending	bending		

2 x 8 Pressure Treated Incising Hem Fir #2

2 x 8 | Hem Fir | #2 | Incising? Yes | Wet Use? No

A =	10.88	in^2	Live	100.00	psf	
S =	13.14	in^3	Dead	47.00	psf	
I =	47.63	in^4	Partition	-	psf	
C_F =	1.20		Total	147.00	psf	
F_b =	850.00	psi				
F_v =	150.00	psi	Allowable Span	@ 8" o.c. =	9.34	ft (bending)
E =	1,300,000.00	psi	Allowable Span	@ 12" o.c. =	7.63	ft (bending)
C_i =	0.80	Incising (Fb)	Allowable Span	@ 16" o.c. =	6.60	ft (bending)
C_i =	0.95	Incising (E)				

Calculations:	spacing (in)	8.00	12.00	16.00	Control	% over allowed
Lv_{allow} = {[A*F_v*C_D/(1.5*w)]+d}*2	Lv (ft) =	23.62	16.15	12.42	Shear	1.00%
Lb_{allow} =(S*F_b*C_D*Cr*Cf*Ci*8/w)$^{1/2}$	Lb (ft) =	9.34	7.63	6.60	Bending	4.00%
Ldallow =[384*E*Ci*I/(5*LL*360)]^1/3	Ld (ft) =	10.93	9.55	8.68	LL Deflection	360
Ldallow =[384*E*Ci*I/(5*TL*240)]^1/3	Ld (ft) =	11.01	9.62	8.74	TL Deflection	240
		bending	bending	bending		

2 x 10 Pressure Treated Incising Hem Fir #2

2 x 10 | Hem Fir | #2 | Incising? Yes | Wet Use? No

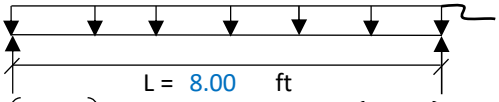
A =	13.88	in^2	Live	100.00	psf	
S =	21.39	in^3	Dead	47.00	psf	
I =	98.93	in^4	Partition	-	psf	
C_F =	1.10		Total	147.00	psf	
F_b =	850.00	psi				
F_v =	150.00	psi	Allowable Span	@ 8" o.c. =	11.41	ft (bending)
E =	1,300,000.00	psi	Allowable Span	@ 12" o.c. =	9.32	ft (bending)
C_i =	0.80	Incising (Fb)	Allowable Span	@ 16" o.c. =	8.07	ft (bending)
C_i =	0.95	Incising (E)				

Calculations:	spacing (in)	8.00	12.00	16.00	Control	% over allowed
Lv_{allow} = {[A*F_v*C_D/(1.5*w)]+d}*2	Lv (ft) =	30.14	20.61	15.84	Shear	1.00%
Lb_{allow} =(S*F_b*C_D*Cr*Cf*Ci*8/w)$^{1/2}$	Lb (ft) =	11.41	9.32	8.07	Bending	4.00%
Ldallow =[384*E*Ci*I/(5*LL*360)]^1/3	Ld (ft) =	13.95	12.19	11.07	LL Deflection	360
Ldallow =[384*E*Ci*I/(5*TL*240)]^1/3	Ld (ft) =	14.04	12.27	11.15	TL Deflection	240
		bending	bending	bending		

SOLUTIONS 4 STRUCTURES Inc.

LOADS ONLY

FB1 PT 4 x 10



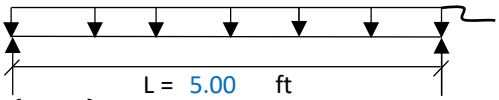
L = 8.00 ft

R_1 = DL 0.32, LL 0.76, ∑ 1.08 k

R_2 = DL 0.32, LL 0.76, ∑ 1.08 k

	Deck PSF	Deck Tributary		Floor PSF	Floor Tributary		PLF
W_1 = DL	25	3.2	+ DL 0 Wall +	26	0.0	= DL	79
LL	60	3.2		40	0.0	LL	190
						∑	269

FB2 4 x 8



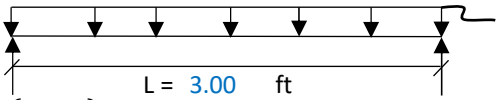
L = 5.00 ft

R_1 = DL 0.34, LL 0.54, ∑ 0.88 k

R_2 = DL 0.34, LL 0.54, ∑ 0.88 k

	Deck PSF	Deck Tributary		Floor PSF	Floor Tributary		PLF
W_1 = DL	25	3.2	+ DL 40 Wall +	26	0.7	= DL	136
LL	60	3.2		40	0.7	SL	217
						∑	353

FB3 4 x 8



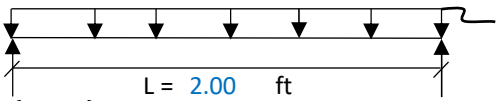
L = 3.00 ft

R_1 = DL 0.33, LL 0.43, ∑ 0.76 k

R_2 = DL 0.33, LL 0.43, ∑ 0.76 k

	Floor PSF	Floor Tributary		Deck PSF	Deck Tributary		PLF
W_1 = DL	26	6.3	+ DL 40 Wall +	25	0.7	= DL	219
LL	40	6.3		60	0.7	LL	290
						∑	509

FB4 4 x 8



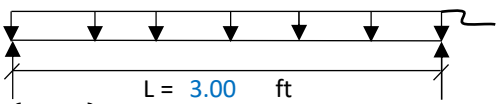
L = 2.00 ft

R_1 = DL 0.21, LL 0.26, ∑ 0.47 k

R_2 = DL 0.21, LL 0.26, ∑ 0.47 k

	Floor PSF	Floor Tributary		Floor PSF	Floor Tributary		PLF
W_1 = DL	26	6.5	+ DL 40 Wall +	26	0.0	= DL	209
LL	40	6.5		40	0.0	SL	260
						∑	469

FB5 4 x 8



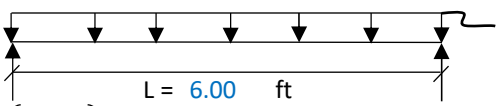
L = 3.00 ft

R_1 = DL 0.51, LL 0.78, ∑ 1.29 k

R_2 = DL 0.51, LL 0.78, ∑ 1.29 k

	Floor PSF	Floor Tributary		Floor PSF	Floor Tributary		PLF
W_1 = DL	26	13.0	+ DL 0 Wall +	26	0.0	= DL	338
LL	40	13.0		40	0.0	LL	520
						∑	858

FB6 4 x 10



L = 6.00 ft

R_1 = DL 1.01, LL 1.56, ∑ 2.57 k

R_2 = DL 1.01, LL 1.56, ∑ 2.57 k

	Floor PSF	Floor Tributary		Floor PSF	Floor Tributary		PLF
W_1 = DL	26	13.0	+ DL 0 Wall +	26	0.0	= DL	338
LL	40	13.0		40	0.0	SL	520
						∑	858

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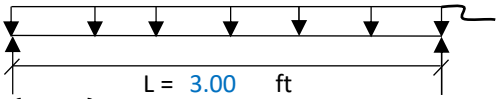
FB7 4 x 8

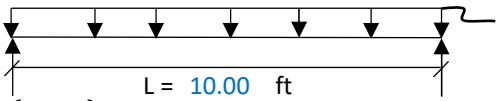


L = 3.00 ft

		Floor PSF	Tributary		Stair PSF	Tributary		PLF
W_1 =	DL	26	6.8	+ DL 40 +	DL 47	0.7	= DL	247
	LL	40	6.8	Wall	LL 100	0.7	SL	337
							∑	583

R_1 =	DL	0.37	R_2 = 0.37
	LL	0.50	0.50
	∑	0.88 k	∑ 0.88 k

FB8 PT 6 x 10 HF1

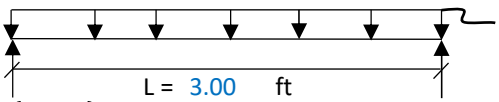


L = 10.00 ft

		Deck PSF	Tributary		Floor PSF	Tributary		PLF
W_1 =	DL	25	3.5	+ DL 0 +	DL 0	0.0	= DL	88
	LL	60	3.5	Wall	LL 0	0.0	LL	210
							∑	298

R_1 =	DL	0.44	R_2 = 0.44
	LL	1.05	1.05
	∑	1.49 k	∑ 1.49 k

FB9 4 x 8

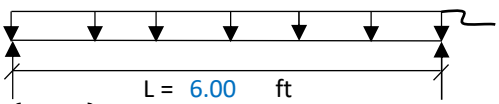


L = 3.00 ft

		Floor PSF	Tributary		Floor PSF	Tributary		PLF
W_1 =	DL	26	8.2	+ DL 0 +	DL 26	0.7	= DL	230
	LL	40	8.2	Wall	LL 40	0.7	SL	353
							∑	583

R_1 =	DL	0.34	R_2 = 0.34
	LL	0.53	0.53
	∑	0.87 k	∑ 0.87 k

FB10 4 x 8

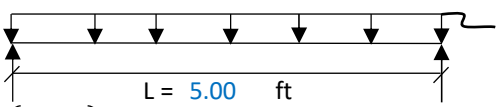


L = 6.00 ft

		Floor PSF	Tributary		Floor PSF	Tributary		PLF
W_1 =	DL	26	6.9	+ DL 0 +	DL 26	0.7	= DL	197
	LL	40	6.9	Wall	LL 40	0.7	SL	303
							∑	501

R_1 =	DL	0.59	R_2 = 0.59
	LL	0.91	0.91
	∑	1.50 k	∑ 1.50 k

FB11 4 x 8

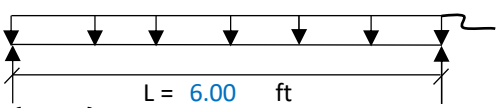


L = 5.00 ft

		Deck PSF	Tributary		Floor PSF	Tributary		PLF
W_1 =	DL	25	3.5	+ DL 0 +	DL 26	5.5	= DL	231
	LL	60	3.5	Wall	LL 40	5.5	LL	430
							∑	661

R_1 =	DL	0.58	R_2 = 0.58
	LL	1.08	1.08
	∑	1.65 k	∑ 1.65 k

FB12 4 x 10



L = 6.00 ft

		Floor PSF	Tributary		Floor PSF	Tributary		PLF
W_1 =	DL	26	9.8	+ DL 0 +	DL 26	0.0	= DL	254
	LL	40	9.8	Wall	LL 40	0.0	SL	390
							∑	644

R_1 =	DL	0.76	R_2 = 0.76
	LL	1.17	1.17
	∑	1.93 k	∑ 1.93 k

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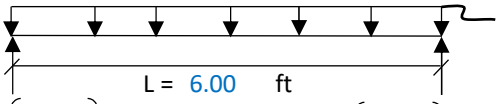
FB13 4 x 10

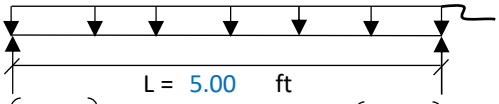


L = 6.00 ft

		Floor PSF	Tributary		Floor PSF	Tributary		PLF
W_1 =	DL	26	7.8	+ DL 0 Wall +	DL 26	0.0	= DL	202
	LL	40	7.8		LL 40	0.0	SL	310
							∑	512

R_1 =	DL	0.60	R_2 = 0.60
	LL	0.93	0.93
	∑	1.53 k	∑ 1.53 k

FB14 4 x 8

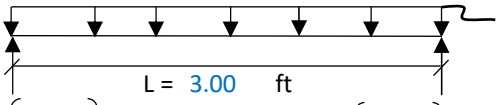


L = 5.00 ft

		Floor PSF	Tributary		Floor PSF	Tributary		PLF
W_1 =	DL	26	5.5	+ DL 0 Wall +	DL 26	0.0	= DL	143
	LL	40	5.5		LL 40	0.0	SL	220
							∑	363

R_1 =	DL	0.36	R_2 = 0.36
	LL	0.55	0.55
	∑	0.91 k	∑ 0.91 k

FB15 4 x 8

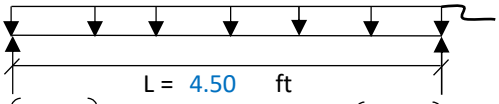


L = 3.00 ft

		Floor PSF	Tributary		Stair PSF	Tributary		PLF
W_1 =	DL	26	4.5	+ DL 0 Wall +	DL 47	0.7	= DL	148
	LL	40	4.5		LL 100	0.7	SL	247
							∑	395

R_1 =	DL	0.22	R_2 = 0.22
	LL	0.37	0.37
	∑	0.59 k	∑ 0.59 k

FB16 4 x 8



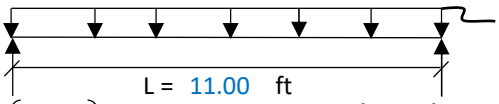
L = 4.50 ft

		Floor PSF	Tributary		Floor PSF	Tributary		PLF
W_1 =	DL	26	12.0	+ DL 0 Wall +	DL 26	0.0	= DL	312
	LL	40	12.0		LL 40	0.0	SL	480
							∑	792

R_1 =	DL	0.70	R_2 = 0.70
	LL	1.08	1.08
	∑	1.78 k	∑ 1.78 k

FB17 See Hand Drawn Diagram

FB18 PT 6 x 10 HF 1



L = 11.00 ft

		Deck PSF	Tributary		Floor PSF	Tributary		PLF
W_1 =	DL	25	3.2	+ DL 0 Wall +	DL 26	0.0	= DL	79
	LL	60	3.2		LL 40	0.0	SL	190
							∑	269

R_1 =	DL	0.44	R_2 = 0.44
	LL	1.04	1.04
	∑	1.48 k	∑ 1.48 k

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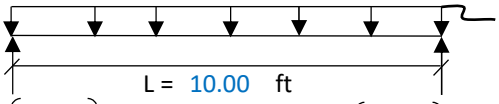
FB19 PT 5-1/8 x 10.5 GLB

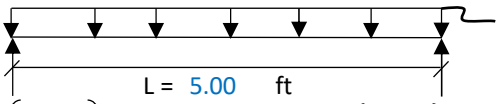


R_1 = DL 1.59, LL 3.38, ∑ 4.96 k

R_2 = DL 1.59, LL 3.38, ∑ 4.96 k

W_1 = (Stair PSF 47, Tributary 6.8; LL 100, 6.8) + (DL 0 Wall) + (Stair PSF 47, Tributary 0.0; LL 100, 0.0) = DL 317, SL 675, ∑ 992 PLF

FB20 PT 4 x 8

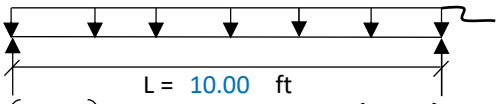


R_1 = DL 0.46, LL 0.98, ∑ 1.44 k

R_2 = DL 0.46, LL 0.98, ∑ 1.44 k

W_1 = (Stair PSF 47, Tributary 3.9; LL 100, 3.9) + (DL 0 Wall) + (Stair PSF 47, Tributary 0.0; LL 100, 0.0) = DL 184, SL 392, ∑ 576 PLF

FB21 PT 3-1/8 x 10.5 GLB

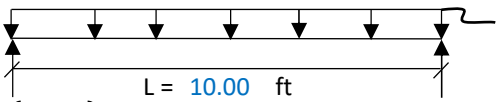


R_1 = DL 1.26, LL 1.63, ∑ 2.89 k

R_2 = DL 1.26, LL 1.63, ∑ 2.89 k

W_1 = (Stair PSF 47, Tributary 3.3; LL 100, 3.3) + (DL 100 Wall) + (Stair PSF 47, Tributary 0.0; LL 100, 0.0) = DL 253, SL 325, ∑ 578 PLF

FB22 PT 5-1/8 x 10.5 GLB



R_1 = DL 1.47, LL 3.13, ∑ 4.59 k

R_2 = DL 1.47, LL 3.13, ∑ 4.59 k

W_1 = (Stair PSF 47, Tributary 6.3; LL 100, 6.3) + (DL 0 Wall) + (Stair PSF 47, Tributary 0.0; LL 100, 0.0) = DL 294, SL 625, ∑ 919 PLF

FB23 See Hand Drawn Diagram

FB24 See Hand Drawn Diagram

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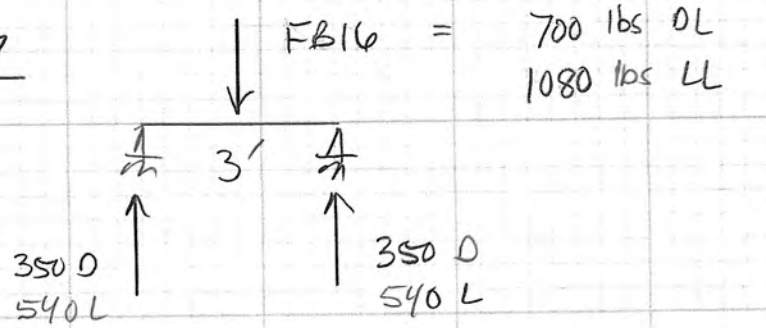
JOB # 23.007

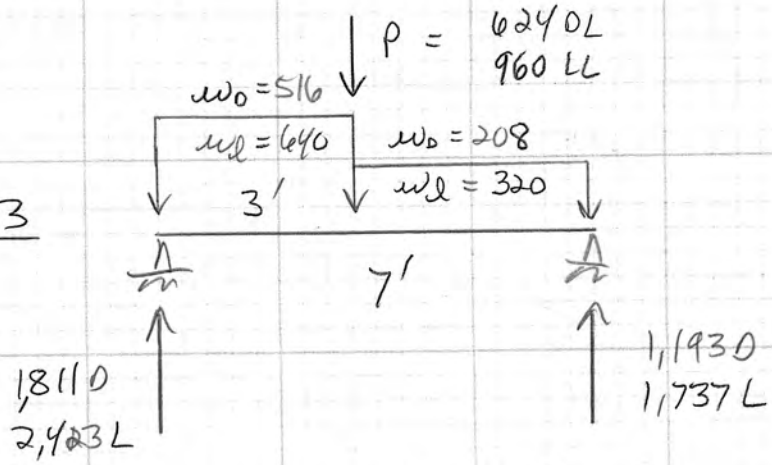
DESIGNED MRO DATE 5-29-23

PROJECT: BRADLEY HEIGHTS APTS

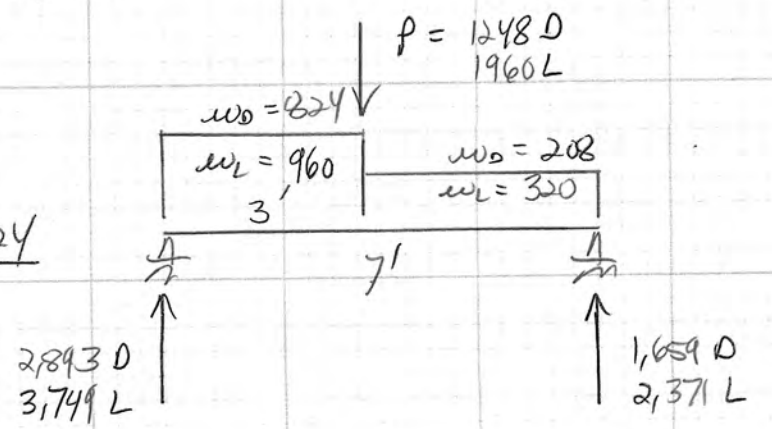
FB17



FB23



FB24



Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

Printed: 29 MAY 2023, 3:47PM

Multiple Simple Beam

File: Beam Designs.ec6

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

Description : Floor Beams FB1-FB12

Wood Beam Design : FB1

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

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

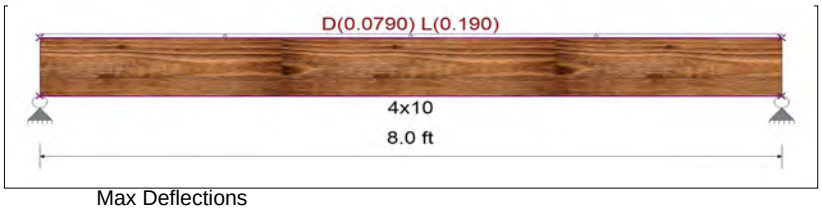
Beam self weight calculated and added to loads
Unif Load: D = 0.0790, L = 0.190 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.648** : 1
fb : Actual : 529.00 psi at 4.000 ft in Span # 1
Fb : Allowable : 816.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.425** : 1
fv : Actual : 50.97 psi at 0.000 ft in Span # 1
Fv : Allowable : 120.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.34	0.76					
Right Support	0.34	0.76					



Max Deflections

Transient Downward	0.059 in	Total Downward	0.085 in
Ratio	1636	Ratio	1130
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB2

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

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

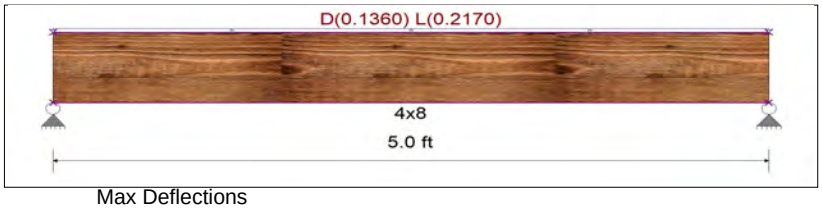
Beam self weight calculated and added to loads
Unif Load: D = 0.1360, L = 0.2170 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.396** : 1
fb : Actual : 437.52 psi at 2.500 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.352** : 1
fv : Actual : 52.87 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.35	0.54					
Right Support	0.35	0.54					



Max Deflections

Transient Downward	0.021 in	Total Downward	0.035 in
Ratio	2825	Ratio	1714
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

Printed: 29 MAY 2023, 3:47PM

Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : FB3

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

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

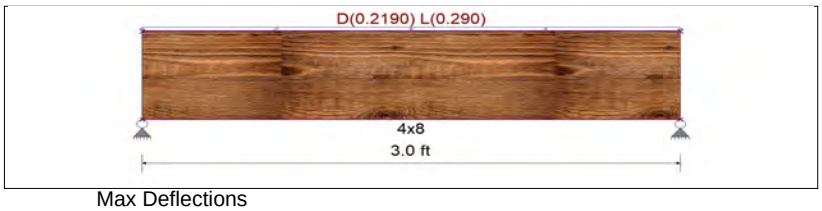
Beam self weight calculated and added to loads
Unif Load: D = 0.2190, L = 0.290 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.205** : 1
fb : Actual : 226.19 psi at 1.500 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.304** : 1
fv : Actual : 45.55 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.34	0.44					
Right Support	0.34	0.44					



Max Deflections

Transient Downward	0.004 in	Total Downward	0.007 in
Ratio	9789	Ratio	5526
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB4

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

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

Beam self weight calculated and added to loads
Unif Load: D = 0.2090, L = 0.260 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.084** : 1
fb : Actual : 92.70 psi at 1.000 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.187** : 1
fv : Actual : 28.00 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.21	0.26					
Right Support	0.21	0.26					

Max Deflections

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

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Multiple Simple Beam

File: Beam Designs.ec6

Lic. # : KW-06013765
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Wood Beam Design : FB5

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

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

Beam self weight calculated and added to loads
Unif Load: D = 0.3380, L = 0.520 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.344** : 1
fb : Actual : 379.85 psi at 1.500 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.510** : 1
fv : Actual : 76.50 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.51	0.78					
Right Support	0.51	0.78					

Max Deflections

Transient Downward	0.007 in	Total Downward	0.011 in
Ratio	5459	Ratio	3290
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB6

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

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

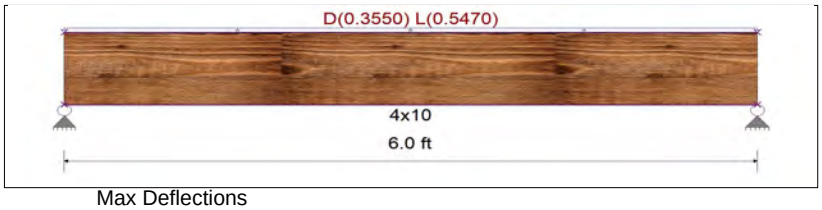
Beam self weight calculated and added to loads
Unif Load: D = 0.3550, L = 0.5470 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.963** : 1
fb : Actual : 982.42 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,020.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.841** : 1
fv : Actual : 126.21 psi at 6.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.08	1.64					
Right Support	1.08	1.64					



Max Deflections

Transient Downward	0.053 in	Total Downward	0.089 in
Ratio	1347	Ratio	811
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : FB7

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

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

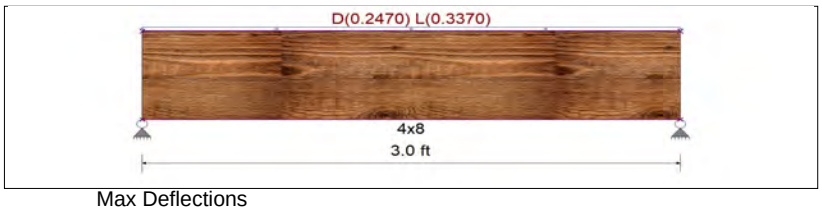
Beam self weight calculated and added to loads
Unif Load: D = 0.2470, L = 0.3370 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.235** : 1
fb : Actual : 259.21 psi at 1.500 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.348** : 1
fv : Actual : 52.20 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.38	0.51					
Right Support	0.38	0.51					



Max Deflections

Transient Downward	0.004 in	Total Downward	0.007 in
Ratio	8424	Ratio	4822
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB8

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

BEAM Size : **6x10, Sawn, Fully Braced**
Using Allowable Stress Design with IBC 2018 Load Combinations, Major Axis Bending
Wood Species : Hem-Fir
Wood Grade : No.1

Fb - Tension	1050 psi	Fc - Prll	750 psi	Fv	140 psi	Ebend- xx	1300 ksi	Density	26.84 pcf
Fb - Compr	1050 psi	Fc - Perp	405 psi	Ft	525 psi	Eminbend - xx	470 ksi		

Applied Loads

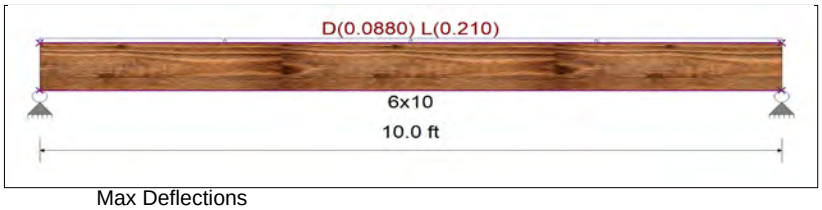
Beam self weight calculated and added to loads
Unif Load: D = 0.0880, L = 0.210 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.664** : 1
fb : Actual : 557.98 psi at 5.000 ft in Span # 1
Fb : Allowable : 840.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.394** : 1
fv : Actual : 44.17 psi at 10.000 ft in Span # 1
Fv : Allowable : 112.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.49	1.05					
Right Support	0.49	1.05					



Max Deflections

Transient Downward	0.093 in	Total Downward	0.136 in
Ratio	1290	Ratio	880
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Multiple Simple Beam

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Wood Beam Design : FB9

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

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

Beam self weight calculated and added to loads
Unif Load: D = 0.230, L = 0.3530 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.234** : 1
fb : Actual : 258.77 psi at 1.500 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.347** : 1
fv : Actual : 52.11 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.35	0.53					
Right Support	0.35	0.53					

Max Deflections

Transient Downward	0.004 in	Total Downward	0.007 in
Ratio	8042	Ratio	4830
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB10

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

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

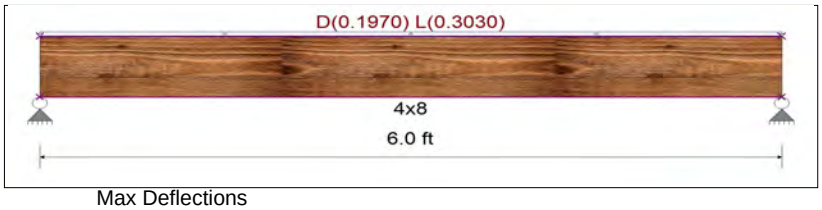
Beam self weight calculated and added to loads
Unif Load: D = 0.1970, L = 0.3030 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.804** : 1
fb : Actual : 888.91 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.597** : 1
fv : Actual : 89.51 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.61	0.91					
Right Support	0.61	0.91					



Max Deflections

Transient Downward	0.061 in	Total Downward	0.102 in
Ratio	1171	Ratio	703
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Wood Beam Design : FB11

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

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

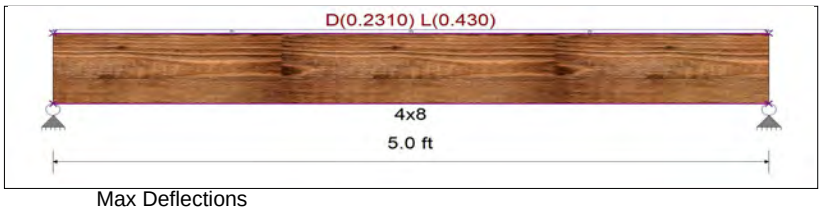
Beam self weight calculated and added to loads
Unif Load: D = 0.2310, L = 0.430 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.737** : 1
fb : Actual : 814.21 psi at 2.500 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.656** : 1
fv : Actual : 98.38 psi at 5.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.59	1.08					
Right Support	0.59	1.08					



Max Deflections

Transient Downward	0.042 in	Total Downward	0.065 in
Ratio	1426	Ratio	921
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB12

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

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

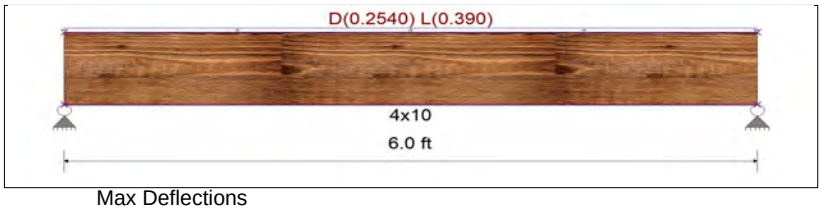
Beam self weight calculated and added to loads
Unif Load: D = 0.2540, L = 0.390 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.689** : 1
fb : Actual : 703.28 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,020.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.602** : 1
fv : Actual : 90.35 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.78	1.17					
Right Support	0.78	1.17					



Max Deflections

Transient Downward	0.038 in	Total Downward	0.064 in
Ratio	1889	Ratio	1133
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Description : Floor Beams FB13-FB24

Wood Beam Design : FB13

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

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

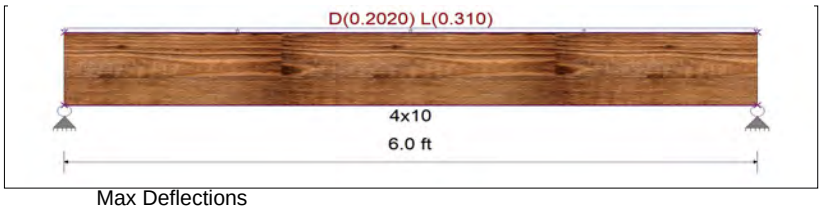
Beam self weight calculated and added to loads
Unif Load: D = 0.2020, L = 0.310 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.549** : 1
fb : Actual : 560.47 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,020.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.480** : 1
fv : Actual : 72.00 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.62	0.93					
Right Support	0.62	0.93					



Max Deflections

Transient Downward	0.030 in	Total Downward	0.051 in
Ratio	2377	Ratio	1422
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB14

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

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

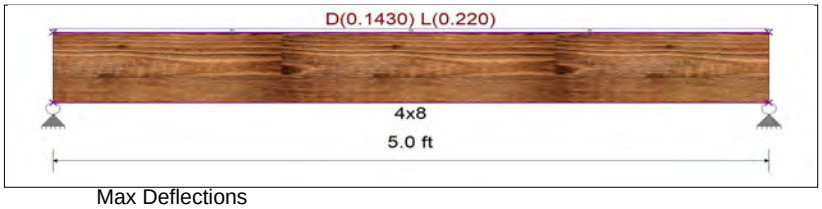
Beam self weight calculated and added to loads
Unif Load: D = 0.1430, L = 0.220 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.407** : 1
fb : Actual : 449.75 psi at 2.500 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.362** : 1
fv : Actual : 54.34 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.37	0.55					
Right Support	0.37	0.55					



Max Deflections

Transient Downward	0.022 in	Total Downward	0.036 in
Ratio	2787	Ratio	1667
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Wood Beam Design : FB15

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

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

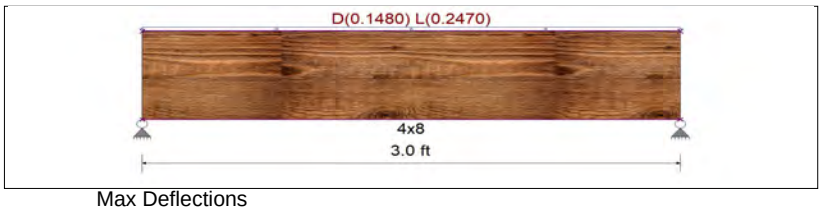
Beam self weight calculated and added to loads
Unif Load: D = 0.1480, L = 0.2470 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.159** : 1
fb : Actual : 176.00 psi at 1.500 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.236** : 1
fv : Actual : 35.44 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.23	0.37					
Right Support	0.23	0.37					



Max Deflections

Transient Downward	0.003 in	Total Downward	0.005 in
Ratio	9999	Ratio	7102
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB16

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

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

Beam self weight calculated and added to loads
Unif Load: D = 0.3120, L = 0.480 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.714** : 1
fb : Actual : 789.29 psi at 2.250 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.706** : 1
fv : Actual : 105.97 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.71	1.08					
Right Support	0.71	1.08					

Max Deflections

Transient Downward	0.031 in	Total Downward	0.051 in
Ratio	1752	Ratio	1055
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

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Multiple Simple Beam

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Solutions 4 Structures, Inc

Wood Beam Design : FB17

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

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

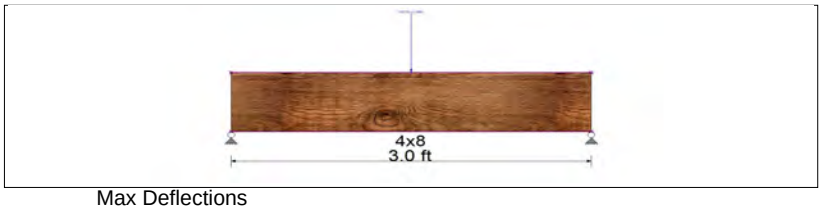
Beam self weight calculated and added to loads
Point: D = 0.70, L = 1.080 k @ 1.50 ft

Design Summary

Max fb/Fb Ratio = **0.475** : 1
fb : Actual : 524.56 psi at 1.500 ft in Span # 1
Fb : Allowable : 1,105.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.354** : 1
fv : Actual : 53.03 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.36	0.54					
Right Support	0.36	0.54					



Max Deflections

Transient Downward	0.007 in	Total Downward	0.012 in
Ratio	4930	Ratio	2976
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB18

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

BEAM Size : **6x10, Sawn, Fully Braced**
Using Allowable Stress Design with IBC 2018 Load Combinations, Major Axis Bending
Wood Species : Hem-Fir Wood Grade : No.1

Fb - Tension	1050 psi	Fc - Prll	750 psi	Fv	140 psi	Ebend- xx	1300 ksi	Density	26.84 pcf
Fb - Compr	1050 psi	Fc - Perp	405 psi	Ft	525 psi	Eminbend - xx	470 ksi		

Applied Loads

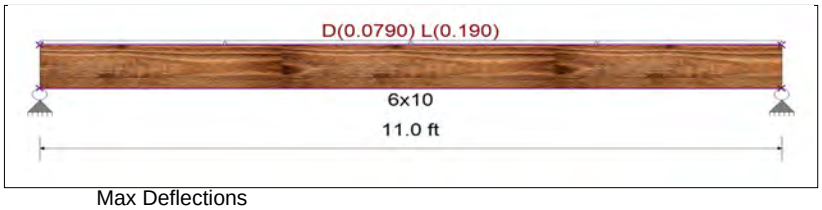
Beam self weight calculated and added to loads
Unif Load: D = 0.0790, L = 0.190 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.728** : 1
fb : Actual : 611.53 psi at 5.500 ft in Span # 1
Fb : Allowable : 840.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.393** : 1
fv : Actual : 44.01 psi at 0.000 ft in Span # 1
Fv : Allowable : 112.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.49	1.05					
Right Support	0.49	1.05					



Max Deflections

Transient Downward	0.123 in	Total Downward	0.181 in
Ratio	1071	Ratio	730
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

Printed: 29 MAY 2023, 3:48PM

Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : FB19

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

BEAM Size : **5.125x10.5, 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

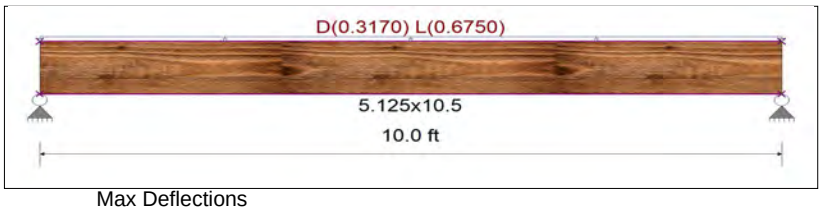
Beam self weight calculated and added to loads
Unif Load: D = 0.3170, L = 0.6750 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.666** : 1
fb : Actual : 1,598.67 psi at 5.000 ft in Span # 1
Fb : Allowable : 2,400.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.528** : 1
fv : Actual : 139.88 psi at 0.000 ft in Span # 1
Fv : Allowable : 265.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.64	3.38					
Right Support	1.64	3.38					



Max Deflections

Transient Downward	0.172 in	Total Downward	0.255 in
Ratio	699	Ratio	470
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB20

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

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

Beam self weight calculated and added to loads
Unif Load: D = 0.1840, L = 0.3920 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.803** : 1
fb : Actual : 710.25 psi at 2.500 ft in Span # 1
Fb : Allowable : 884.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.715** : 1
fv : Actual : 85.82 psi at 5.000 ft in Span # 1
Fv : Allowable : 120.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.47	0.98					
Right Support	0.47	0.98					

Max Deflections

Transient Downward	0.038 in	Total Downward	0.057 in
Ratio	1564	Ratio	1055
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

Printed: 29 MAY 2023, 3:48PM

Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : FB21

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

BEAM Size : **3.125x10.5, 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

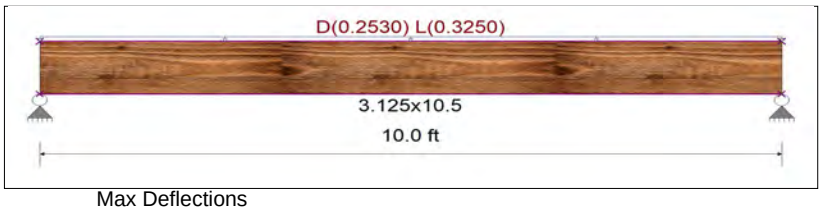
Beam self weight calculated and added to loads
Unif Load: D = 0.2530, L = 0.3250 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.637** : 1
fb : Actual : 1,528.45 psi at 5.000 ft in Span # 1
Fb : Allowable : 2,400.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.505** : 1
fv : Actual : 133.74 psi at 10.000 ft in Span # 1
Fv : Allowable : 265.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.30	1.63					
Right Support	1.30	1.63					



Max Deflections

Transient Downward	0.135 in	Total Downward	0.244 in
Ratio	885	Ratio	491
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB22

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

BEAM Size : **5.125x10.5, 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

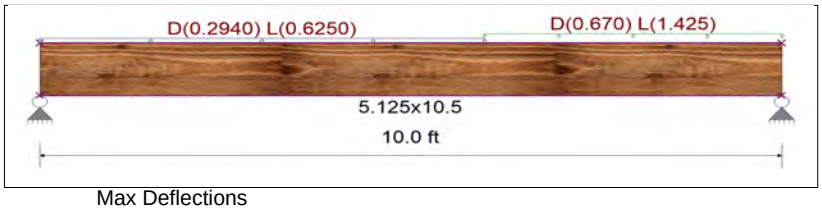
Beam self weight calculated and added to loads
Unif Load: D = 0.2940, L = 0.6250 k/ft, 0.0 ft to 6.0 ft, Trib= 1.0 ft
Unif Load: D = 0.670, L = 1.425 k/ft, 6.0 to 10.0 ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.893** : 1
fb : Actual : 2,142.39 psi at 6.000 ft in Span # 1
Fb : Allowable : 2,400.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.885** : 1
fv : Actual : 234.61 psi at 10.000 ft in Span # 1
Fv : Allowable : 265.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.83	3.77					
Right Support	2.73	5.69					



Max Deflections

Transient Downward	0.229 in	Total Downward	0.339 in
Ratio	524	Ratio	353 <360
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Project Title: Bradley Heights Apartments
Engineer: M. Oman
Project ID:
Project Descr: 3-4 Story Apartment Bldgs

Printed: 29 MAY 2023, 3:48PM

Multiple Simple Beam

File: Beam Designs.ec6

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

Wood Beam Design : FB23

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

BEAM Size : **3.5x11.875, TimberStrand LSL, Fully Braced**
Using Allowable Stress Design with IBC 2018 Load Combinations, Major Axis Bending
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

Fb - Tension	2,325.0 psi	Fc - Prll	2,050.0 psi	Fv	310.0 psi	Ebend- xx	1,550.0 ksi	Density	45.010 pcf
Fb - Compr	2,325.0 psi	Fc - Perp	800.0 psi	Ft	1,070.0 psi	Eminbend - xx	787.82 ksi		

Applied Loads

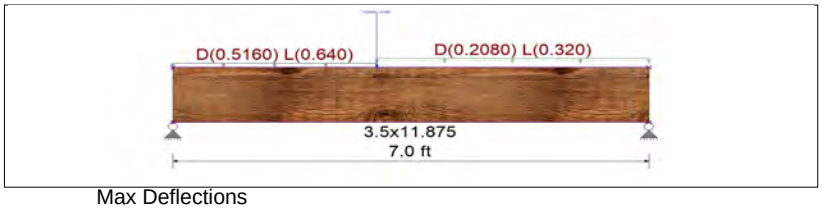
Beam self weight calculated and added to loads
Unif Load: D = 0.5160, L = 0.640 k/ft, 0.0 ft to 3.0 ft, Trib= 1.0 ft
Unif Load: D = 0.2080, L = 0.320 k/ft, 3.0 to 7.0 ft, Trib= 1.0 ft
Point: D = 0.6240, L = 0.960 k @ 3.0 ft

Design Summary

Max fb/Fb Ratio = **0.475** : 1
fb : Actual : 1,104.04 psi at 3.010 ft in Span # 1
Fb : Allowable : 2,325.00 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.498** : 1
fv : Actual : 154.43 psi at 0.000 ft in Span # 1
Fv : Allowable : 310.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.86	2.42					
Right Support	1.24	1.74					



Max Deflections

Transient Downward	0.047 in	Total Downward	0.082 in
Ratio	1779	Ratio	1029
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : FB24

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

BEAM Size : **3.5x11.875, TimberStrand LSL, Fully Braced**
Using Allowable Stress Design with IBC 2018 Load Combinations, Major Axis Bending
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.55E

Fb - Tension	2,325.0 psi	Fc - Prll	2,050.0 psi	Fv	310.0 psi	Ebend- xx	1,550.0 ksi	Density	45.010 pcf
Fb - Compr	2,325.0 psi	Fc - Perp	800.0 psi	Ft	1,070.0 psi	Eminbend - xx	787.82 ksi		

Applied Loads

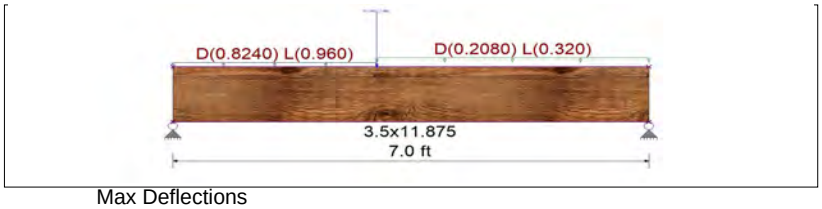
Beam self weight calculated and added to loads
Unif Load: D = 0.8240, L = 0.960 k/ft, 0.0 ft to 3.0 ft, Trib= 1.0 ft
Unif Load: D = 0.2080, L = 0.320 k/ft, 3.0 to 7.0 ft, Trib= 1.0 ft
Point: D = 1.248, L = 1.960 k @ 3.0 ft

Design Summary

Max fb/Fb Ratio = **0.750** : 1
fb : Actual : 1,744.39 psi at 2.987 ft in Span # 1
Fb : Allowable : 2,325.00 psi
Load Comb : +D+L+H

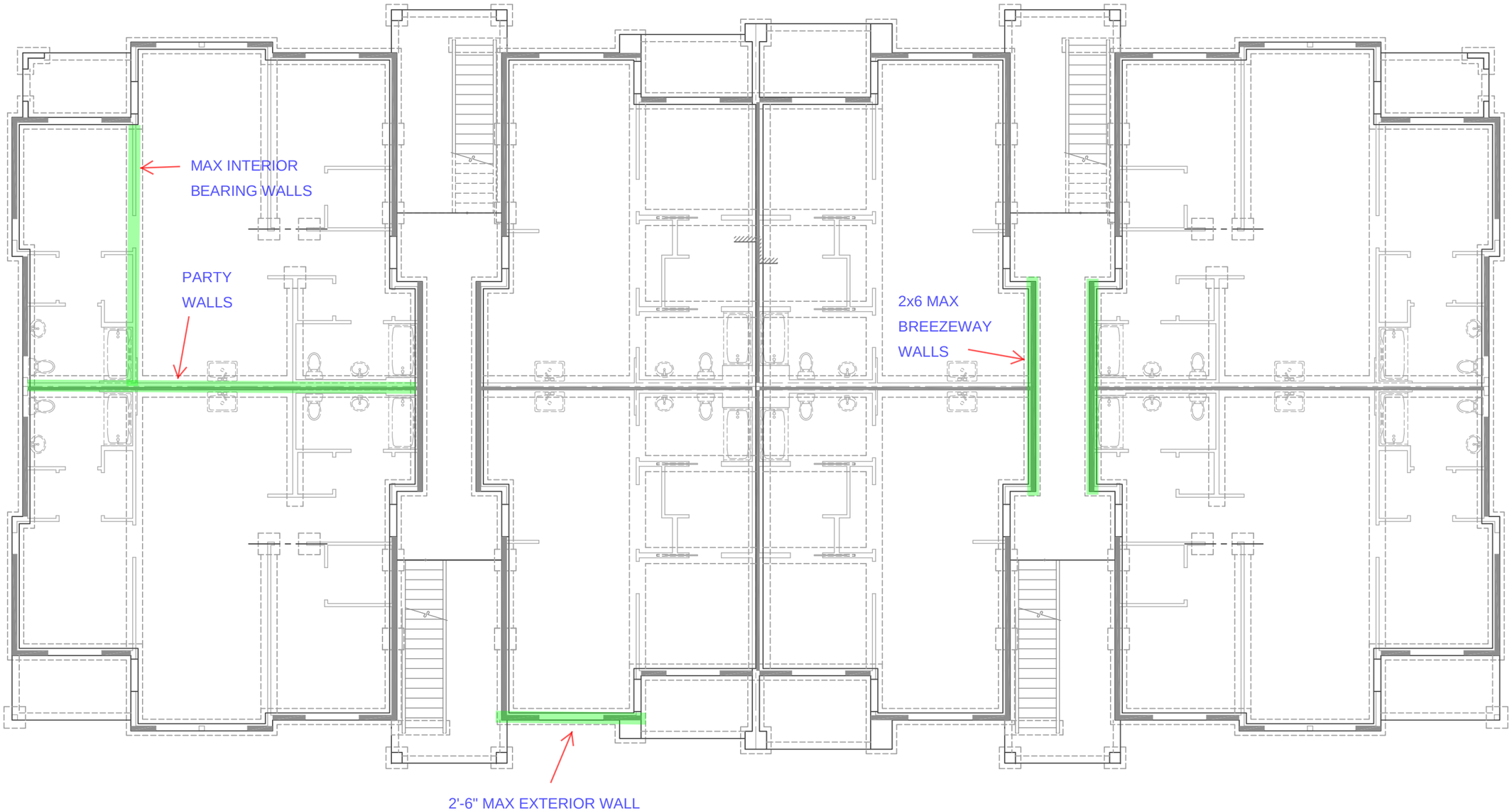
Max fv/FvRatio = **0.779** : 1
fv : Actual : 241.34 psi at 0.000 ft in Span # 1
Fv : Allowable : 310.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	2.94	3.75					
Right Support	1.70	2.37					



Max Deflections

Transient Downward	0.072 in	Total Downward	0.125 in
Ratio	1164	Ratio	671
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:



CONTROLLING BEARING WALLS - KEY PLAN

Bradley Heights Apt - S4S Job# 23.007
Bearing Wall Loading

Max Loaded Exterior Wall							
	Tributary Widths				Wall Loading		
DL/LL	22/25	26/40	25/60	47/100	+12 psf self Wt		
Level	Roof	Floor	Deck	Corridor	DL	LL	S
Roof	15.0				450	0	375
3rd		5.5	2.5		773	365	375
2nd		5.5	2.5		1,096	730	375
1st		5.5	2.5		1,419	1,095	375

Breezway Walls							
	Tributary Widths				Wall Loading		
DL/LL	22/25	26/40	25/60	47/100	+12 psf self Wt		
Level	Roof	Floor	Deck	Corridor	DL	LL	S
Roof	2.0				164	0	50
3rd		7.5		2.5	597	550	50
2nd		7.5		2.5	1,029	1,100	50
1st		7.5		2.5	1,462	1,650	50

2x4 and 2x6 Interior							
	Tributary Widths				Wall Loading		
DL/LL	22/25	26/40	25/60	47/100	+9 psf self Wt		
Level	Roof	Floor	Deck	Corridor	DL	LL	S
Roof	2.0				134	0	50
3rd		13.0			562	520	50
2nd		13.0			990	1,040	50
1st		13.0			1,418	1,560	50

2x6 Party							
	Tributary Widths				Wall Loading		
DL/LL	22/25	26/40	25/60	47/100	+9 psf self Wt		
Level	Roof	Floor	Deck	Corridor	DL	LL	S
Roof	13.5				387	0	338
3rd		4.5			594	180	338
2nd		4.5			801	360	338
1st		4.5			1,008	540	338

2x4 Party							
	Tributary Widths				Wall Loading		
DL/LL	22/25	26/40	25/60	47/100	+9 psf self Wt		
Level	Roof	Floor	Deck	Corridor	DL	LL	S
Roof	13.5				387	0	338
3rd		0.67			494	27	338
2nd		0.67			602	54	338
1st		1.67			735	120	338

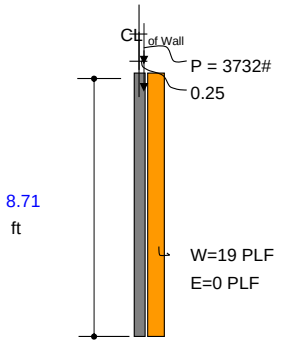
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments Typical Exterior - 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	1,419
P_{SL} (#/ft) =	375
P_{LL} (#/ft) =	1,095
P_{TOT} (#/ft) =	2,889
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	15.00
E (PSF) =	0.00
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) =	104.5	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) = 8.25 405 = $F_{c\perp}$ (psi

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

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

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
L_u (ft) =	8.708	8.708	8.708	8.708	8.708	
$V_{applied}$ (#) =	16	11	16	93	79	
$M_{applied}$ (ft-#) =	68	48	68	237	226	
$P_{applied}$ (#) =	3247	2317	3257	1833	3257	
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 =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)
F'$_b$ (psi)=	776	893	893	1242	1242	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 1002		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.00	19.00	19.00	19.00	19.00	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013	(Eq 3.7-1)
F'c (psi)=	610	662	662	770	770	(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	1321	1321	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	489	563	563	783	783	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	5,035	5,465	5,465	6,353	6,353	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.64	0.30	0.55	0.47	0.74	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.39	0.28	0.39	0.22	0.39	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	3,343	3,343	3,343	3,343	3,343	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	3,341	3,341	3,341	3,341	3,341	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/1040	L/1387	L/(I * E / 15 * L *$M_{applied}$)
240	0.00	0.00	0.00	0.10	0.08	(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	
$V_{applied}/V_{allow}$	1.9%	1.2%	1.6%	7.1%	6.0%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	13.8%	8.6%	12.1%	30.3%	28.9%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	64.5%	42.4%	59.6%	28.9%	51.3%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	64.4%	29.9%	55.4%	47.3%	73.9%	Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	39.3%	28.0%	39.4%	22.2%	39.4%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	97.1%	69.3%	97.4%	54.8%	97.4%	Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	97.2%	69.4%	97.5%	54.9%	97.5%	Bearing on
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	23.1%	17.3%	
Overall Check	OK	OK	OK	OK	OK	

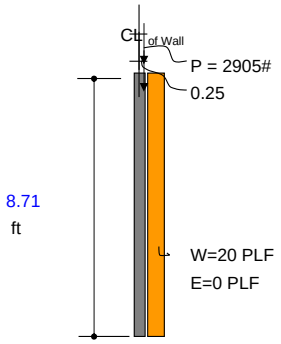
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments Breeqway - 2nd

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	1,029
P_{SL} (#/ft) =	50
P_{LL} (#/ft) =	1,100
P_{TOT} (#/ft) =	2,179
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	15.00
E (PSF) =	0.00
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) =	104.5	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) = 8.25 405 = $F_{c\perp}$ (psi

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

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

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
L_u (ft) =	8.708	8.708	8.708	8.708	8.708	
$V_{applied}$ (#) =	14	7	12	94	77	
$M_{applied}$ (ft-#) =	59	30	53	230	211	
$P_{applied}$ (#) =	2839	1439	2522	1372	2522	
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 =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)
F'$_b$ (psi)=	776	893	893	1242	1242	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 1002		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.00	19.00	19.00	19.00	19.00	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013	(Eq 3.7-1)
F'c (psi)=	610	662	662	770	770	(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} (#) =	5,033	5,462	5,462	6,350	6,350	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.50	0.13	0.35	0.40	0.55	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.34	0.17	0.31	0.17	0.31	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	3,341	3,341	3,341	3,341	3,341	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	3,341	3,341	3,341	3,341	3,341	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/1008	L/1344	L/(I * E / 15 * L *$M_{applied}$)
240	0.00	0.00	0.00	0.10	0.08	(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	
$V_{applied}/V_{allow}$	1.6%	0.7%	1.3%	7.1%	5.9%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	12.1%	5.3%	9.3%	29.4%	27.0%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	56.4%	26.3%	46.2%	21.6%	39.7%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	50.2%	13.4%	34.8%	39.9%	54.6%	Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	34.3%	17.4%	30.5%	16.6%	30.5%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	85.0%	43.1%	75.5%	41.1%	75.5%	Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	85.0%	43.1%	75.5%	41.1%	75.5%	Bearing on
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	23.8%	17.9%	
Overall Check	OK	OK	OK	OK	OK	

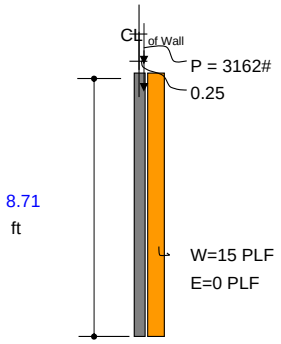
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments Breeqway - 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	1,462
P_{SL} (#/ft) =	50
P_{LL} (#/ft) =	1,650
P_{TOT} (#/ft) =	3,162
e (IN) =	0.5
TRIB. (IN) =	12

LATERAL LOADS W	
W (PSF) =	15.00
E (PSF) =	0.00
TRIB. (IN) =	12

DESIGN VALUES			
F_b (psi) =	675	Hem Fir	
F_v (psi) =	150	Stud Grade	
F_c (psi) =	800	Bending X-X axis	
$F_{c\perp}$ (psi) =	405		405
E (psi) =	1.20E+06	Incised, No	
E_{min} (psi) =	4.40E+05	Wet Use, No	
C_r =	1.15	Repetive, Yes	
L_u (in) =	104.5	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) = 8.25 405 = $F_{c\perp}$ (psi

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

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

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)		
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)		
L_u (ft) =	8.708	8.708	8.708	8.708	8.708		
$V_{applied}$ (#) =	15	7	13	72	62		
$M_{applied}$ (ft-#) =	65	32	57	182	177		
$P_{applied}$ (#) =	3112	1512	2737	1462	2737		
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 =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)	
F'$_b$ (psi)=	776	893	893	1242	1242	(Table 4.3.1)	
AXIAL STESS CALCS		F_{cE} = 1002		C_{cF} = 1		(Table 4a Compression)	
L_e/d =	19.00	19.00	19.00	19.00	19.00	(3.7.1.4)	<50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)	
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013	(Eq 3.7-1)	
F'c (psi)=	610	662	662	770	770	(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} (#) =	5,033	5,462	5,462	6,350	6,350	$P_{allow} = A * F_c * C_D * C_F * C_P$	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.59	0.15	0.40	0.34	0.52	(Eq 3.9-3)	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.38	0.18	0.33	0.18	0.33	(Eq 3.9-4)	
$P_{c\perp allow}$ on PL (#) =	3,341	3,341	3,341	3,341	3,341	$P_{c\perp allow} = A * Fc * C_b$	
$P_{c\perp allow}$ on Beam (#) =	3,341	3,341	3,341	3,341	3,341	$P_{c\perp allow} = A * Fc$	
Deflection L/	NA	NA	NA	L/1344	L/1792	L/(I * E / 15 * L *$M_{applied}$)	
240	0.00	0.00	0.00	0.08	0.06	(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		
$V_{applied}/V_{allow}$	1.8%	0.8%	1.4%	5.5%	4.7%		
MOMENT M	OK	OK	OK	OK	OK		
$M_{applied}/M_{allow}$	13.3%	5.6%	10.1%	23.3%	22.6%		
AXIAL P	OK	OK	OK	OK	OK		
$P_{applied}/P_{allow}$	61.8%	27.7%	50.1%	23.0%	43.1%		
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK		
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	59.5%	14.5%	40.3%	33.6%	52.4%		Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK		
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	37.7%	18.3%	33.1%	17.7%	33.1%		
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK		
$P_{c\text{^}applied}/P_{c\perp allow}$	93.1%	45.3%	81.9%	43.8%	81.9%		Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK		
$P_{c\text{^}applied}/P_{c\perp allow}$	93.1%	45.3%	81.9%	43.8%	81.9%		Bearing on
DEFLECTION	OK	OK	OK	OK	OK		
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	17.9%	13.4%		
Overall Check	OK	OK	OK	OK	OK		

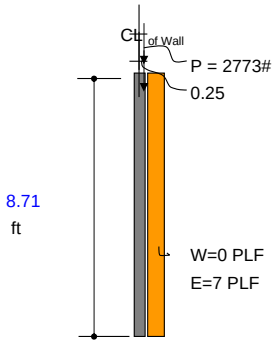
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x6 Bearing- 2nd

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	990
P_{SL} (#/ft) =	50
P_{LL} (#/ft) =	1,040
P_{TOT} (#/ft) =	2,080
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	0.00
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) =	104.5	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) = 8.25 405 = $F_{c\perp}$ (psi

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

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

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	
L_u (ft) =	8.708	8.708	8.708	8.708	8.708	
$V_{applied}$ (#) =	13	7	12	35	33	
$M_{applied}$ (ft-#) =	56	29	50	94	103	
$P_{applied}$ (#) =	2707	1387	2410	1320	2410	
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 =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)
F'$_b$ (psi)=	776	893	893	1242	1242	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 1002		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.00	19.00	19.00	19.00	19.00	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013	(Eq 3.7-1)
F'c (psi)=	610	662	662	770	770	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	
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} (#) =	5,033	5,462	5,462	6,350	6,350	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.46	0.13	0.32	0.19	0.33	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.33	0.17	0.29	0.16	0.29	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	3,341	3,341	3,341	3,341	3,341	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	3,341	3,341	3,341	3,341	3,341	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/3023	L/4031	L/(I * E / 15 * L *$M_{applied}$)
240	0.00	0.00	0.00	0.03	0.03	(1.0) x E Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	1.6%	0.7%	1.2%	2.7%	2.5%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	11.5%	5.1%	8.9%	12.1%	13.1%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	53.8%	25.4%	44.1%	20.8%	38.0%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	46.1%	12.6%	32.1%	18.7%	32.9%	Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	32.7%	16.8%	29.2%	16.0%	29.2%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	81.0%	41.5%	72.1%	39.5%	72.1%	Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	81.0%	41.5%	72.1%	39.5%	72.1%	Bearing on
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	7.9%	6.0%	
Overall Check	OK	OK	OK	OK	OK	

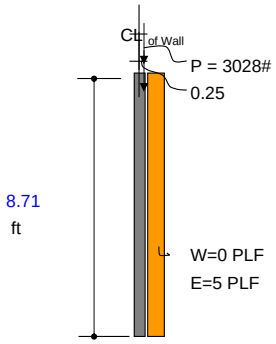
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x6 Bearing- 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	1,418
P_{SL} (#/ft) =	50
P_{LL} (#/ft) =	1,560
P_{TOT} (#/ft) =	3,028
e (IN) =	0.5
TRIB. (IN) =	12

LATERAL LOADS W	
W (PSF) =	0.00
E (PSF) =	5.00
TRIB. (IN) =	12

DESIGN VALUES			
F_b (psi) =	675	Hem Fir	
F_v (psi) =	150	Stud Grade	
F_c (psi) =	800	Bending X-X axis	
$F_{c\perp}$ (psi) =	405		405
E (psi) =	1.20E+06	Incised, No	
E_{min} (psi) =	4.40E+05	Wet Use, No	
C_r =	1.15	Repetive, Yes	
L_u (in) =	104.5	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) = 8.25 405 = $F_{c\perp}$ (psi

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

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

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	
L_u (ft) =	8.708	8.708	8.708	8.708	8.708	
$V_{applied}$ (#) =	14	7	13	29	29	
$M_{applied}$ (ft-#) =	62	31	55	80	94	
$P_{applied}$ (#) =	2978	1468	2626	1418	2626	
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 =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)
F'$_b$ (psi)=	776	893	893	1242	1242	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 1002		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.00	19.00	19.00	19.00	19.00	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013	(Eq 3.7-1)
F'c (psi)=	610	662	662	770	770	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	
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} (#) =	5,033	5,462	5,462	6,350	6,350	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.55	0.14	0.37	0.17	0.35	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.36	0.18	0.32	0.17	0.32	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	3,341	3,341	3,341	3,341	3,341	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	3,341	3,341	3,341	3,341	3,341	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/4031	L/5375	L/(I * E / 15 * L *$M_{applied}$)
240	0.00	0.00	0.00	0.03	0.02	(1.0) x E Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	1.7%	0.7%	1.3%	2.2%	2.2%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	12.7%	5.4%	9.7%	10.2%	12.1%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	59.2%	26.9%	48.1%	22.3%	41.3%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	54.8%	13.8%	37.4%	17.3%	34.8%	Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	36.0%	17.8%	31.8%	17.2%	31.8%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	89.1%	43.9%	78.6%	42.4%	78.6%	Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	89.1%	43.9%	78.6%	42.4%	78.6%	Bearing on
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	6.0%	4.5%	
Overall Check	OK	OK	OK	OK	OK	

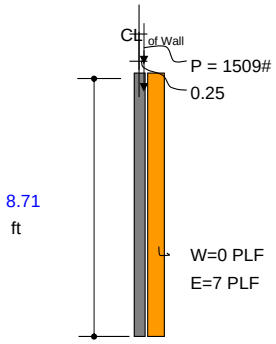
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x4 Bearing- 3rd

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	562
P_{SL} (#/ft) =	50
P_{LL} (#/ft) =	520
P_{TOT} (#/ft) =	1,132
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	0.00
E (PSF) =	5.00
TRIB. (IN) =	16

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) =	104.5	Full Bracing, Yes
c =	0.8	(Sawn Lumber)
K_e =	1	(Appendix G)
C_b =	1.00	(Bearing Area Factor)

Bearing wall Fire rated ? No
Fire Retardant FirePRO? No
Header Bearing Area (in^2) = 5.25 405 = $F_{c\perp}$ (psi

Use: (1) 2" X 4" @ 16" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	1	A =	5.25 in^2
b =	1.5 in	S =	3.06 in^3
d =	3.5 in	I =	5.36 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 + E	DL+0.75(LL+SL+E)	
L_u (ft) =	8.708	8.708	8.708	8.708	8.708	
$V_{applied}$ (#) =	7	4	6	33	28	
$M_{applied}$ (ft-#) =	30	17	27	87	85	
$P_{applied}$ (#) =	1443	816	1319	749	1319	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 29334		C_{bF} = 1.5		(Table 4a Bending)
F_b* (psi)=	1466	1686	1686	2346	2346	(Eq 3.7-1)
C_L =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)
F'$_b$ (psi)=	1466	1686	1686	2346	2346	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 433		C_{cF} = 1.15		(Table 4a Compression)
L_e/d =	29.86	29.86	29.86	29.86	29.86	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1495	1719	1719	2392	2392	(Eq 3.7-1)
C_P =	0.2699	0.2373	0.2373	0.1739	0.1739	(Eq 3.7-1)
F'c (psi)=	404	408	408	416	416	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	
V_{allow} (#) =	525	604	604	840	840	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	374	430	430	599	599	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	2,119	2,142	2,142	2,183	2,183	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.68	0.21	0.53	0.33	0.70	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.63	0.36	0.58	0.33	0.58	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	2,126	2,126	2,126	2,126	2,126	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	2,126	2,126	2,126	2,126	2,126	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/844	L/1125	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.12	0.09	(1.0) x E Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	1.3%	0.6%	1.0%	3.9%	3.3%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	8.0%	4.0%	6.4%	14.5%	14.2%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	68.1%	38.1%	61.6%	34.3%	60.4%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	68.3%	20.7%	53.1%	33.3%	70.3%	Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	63.4%	35.9%	58.0%	32.9%	58.0%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	67.9%	38.4%	62.0%	35.2%	62.0%	Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	67.9%	38.4%	62.0%	35.2%	62.0%	Bearing on
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	28.4%	21.3%	
Overall Check	OK	OK	OK	OK	OK	

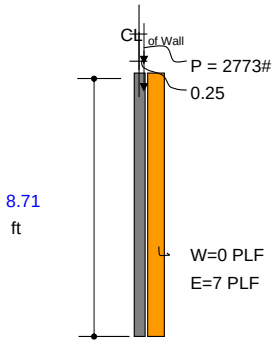
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x4 Bearing- 2nd

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	990
P_{SL} (#/ft) =	50
P_{LL} (#/ft) =	1,040
P_{TOT} (#/ft) =	2,080
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	0.00
E (PSF) =	5.00
TRIB. (IN) =	16

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) =	104.5	Full Bracing, Yes
c =	0.8	(Sawn Lumber)
K_e =	1	(Appendix G)
C_b =	1.00	(Bearing Area Factor)

Bearing wall Fire rated ? No
Fire Retardant FirePRO? No
Header Bearing Area (in^2) = 10.5 405 = $F_{c\perp}$ (psi

Use: (2) 2" X 4" @ 16" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	2	A =	10.50 in^2
b =	1.5 in	S =	6.13 in^3
d =	3.5 in	I =	10.72 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 + E	DL+0.75(LL+SL+E)	
L_u (ft) =	8.708	8.708	8.708	8.708	8.708	
$V_{applied}$ (#) =	13	7	12	35	33	
$M_{applied}$ (ft-#) =	56	29	50	98	107	
$P_{applied}$ (#) =	2707	1387	2410	1320	2410	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 29334		C_{bF} = 1.5		(Table 4a Bending)
F_b* (psi)=	1466	1686	1686	2346	2346	(Eq 3.7-1)
C_L =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)
F'$_b$ (psi)=	1466	1686	1686	2346	2346	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 433		C_{cF} = 1.15		(Table 4a Compression)
L_e/d =	29.86	29.86	29.86	29.86	29.86	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1495	1719	1719	2392	2392	(Eq 3.7-1)
C_P =	0.2699	0.2373	0.2373	0.1739	0.1739	(Eq 3.7-1)
F'c (psi)=	404	408	408	416	416	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	
V_{allow} (#) =	1050	1208	1208	1680	1680	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	748	861	861	1197	1197	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	4,237	4,284	4,284	4,367	4,367	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.59	0.15	0.44	0.21	0.49	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.59	0.30	0.53	0.29	0.53	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	4,253	4,253	4,253	4,253	4,253	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	4,253	4,253	4,253	4,253	4,253	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/1688	L/2251	L/(I * E / 15 * L *$M_{applied}$)
240	0.00	0.00	0.00	0.06	0.05	(1.0) x E Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	1.2%	0.5%	1.0%	2.1%	2.0%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	7.5%	3.4%	5.8%	8.1%	8.9%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	63.9%	32.4%	56.3%	30.2%	55.2%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	59.4%	15.3%	44.0%	20.6%	49.4%	Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	59.5%	30.5%	53.0%	29.0%	53.0%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	63.6%	32.6%	56.7%	31.0%	56.7%	Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	63.6%	32.6%	56.7%	31.0%	56.7%	Bearing on
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	14.2%	10.7%	
Overall Check	OK	OK	OK	OK	OK	

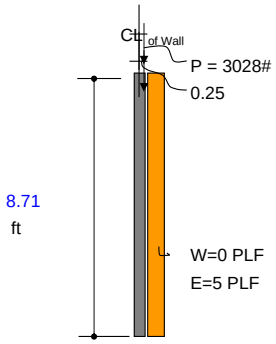
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x4 Bearing- 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	1,418
P_{SL} (#/ft) =	50
P_{LL} (#/ft) =	1,560
P_{TOT} (#/ft) =	3,028
e (IN) =	0.5
TRIB. (IN) =	12

LATERAL LOADS W	
W (PSF) =	0.00
E (PSF) =	5.00
TRIB. (IN) =	12

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) =	104.5	Full Bracing, Yes
c =	0.8	(Sawn Lumber)
K_e =	1	(Appendix G)
C_b =	1.00	(Bearing Area Factor)

Bearing wall Fire rated ? No
Fire Retardant FirePRO? No
Header Bearing Area (in^2) = 10.5 405 = $F_{c\perp}$ (psi

Use: (2) 2" X 4" @ 12" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	2	A =	10.50 in^2
b =	1.5 in	S =	6.13 in^3
d =	3.5 in	I =	10.72 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 + E	DL+0.75(LL+SL+E)	
L_u (ft) =	8.708	8.708	8.708	8.708	8.708	
$V_{applied}$ (#) =	14	7	13	29	29	
$M_{applied}$ (ft-#) =	62	31	55	82	98	
$P_{applied}$ (#) =	2978	1468	2626	1418	2626	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 29334		C_{bF} = 1.5		(Table 4a Bending)
F_b* (psi)=	1466	1686	1686	2346	2346	(Eq 3.7-1)
C_L =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)
F'$_b$ (psi)=	1466	1686	1686	2346	2346	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 433		C_{cF} = 1.15		(Table 4a Compression)
L_e/d =	29.86	29.86	29.86	29.86	29.86	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1495	1719	1719	2392	2392	(Eq 3.7-1)
C_P =	0.2699	0.2373	0.2373	0.1739	0.1739	(Eq 3.7-1)
F'c (psi)=	404	408	408	416	416	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	
V_{allow} (#) =	1050	1208	1208	1680	1680	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	748	861	861	1197	1197	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	4,237	4,284	4,284	4,367	4,367	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.73	0.17	0.53	0.21	0.55	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.65	0.32	0.58	0.31	0.58	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	4,253	4,253	4,253	4,253	4,253	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	4,253	4,253	4,253	4,253	4,253	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/2251	L/3001	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.05	0.03	(1.0) x E Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	1.4%	0.6%	1.0%	1.7%	1.7%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	8.3%	3.6%	6.4%	6.9%	8.2%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	70.3%	34.3%	61.3%	32.5%	60.1%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	73.4%	17.0%	52.6%	20.5%	55.5%	Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	65.4%	32.3%	57.7%	31.2%	57.7%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	70.0%	34.5%	61.7%	33.3%	61.7%	Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	70.0%	34.5%	61.7%	33.3%	61.7%	Bearing on
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	10.7%	8.0%	
Overall Check	OK	OK	OK	OK	OK	

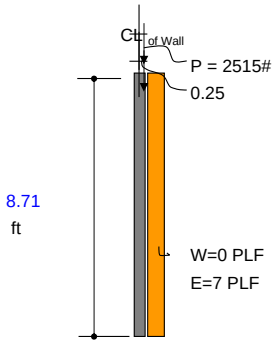
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x6 Party - 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	1,008
P_{SL} (#/ft) =	338
P_{LL} (#/ft) =	540
P_{TOT} (#/ft) =	1,886
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	0.00
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) =	104.5	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) = 8.25 405 = $F_{c\perp}$ (psi

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

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

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)		
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)		
L_u (ft) =	8.708	8.708	8.708	8.708	8.708		
$V_{applied}$ (#) =	10	9	11	35	32		
$M_{applied}$ (ft-#) =	43	37	46	95	98		
$P_{applied}$ (#) =	2064	1795	2222	1344	2222		
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 =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)	
F'$_b$ (psi)=	776	893	893	1242	1242	(Table 4.3.1)	
AXIAL STESS CALCS		F_{cE} = 1002		C_{cF} = 1		(Table 4a Compression)	
L_e/d =	19.00	19.00	19.00	19.00	19.00	(3.7.1.4)	<50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)	
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013	(Eq 3.7-1)	
F'c (psi)=	610	662	662	770	770	(Table 4.3.1)	
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)		
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} (#) =	5,033	5,462	5,462	6,350	6,350	$P_{allow} = A * F_c * C_D * C_F * C_P$	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.29	0.19	0.28	0.19	0.29	(Eq 3.9-3)	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.25	0.22	0.27	0.16	0.27	(Eq 3.9-4)	
$P_{c\perp allow}$ on PL (#) =	3,341	3,341	3,341	3,341	3,341	$P_{c\perp allow} = A * Fc * C_b$	
$P_{c\perp allow}$ on Beam (#) =	3,341	3,341	3,341	3,341	3,341	$P_{c\perp allow} = A * Fc$	
Deflection L/	NA	NA	NA	L/3023	L/4031	L/(I * E / 15 * L *$M_{applied}$)	
240	0.00	0.00	0.00	0.03	0.03	(1.0) x E	Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	Actual △	
SHEAR V	OK	OK	OK	OK	OK		
$V_{applied}/V_{allow}$	1.2%	0.9%	1.1%	2.7%	2.5%		
MOMENT M	OK	OK	OK	OK	OK		
$M_{applied}/M_{allow}$	8.8%	6.6%	8.2%	12.1%	12.6%		
AXIAL P	OK	OK	OK	OK	OK		
$P_{applied}/P_{allow}$	41.0%	32.9%	40.7%	21.2%	35.0%		
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK		
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	28.5%	19.3%	27.8%	19.0%	29.5%		Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK		
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	25.0%	21.7%	26.9%	16.3%	26.9%		
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK		
$P_{c\text{^}applied}/P_{c\perp allow}$	61.8%	53.7%	66.5%	40.2%	66.5%		Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK		
$P_{c\text{^}applied}/P_{c\perp allow}$	61.8%	53.7%	66.5%	40.2%	66.5%		Bearing on
DEFLECTION	OK	OK	OK	OK	OK		
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	7.9%	6.0%		
Overall Check	OK	OK	OK	OK	OK		

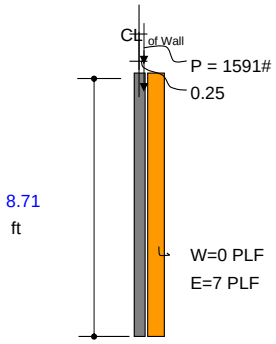
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x4 Party - 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	735
P_{SL} (#/ft) =	338
P_{LL} (#/ft) =	120
P_{TOT} (#/ft) =	1193
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	0.00
E (PSF) =	5.00
TRIB. (IN) =	16

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) =	104.5	Full Bracing, Yes
c =	0.8	(Sawn Lumber)
K_e =	1	(Appendix G)
C_b =	1.00	(Bearing Area Factor)

Bearing wall Fire rated ? No
Fire Retardant FirePRO? No
Header Bearing Area (in^2) = 5.25 405 = $F_{c\perp}$ (psi

Use: (1) 2" X 4" @ 16" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	1	A =	5.25 in^2
b =	1.5 in	S =	3.06 in^3
d =	3.5 in	I =	5.36 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 + E	DL+0.75(LL+SL+E)	
L_u (ft) =	8.708	8.708	8.708	8.708	8.708	
$V_{applied}$ (#) =	5	7	7	34	29	
$M_{applied}$ (ft-#) =	24	30	30	94	88	
$P_{applied}$ (#) =	1140	1431	1438	980	1438	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 29334		C_{bF} = 1.5		(Table 4a Bending)
F_b* (psi)=	1466	1686	1686	2346	2346	(Eq 3.7-1)
C_L =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)
F'$_b$ (psi)=	1466	1686	1686	2346	2346	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 433		C_{cF} = 1.15		(Table 4a Compression)
L_e/d =	29.86	29.86	29.86	29.86	29.86	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1495	1719	1719	2392	2392	(Eq 3.7-1)
C_P =	0.2699	0.2373	0.2373	0.1739	0.1739	(Eq 3.7-1)
F'c (psi)=	404	408	408	416	416	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	
V_{allow} (#) =	525	604	604	840	840	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	374	430	430	599	599	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	2,119	2,142	2,142	2,183	2,183	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.42	0.63	0.64	0.48	0.84	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.50	0.63	0.63	0.43	0.63	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	2,126	2,126	2,126	2,126	2,126	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	2,126	2,126	2,126	2,126	2,126	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/844	L/1125	L/(I * E / 15 * L *$M_{applied}$)
240	0.00	0.00	0.00	0.12	0.09	(1.0) x E Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	1.0%	1.1%	1.1%	4.0%	3.4%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	6.3%	6.9%	7.0%	15.7%	14.8%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	53.8%	66.8%	67.1%	44.9%	65.9%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	41.7%	63.3%	64.0%	47.6%	83.5%	Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	50.1%	62.9%	63.2%	43.1%	63.2%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	53.6%	67.3%	67.6%	46.1%	67.6%	Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	53.6%	67.3%	67.6%	46.1%	67.6%	Bearing on
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	28.4%	21.3%	
Overall Check	OK	OK	OK	OK	OK	

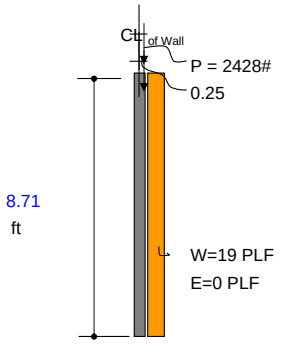
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x Brg at 4x Header

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	921
P_{SL} (#/ft) =	244
P_{LL} (#/ft) =	714
P_{TOT} (#/ft) =	1,880
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	15.00
E (PSF) =	0.00
TRIB. (IN) =	16

DESIGN VALUES			
F_b (psi) =	675	Hem Fir	0.49
F_v (psi) =	150	Stud Grade	0.13
F_c (psi) =	800	Bending X-X axis	0.38
$F_{c\perp}$ (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) =	104.5	Full Bracing, Yes	
c =	0.8	(Sawn Lumber)	
K_e =	1	(Appendix G)	
C_b =	1.00	(Bearing Area Factor)	

Bearing wall Fire rated ? No
Fire Retardant FirePRO? No
Header Bearing Area (in^2) = 5.25 405 = $F_{c\perp}$ (psi

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

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

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
L_u (ft) =	8.708	8.708	8.708	8.708	8.708	
$V_{applied}$ (#) =	10	7	10	90	73	
$M_{applied}$ (ft-#) =	44	31	44	218	195	
$P_{applied}$ (#) =	2113	1506	2119	1190	2119	
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 =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)
F'$_b$ (psi)=	776	893	893	1242	1242	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 1002		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.00	19.00	19.00	19.00	19.00	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013	(Eq 3.7-1)
F'c (psi)=	610	662	662	770	770	(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	1321	1321	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	489	563	563	783	783	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	5,035	5,465	5,465	6,353	6,353	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.30	0.14	0.26	0.36	0.45	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.26	0.18	0.26	0.14	0.26	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	3,343	3,343	3,343	3,343	3,343	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	2,126	2,126	2,126	2,126	2,126	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/1040	L/1387	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.10	0.08	(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	
$V_{applied}/V_{allow}$	1.2%	0.8%	1.1%	6.8%	5.6%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	9.0%	5.6%	7.8%	27.9%	24.9%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	42.0%	27.6%	38.8%	18.7%	33.3%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	29.7%	14.4%	25.6%	36.1%	44.6%	Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	25.5%	18.2%	25.6%	14.4%	25.6%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	63.2%	45.0%	63.4%	35.6%	63.4%	Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	99.4%	70.8%	99.6%	56.0%	99.6%	Bearing on
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	23.1%	17.3%	
Overall Check	OK	OK	OK	OK	OK	

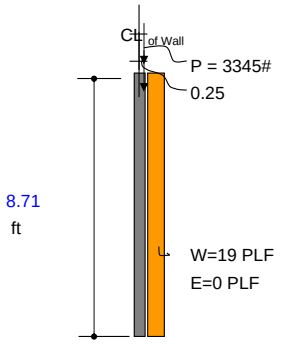
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x Brg at 3-1/8 GLB Header

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	1,269
P_{SL} (#/ft) =	337
P_{LL} (#/ft) =	984
P_{TOT} (#/ft) =	2,590
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	15.00
E (PSF) =	0.00
TRIB. (IN) =	16

DESIGN VALUES			
F_b (psi) =	675	Hem Fir	0.49
F_v (psi) =	150	Stud Grade	0.13
F_c (psi) =	800	Bending X-X axis	0.38
$F_{c\perp}$ (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) =	104.5	Full Bracing, Yes	
c =	0.8	(Sawn Lumber)	
K_e =	1	(Appendix G)	
C_b =	1.00	(Bearing Area Factor)	

Bearing wall Fire rated ? No
Fire Retardant FirePRO? No
Header Bearing Area (in^2) = 4.69 625 = $F_{c\perp}$ (psi

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

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

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)		
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)		
L_u (ft) =	8.708	8.708	8.708	8.708	8.708		
$V_{applied}$ (#) =	14	10	14	92	77		
$M_{applied}$ (ft-#) =	61	43	61	232	217		
$P_{applied}$ (#) =	2911	2074	2919	1639	2919		
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 =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)	
F'$_b$ (psi)=	776	893	893	1242	1242	(Table 4.3.1)	
AXIAL STESS CALCS		F_{cE} = 1002		C_{cF} = 1		(Table 4a Compression)	
L_e/d =	19.00	19.00	19.00	19.00	19.00	(3.7.1.4)	<50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)	
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013	(Eq 3.7-1)	
F'c (psi)=	610	662	662	770	770	(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	1321	1321	$V_{allow} = A * F_v * C_D / 1.5$	
M_{allow} (ft - #) =	489	563	563	783	783	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$	
P_{allow} (#) =	5,035	5,465	5,465	6,353	6,353	$P_{allow} = A * F_c * C_D * C_F * C_P$	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.53	0.25	0.45	0.44	0.64	(Eq 3.9-3)	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.35	0.25	0.35	0.20	0.35	(Eq 3.9-4)	
$P_{c\perp allow}$ on PL (#) =	3,343	3,343	3,343	3,343	3,343	$P_{c\perp allow} = A * Fc * C_b$	
$P_{c\perp allow}$ on Beam (#) =	2,930	2,930	2,930	2,930	2,930	$P_{c\perp allow} = A * Fc$	
Deflection L/	NA	NA	NA	L/1040	L/1387	L/(I * E / 15 * L *$M_{applied}$)	
240	0.00	0.00	0.00	0.10	0.08	(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		
$V_{applied}/V_{allow}$	1.7%	1.0%	1.5%	7.0%	5.8%		
MOMENT M	OK	OK	OK	OK	OK		
$M_{applied}/M_{allow}$	12.4%	7.7%	10.8%	29.6%	27.7%		
AXIAL P	OK	OK	OK	OK	OK		
$P_{applied}/P_{allow}$	57.8%	38.0%	53.4%	25.8%	45.9%		
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK		
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	52.5%	24.7%	45.2%	43.6%	63.9%		Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK		
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	35.2%	25.1%	35.3%	19.8%	35.3%		
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK		
$P_{c\text{^}applied}/P_{c\perp allow}$	87.1%	62.0%	87.3%	49.0%	87.3%		Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK		
$P_{c\text{^}applied}/P_{c\perp allow}$	99.3%	70.8%	99.6%	56.0%	99.6%		Bearing on
DEFLECTION	OK	OK	OK	OK	OK		
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	23.1%	17.3%		
Overall Check	OK	OK	OK	OK	OK		

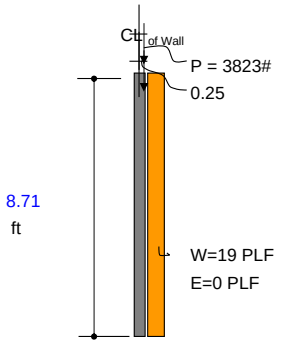
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x Brg at 5-1/8 GLB Header

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	1,450
P_{SL} (#/ft) =	385
P_{LL} (#/ft) =	1,125
P_{TOT} (#/ft) =	2,960
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	15.00
E (PSF) =	0.00
TRIB. (IN) =	16

DESIGN VALUES			
F_b (psi) =	675	Hem Fir	0.49
F_v (psi) =	150	Stud Grade	0.13
F_c (psi) =	800	Bending X-X axis	0.38
$F_{c\perp}$ (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) =	104.5	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) =		7.69	625 = $F_{c\perp}$ (psi

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

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

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)		
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)		
L_u (ft) =	8.708	8.708	8.708	8.708	8.708		
$V_{applied}$ (#) =	16	11	16	93	79		
$M_{applied}$ (ft-#) =	69	49	69	238	228		
$P_{applied}$ (#) =	3326	2370	3336	1873	3336		
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 =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)	
F'$_b$ (psi)=	776	893	893	1242	1242	(Table 4.3.1)	
AXIAL STESS CALCS		F_{cE} = 1002		C_{cF} = 1		(Table 4a Compression)	
L_e/d =	19.00	19.00	19.00	19.00	19.00	(3.7.1.4)	<50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)	
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013	(Eq 3.7-1)	
F'c (psi)=	610	662	662	770	770	(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	1321	1321	$V_{allow} = A * F_v * C_D / 1.5$	
M_{allow} (ft - #) =	489	563	563	783	783	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$	
P_{allow} (#) =	5,035	5,465	5,465	6,353	6,353	$P_{allow} = A * F_c * C_D * C_F * C_P$	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.67	0.31	0.58	0.48	0.76	(Eq 3.9-3)	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.40	0.29	0.40	0.23	0.40	(Eq 3.9-4)	
$P_{c\perp allow}$ on PL (#) =	3,343	3,343	3,343	3,343	3,343	$P_{c\perp allow} = A * Fc * C_b$	
$P_{c\perp allow}$ on Beam (#) =	4,805	4,805	4,805	4,805	4,805	$P_{c\perp allow} = A * Fc$	
Deflection L/	NA	NA	NA	L/1040	L/1387	L/(I * E / 15 * L *$M_{applied}$)	
240	0.00	0.00	0.00	0.10	0.08	(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		
$V_{applied}/V_{allow}$	1.9%	1.2%	1.7%	7.1%	6.0%		
MOMENT M	OK	OK	OK	OK	OK		
$M_{applied}/M_{allow}$	14.2%	8.8%	12.4%	30.5%	29.2%		
AXIAL P	OK	OK	OK	OK	OK		
$P_{applied}/P_{allow}$	66.1%	43.4%	61.0%	29.5%	52.5%		
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK		
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	67.3%	31.1%	58.0%	48.1%	76.4%		Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK		
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	40.2%	28.7%	40.3%	22.7%	40.3%		
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK		
$P_{c\text{^}applied}/P_{c\perp allow}$	99.5%	70.9%	99.8%	56.0%	99.8%		Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK		
$P_{c\text{^}applied}/P_{c\perp allow}$	69.2%	49.3%	69.4%	39.0%	69.4%		Bearing on
DEFLECTION	OK	OK	OK	OK	OK		
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	23.1%	17.3%		
Overall Check	OK	OK	OK	OK	OK		

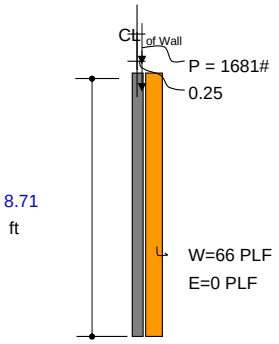
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments Max Trib for (1) 2x6 Jamb Stud

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	1,419
P_{SL} (#/ft) =	375
P_{LL} (#/ft) =	1,095
P_{TOT} (#/ft) =	2,522
e (IN) =	0.5
TRIB. (IN) =	8

LATERAL LOADS W	
W (PSF) =	15.00
E (PSF) =	0.00
TRIB. (IN) =	53

DESIGN VALUES			
F_b (psi) =	675	Hem Fir	0.56276
F_v (psi) =	150	Stud Grade	0.148721
F_c (psi) =	800	Bending X-X axis	0.434265
$F_{c\perp}$ (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) =	104.5	Full Bracing, Yes	
c =	0.8	(Sawn Lumber)	
K_e =	1	(Appendix G)	
C_b =	1.00	(Bearing Area Factor)	

Bearing wall Fire rated ? No
Fire Retardant FirePRO? No
Header Bearing Area (in^2) = 5.25 405 = $F_{c\perp}$ (psi

Use: (1) 2" X 6" @ 53" O.C. OK

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

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
L_u (ft) =	8.708	8.708	8.708	8.708	8.708	
$V_{applied}$ (#) =	8	6	8	293	224	
$M_{applied}$ (ft-#) =	35	25	35	675	542	
$P_{applied}$ (#) =	1676	1196	1681	946	1681	
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 =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)
F'$_b$ (psi)=	776	893	893	1242	1242	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 1002		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.00	19.00	19.00	19.00	19.00	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013	(Eq 3.7-1)
F'c (psi)=	610	662	662	770	770	(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	1321	1321	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	489	563	563	783	783	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	5,035	5,465	5,465	6,353	6,353	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.20	0.10	0.17	1.00	0.94	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.20	0.14	0.20	0.11	0.20	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	3,343	3,343	3,343	3,343	3,343	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	2,126	2,126	2,126	2,126	2,126	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/304	L/406	L/(I * E / 15 * L *$M_{applied}$)
240	0.00	0.00	0.00	0.34	0.26	(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	
$V_{applied}/V_{allow}$	1.0%	0.6%	0.8%	22.2%	17.0%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	7.1%	4.4%	6.2%	86.2%	69.3%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	33.3%	21.9%	30.8%	14.9%	26.5%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	20.0%	10.0%	17.3%	99.6%	93.9%	Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	20.3%	14.5%	20.3%	11.4%	20.3%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	50.1%	35.8%	50.3%	28.3%	50.3%	Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	78.8%	56.2%	79.1%	44.5%	79.1%	Bearing on
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	78.9%	59.2%	
Overall Check	OK	OK	OK	OK	OK	

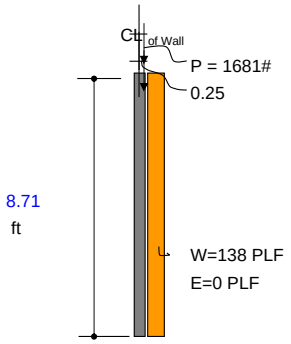
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: MRO
DATE: 05/31/23

PROJECT: Bradley Hts Apartments Max Trib for (2) 2x6 Jamb Stud

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	1,419
P_{SL} (#/ft) =	375
P_{LL} (#/ft) =	1,095
P_{TOT} (#/ft) =	2,522
e (IN) =	0.5
TRIB. (IN) =	8

LATERAL LOADS W	
W (PSF) =	15.00
E (PSF) =	0.00
TRIB. (IN) =	110

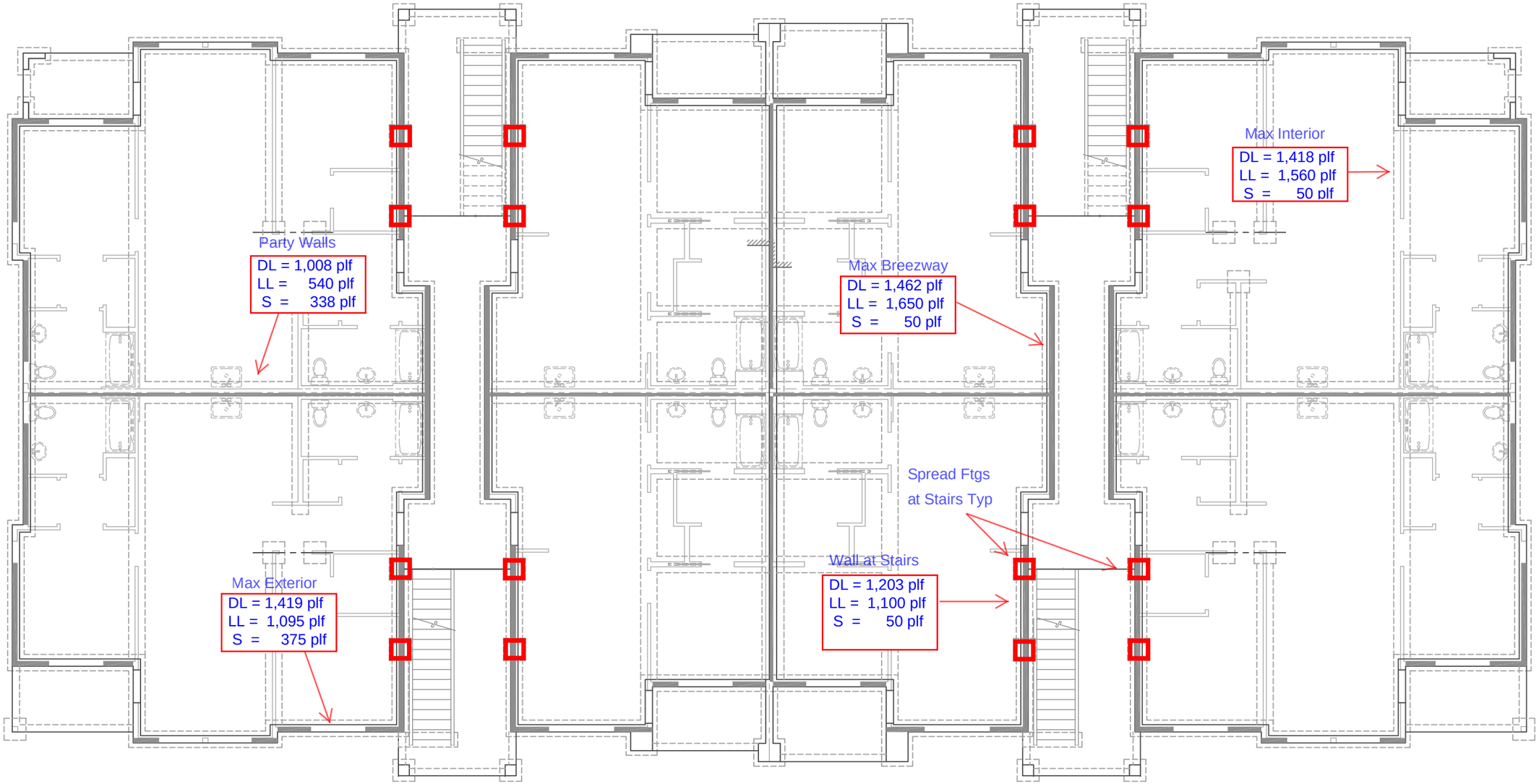
DESIGN VALUES			
F_b (psi) =	675	Hem Fir	0.56276
F_v (psi) =	150	Stud Grade	0.148721
F_c (psi) =	800	Bending X-X axis	0.434265
$F_{c\perp}$ (psi) =	405		405
E (psi) =	1.20E+06	Incised, No	
E_{min} (psi) =	4.40E+05	Wet Use, No	
C_r =	1.15	Repetive, Yes	
L_u (in) =	104.5	Full Bracing, Yes	
c =	0.8	(Sawn Lumber)	
K_e =	1	(Appendix G)	
C_b =	1.00	(Bearing Area Factor)	

Bearing wall Fire rated ? No
Fire Retardant FirePRO? No
Header Bearing Area (in^2) = 5.25 405 = $F_{c\perp}$ (psi

Use: (2) 2" X 6" @ 110" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	2	A =	8.25 in^2
b =	1.5 in	S =	15.13 in^3
d =	5.5 in	I =	41.59 in^4

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
L_u (ft) =	8.708	8.708	8.708	8.708	8.708	
$V_{applied}$ (#) =	8	6	8	603	457	
$M_{applied}$ (ft-#) =	35	25	35	1351	1050	
$P_{applied}$ (#) =	1676	1196	1681	946	1681	
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 =	1.000	1.000	1.000	1.000	1.000	(Eq 3.7-1)
F'$_b$ (psi)=	776	893	893	1242	1242	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 1002		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.00	19.00	19.00	19.00	19.00	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013	(Eq 3.7-1)
F'c (psi)=	610	662	662	770	770	(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	1321	1321	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	978	1125	1125	1565	1565	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	5,035	5,465	5,465	6,353	6,353	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.16	0.07	0.13	1.00	0.91	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.20	0.14	0.20	0.11	0.20	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	3,343	3,343	3,343	3,343	3,343	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	2,126	2,126	2,126	2,126	2,126	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/293	L/391	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.36	0.27	(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	
$V_{applied}/V_{allow}$	1.0%	0.6%	0.8%	45.7%	34.6%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	3.6%	2.2%	3.1%	86.3%	67.1%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	33.3%	21.9%	30.8%	14.9%	26.5%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	15.6%	7.4%	13.4%	99.7%	91.2%	Axial + Ber
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	20.3%	14.5%	20.3%	11.4%	20.3%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	50.1%	35.8%	50.3%	28.3%	50.3%	Bearing on
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\text{^}applied}/P_{c\perp allow}$	78.8%	56.2%	79.1%	44.5%	79.1%	Bearing on
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	81.9%	61.4%	
Overall Check	OK	OK	OK	OK	OK	



FOUNDATIONS - KEY PLAN

Bradley Heights Apartments

S4S Job# 23.007

Foundation Load Summary

Spread Ftgs	Beams	Σ DL	Σ LL	Σ S	D+L	D + 0.75(L+S)
Breezway (3 story)	(2) FB19	3.2	6.8		9.9 k	8.3 k
Breezway (3 story)	RB6 + (2) FB19	4.8	6.8	1.83	11.6 k	11.2 k
Breezway (4 story)	(3) FB19	4.8	10.1		14.9 k	12.4 k
Breezway (4 story)	RB6 + (3) FB19	6.4	10.1	1.83	16.5 k	15.4 k

Wall Footings	Building Levels	Σ DL	Σ LL	Σ S	D+L	D + 0.75(L+S)
Max Exterior	3 story	1,096	730	375	1,826 plf	1,925 plf
Max Exterior	4 story	1,419	1,095	375	2,514 plf	2,522 plf
Max Breezeway	3 story	1,029	1,100	50	2,129 plf	1,892 plf
Max Breezeway	4 story	1,462	1,650	50	3,112 plf	2,737 plf
Max Interior	3 story	990	1,040	50	2,030 plf	1,808 plf
Max Interior	4 story	1,418	1,560	50	2,978 plf	2,626 plf
Party Walls	3 story	801	360	338	1,161 plf	1,325 plf
Party Walls	4 story	1,008	540	338	1,548 plf	1,667 plf

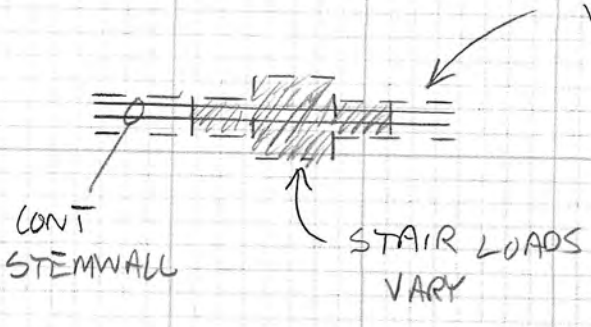
SOLUTIONS 4 STRUCTURES Inc.

JOB # 23.007

DESIGNED MRO DATE 5-31-23

PROJECT: BRADLEY HEIGHTS APTS

COMBINED FOOTINGS AT STAIRS



EXAMPLE (3) STORY @ RB16

WALL LOADING = $[2.5 + 2(2.0)](1590) = 10,335$

LANDING LOAD $= 11,600$

$21,935$ lbs

COMBINED AREA = $2(2 \times 1.5) - 6.0 + (2.5 \times 2.5)$

$= 12.25\ ft^2$

SOIL PRESSURE = $21,935/12.25 = 1,791$ PSF ($<$ ASBP $= 2,000$)

	POINT LD	WALL LD	FTG	SP
3-STORY	9,900	9,540	F2.0	1,944 PSF
3-STORY @ RB16	11,600	10,335	F2.5	1,791 PSF
4-STORY	14,900	16,121	F3.0	2,068 PSF (WITHIN 3%)
4-STORY @ RB16	16,500	17,273	F3.5	1,851 PSF

SOLUTIONS 4 STRUCTURES Inc.

JOB # 23.007

DESIGNED MRO DATE 5-31-23

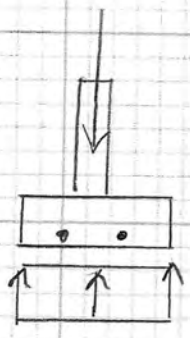
PROJECT: BRADLEY HEIGHTS - APTS

TYPICAL WALL FOOTING

$A = 18 \times 8 = 144 \text{ in}^2$

$A_{s\,min} = 0.0018\,(144) = 0.26 \text{ in}^2$

(2) #4 PROVIDED $= 0.40 \text{ in}^2$ ✓



$w_u = 1.2\,(1462) + 1.6\,(1650) = 4{,}394 \text{ PSF}$

DESIGN TOE USING STRUCTURAL PLAIN CONCRETE

$\text{TOE} = \frac{18-6}{2} = 6 \text{ in}$

$V_u = 4.394\,(6/12) = 2.20 \text{ k}$

$\phi V_c = 0.75(2)\sqrt{2500}\,(12)(4.75) = 4.28 \text{ k}$ ✓

$M_u = 4.394\,(6/12)^2/2 = 0.55 \text{ kft}$

$S = \frac{1}{6}\,(12)(8)^2 = 128 \text{ in}^3$

$\phi M_n = 0.75(5)\sqrt{2500}\,(128/12) = 2.00 \text{ kft}$ ✓

PROJECT NAME: **Bradley Heights Apts** SHEET OF
PROJECT NUMBER: **23.007**
SOLUTIONS 4 STRUCTURES DATE: 4/15/2022
STRUCTURAL ENGINEERING CONSULTANTS DESIGN BY: **MRO**

SINGLE FOOTING DESIGN TABLE

2.00 ft x 2.00 ft x 10 inches thick
(3)-#4 BOT EA. WAY

2.0'x2.0'x10 '' ..2ksf

	D	L	Hs		
LOADS	**4 k**	**4 k**	**0 k**		
Ftg Self	0.5 k				

LOAD COMBINATIONS

	D	L	Hs	AXIAL	
ASD	**1**	**1**	**1**	**8 k**	Service
ULT	**1.2**	**1.6**	**1**	**11 k**	Factored
ϕ (shear)	**0.75**				
ϕ (flexure)	**0.9**				
include ftg self weight		**no**	SW =	0.5 k	

FOOTING SIZE

LENGTH:	**2.00**	FT
WIDTH:	**2.00**	FT
DEPTH:	**10**	IN
AREA:	4.00	SF

COLUMN DATA

LENGTH:	**4**	IN
WIDTH:	**4**	IN

CONCRETE SPECS

F'c:	**2,500**	PSI
Fy:	**60,000**	PSI
d: (DEPTH-3.5"):	6.50	IN
Conc Density	**150**	PCF
Conc Ftg Weight	**0.5**	kips

SOIL

ALLOW. BEARING:	**2.00**	KSF
ACTUAL BEARING:	2.00	KSF
ULT BEARING:	2.80	KSF
	OK	

CONCRETE BEAM; SHEAR

Vu2l:	2	KIPS
Vu2w:	2	IN
Vu2(max):	2	IN^2
ϕVc2:	12	KIPS
$SR_2 = Vu_2(max) / Vc_2$ =	0.140	
	OK	

CONCRETE PUNCHING SHEAR

Vu1:	9	KIPS
bo:	42	IN
bo * d	273	IN^2
ϕVc1:	41	KIPS
$SR_1 = Vu_1 / Vc_1$ =	0.221	
	OK	

WIDTH
CONCRETE BEAM; BENDING

Muw:	1.94	K-FT
$A_{s\ (req)}$:	0.09	IN^2@ d=6.50 "
$A_{s(req)}$/FT:	0.04	IN2/FT
Mcr	12.50	K-FT
Ms	1.39	K-FT

LENGTH
CONCRETE BEAM; BENDING

Mul:	1.94	K-FT
$A_{s\ (req)}$:	0.09	IN^2@ d=6.50 "
$A_{s(req)}$/FT:	0.04	IN2/FT
Mcr	12.50	K-FT
Ms	1.39	K-FT

number of bars	**3**	
bar size	**4**	
As	**0.60**	in^2
d	**6.5**	inches
ϕMn	17	K-FT @ d=6.50 "
ϕMn / Mu1	8.54	
Mcr/Ms =	9.00	
ϕMn/Mcr =	1.33	

PROJECT NAME: **Bradley Heights Apts** SHEET OF
PROJECT NUMBER: **23.007**
SOLUTIONS 4 STRUCTURES DATE: 4/15/2022
STRUCTURAL ENGINEERING CONSULTANTS DESIGN BY: **MRO**

SINGLE FOOTING DESIGN TABLE

2.50 ft x 2.50 ft x 10 inches thick
(3)-#4 BOT EA. WAY

2.5'x2.5'x10 '' ..2ksf

	D	L	Hs		
LOADS	**6 k**	**6 k**	**0 k**		
Ftg Self	0.8 k				

LOAD COMBINATIONS

	D	L	Hs	AXIAL	
ASD	**1**	**1**	**1**	**13 k**	Service
ULT	**1.2**	**1.6**	**1**	**18 k**	Factored
ϕ (shear)	**0.75**				
ϕ (flexure)	**0.9**				
include ftg self weight		**no**	SW =	0.8 k	

FOOTING SIZE

LENGTH:	**2.50**	FT
WIDTH:	**2.50**	FT
DEPTH:	**10**	IN
AREA:	6.25	SF

COLUMN DATA

LENGTH:	**4**	IN
WIDTH:	**4**	IN

CONCRETE SPECS

F'c:	**2,500**	PSI
Fy:	**60,000**	PSI
d: (DEPTH-3.5"):	6.50	IN
Conc Density	**150**	PCF
Conc Ftg Weight	**0.78125**	kips

SOIL

ALLOW. BEARING:	**2.00**	KSF
ACTUAL BEARING:	2.00	KSF
ULT BEARING:	2.80	KSF
	OK	

CONCRETE BEAM; SHEAR

Vu2l:	4	KIPS
Vu2w:	4	IN
Vu2(max):	4	IN^2
ϕVc2:	15	KIPS
$SR_2 = Vu_2(max) / Vc_2$ =	0.259	
	OK	

CONCRETE PUNCHING SHEAR

Vu1:	15	KIPS
bo:	42	IN
bo * d	273	IN^2
ϕVc1:	41	KIPS
$SR_1 = Vu_1 / Vc_1$ =	0.375	
	OK	

WIDTH
CONCRETE BEAM; BENDING

Muw:	4.11	K-FT
$A_{s\ (req)}$:	0.19	IN^2@ d=6.50 "
$A_{s(req)}$/FT:	0.08	IN2/FT
Mcr	15.63	K-FT
Ms	2.93	K-FT

LENGTH
CONCRETE BEAM; BENDING

Mul:	4.11	K-FT
$A_{s\ (req)}$:	0.19	IN^2@ d=6.50 "
$A_{s(req)}$/FT:	0.08	IN2/FT
Mcr	15.63	K-FT
Ms	2.93	K-FT

number of bars	**3**	
bar size	**4**	
As	**0.60**	in^2
d	**6.5**	inches
ϕMn	17	K-FT @ d=6.50 "
ϕMn / Mu1	4.09	
Mcr/Ms =	5.33	
ϕMn/Mcr =	1.07	

PROJECT NAME: **Bradley Heights Apts** SHEET OF
PROJECT NUMBER: **23.007**
SOLUTIONS 4 STRUCTURES DATE: 4/15/2022
STRUCTURAL ENGINEERING CONSULTANTS DESIGN BY: **MRO**

SINGLE FOOTING DESIGN TABLE

3.00 ft x 3.00 ft x 12 inches thick
(3)-#4 BOT EA. WAY

3.0'x3.0'x12 '' ..2ksf

	D	L	Hs		
LOADS	**9 k**	**9 k**	**0 k**		
Ftg Self	1.4 k				

LOAD COMBINATIONS

	D	L	Hs	AXIAL	
ASD	**1**	**1**	**1**	**18 k**	Service
ULT	**1.2**	**1.6**	**1**	**25 k**	Factored

ϕ (shear)	**0.75**			
ϕ (flexure)	**0.9**			
include ftg self weight		**no**	SW =	1.4 k

FOOTING SIZE

LENGTH:	**3.00**	FT
WIDTH:	**3.00**	FT
DEPTH:	**12**	IN
AREA:	9.00	SF

COLUMN DATA

LENGTH:	**4**	IN
WIDTH:	**4**	IN

CONCRETE SPECS

F'c:	**2,500**	PSI
Fy:	**60,000**	PSI
d: (DEPTH-3.5"):	8.50	IN
Conc Density	**150**	PCF
Conc Ftg Weight	**1.35**	kips

SOIL

ALLOW. BEARING:	**2.00**	KSF
ACTUAL BEARING:	2.00	KSF
ULT BEARING:	2.80	KSF
	OK	

CONCRETE BEAM; SHEAR

Vu2l:	5	KIPS
Vu2w:	5	IN
Vu2(max):	5	IN^2
ϕVc2:	23	KIPS
$SR_2 = Vu_2(max) / Vc_2$ =	0.229	
	OK	

CONCRETE PUNCHING SHEAR

Vu1:	22	KIPS
bo:	50	IN
bo * d	425	IN^2
ϕVc1:	64	KIPS
$SR_1 = Vu_1 / Vc_1$ =	0.348	
	OK	

WIDTH
CONCRETE BEAM; BENDING

Muw:	7.47	K-FT
$A_{s\ (req)}$:	0.26	IN^2@ d=8.50 "
$A_{s(req)}$/FT:	0.09	IN2/FT
Mcr	27.00	K-FT
Ms	5.33	K-FT

LENGTH
CONCRETE BEAM; BENDING

Mul:	7.47	K-FT
$A_{s\ (req)}$:	0.26	IN^2@ d=8.50 "
$A_{s(req)}$/FT:	0.09	IN2/FT
Mcr	27.00	K-FT
Ms	5.33	K-FT

number of bars	**3**	
bar size	**4**	
As	**0.60**	in^2
d	**8.5**	inches
ϕMn	22	K-FT @ d=8.50 "
ϕMn / Mu1	2.99	
Mcr/Ms =	5.06	
ϕMn/Mcr =	0.83	

PROJECT NAME: **Bradley Heights Apts** SHEET OF
PROJECT NUMBER: **23.007**
SOLUTIONS 4 STRUCTURES DATE: 4/15/2022
STRUCTURAL ENGINEERING CONSULTANTS DESIGN BY: **MRO**

SINGLE FOOTING DESIGN TABLE

3.5'x3.5'x12 '' ..2ksf

3.50 ft x 3.50 ft x 12 inches thick
(4)-#4 BOT EA. WAY

	D	L	Hs		
LOADS	**12 k**	**12 k**	**0 k**		
Ftg Self	1.8 k				

LOAD COMBINATIONS

	D	L	Hs	AXIAL	
ASD	**1**	**1**	**1**	**25 k**	Service
ULT	**1.2**	**1.6**	**1**	**34 k**	Factored
ϕ (shear)	**0.75**				
ϕ (flexure)	**0.9**				
include ftg self weight		**no**	SW =	1.8 k	

FOOTING SIZE

LENGTH:	**3.50**	FT
WIDTH:	**3.50**	FT
DEPTH:	**12**	IN
AREA:	12.25	SF

COLUMN DATA

LENGTH:	**4**	IN
WIDTH:	**4**	IN

CONCRETE SPECS

F'c:	**2,500**	PSI
Fy:	**60,000**	PSI
d: (DEPTH-3.5"):	8.50	IN
Conc Density	**150**	PCF
Conc Ftg Weight	**1.8375**	kips

SOIL

ALLOW. BEARING:	**2.00**	KSF
ACTUAL BEARING:	2.00	KSF
ULT BEARING:	2.80	KSF
	OK	

CONCRETE BEAM; SHEAR

Vu2l:	9	KIPS
Vu2w:	9	IN
Vu2(max):	9	IN^2
ϕVc2:	27	KIPS
$SR_2 = Vu_2(max) / Vc_2$ =	0.320	
	OK	

CONCRETE PUNCHING SHEAR

Vu1:	31	KIPS
bo:	50	IN
bo * d	425	IN^2
ϕVc1:	64	KIPS
$SR_1 = Vu_1 / Vc_1$ =	0.490	
	OK	

WIDTH
CONCRETE BEAM; BENDING

Muw:	12.28	K-FT
$A_{s\ (req)}$:	0.43	IN^2@ d=8.50 "
$A_{s(req)}$/FT:	0.12	IN2/FT
Mcr	31.50	K-FT
Ms	8.77	K-FT

LENGTH
CONCRETE BEAM; BENDING

Mul:	12.28	K-FT
$A_{s\ (req)}$:	0.43	IN^2@ d=8.50 "
$A_{s(req)}$/FT:	0.12	IN2/FT
Mcr	31.50	K-FT
Ms	8.77	K-FT

number of bars	**4**	
bar size	**4**	
As	**0.80**	in^2
d	**8.5**	inches
ϕMn	30	K-FT @ d=8.50 "
ϕMn / Mu1	2.41	
Mcr/Ms =	3.59	
ϕMn/Mcr =	0.94	

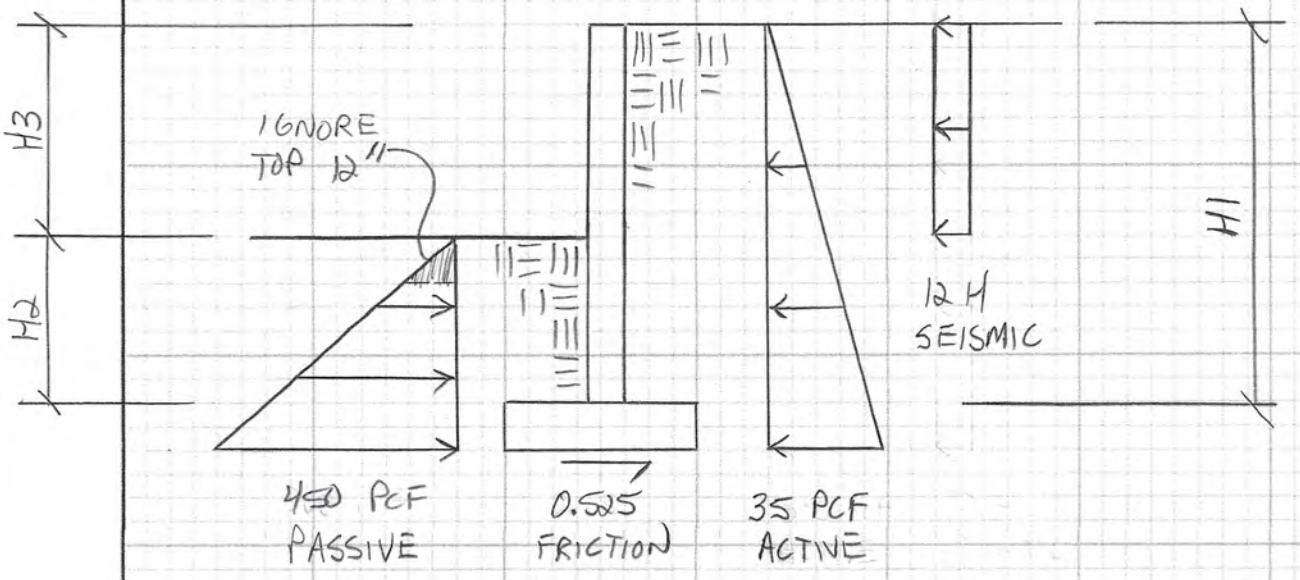
SOLUTIONS 4 STRUCTURES Inc.

JOB # 23.007

DESIGNED MRO DATE 5-29-23

PROJECT: BRADLEY HEIGHTS APTS

BASEMENT RETAINING WALL



TOTAL HT H1	EXTERIOR HT H2	WALL DESIGN HT H3	
10'-0"	3'-6"	6'-6"	← CONTROLS
8'-0"	3'-0"	5'-0"	
6'-0"	2'-0"	4'-0"	
4'-0"	1'-0"	3'-0"	
2'-0"	0'-8"	1'-4"	

SITE RETAINING WALLS

Project Bradley Heights
S4S Job# 23.007
Date 5-19-23

SOIL PROPERTIES

Active Pressure	P_A =	35 pcf
Seismic Surcharge	P_E =	0 H
Passive Pressure	P_P =	450 pcf
Friction	μ=	0.525
Soil Weight	γ =	120 pcf
Allowable Bearing	ASBP =	2,000 psf
Allowable 1/3 Increase?		yes
Add'l Wall Loading	D+L =	0 plf
Live Load Surcharge	LL =	0.00 ft

WALL & FOOTING DIMENSIONS

Concrete Strength	f'c =	3,000 psi
Wall thickness	t =	8 in
Footing thickness	tf =	14 in
Wall Height	H =	10.0 ft
Toe Length	bt =	2.67 ft
Heel Lenth	bh =	1.67 ft
Footing Length	bf =	5.00 ft

STABILITY CHECKS

Wall wt	W_w =	1.000 k
Add'l D+L	W_{D+L} =	0.000 k
Footing wt	W_f =	0.875 k
Soil wt	W_s =	2.000 k
Surcharge	W =	0.000 k
Total wt	W =	3.875 k

Construction

Overturning M	OTM =	8.12 kft
Resisting M	RM =	13.5 kft
Sliding Force	V =	2.182 k
Friction	R =	2.187 k
Sliding FS	SF =	See hand Calcs
Soil Pressure	SP =	1,854 psf **OK!**

WALL DESIGN

Base Design Shear	Vu =	1.7 k	
Shear Strength	ϕVc =	5.6 k	OK!
Base Design Moment	Mu =	7.9 kft	
Bending Strength	**ϕMn =**	**8.9 kft**	**OK!**
Cracking Moment	Mcr =	4.38 kft	Ductile
Bar A	#	5	
Spacing A	s =	10 in o.c.	
As provided	As =	0.37 in2	OK!
As min	As min =	0.23 in2	
Development	Ldh =	10 in	OK!
1/3 height Moment	Mu =	2.02 kft	
Bending Strength	**ϕMn =**	**4.07 kft**	**OK!**
Cracking Moment	Mcr =	4.38 kft	>> Mu
Bar B	#	4	
Spacing B	s =	10 in o.c.	

FOOTING DESIGN

Heel Shear	Vu =	1.2 k	
Heel Shear Strength	ϕVc =	11.6 k	OK!
Heel Design Moment	Mu =	2.3 kft	
Heel Bending Strength	**ϕMn =**	**12.4 kft**	**OK!**
Bar C	#	4	
Spacing C	s =	10 in o.c.	
As provided	As =	0.24 in2	OK!
As min	As min =	0.24 in2	

SITE RETAINING WALLS

Project Bradley Heights
S4S Job# 23.007
Date 5-19-23

SOIL PROPERTIES

Active Pressure	P_A =	35	pcf
Seismic Surcharge	P_E =	0	H
Passive Pressure	P_P =	450	pcf
Friction	μ=	0.525	
Soil Weight	γ =	120	pcf
Allowable Bearing	ASBP =	2,000	psf
Allowable 1/3 Increase?		yes	
Add'l Wall Loading	D+L =	0	plf
Live Load Surcharge	LL =	0.00	ft

WALL DESIGN

Base Design Shear	Vu =	1.0	k	
Shear Strength	ϕVc =	5.6	k	OK!
Base Design Moment	Mu =	3.6	kft	
Bending Strength	**ϕMn =**	**7.5**	**kft**	**OK!**
Cracking Moment	Mcr =	4.38	kft	Ductile
Bar A	#	5		
Spacing A	s =	12	in o.c.	
As provided	As =	0.31	in2	OK!
As min	As min =	0.21	in2	
Development	Ldh =	6	in	OK!

WALL & FOOTING DIMENSIONS

Concrete Strength	f'c =	3,000	psi
Wall thickness	t =	8	in
Footing thickness	tf =	12	in
Wall Height	H =	8.0	ft
Toe Length	bt =	2.00	ft
Heel Lenth	bh =	1.33	ft
Footing Length	bf =	4.00	ft

1/3 height Moment	Mu =	1.03	kft
Bending Strength	**ϕMn =**	**3.42**	**kft** **OK!**
Cracking Moment	Mcr =	4.38	kft >> Mu
Bar B	#	4	
Spacing B	s =	12	in o.c.

STABILITY CHECKS

Wall wt	W_w =	0.800	k
Add'l D+L	W_{D+L} =	0.000	k
Footing wt	W_f =	0.600	k
Soil wt	W_s =	1.280	k
Surcharge	W =	0.000	k
Total wt	W =	2.680	k

FOOTING DESIGN

Heel Shear	Vu =	0.7	k	
Heel Shear Strength	ϕVc =	9.6	k	OK!
Heel Design Moment	Mu =	1.2	kft	
Heel Bending Strength	**ϕMn =**	**8.6**	**kft**	**OK!**
Bar C	#	4		
Spacing C	s =	12	in o.c.	
As provided	As =	0.20	in2	OK!
As min	As min =	0.20	in2	

Construction

Overturning M	OTM =	4.25	kft
Resisting M	RM =	7.3	kft
Sliding Force	V =	1.418	k
Friction	R =	1.519	k
Sliding FS	SF =	See hand Calcs	
Soil Pressure	SP =	1,555	psf **OK!**

SITE RETAINING WALLS

Project Bradley Heights
S4S Job# 23.007
Date 5-19-23

SOIL PROPERTIES

Active Pressure	P_A =	35	pcf
Seismic Surcharge	P_E =	0	H
Passive Pressure	P_P =	450	pcf
Friction	μ=	0.525	
Soil Weight	γ =	120	pcf
Allowable Bearing	ASBP =	2,000	psf
Allowable 1/3 Increase?		yes	
Add'l Wall Loading	D+L =	0	plf
Live Load Surcharge	LL =	0.00	ft

WALL & FOOTING DIMENSIONS

Concrete Strength	f'c =	3,000	psi
Wall thickness	t =	8	in
Footing thickness	tf =	12	in
Wall Height	H =	6.0	ft
Toe Length	bt =	1.33	ft
Heel Lenth	bh =	1.00	ft
Footing Length	bf =	3.00	ft

STABILITY CHECKS

Wall wt	W_w =	0.600 k
Add'l D+L	W_{D+L} =	0.000 k
Footing wt	W_f =	0.450 k
Soil wt	W_s =	0.720 k
Surcharge	W =	0.000 k
Total wt	W =	1.770 k

Construction

Overturning M	OTM =	2.00 kft
Resisting M	RM =	3.5 kft
Sliding Force	V =	0.858 k
Friction	R =	1.042 k
Sliding FS	SF =	See hand Calcs
Soil Pressure	SP =	1,417 psf **OK!**

WALL DESIGN

Base Design Shear	Vu =	0.6 k	
Shear Strength	ϕVc =	3.9 k	OK!
Base Design Moment	Mu =	1.9 kft	
Bending Strength	**ϕMn =**	**3.4 kft**	**OK!**
Cracking Moment	Mcr =	4.38 kft	>> Mu
Bar A	#	4	
Spacing A	s =	12 in o.c.	
As provided	As =	0.20 in2	OK!
As min	As min =	0.17 in2	
Development	Ldh =	6 in	OK!
1/3 height Moment	Mu =	0.44 kft	
Bending Strength	**ϕMn =**	**3.42 kft**	**OK!**
Cracking Moment	Mcr =	4.38 kft	>> Mu
Bar B	#	4	
Spacing B	s =	12 in o.c.	
			Full ht bar

FOOTING DESIGN

Heel Shear	Vu =	0.2 k	
Heel Shear Strength	ϕVc =	9.6 k	OK!
Heel Design Moment	Mu =	0.5 kft	
Heel Bending Strength	**ϕMn =**	**8.6 kft**	**OK!**
Bar C	#	4	
Spacing C	s =	12 in o.c.	
As provided	As =	0.20 in2	OK!
As min	As min =	0.20 in2	

SITE RETAINING WALLS

Project Bradley Heights
S4S Job# 23.007
Date 5-19-23

SOIL PROPERTIES

Active Pressure	P_A =	35	pcf
Seismic Surcharge	P_E =	0	H
Passive Pressure	P_P =	450	pcf
Friction	μ=	0.525	
Soil Weight	γ =	120	pcf
Allowable Bearing	ASBP =	2,000	psf
Allowable 1/3 Increase?		yes	
Add'l Wall Loading	D+L =	0	plf
Live Load Surcharge	LL =	0.00	ft

WALL & FOOTING DIMENSIONS

Concrete Strength	f'c =	3,000	psi
Wall thickness	t =	8	in
Footing thickness	tf =	10	in
Wall Height	H =	4.0	ft
Toe Length	bt =	0.67	ft
Heel Lenth	bh =	0.67	ft
Footing Length	bf =	2.00	ft

STABILITY CHECKS

Wall wt	W_w =	0.400	k
Add'l D+L	W_{D+L} =	0.000	k
Footing wt	W_f =	0.250	k
Soil wt	W_s =	0.320	k
Surcharge	W =	0.000	k
Total wt	W =	0.970	k

Construction

Overturning M	OTM =	0.66	kft
Resisting M	RM =	1.2	kft
Sliding Force	V =	0.409	k
Friction	R =	0.587	k
Sliding FS	SF =	See hand Calcs	
Soil Pressure	SP =	1,196 psf	**OK!**

WALL DESIGN

Base Design Shear	Vu =	0.4 k	
Shear Strength	ϕVc =	3.9 k	OK!
Base Design Moment	Mu =	0.8 kft	
Bending Strength	**ϕMn =**	**2.6 kft**	**OK!**
Cracking Moment	Mcr =	4.38 kft	>> Mu
Bar A	#	4	
Spacing A	s =	16 in o.c.	
As provided	As =	0.15 in2	OK!
As min	As min =	0.17 in2	
Development	Ldh =	6 in	OK!
1/3 height Moment	Mu =	0.13 kft	
Bending Strength	**ϕMn =**	**2.60 kft**	**OK!**
Cracking Moment	Mcr =	4.38 kft	>> Mu
Bar B	#	4	
Spacing B	s =	16 in o.c.	
			Full ht bar

FOOTING DESIGN

Heel Shear	Vu =	0.0 k	
Heel Shear Strength	ϕVc =	7.6 k	OK!
Heel Design Moment	Mu =	0.2 kft	
Heel Bending Strength	**ϕMn =**	**5.1 kft**	**OK!**
Bar C	#	4	
Spacing C	s =	16 in o.c.	
As provided	As =	0.15 in2	OK!
As min	As min =	0.17 in2	

SOLUTIONS 4 STRUCTURES Inc.

JOB # 23.007

DESIGNED MRO DATE 5-29-23

PROJECT: BRADLEY HEIGHTS APTS

WALL DESIGN

MAX FREE HT (ABOVE EXTERIOR GRADE = 6'-6")

DEPTH TO ZERO SHEAR (ie MAX MOMENT)

$$(1.6)\frac{450x^2}{2} = (1.6)\frac{35(x+6.5)^2}{2} + 12(6.5)^2$$

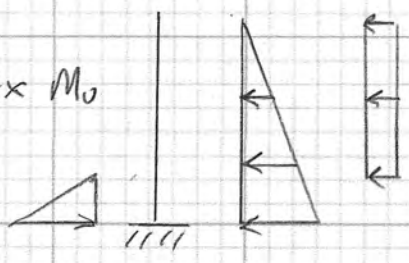
$x = 2.87$ ft

∴ DESIGN $H = 6.5 + 2.87 = 9.37$ ft

MAX $V_u = 1.6(35)(6.5)^2/2 + 12(6.5)^2 = 1.69$ k

$\phi V_c = 0.75(2)\sqrt{3000}(12)(4.0) = 3.94$ k ✓

MAX M_u



$M_u = 1.6(35)(9.37)^3/6 = 7.68$

$+ 12(6.5)^2(6.12) = 3.10$

$- 1.6(450)(2.87)^3/6 = -2.84$

7.94 kft

$A_s = \#5\ @\ 10" = 0.372$

$a = \frac{.372(60)}{.85(3)(12)} = 0.729$ in

$\phi M_n = 0.9(.372)(60)\left(5.69 - \frac{.729}{2}\right)/12 = 8.91$ kft

SOLUTIONS 4 STRUCTURES Inc.

JOB # 23.007

DESIGNED MRO DATE 5-29-23

PROJECT: BRADLEY HEIGHTS APTS

SLIDING CHECKS

HI	ACTIVE	SEISMIC	FRICTION	PASSIVE	SF
10'-0"	2,182	355	2,623	4,675	2.88
8'-0"	1,418	210	1,785	3,375	3.17
6'-0"	858	134	1,097	1,800	2.92
4'-0"	409	76	594	531	2.32
2'-0"	140	15	274	281	3.58

EXAMPLE: 10'-0" WALL

ACTIVE = $35(10 + 14/12)^2/2$ = 2,182

SEISMIC = $12(6.5)(6.5) \times 0.7$ = 355

2,537 lbs

ΣW $5(175) + 10(100) + 3.5(2.67 \times 120) + 10(1.67 \times 120)$ = 4,995 lbs

FRICTION = $0.525(4,995)$ = 2,623

PASSIVE = $450(4.83)^2/2 - 450(1)^2/2$ = 4,675

7,298 lbs

SF = 7,298/2,537 = 2.88

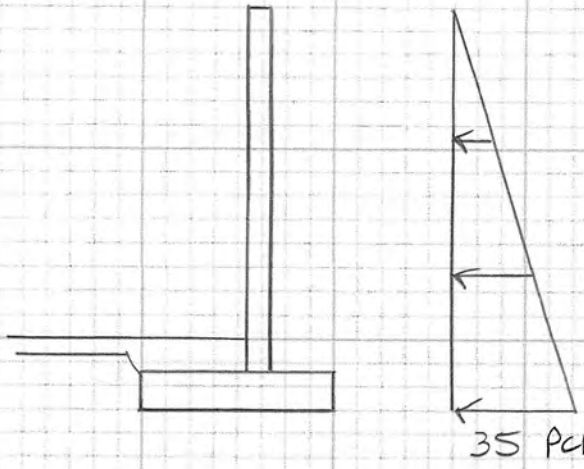
SOLUTIONS 4 STRUCTURES Inc.

JOB # 23.007

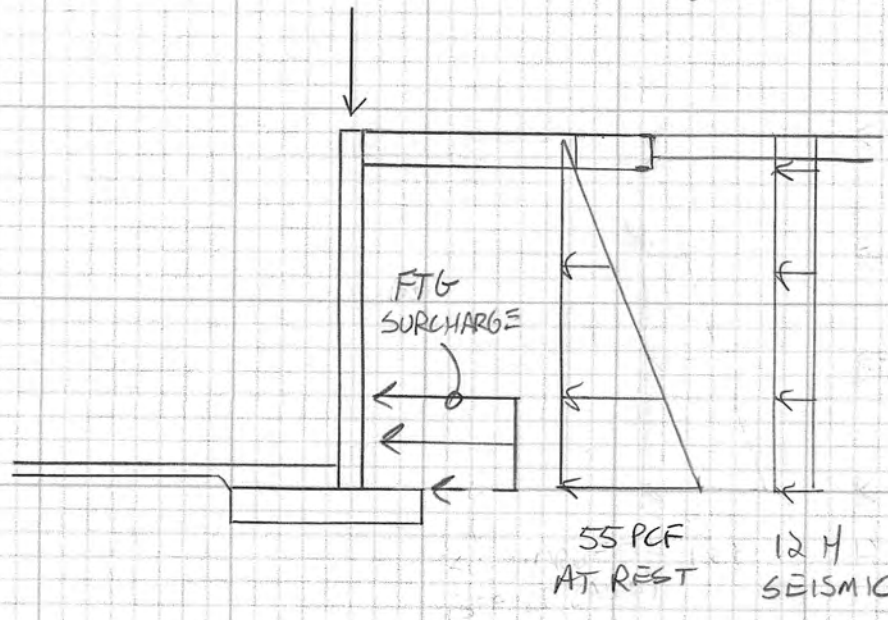
DESIGNED MRO DATE 5-29-23

PROJECT: BRADLEY HEIGHTS APTS

3-4 SPLIT LEVEL BASEMENT WALL



CONDITION 1 = TEMP CANTILEVER DURING CONSTRUCTION (SEE SPREADSHEET OUTPUT)



CONDITION 2 = FINAL AT REST CONDITION

SITE RETAINING WALLS

Project Bradley Heights
S4S Job# 23.007
Date 5-19-23

SOIL PROPERTIES

Active Pressure	P_A =	35	pcf
Seismic Surcharge	P_E =	0	H
Passive Pressure	P_P =	450	pcf
Friction	μ=	0.525	
Soil Weight	γ =	120	pcf
Allowable Bearing	ASBP =	2,000	psf
Allowable 1/3 Increase?		yes	
Add'l Wall Loading	D+L =	0	plf
Live Load Surcharge	LL =	0.00	ft

WALL DESIGN

Base Design Shear	Vu =	2.8	k	
Shear Strength	ϕVc =	5.6	k	OK!
Base Design Moment	Mu =	9.3	kft	
Bending Strength	**ϕMn =**	**9.9**	**kft**	**OK!**
Cracking Moment	Mcr =	4.38	kft	Ductile
Bar A	#	5		
Spacing A	s =	8	in o.c.	
As provided	As =	0.47	in2	OK!
As min	As min =	0.23	in2	
Development	Ldh =	10	in	OK!

WALL & FOOTING DIMENSIONS

Concrete Strength	f'c =	3,000	psi
Wall thickness	t =	8	in
Footing thickness	tf =	14	in
Wall Height	H =	10.0	ft
Toe Length	bt =	2.67	ft
Heel Lenth	bh =	1.67	ft
Footing Length	bf =	5.00	ft

1/3 height Moment	Mu =	2.02	kft	
Bending Strength	**ϕMn =**	**5.00**	**kft**	**OK!**
Cracking Moment	Mcr =	4.38	kft	>> Mu
Bar B	#	4		
Spacing B	s =	8	in o.c.	

STABILITY CHECKS

Wall wt	W_w =	1.000	k
Add'l D+L	W_{D+L} =	0.000	k
Footing wt	W_f =	0.875	k
Soil wt	W_s =	2.000	k
Surcharge	W =	0.000	k
Total wt	W =	3.875	k

FOOTING DESIGN

Heel Shear	Vu =	1.2	k	
Heel Shear Strength	ϕVc =	11.6	k	OK!
Heel Design Moment	Mu =	2.3	kft	
Heel Bending Strength	**ϕMn =**	**15.5**	**kft**	**OK!**
Bar C	#	4		
Spacing C	s =	8	in o.c.	
As provided	As =	0.30	in2	OK!
As min	As min =	0.24	in2	

Construction

Overturning M	OTM =	8.12	kft
Resisting M	RM =	13.5	kft
Sliding Force	V =	2.182	k
Friction	R =	2.187	k
Sliding FS	SF =	1.00	**Add Key !!**
Soil Pressure	SP =	1,855	psf **OK!**

SOLUTIONS 4 STRUCTURES Inc.

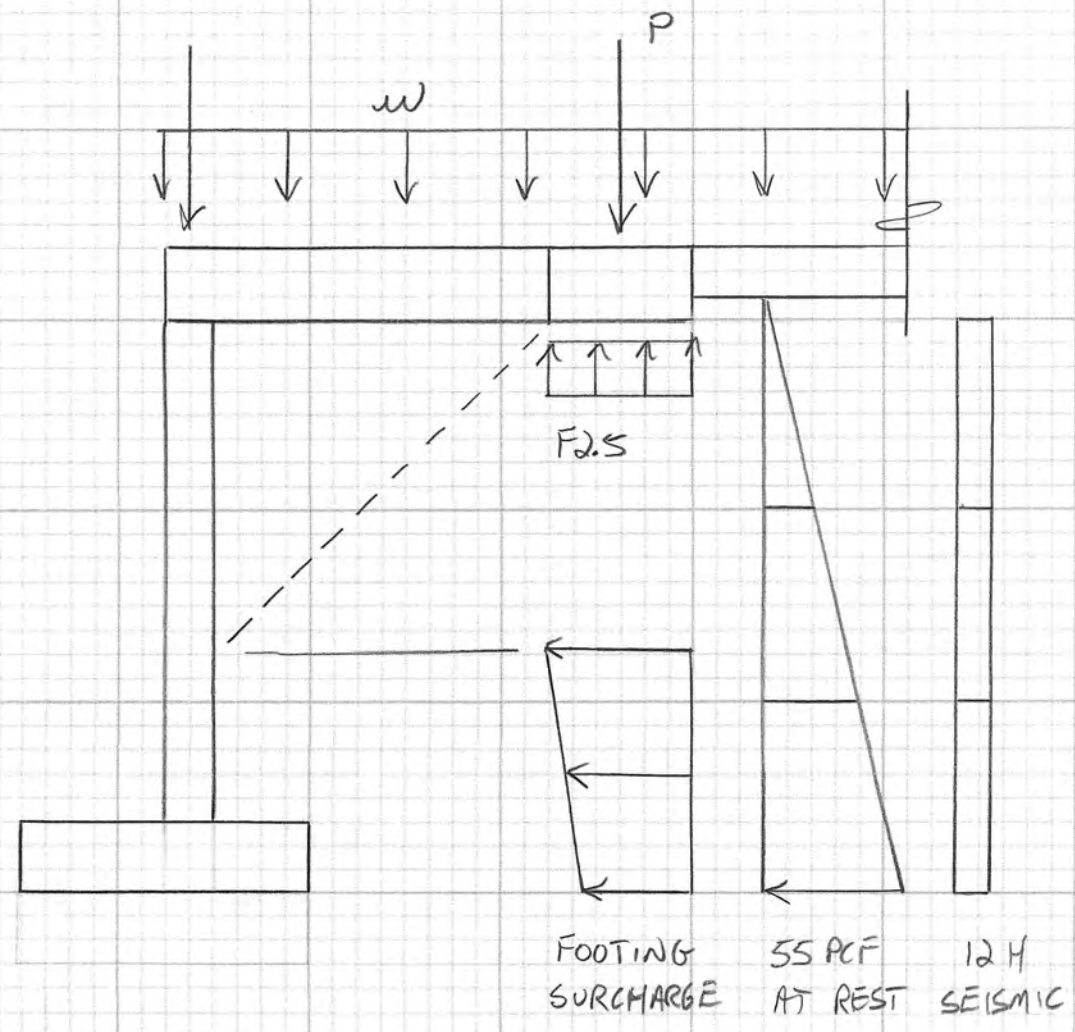
JOB # _____

DESIGNED _____ DATE _____

PROJECT: _____

3-4 STORY SPLIT LEVEL BASEMENT WALL

DESIGN GRADE BEAM TO SPAN BEARING WALL AT BACKFILL



$w_{u\,max}$ = 3,066 plf (SEE GRADE BM DESIGN)

P_u = 3,066 (8/2) = 12.2 K

SURCHARGE VARIES W/ DEPTH

d = 8 ft w_u = 12.2 (55/120) / (2(8) + 2.5) = 302 PSF

d = 10 ft w_u = 12.2 (55/120) / (2(10) + 2.5) = 249 PSF

Description:

Bradley Heights Apts
S4S Job# 23.007

Split Level Basement Wall

Units: English

Properties - X = feet, E = ksi, I = in^4
X = 0; E = 3122; I = 512;

Moment Releases - X = feet

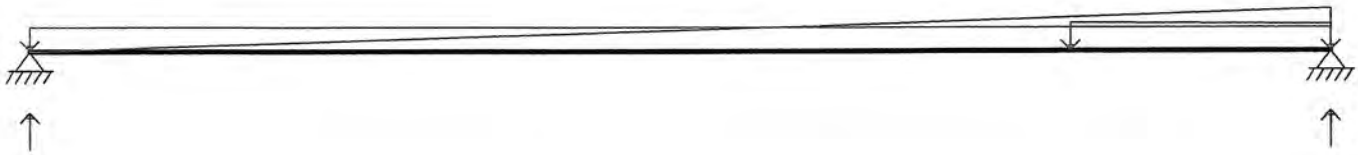
Supports - X = feet, Displacement = inches, Rotation = radians
X = 0; Disp = 0;
X = 10; Disp = 0;

Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

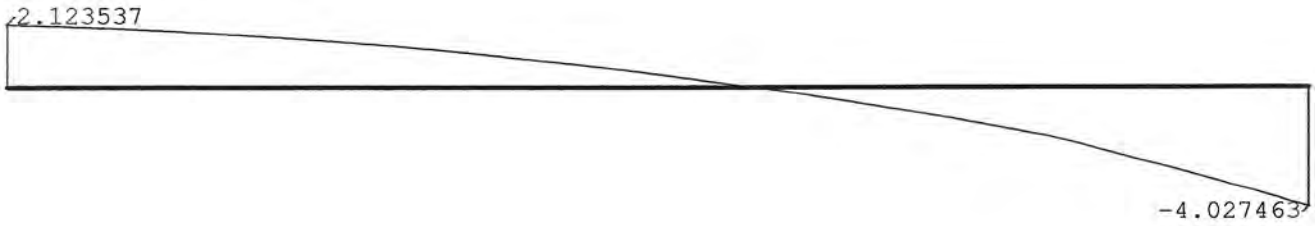
Point Loads - X = feet, PLoad = kips, Moment = kip ft

Uniform Loads - XStart & XEnd = feet, UStart & UEnd = kip/ft
XStart = 0; XEnd = 10; UStart = -0.120; UEnd = -0.120;
/Seismic Surcharge
XStart = 0; XEnd = 10; UStart = 0; UEnd = -0.880;
/At Rest Pressure
XStart = 8; XEnd = 10; UStart = -0.302; UEnd = -0.249;
/Surcharge Pressure

Reactions - kips, kip ft

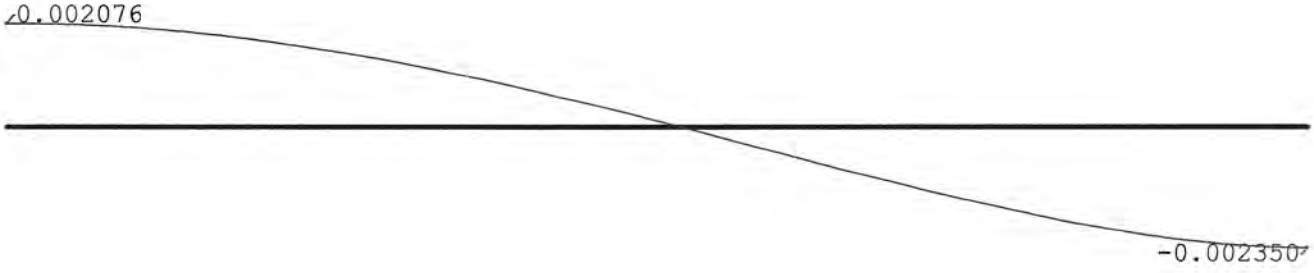


Shear - kips

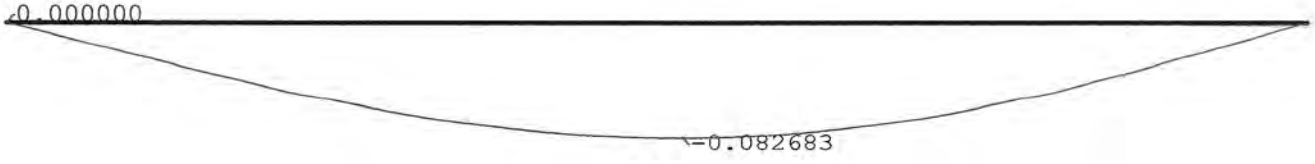


Moment - kip ft

Rotation - radians



Deflection - inches



Analysis Data:

Beam Length = 10. feet
Number of Nodes = 201
Number of Elements = 200
Number of Degrees of Freedom = 402

Reactions:

X feet	Vert kips	Rot kip ft
0	2.124	
10.000	4.027	

Equilibrium:

	Force	Reaction	Diff
Vert	-6.151	6.151	0.000 kips
Rot	40.275	-40.275	0.000 kip ft

Min & Max values:

Min Shear	=	-4.027 kips	at	10.000 feet
Max Shear	=	2.124 kips	at	0 feet
Min Moment	=	-2.634e-013 kip ft	at	10.000 feet
Max Moment	=	7.439 kip ft	at	5.700 feet
Min Rotation	=	-0.00235 radians	at	10.000 feet
Max Rotation	=	0.002076 radians	at	0 feet
Min Deflection	=	-0.082683 in	at	5.200 feet
Max Deflection	=	0 in	at	0 feet

SOLUTIONS 4 STRUCTURES Inc.

JOB # 23.007

DESIGNED MRO DATE 5-29-23

PROJECT: BRADLEY HEIGHTS APTS

FINAL BASEMENT WALL DESIGN

$V_{u_{max}} = 4.03$ K

$M_{u_{max}} = 7.43$ K-ft

} SEE OUTPUT

$\phi V_c = 0.75(2)\sqrt{3000}\,(12)(5.69) = 5.61$ K ✓

$A_s = \#5 @ 8''$ (MID-HT)

$= 0.465$ in^2

$a = \dfrac{.465(60)}{.85(3)(12)} = 0.912$ in

$\phi M_n = 0.9(.465)(60)\left(4.0 - \dfrac{.912}{2}\right)/12 = 7.42$ K-ft ✓

SOLUTIONS 4 STRUCTURES Inc.

JOB # 23.007

DESIGNED MRO DATE 5-29-23

PROJECT: BRADLEY HEIGHTS APTS

GRADE BEAM DESIGN (18" x 14")

SELF WT = 1.5(1.17)(150) = 263

SDL = 825 (MAX PERP BRG WALL)

1,088

LL = 1,100

w = 1088 + 1100 = 2,188 plf

w_u = 1.2(1088) + 1.6(1100) = 3,066 plf

F25 R

= 2,188 (8/2)

= 8,752 lbs (1400 PSF)

V_u = 3.066(8/2) = 12.2k (9.6k @ dist d)

ϕV_c = 0.75(2)$\sqrt{2500}$(18)(10.25) = 13.9k $\geq 2V_u$ (PROVIDE MIN REINF @ d/2)

MIN REINF AREA = $\frac{12.2 - 13.9/2}{12.2}(4.0)$ = 1.72 sq ft

M_u = 3.066(8)^2/8 = 24.5 kft

A_s = (2) #5 = 0.62 in^2

$a = \frac{0.62(60)}{.85(2.5)(18)}$ = 0.972 in

$\phi M_n = 0.9(.62)(60)\left(10.25 - \frac{.972}{2}\right)/12$ = 27.2 kft ✓

Lateral

Building F

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 **Sheet:**

Designed: MRO **Date:** 5/29/23

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)

This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

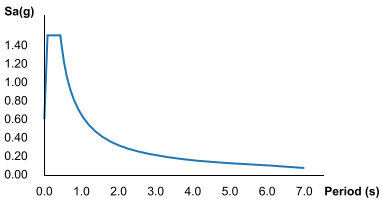
The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Hazards by Location

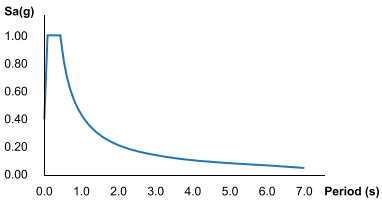
Search Information

Coordinates:	47.16516801120486, -122.2920663220895
Elevation:	386 ft
Timestamp:	2023-05-11T15:08:01.436Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	C

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	1.264	MCE_R ground motion (period=0.2s)
S_1	0.436	MCE_R ground motion (period=1.0s)
S_{MS}	1.516	Site-modified spectral acceleration value
S_{M1}	0.654	Site-modified spectral acceleration value
S_{DS}	1.011	Numeric seismic design value at 0.2s SA
S_{D1}	0.436	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.914	Coefficient of risk (0.2s)
CR_1	0.898	Coefficient of risk (1.0s)
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
SsRT	1.264	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.383	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.436	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.485	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

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

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 **Sheet:**

Designed: TLC **Date:** 5/29/23

Checked: **Date:**

Project: Bradley Heights Apartments 3 story

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= 35.32 feet Alpha = 7

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

Building Width, B= 60.00 feet

Building Length, L= 158.00 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	2.67	9.69	4.36
20	0.62	12.60	8.57	2.67	11.23	5.90
30	0.70	14.14	9.62	2.67	12.29	6.95
35	0.73	14.78	10.05	2.67	12.72	7.38
35.32	0.73	14.82	10.08	2.67	12.75	7.41
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
35.32	$q=q_h=q_i$=	14.82	10.08	2.67	12.75	7.41
0	$q=q_p$=	0.00	-	-	-	Parapet

Totals

Windward + Leeward		h
Along B	Along L	feet
10.4 (6.2)	13.3 (8.0)	10
11.9 (7.2)	14.9 (8.9)	20
13.0 (7.8)	15.9 (9.6)	30
13.4 (8.1)	16.4 (9.8)	35
13.5 (8.1)	16.4 (9.8)	35.32
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
13.5 (8.1)	16.4 (9.8)	35.32
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)	
14.82	-6.30	2.67	-3.63	-8.97	Along L
14.82	-3.38	2.67	-0.71	-6.05	Along B

C_p = -0.5 (Leeward along L)

C_p = -0.27 (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	17.5 (10.5)	-1.10	-19.0 (-11.4)	-1.40	-23.4 (-14.0)
25	0.93	16.4 (9.9)	-1.03	-17.9 (-10.8)	-1.26	-21.3 (-12.8)
50	0.88	15.7 (9.4)	-0.98	-17.1 (-10.3)	-1.15	-19.8 (-11.9)
200	0.77	14.1 (8.4)	-0.87	-15.6 (-9.3)	-0.94	-16.6 (-10.0)

GC_{pi} = 0.18 (Windward)

GC_{pi} = -0.18 (Leeward)

q_h(psf) = 14.82

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 **Sheet:**

Designed: TLC **Date:** 5/29/23

Checked: **Date:**

Project: Bradley Heights Apartments 3 story

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= 44.50 feet Alpha = 7

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

Building Width, B= 60.00 feet

Building Length, L= 158.00 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	2.85	9.88	4.18
20	0.62	12.60	8.57	2.85	11.42	5.72
30	0.70	14.14	9.62	2.85	12.47	6.77
35	0.73	14.78	10.05	2.85	12.90	7.20
40	0.76	15.36	10.44	2.85	13.29	7.59
44.5	0.78	15.83	10.77	2.85	13.62	7.92
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
44.5	q=q_h=q_i=	15.83	10.77	2.85	13.62	7.92
0	q=q_p=	0.00	-	-	-	Parapet

Totals

Windward + Leeward		h
Along B	Along L	feet
10.6 (6.4)	13.8 (8.3)	10
12.2 (7.3)	15.3 (9.2)	20
13.2 (7.9)	16.3 (9.8)	30
13.7 (8.2)	16.8 (10.1)	35
14.1 (8.4)	17.2 (10.3)	40
14.4 (8.6)	17.5 (10.5)	44.5
-	-	-
-	-	-
-	-	-
-	-	-
14.4 (8.6)	17.5 (10.5)	44.5
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)	
15.83	-6.73	2.85	-3.88	-9.58	Along L
15.83	-3.61	2.85	-0.76	-6.46	Along B

C_p = -0.5 (Leeward along L)

C_p = -0.27 (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 (ft^2)	GC_p(4&5)	Windward	GC_p(4)	Leeward	GC_p(5)	Leeward
10	1.00	18.7 (11.2)	-1.10	-20.3 (-12.2)	-1.40	-25.0 (-15.0)
25	0.93	17.6 (10.5)	-1.03	-19.2 (-11.5)	-1.26	-22.8 (-13.7)
50	0.88	16.7 (10.0)	-0.98	-18.3 (-11.0)	-1.15	-21.1 (-12.7)
200	0.77	15.0 (9.0)	-0.87	-16.6 (-10.0)	-0.94	-17.7 (-10.6)

GC_{pi} = 0.18 (Windward)

GC_{pi} = -0.18 (Leeward)

q_h(psf) = 15.83

This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Hazards by Location

Search Information

Coordinates: 47.16516801120486, -122.2920663220895

Elevation: 386 ft

Timestamp: 2023-05-11T15:05:14.182Z

Hazard Type: Wind

ASCE 7-16		ASCE 7-10		ASCE 7-05	
MRI 10-Year	67 mph	MRI 10-Year	72 mph	ASCE 7-05 Wind Speed	85 mph
MRI 25-Year	73 mph	MRI 25-Year	79 mph		
MRI 50-Year	78 mph	MRI 50-Year	85 mph		
MRI 100-Year	82 mph	MRI 100-Year	91 mph		
Risk Category I	92 mph	Risk Category I	100 mph		
Risk Category II	97 mph	Risk Category II	110 mph		
Risk Category III	104 mph	Risk Category III-IV	115 mph		
Risk Category IV	108 mph				

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

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

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

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

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202 27th Ave SE, Puyallup, WA 98374

202 27th Ave SE

Building

Directions | Save | Nearby | Send to phone | Share

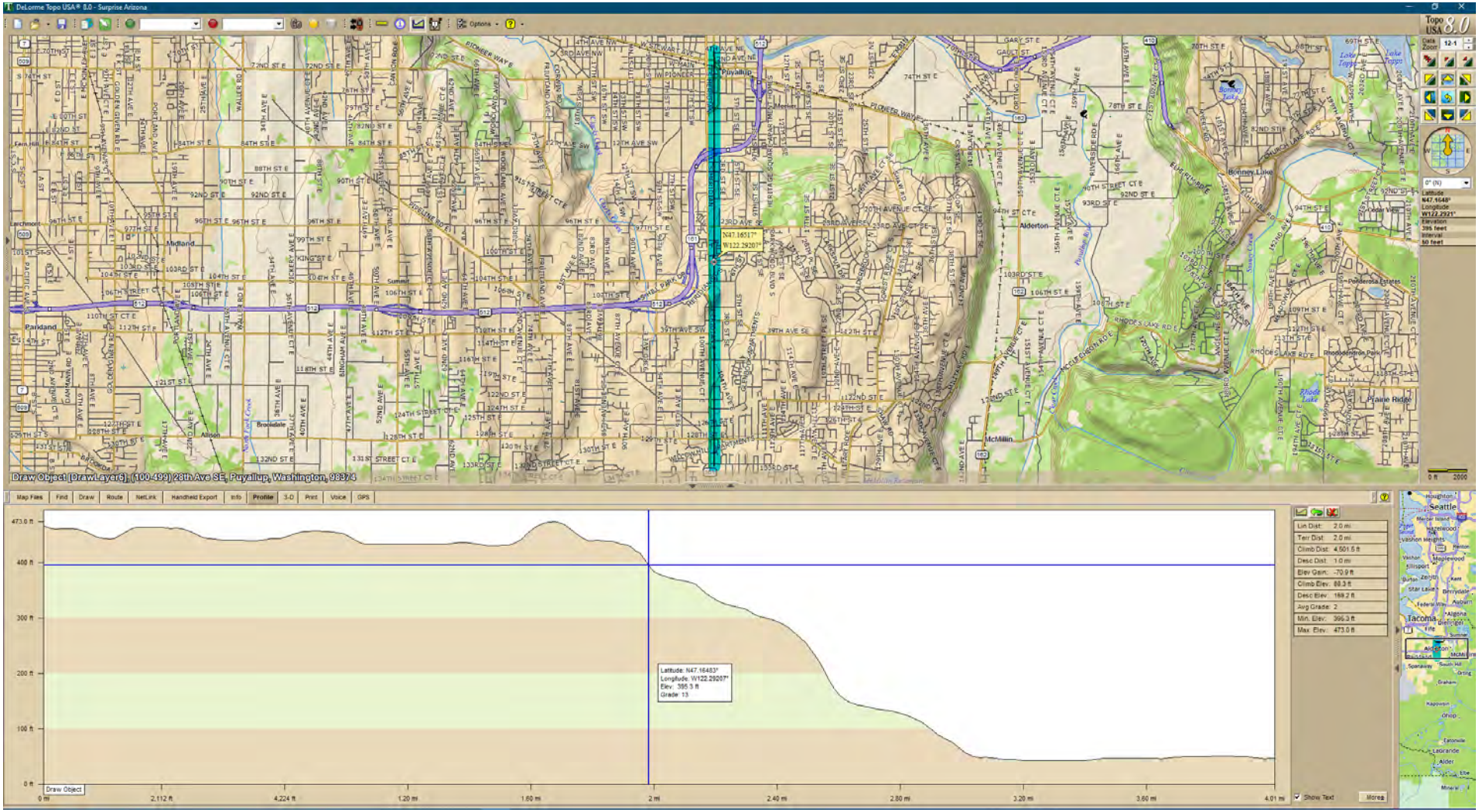
202 27th Ave SE, Puyallup, WA 98374

Suggest an edit on 202 27th Ave SE

Add a missing place

Add your business

Photos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Topo USA 8.0
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Map Files
Find
Draw
Route
NetLink
Handheld Export
Info
Profile
3-D
Print
Voice
GPS
Draw Object
Show Text
More

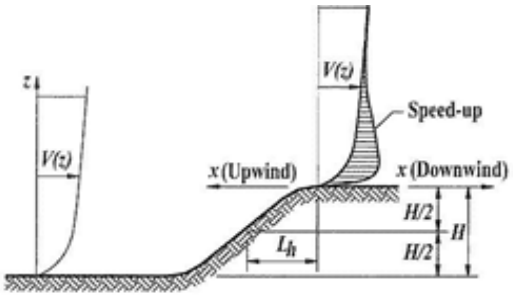
Kzt = 1.0

26.8 TOPOGRAPHIC EFFECTS

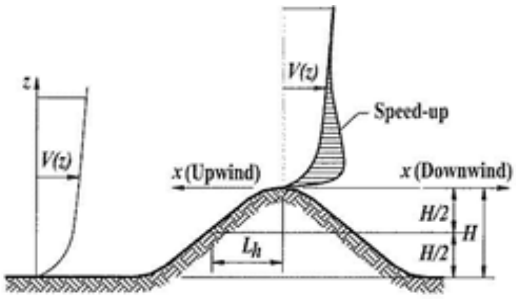
K_{ZT} 1

Exposure Category: B

Hill Shape: 2D Escarpment



ESCARPMENT



2-D RIDGE OR 3-D AXISYMMETRICAL HILL

EL_{top} =	473 ft	Elevation at crest of 2D Escarpment	
EL_{Bot} =	142.1 ft	Elevation at base of 2D Escarpment	
H =	330.9 ft	307.55	
H/2 =	165.45 ft		
L_h =	3541 ft		
H/L_h =	0.0934	Kzt Calc Not Required	

K_1 = 0.75H/Lh 0.070086

$K_1/(H/L_h)$ = 0.75 (Figure 26.8-1)

$K_2 = (1-(\frac{|x|}{\mu L_h})$ = 0.602372

x = 2112 ft 5311.5 distance KZT no long affects wind speed

upwind

μ = 1.5 (Figure 26.8-1)

L_h = 3541 ft

$K_3 = e^{-\gamma z/Lh}$ = 0.989466

z = 15 ft height above ground surface at site

γ = 2.5 (Figure 26.8-1)

L_h = 3541 ft

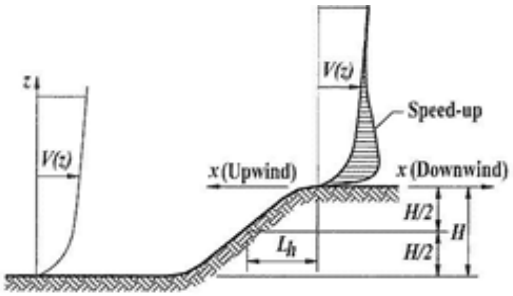
$K_{ZT} = (1+K_1 K_2 K_3)^2$ = 1.00 (Eq. 26.8-1)

26.8 TOPOGRAPHIC EFFECTS

K_{ZT} 2

Exposure Category: B

Hill Shape: 2D Escarpment



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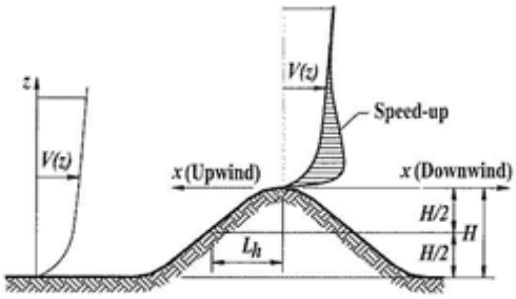


2-D RIDGE OR 3-D AXISYMMETRICAL HILL

EL_{top} =	301 ft	Elevation at crest of 2D Escarpment	
EL_{Bot} =	142.1 ft	Elevation at base of 2D Escarpment	
H =	158.9 ft		
H/2 =	79.45 ft	221.55	
L_h =	940 ft		
H/L_h =	0.1690	Kzt Calc Not Required	

K_1 = 0.75H/Lh 0.126782

$K_1/(H/L_h)$ = 0.75 (Figure 26.8-1)

$K_2 = (1-(\frac{|x|}{\mu L_h})$ = 0.562234

x = 1646 ft 3760 distance KZT no long affects wind speed

downwind

μ = 4 (Figure 26.8-1)

L_h = 940 ft

$K_3 = e^{-\gamma z/Lh}$ = 0.960892

z = 15 ft height above ground surface at site

γ = 2.5 (Figure 26.8-1)

L_h = 940 ft

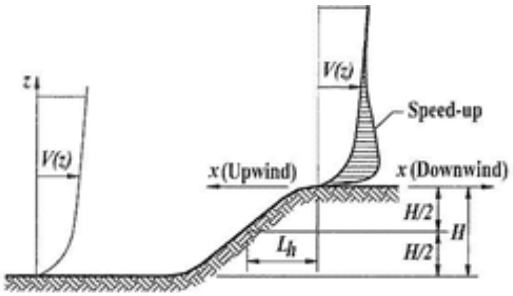
$K_{ZT} = (1+K_1 K_2 K_3)^2$ = 1.00 (Eq. 26.8-1)

26.8 TOPOGRAPHIC EFFECTS

K_{ZT} 3

Exposure Category: B

Hill Shape: 2D Escarpment



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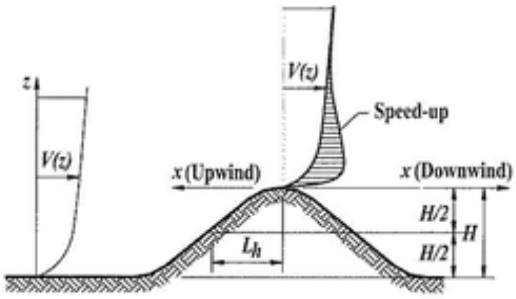


2-D RIDGE OR 3-D AXISYMMETRICAL HILL

EL_{top} =	177.4	ft	Elevation at crest of 2D Escarpment
EL_{Bot} =	0	ft	Elevation at base of 2D Escarpment
H =	177.4	ft	
H/2 =	88.7	ft	
L_h =	1144	ft	
H/L_h =	0.1551		Kzt Calc Not Required

K_1 = 0.75H/Lh 0.116302

$K_1/(H/L_h)$ = 0.75 (Figure 26.8-1)

$K_2 = (1-(\frac{|x|}{\mu L_h})$ = 0

x = 6598 ft 4576 distance KZT no long affects wind speed

downwind

μ = 4 (Figure 26.8-1)

L_h = 1144 ft

$K_3 = e^{-\gamma z/Lh}$ = 0.967752

z = 15 ft height above ground surface at site

γ = 2.5 (Figure 26.8-1)

L_h = 1144 ft

$K_{ZT} = (1+K_1 K_2 K_3)^2$ = 1.00 (Eq. 26.8-1)

K_{ZT} Check

26.8 TOPOGRAPHIC EFFECTS

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

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

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

26.8.2 Topographic Factor

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

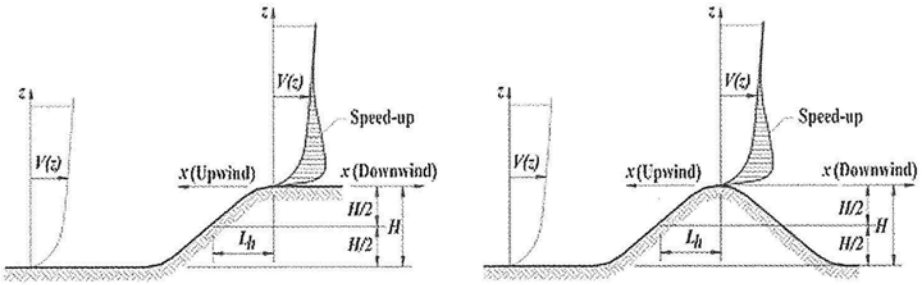
$$K_{zt} = (1 + K_1K_2K_3)^2 \qquad (26.8\text{-}1)$$

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

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

Kzt =1.0

Diagrams



Topographic Multipliers for Exposure C[a,b,c]

	K_1 Multiplier				K_2 Multiplier			K_2 Multiplier		
H/L_h	2D Ridge	2D Escarpment	3D Axisymmetrical Hill	x/L_h	2D Escarpment	All Other Cases	z/L_h	2D Ridge	2D Escarpment	3D Axisymmetrical Hill
0.20	0.29	0.17	0.21	0.00	1.00	1.00	0.00	1.00	1.00	1.00
0.25	0.36	0.21	0.26	0.50	0.88	0.67	0.10	0.74	0.78	0.67
0.30	0.43	0.26	0.32	1.00	0.75	0.33	0.20	0.55	0.61	0.45
0.35	0.51	0.30	0.37	1.50	0.63	0.00	0.30	0.41	0.47	0.30
0.40	0.58	0.34	0.42	2.00	0.50	0.00	0.40	0.30	0.37	0.20
0.45	0.65	0.38	0.47	2.50	0.38	0.00	0.50	0.22	0.29	0.14
0.50	0.72	0.43	0.53	3.00	0.25	0.00	0.60	0.17	0.22	0.09
				3.50	0.13	0.00	0.70	0.12	0.17	0.06
				4.00	0.00	0.00	0.80	0.09	0.14	0.04
							0.90	0.07	0.11	0.03
							1.00	0.05	0.08	0.02
							0.50	0.01	0.02	0.00
							2.00	0.00	0.00	0.00

[a]For values of H/L_h, x/L_h, and z/L_h other than those shown, linear interpolation is permitted.
[b]For $H/L_h > 0.5$, assume that $H/L_h = 0.5$ for evaluating K_1 and substitute $2H$ for L_h for evaluating K_2 and K_3.
[c]Multipliers are based on the assumption that wind approaches the hill or escarpment along the direction of maximum slope.

Notation

H = Height of hill or escarpment relative to the upwind terrain, in ft (m).
K_1 = Factor to account for shape of topographic feature and maximum speed-up effect.
K_2 = Factor to account for reduction in speed-up with distance upwind or downwind of crest.
K_3 = Factor to account for reduction in speed-up with height above local terrain.
L_h = Distance upwind of crest to where the difference in ground elevation is half the height of hill or escarpment, in ft (m).
x = Distance (upwind or downwind) from the crest to the site of the building or other structure, in ft (m).
z = Height above ground surface at the site of the building or other structure, in ft (m).
μ = Horizontal attenuation factor.
γ = Height attenuation factor.

Equations

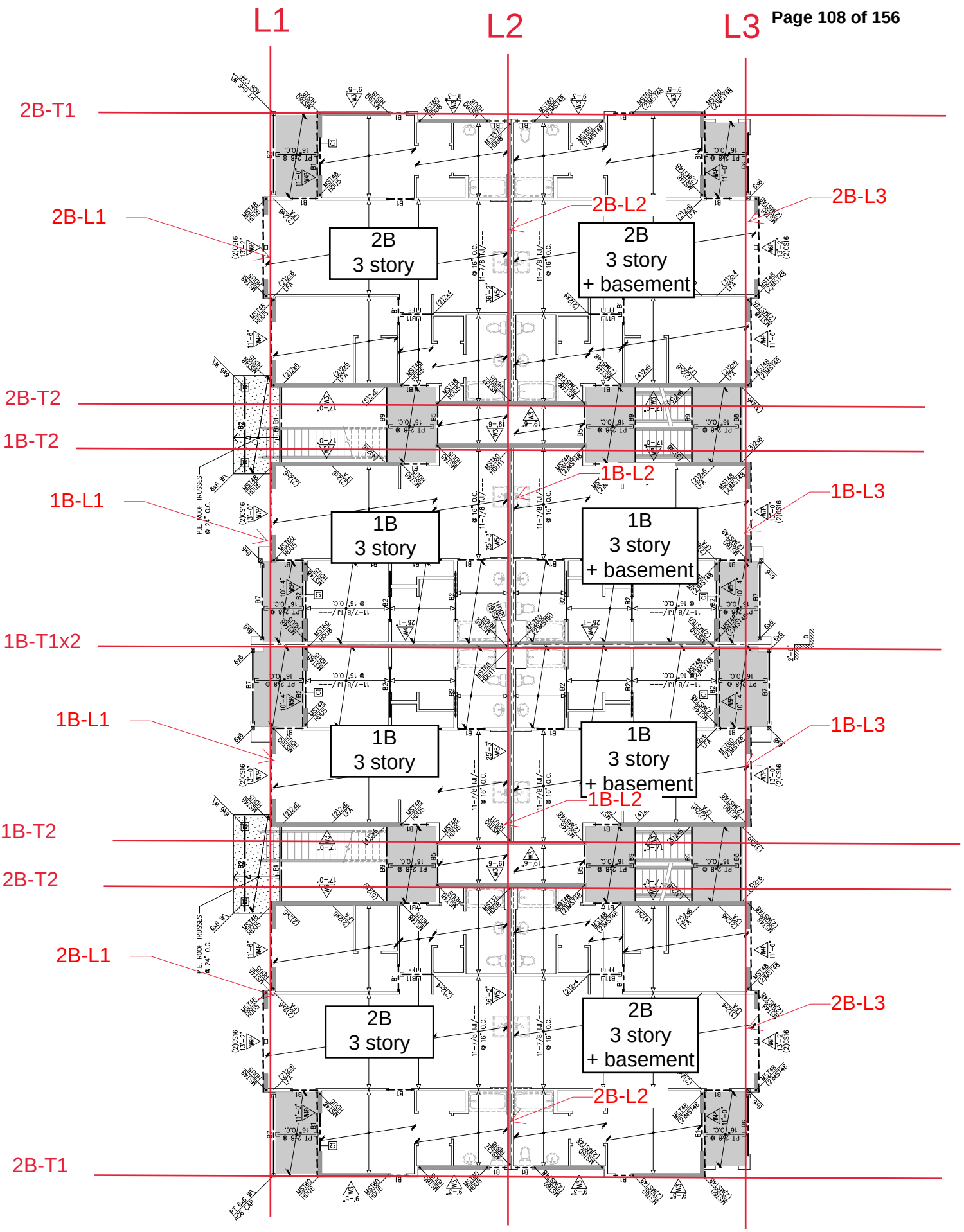
$K_{zt} = (1 + K_1 K_2 K_3)^2$
K_1 = determined from table below
$K_2 = (1 - |x|/\mu L_h)$
$K_3 = e^{-\gamma z/L_h}$

Parameters for Speed-Up over Hills and Escarpments

	$K_1/(H/L_h)$				μ	
	Exposure					
Hill Shape	B	C	D	γ	Upwind of Crest	Downwind of Crest
2D ridges (or valleys with negative H in $K_1/(H/L_h)$)	1.30	1.45	1.55	3	1.5	1.5
2D escarpments	0.75	0.85	0.95	2.5	1.5	4
3D axisymmetrical hill	0.95	1.05	1.15	4	1.5	1.5

FIGURE 26.8-1 Topographic Factor, K_{zt}

wind combined			wind 3 story			wind 3 story + basement
156	152	10	10.6875	159	10.5	10.6875
		10	9.083333		10.3	9.083333
102	101	10	1.05	103	10	1.05
		10	9.083333		10	9.083333
101	101	10	1.05	101	10	1.05
		10	9.083333		10	9.083333
				101	10	1.05
					10	9.083333


L1
L2
L3
2B-T1
2B-L1
2B-L2
2B-L3
2B
3 story
2B
3 story
+ basement
2B-T2
1B-T2
1B-L2
1B-L1
1B-L3
1B
3 story
1B
3 story
+ basement
1B-T1x2
1B-L1
1B-L3
1B
3 story
1B
3 story
+ basement
1B-L2
1B-T2
2B-T2
2B-L1
2B-L3
2B
3 story
2B
3 story
+ basement
2B-L2
2B-T1

Building F

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.002 ***Sheet:***

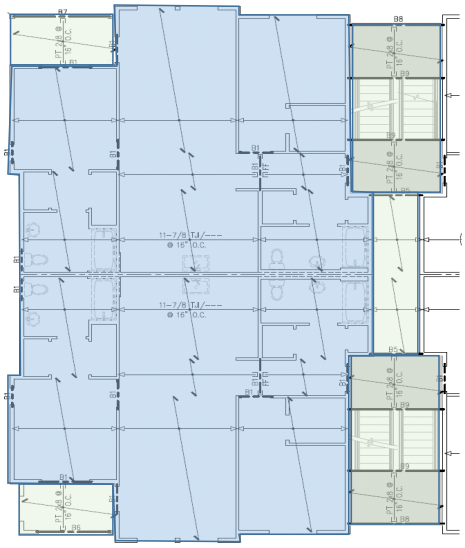
Designed: TLC ***Date:*** 5/29/23

Checked: ***Date:***

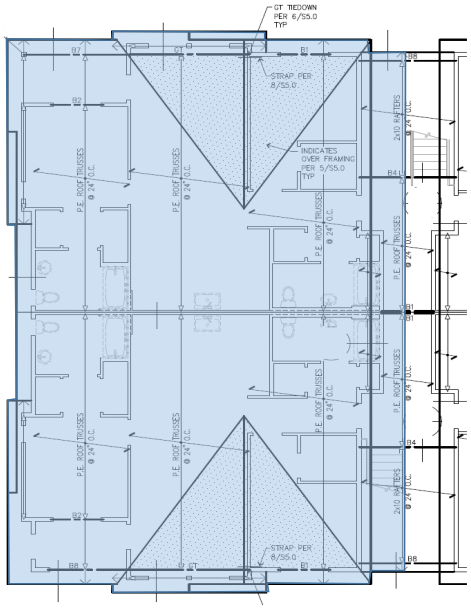
Project: Bradley Heights - 3 Story & basement Story

Seismic Design: 2 Bedroom units

Low Flat roof
Typ Roof/Floor
Exit 3" Concrete
not used



32.00



32.00

1 37.08333 2.5

2nd - 3rd Floors

1 37.08333 2.5

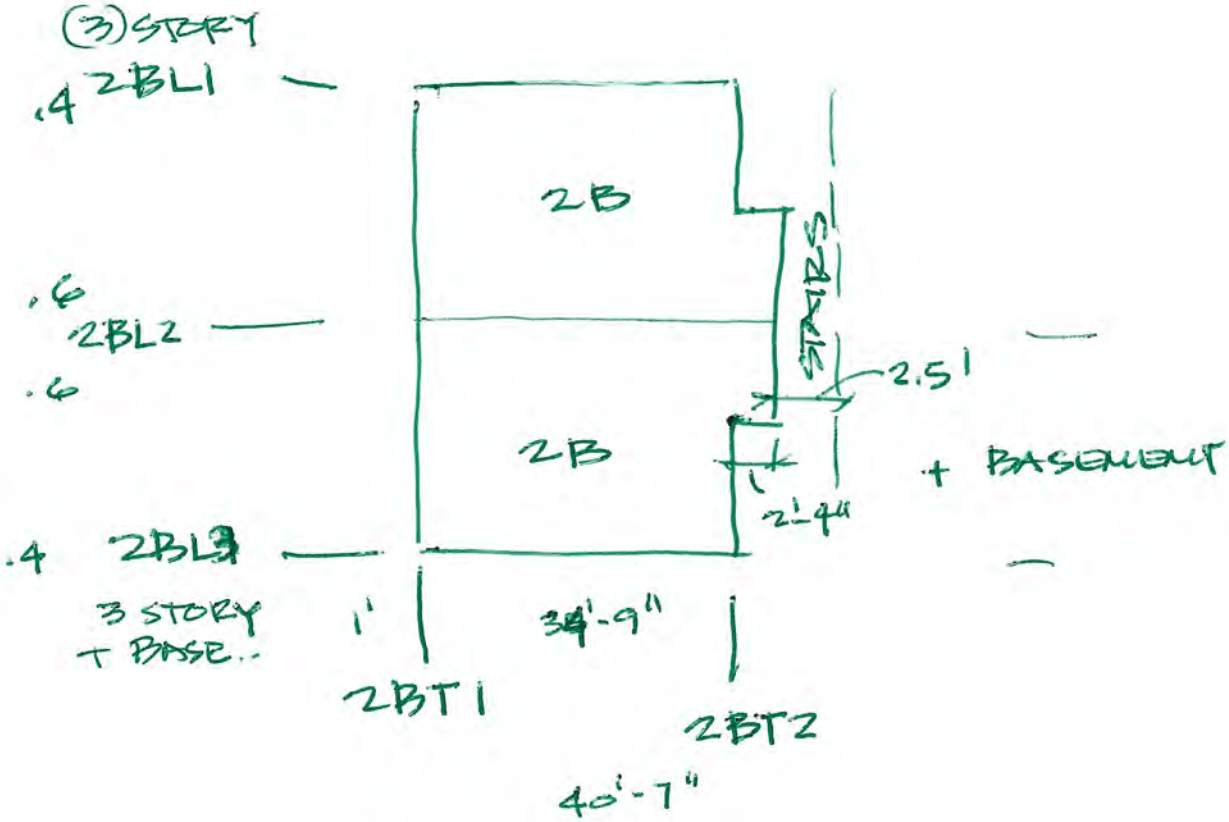
Roof

C_s/1.4 = 0.111 Typ. Roof (psf) = 22 Typ Floor (psf)= 26 Ext. wall (psf) = 10 Ext. wall (psf) = 20

Low Roof (psf) = 22 Other Floor (psf)= 47 Int. wall (psf) = 10 Int. wall (psf) = 13

							1hr				2hr			Wind:		
2Bx1	**Roof**	L (ft)	W or h(ft)	psf	W (#)		0.1110W			With			**156**	plf	
3 story	Typ Roof	1381	1	22	30382	30382	3372			Vertical Distribution			0.615385	0.384615	
	Low Roof	0	1	22	0							L(ft)	windward	leeward	
	Ext	64	4.5415	10	2906.56	4359.84	484	→	3856	6095	32.00	3080	1925	3080
	Int	32	4.5415	10	1453.28					190.4544				96
	Ext	38.17	4.5415	10	1733.491	3466.981	385	↑	3757	5932	40.58	3906	2442	3906
	Int	38.17	4.5415	10	1733.491					146.1798				96
	3rd Floor	L (ft)	W or h(ft)	psf	W (#)		0.1110W						**102**	plf	
	Typ Floor	1118	1	26	29068	46834	5199								
d1, d2	Other Floor	378	1	47	17766							L(ft)	windward	leeward	
	Ext	64	9.083	10	5813.12	8719.68	968	→	6166	6730	32.00	2012	1258	2012
	Int	32	9.083	10	2906.56					210.3066				63
	Ext	38.17	9.083	10	3466.981	6933.962	770	↑	5968	6508	40.58	2552	1595	2552
	Int	38.17	9.083	10	3466.981					160.3493				63
	2nd Floor	L (ft)	W or h(ft)	psf	W (#)		0.1110W						**101**	plf	
	Typ Floor	1118	1	26	29068	46834	5199								
d1, d2	Other Floor	378	1	47	17766										
	Ext	64	9.083	10	5813.12	8719.68	968	→	6166	3365	32.00	1996	1247	1996
	Int	32	9.083	10	2906.56				1.83258	105.1533				62
	Ext	38.17	9.083	10	3466.981	6933.962	770	↑	5968	3254	40.58	2531	1582	2531
	Int	38.17	9.083	10	3466.981				1.834264	80.17464				62
											2hr			Wind:		

2BEDROOM



$\frac{18.375}{40.5833} = 0.45$ $\frac{22.205}{40.5833} = 0.55$

2Bx1	Roof	L (ft)	W or h(ft)	psf	W (#)		0.1110W			With		**156** plf			
3 story + B	Typ Roof	1381	1	22	30382	30382	3372			Vertical Distribution					
	Low Roof	0	1	22	0							L(ft)	windward	leeward	
	Ext	64	4.5415	10	2906.56	4359.84	484	→		3856	6457	32.00	3080	1925	3080
	Int	32	4.5415	10	1453.28						201.7684				
	Ext	38.17	4.5415	10	1733.491	3466.981	385	↑		3757	6286	40.58	3906	2442	3906
	Int	38.17	4.5415	10	1733.491						154.8861				
	3rd Floor	L (ft)	W or h(ft)	psf	W (#)		0.1110W					**102** plf			
	Typ Floor	1118	1	26	29068	46834	5199								
e	Other Floor	378	1	47	17766							L(ft)	windward	leeward	
	Ext	64	9.083	10	5813.12	8719.68	968	→		6166	7950	32.00	2012	1258	2012
	Int	32	9.083	10	2906.56						248.4239				
	Ext	38.17	9.083	10	3466.981	6933.962	770	↑		5968	7688	40.58	2552	1595	2552
	Int	38.17	9.083	10	3466.981						189.4395				
	2nd Floor	L (ft)	W or h(ft)	psf	W (#)		0.1110W					**101** plf			
	Typ Floor	1118	1	26	29068	46834	5199								
e	Other Floor	378	1	47	17766							L(ft)	windward	leeward	
	Ext	64	9.083	10	5813.12	8719.68	968	→		6166	5300	32.00	1996	1247	1996
	Int	32	9.083	10	2906.56						165.616				
	Ext	38.17	9.083	10	3466.981	6933.962	770	↑		5968	5125	40.58	2531	1582	2531
	Int	38.17	9.083	10	3466.981						126.293				
	1st Floor	L (ft)	W or h(ft)	psf	W (#)		0.1110W					**101** plf			
	Typ Floor	1118	1	26	29068	46834	5199								
b1, b2	Other Floor	378	1	47	17766							L(ft)	windward	leeward	
	Ext	64	9.083	10	5813.12	8719.68	968	→		6166	2650	32.00	1996	1247	1996
	Int	32	9.083	10	2906.56						82.80798				
	Ext	38.17	9.083	10	3466.981	6933.962	770	↑		5968	2563	40.58	2531	1582	2531
	Int	38.17	9.083	10	3466.981						63.14651				

Unit B2 →			Unit B2 ↑				
Roof →	3080	Wind	Roof ↑	2442	Roof ↓	3906	Wind
	6095	Seismic		5932		5932	Seismic
3rd →	2012	Wind	3rd ↑	1595	3rd ↓	2552	Wind
	6730	Seismic		6508		6508	Seismic
2nd →	1996	Wind	2nd ↑	1582	2nd ↓	2531	Wind
	3365	Seismic		3254		3254	Seismic

Unit B2 + Basement →			Unit B2 + Basement ↑				
Roof →	3080	Wind	Roof ↑	3906	Roof ↓	2442	Wind
	6457	Seismic		6286		6286	Seismic
3rd →	2012	Wind	3rd ↑	2552	3rd ↓	1595	Wind
	7950	Seismic		7688		7688	Seismic
2nd →	1996	Wind	2nd ↑	2531	2nd ↓	1582	Wind
	5300	Seismic		5125		5125	Seismic
1st →	1996	Wind	2nd ↑	2531	2nd ↓	1582	Wind
	2650	Seismic		2563		2563	Seismic

B2 + B2 ↑	B2 + B2 ↓	max	
6348	6348	6348	Wind
12218	12218	12218	Seismic
4147	4147	4147	Wind
14196	14196	14196	Seismic
4113	4113	4113	Wind
8379	8379	8379	Seismic
2531	1582	2531	Wind
2563	2563	2563	Seismic

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.002 ***Sheet:***

Designed: TLC ***Date:*** 5/29/23

Checked: ***Date:***

Project: Bradley Heights - 3 Story & basement Story

Diaphragm Design Forces 2 Bedroom units

$F_x = C_{vx} V$ (12.8-11)

$$F_{px} = \frac{\sum_{i=x}^{n} F_i}{\sum_{i=x}^{n} w_i} w_{px} \quad (12.10\text{-}1)$$

F_{px} = the diaphragm design force at Level x

F_i = the design force applied to level i

w_i = the weight tributary to Level i

w_{px} = the weight tributary to the diaphragm at Level x

I_e = 1

S_{DS} = 0.8787

Minimum: $F_{px} = 0.2 S_{DS} I_e w_{px}$

Maximum: $F_{px} = 0.4 S_{DS} I_e w_{px}$

3- story D →

	F_i	$\sum_{i=x}^{n} F_i$	w_{xp}	$\sum_{i=x}^{n} w_i$	F_{px}	Min	Max	use F_{px}	x factor
Roof	6095	6095	34742	34741.84	6095	6106	12211	6106	1.001803
3rd Floor	6730	12824	55554	90295.52	7890	9763	19526	9763	1.237375
2nd Floor	3365	16189	55554	145849.2	6166	9763	19526	9763	1.583243

3- story D ↑

	F_i	$\sum_{i=x}^{n} F_i$	w_i	$\sum_{i=x}^{n} w_i$	F_{px}	Min	Max	use F_{px}	x factor
Roof	5932	5932	33849	33848.98	5932	5949	11897	5949	1.002724
3rd Floor	6508	12440	53768	87616.94	7634	9449	18898	9449	1.237768
2nd Floor	3254	15694	53768	141384.9	5968	9449	18898	9449	1.583243

4- story E →

	F_i	$\sum_{i=x}^{n} F_i$	w_{xp}	$\sum_{i=x}^{n} w_i$	F_{px}	Min	Max	use F_{px}	x factor
Roof	6457	6457	34742	34741.84	6457	6106	12211	6457	1
3rd Floor	7950	14406	55554	90295.52	8863	9763	19526	9763	1.101511
2nd Floor	5300	19706	55554	145849.2	7506	9763	19526	9763	1.300706
1st Floor	2650	22356	55554	201402.9	6166	9763	19526	9763	1.583243

4- story ↑

	F_i	$\sum_{i=x}^{n} F_i$	w_i	$\sum_{i=x}^{n} w_i$	F_{px}	Min	Max	use F_{px}	x factor
Roof	6286	6286	33849	33848.98	6286	5949	11897	6286	1
3rd Floor	7688	13974	53768	87616.94	8575	9449	18898	9449	1.101899
2nd Floor	5125	19099	53768	141384.9	7263	9449	18898	9449	1.300939
1st Floor	2563	21662	53768	195152.9	5968	9449	18898	9449	1.583243

Unit B2														
3 story			3 story + Basement			Combined				Line 2B-T1	Line 2B-T2	Line **B2-L1**	Line **B2-L2**	Line **B2-L3**
Unit B2	→		**Unit B2**	→		B2+B2 combined				0.45	0.55	0.4	0.6	0.4
Roof	3080	**Wind**	**Roof**	3080	**Wind**	**Roof**	6348	**wind**	**Roof**	2857	3491	1232	3696	1232
	6095	**Seismic**		6457	**Seismic**		12218	**seismic**		5498	6720	2438	7531	2583
3rd Floor	2012	**Wind**	**3rd Floor**	2012	**Wind**	**3rd Floor**	4147	**wind**	**3rd Floor**	1866	2281	805	2415	805
	6730	**Seismic**		7950	**Seismic**		14196	**seismic**		6388	7808	2692	8808	3180
2nd Floor	1996	**Wind**	**2nd Floor**	1996	**Wind**	**2nd Floor**	4113	**wind**	**2nd Floor**	1851	2262	798	2395	798
	3365	**Seismic**		5300	**Seismic**		8379	**seismic**		3771	4609	1346	5199	2120
			1st Floor	1996	**Wind**	**1st Floor**	2531	**wind**	**1st Floor**	1139	1392	0	1198	798
				2650	**Seismic**		2563	**seismic**		1153	1409	0	1590	1060
													to concrete retaining wall	

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 *Sheet:*

Designed TLC *Date:* 5/26

Checked: *Date:*

Project: Bradley Height Apartments

2B-L1

Note: forces to this line on the 3 story side can be lower we used the loads from the L3 side for consistency — 0.5 (ft) holdown dist from end

Roof:																				
W1	Wind (ASD): 1.232 kips					72 #/ft													76 #/ft	
	Seismic (ASD): 2.583 kips					150 #/ft													160 #/ft	
	use W1P		SW 2B-L3 -1			use W2P		SW 2B-L3 -2					use W1P		SW 2B-L3 -3					
	5	5	5	5		6	6	8.5	6				5	5	5	5			9.083 ft	
	3.333 ft		2.667 ft		0 ft	2.333 ft		2.333 ft		0 ft		0 ft	3 ft		3.5 ft				17.17	Actual
Distribution L	3.333 ft		2.667 ft		0 ft	1.815 ft		1.815 ft		0 ft		0 ft	3 ft		3.5 ft				16.13	Distribu
h/b_s =	1.5 W1		1.875 W1			2.571 W1		2.571 W1					1.667 W1		1.429 W1					
DL w (plf) =	427.2		427.2		0	178.8		178.8		0		0	429.1		429.1					
0.6M_R (#-ft) =	1424		911		0	292		292		0		0	1159		1577					
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E				
PLF	76	160	76	160	0	0	59	125	59	125	0	0	0	0	76	160	76	160		
M_{ot} (#-ft) =	2313	4848	1850	3878	0	0	1259	2639	1259	2639	0	0	0	0	2082	4363	2428	5090		
F (#) =	314	1208	433	1369	0	0	528	1280	528	1280	0	0	0	0	369	1282	284	1171		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
	No Holdown NG		No Holdown NG		No Holdown OK	No Holdown NG		No Holdown NG		No Holdown OK		No Holdown OK	No Holdown NG		No Holdown NG					
	(see calc next pp OK)					(see calc next pp OK)							(see calc next pp OK)							

3rd Floor:																				
W2	Wind (ASD): 0.805 kips					119 #/ft													126 #/ft	
	Seismic (ASD): 3.18 kips					336 #/ft													357 #/ft	
	use W3P		SW 2B-L3 -1			use W4P		SW 2B-L3 -2					use W3P		SW 2B-L3 -3					
	5	5	5	5		6	6	6	6				5	5	5	5			9.083 ft	
	3.333 ft		2.667 ft		0 ft	2.333 ft		2.333 ft		0 ft		0 ft	3 ft		3.5 ft				17.17	Actual
Distribution L	3.333 ft		2.667 ft		0 ft	1.815 ft		1.815 ft		0 ft		0 ft	3 ft		3.5 ft				16.13	Distribu
h/b_s =	1.5 W2		1.875 W2			2.571 W2		2.571 W2					1.667 W2		1.429 W2					
DL w (plf) =	108.2		108.2		0	108.2		108.2		0		0	108.2		108.2					
0.6M_R (#-ft) =	361		231		0	177		177		0		0	292		398					
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E				
PLF	126	357	126	357	0	0	98	278	98	278	0	0	0	0	126	357	126	357		
M_{ot} (#-ft) =	3824	10817	3059	8654	0	0	2082	5889	2082	5889	0	0	0	0	3441	9735	4015	11358		
F (#) =	1536	4899	1739	5257	0	0	1567	4396	1567	4396	0	0	0	0	1629	5059	1490	4825		
Holdown	2335	S2	2335	S2	1000	-	2335	S2	2335	S2	1000	-	1000	-	2335	S2	2335	S2		
	MST48 NG		MST48 NG		No Holdown OK	MST48 NG		MST48 NG		No Holdown OK		No Holdown OK	MST48 NG		MST48 NG					
	(see calc next pp OK)					(see calc next pp OK)							(see calc next pp OK)							

2nd Floor																				
W4	Wind (ASD): 0.798 kips					165 #/ft													176 #/ft	
	Seismic (ASD): 2.12 kips					459 #/ft													489 #/ft	
	use W4P		SW 2B-L3 -1			use W6P		SW 2B-L3 -2					use W4P		SW 2B-L3 -3					
	5	5	5	5		6	6	6	6				5	5	5	5			9.083 ft	
	3.333 ft		2.667 ft		0 ft	2.333 ft		2.333 ft		0 ft		0 ft	3 ft		3.5 ft				17.17	Actual
Distribution L	3.333 ft		2.667 ft		0 ft	1.815 ft		1.815 ft		0 ft		0 ft	3 ft		3.5 ft				16.13	Distribu
h/b_s =	1.5 W4		1.875 W4			2.571 W4		2.571 W4					1.667 W4		1.429 W4					
DL w (plf) =	108.2		108.2		0	108.2		108.2		0		0	108.2		108.2					
0.6M_R (#-ft) =	361		231		0	177		177		0		0	292		398					
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E				
PLF	176	489	176	489	0	0	137	380	137	380	0	0	0	0	176	489	176	489		
M_{ot} (#-ft) =	5323	14796	4258	11837	0	0	2898	8056	2898	8056	0	0	0	0	4790	13317	5589	15536		
F (#) =	3287	9994	3597	10614	0	0	3051	8694	3051	8694	0	0	0	0	3428	10269	3220	9871		
Holdown	4065	H3	4065	H3	1000	-	4065	H3	4065	H3	1000	-	1000	-	4065	H3	6970	H4		
1.05	HDU5 NG		HDU5 NG		No Holdown OK	HDU5 NG		HDU5 NG		No Holdown OK		No Holdown OK	HDU5 NG		HDU8 NG					
	(see calc next pp OK)					(see calc next pp OK)							(see calc next pp OK)							

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 ***Sheet:***

Designed TLC ***Date:*** 5/26

Checked: ***Date:***

Project: Bradley Height Apartments

2B-L2

0.5 (ft) holdown dist from end

Roof:					Wind (ASD): 3.696 kips		102 #/ft										102 #/ft	
W1					Seismic (ASD): 7.531 kips		208 #/ft										208 #/ft	
									Use W2									
																	9.083 ft	
	0 ft		0 ft		0 ft		0 ft		36.17 ft		0 ft		0 ft		0 ft		36.17	Actual
Distribution L	0 ft		0 ft		0 ft		0 ft		36.17 ft		0 ft		0 ft		0 ft		36.17	Distribu
h/b_s =									0.251 W1									
DL w (plf) =	0		0		0		0		363.1		0		0		0			
$0.6M_R$ (#-ft) =	0		0		0		0		142477		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	0	0	0	0	0	0	0	0	102	208	0	0	0	0	0	0		
M_{ot} (#-ft) =	0	0	0	0	0	0	0	0	33575	68404	0	0	0	0	0	0		
F (#) =	0	0	0	0	0	0	0	0	-3053	-2077	0	0	0	0	0	0		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
	No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			

3rd Floor:					Wind (ASD): 2.415 kips		169 #/ft										169 #/ft	
W3					Seismic (ASD): 8.808 kips		452 #/ft										452 #/ft	
									Use W4									
																	9.083 ft	
	0 ft		0 ft		0 ft		0 ft		36.17 ft		0 ft		0 ft		0 ft		36.17	Actual
Distribution L	0 ft		0 ft		0 ft		0 ft		36.17 ft		0 ft		0 ft		0 ft		36.17	Distribu
h/b_s =									0.251 W3									
DL w (plf) =	0		0		0		0		108.2		0		0		0			
$0.6M_R$ (#-ft) =	0		0		0		0		42446		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	0	0	0	0	0	0	0	0	169	452	0	0	0	0	0	0		
M_{ot} (#-ft) =	0	0	0	0	0	0	0	0	55510	148406	0	0	0	0	0	0		
F (#) =	0	0	0	0	0	0	0	0	-2687	894	0	0	0	0	0	0		
Holdown	2335	S2	1000	-	1000	-	1000	-	1256	S1	1000	-	1000	-	1000	-	2335	S2
	MST48 OK		No Holdown OK		No Holdown OK		No Holdown OK		MST37 OK		No Holdown OK		No Holdown OK		No Holdown OK		MST48 OK	

2nd Floor					Wind (ASD): 2.395 kips		235 #/ft										235 #/ft	
W4					Seismic (ASD): 5.199 kips		595 #/ft										595 #/ft	
									Use W5									
																	9.083 ft	
	0 ft		0 ft		0 ft		0 ft		36.17 ft		0 ft		0 ft		0 ft		36.17	Actual
Distribution L	0 ft		0 ft		0 ft		0 ft		36.17 ft		0 ft		0 ft		0 ft		36.17	Distribu
h/b_s =									0.251 W4									
DL w (plf) =	0		0		0		0		108.2		0		0		0			
$0.6M_R$ (#-ft) =	0		0		0		0		42446		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	0	0	0	0	0	0	0	0	235	595	0	0	0	0	0	0		
M_{ot} (#-ft) =	0	0	0	0	0	0	0	0	77265	195628	0	0	0	0	0	0		
F (#) =	0	0	0	0	0	0	0	0	-1711	5189	0	0	0	0	0	0		
Holdown	4065	H3	6970	H4	1000	-	1000	-	4065	H3	1000	-	1000	-	6970	H4	9535	H5
1.05	HDU5 OK		HDU8 OK		No Holdown OK		No Holdown OK		HDU5 NG		No Holdown OK		No Holdown OK		HDU8 OK		HDU11 OK	

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 Sheet:

Designed TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

2B-L3

0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	1.232	kips	72	#/ft																76	#/ft
W1			Seismic (ASD):	2.583	kips	150	#/ft																160	#/ft
	use W1P		SW 2B-L3 -1					use W2P		SW 2B-L3 -2						use W1P		SW 2B-L3 -3					
	5		5	5				6		8.5	6					5		5	5			9.083	ft	
	3.333 ft		2.667 ft		0 ft			2.333 ft		2.333 ft		0 ft		0 ft		3 ft		3.5 ft				17.17	Actual	
Distribution L	3.333 ft		2.667 ft		0 ft			1.815 ft		1.815 ft		0 ft		0 ft		3 ft		3.5 ft				16.13	Distribu	
h/b_s =	1.5	W1	1.875	W1				2.571	W1	2.571	W1					1.667	W1	1.429	W1					
DL w (plf) =	427.2		427.2		0			178.8		178.8		0		0		429.1		429.1						
0.6M_R (#-ft) =	1424		911		0			292		292		0		0		1159		1577						
	W	E	W	E	W	E		W	E	W	E	W	E	W	E	W	E	W	E					
PLF	76	160	76	160	0	0		59	125	59	125	0	0	0	0	76	160	76	160					
M_{ot} (#-ft) =	2313	4848	1850	3878	0	0		1259	2639	1259	2639	0	0	0	0	2082	4363	2428	5090					
F (#) =	314	1208	433	1369	0	0		528	1280	528	1280	0	0	0	0	369	1282	284	1171					
Holdown	1000	-	1000	-	1000	-		1000	-	1000	-	1000	-	1000	-	1000	-	1000	-					
	No Holdown NG		No Holdown NG		No Holdown OK			No Holdown NG		No Holdown NG		No Holdown OK		No Holdown OK		No Holdown NG		No Holdown NG						
	(see calc next pp OK)							(see calc next pp OK)								(see calc next pp OK)								
3rd Floor:			Wind (ASD):	0.805	kips	119	#/ft																126	#/ft
W2			Seismic (ASD):	3.18	kips	336	#/ft																357	#/ft
	use W3P		SW 2B-L3 -1					use W4P		SW 2B-L3 -2						use W3P		SW 2B-L3 -3					
	5		5	5				6		6	6					5		5	5			9.083	ft	
	3.333 ft		2.667 ft		0 ft			2.333 ft		2.333 ft		0 ft		0 ft		3 ft		3.5 ft				17.17	Actual	
Distribution L	3.333 ft		2.667 ft		0 ft			1.815 ft		1.815 ft		0 ft		0 ft		3 ft		3.5 ft				16.13	Distribu	
h/b_s =	1.5	W2	1.875	W2				2.571	W2	2.571	W2					1.667	W2	1.429	W2					
DL w (plf) =	108.2		108.2		0			108.2		108.2		0		0		108.2		108.2						
0.6M_R (#-ft) =	361		231		0			177		177		0		0		292		398						
	W	E	W	E	W	E		W	E	W	E	W	E	W	E	W	E	W	E					
PLF	126	357	126	357	0	0		98	278	98	278	0	0	0	0	126	357	126	357					
M_{ot} (#-ft) =	3824	10817	3059	8654	0	0		2082	5889	2082	5889	0	0	0	0	3441	9735	4015	11358					
F (#) =	1536	4899	1739	5257	0	0		1567	4396	1567	4396	0	0	0	0	1629	5059	1490	4825					
Holdown	2335	S2	2335	S2	1000	-		2335	S2	2335	S2	1000	-	1000	-	2335	S2	2335	S2					
	MST48 NG		MST48 NG		No Holdown OK			MST48 NG		MST48 NG		No Holdown OK		No Holdown OK		MST48 NG		MST48 NG						
	(see calc next pp OK)							(see calc next pp OK)								(see calc next pp OK)								
2nd Floor			Wind (ASD):	0.798	kips	165	#/ft																176	#/ft
W4			Seismic (ASD):	2.12	kips	459	#/ft																489	#/ft
	use W4P		SW 2B-L3 -1					use W6P		SW 2B-L3 -2						use W4P		SW 2B-L3 -3					
	5		5	5				6		6	6					5		5	5			9.083	ft	
	3.333 ft		2.667 ft		0 ft			2.333 ft		2.333 ft		0 ft		0 ft		3 ft		3.5 ft				17.17	Actual	
Distribution L	3.333 ft		2.667 ft		0 ft			1.815 ft		1.815 ft		0 ft		0 ft		3 ft		3.5 ft				16.13	Distribu	
h/b_s =	1.5	W4	1.875	W4				2.571	W4	2.571	W4					1.667	W4	1.429	W4					
DL w (plf) =	108.2		108.2		0			108.2		108.2		0		0		108.2		108.2						
0.6M_R (#-ft) =	361		231		0			177		177		0		0		292		398						
	W	E	W	E	W	E		W	E	W	E	W	E	W	E	W	E	W	E					
PLF	176	489	176	489	0	0		137	380	137	380	0	0	0	0	176	489	176	489					
M_{ot} (#-ft) =	5323	14796	4258	11837	0	0		2898	8056	2898	8056	0	0	0	0	4790	13317	5589	15536					
F (#) =	3287	9994	3597	10614	0	0		3051	8694	3051	8694	0	0	0	0	3428	10269	3220	9871					
Holdown	4670	S4	4670	S4	1000	-		4670	S4	4670	S4	1000	-	1000	-	4670	S4	4670	S4					
	(2) MST48 NG		(2) MST48 NG		No Holdown OK			(2) MST48 NG		(2) MST48 NG		No Holdown OK		No Holdown OK		(2) MST48 NG		(2) MST48 NG						
	(see calc next pp OK)							(see calc next pp OK)								(see calc next pp OK)								
1st Floor			Wind (ASD):	0.798	kips	212	#/ft																225	#/ft
W4			Seismic (ASD):	1.06	kips	521	#/ft																554	#/ft
	use W5P		SW 2B-L3 -1					use W6P		SW 2B-L3 -2						use W5P		SW 2B-L3 -3					
	5		5	5				6		6	6					5		5	5			9.083	ft	
	3.333 ft		2.667 ft		0 ft			2.333 ft		2.333 ft		0 ft		0 ft		3 ft		3.5 ft				17.17	Actual	
Distribution L	3.333 ft		2.667 ft		0 ft			1.815 ft		1.815 ft		0 ft		0 ft		3 ft		3.5 ft				16.13	Distribu	
h/b_s =	1.5	W4	1.875	W4				2.571	W4	2.571	W4					1.667	W4	1.429	W4					
DL w (plf) =	108.2		108.2		0			108.2		108.2		0		0		108.2		108.2						
0.6M_R (#-ft) =	361		231		0			177		177		0		0		292		398						
	W	E	W	E	W	E		W	E	W	E	W	E	W	E	W	E	W	E					
PLF	225	554	225	554	0	0		175	431	175	431	0	0	0	0	225	554	225	554					
M_{ot} (#-ft) =	6821	16786	5457	13429	0	0		3714	9139	3714	9139	0	0	0	0	6139	15107	7162	17625					
F (#) =	5567	15791	6009	16705	0	0		4980	13583	4980	13583	0	0	0	0	5767	16195	5475	15613					
Holdown	6970	H4	6970	H4	1000	-		6970	H4	6970	H4	1000	-	1000	-	6970	H4	6970	H4					
1.05	HDU8 NG		HDU8 NG		No Holdown OK			HDU8 NG		HDU8 NG		No Holdown OK		No Holdown OK		HDU8 NG		HDU8 NG						
	(see calc next pp OK)							(see calc next pp OK)								(see calc next pp OK)								

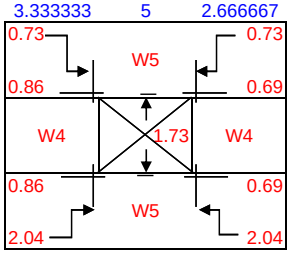
Shear Wall Line 2B-L3-1 1st

W Designation

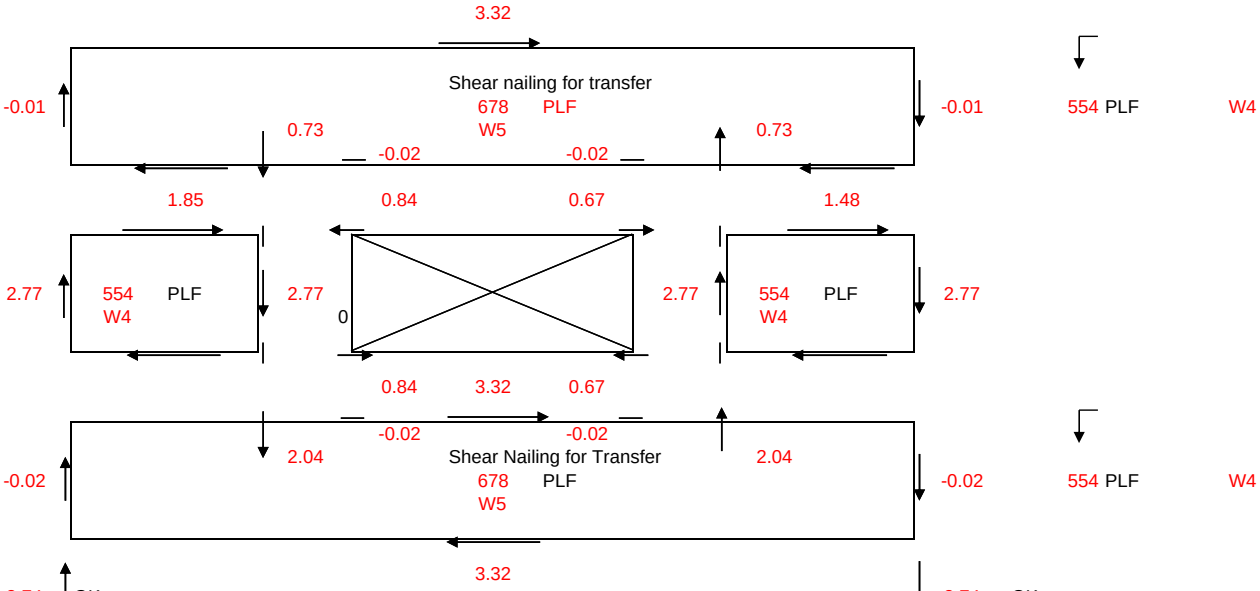
b= 11 CS16

b_1= 3.333333 b_o= 5 b_2= 2.666667

P= 3.324 Kips
554 plf
554 plf



h_1= 1.083333
h_o= 5 h= 9.083333
h_2= 3



2.74 OK
4.98
7.73 HDU8 Capacity 6970 OK

weight of wall
0.99913 kips

2.74 OK
4.98
7.73 HDU8 Capacity 6970 OK

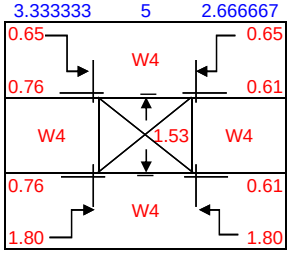
Shear Wall Line 2B-L3-1 2nd

W Designation

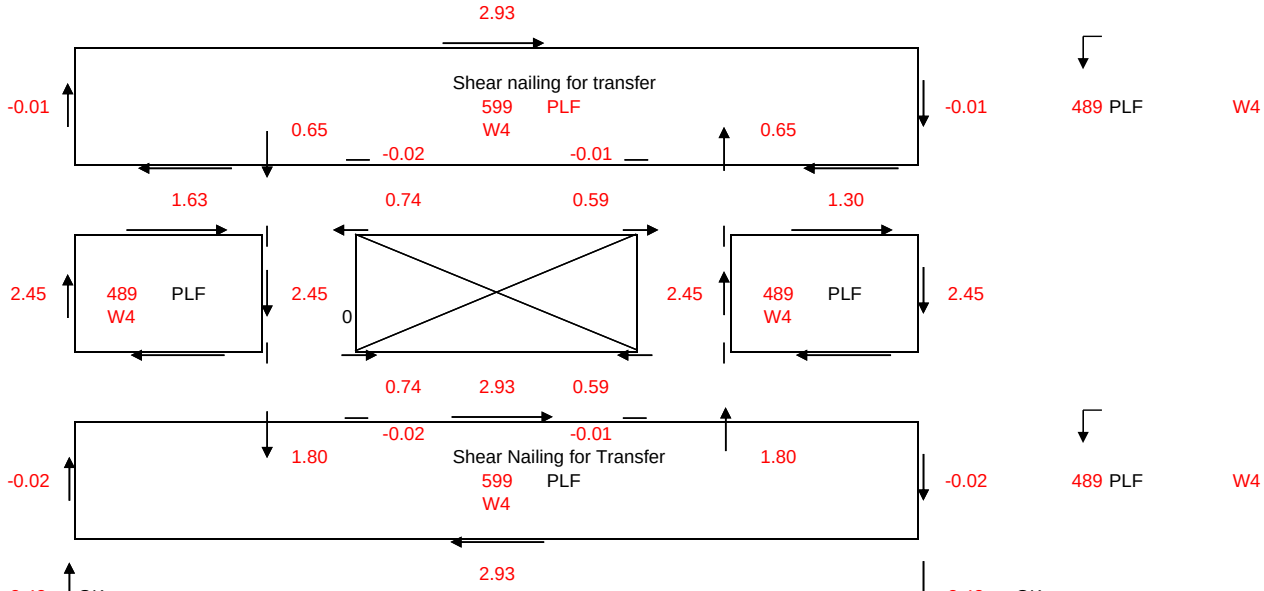
b= 11 CS16

b_1= 3.333333 b_o= 5 b_2= 2.666667

P= 2.934 Kips
489 plf
489 plf



h_1= 1.083333
h_o= 5 h= 9.083333
h_2= 3



2.42 OK
2.56 HDU5 Capacity 4065 OK
4.98 (2)MST48 Capacity 4670 OK

weight of wall
0.99913 kips

2.42 OK
2.56 HDU5 Capacity 4065 OK
4.98 (2)MST48 Capacity 4670 OK

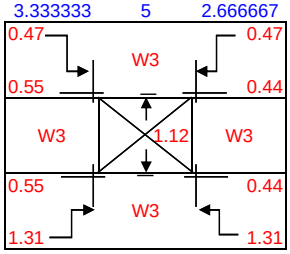
Shear Wall Line 2B-L3-1 3rd

W Designation

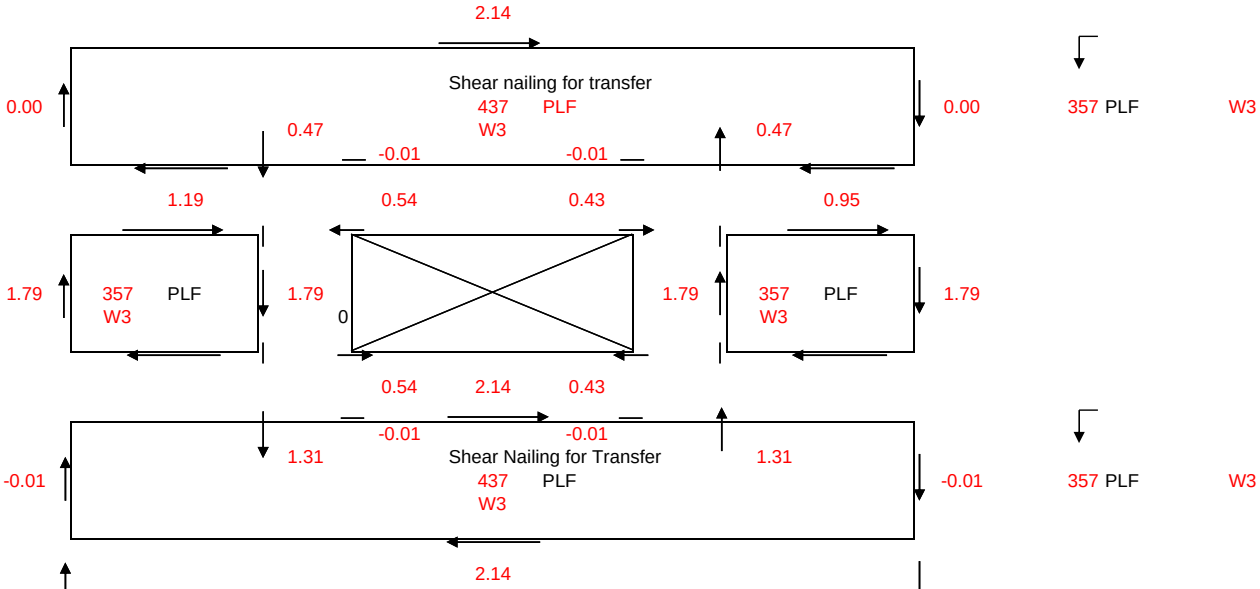
b= 11 CS16

b_1= 3.333333 b_o= 5 b_2= 2.666667

P= 2.142 Kips
357 plf
357 plf



h_1= 1.083333
h_o= 5
h= 9.083333
h_2= 3



1.77 OK
0.79
2.56 MST48 Capacity 2335 OK

weight of wall
0.99913 kips

1.77 OK
0.79
2.56 MST48 Capacity 2335 OK

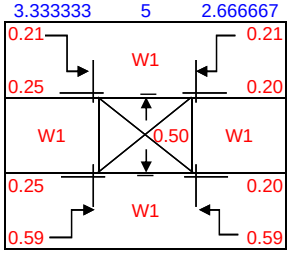
Shear Wall Line 2B-L3-1 roof

W Designation

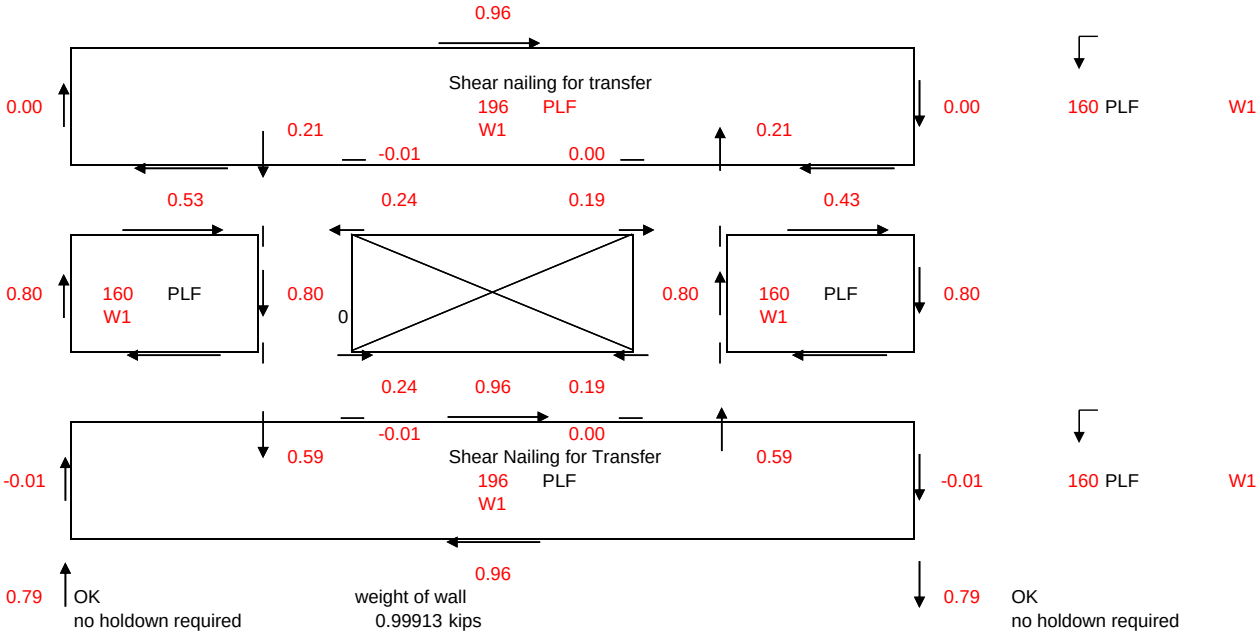
b= 11 CS16

b_1= 3.333333 b_o= 5 b_2= 2.666667

P= 0.960 Kips
160 plf
160 plf



h_1= 1.083333
h_o= 5 h= 9.083333
h_2= 3



weight of wall
0.99913 kips

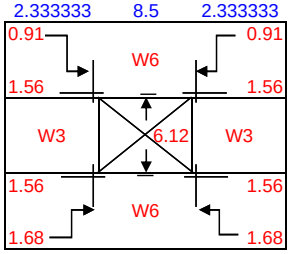
Shear Wall Line 2B-L3-2 1st

W Designation

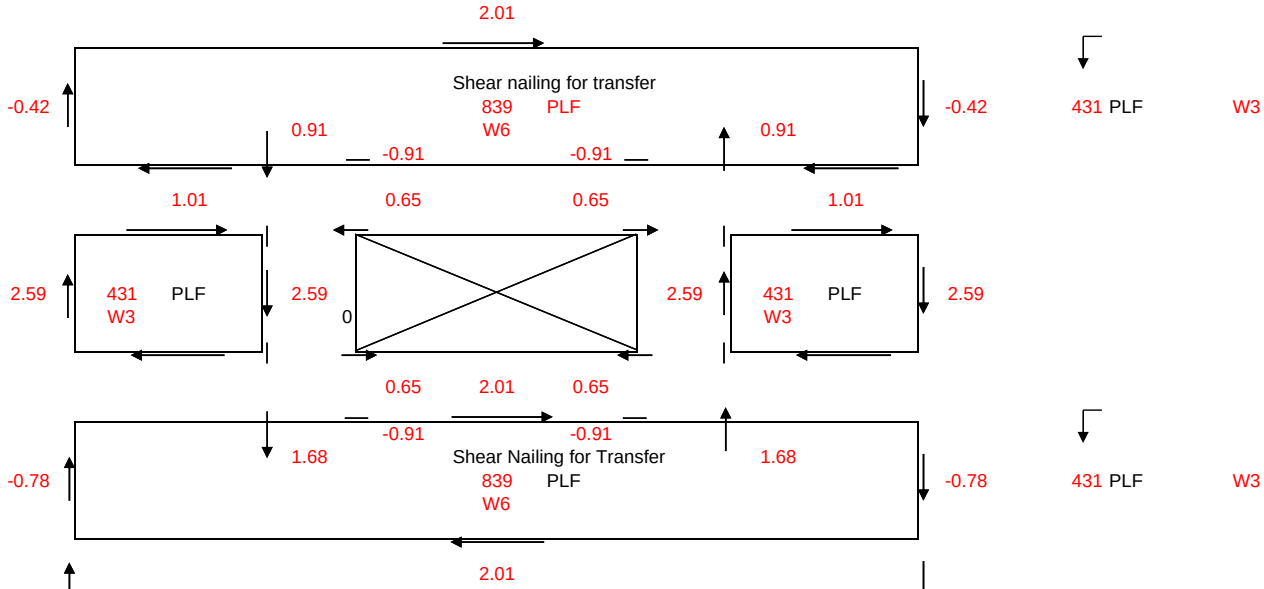
b= 13.16667 (2) CS16 each sheathing layer

b_1= 2.333333 b_o= 8.5 b_2= 2.333333

P= 2.011 Kips
431 plf
431 plf



h_1= 1.083333
h_o= 6 h= 9.083333
h_2= 2



1.39 OK
3.88
5.27 HDU8 Capacity 6970 OK

weight of wall
1.044545 kips

1.39 OK
3.88
5.27 HDU8 Capacity 6970 OK

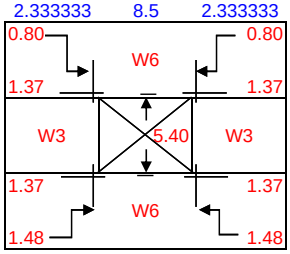
Shear Wall Line 2B-L3-2 2nd

W Desigination

b= 13.16667 (2) CS16 each sheathing layer

b_1= 2.333333 b_o= 8.5 b_2= 2.333333

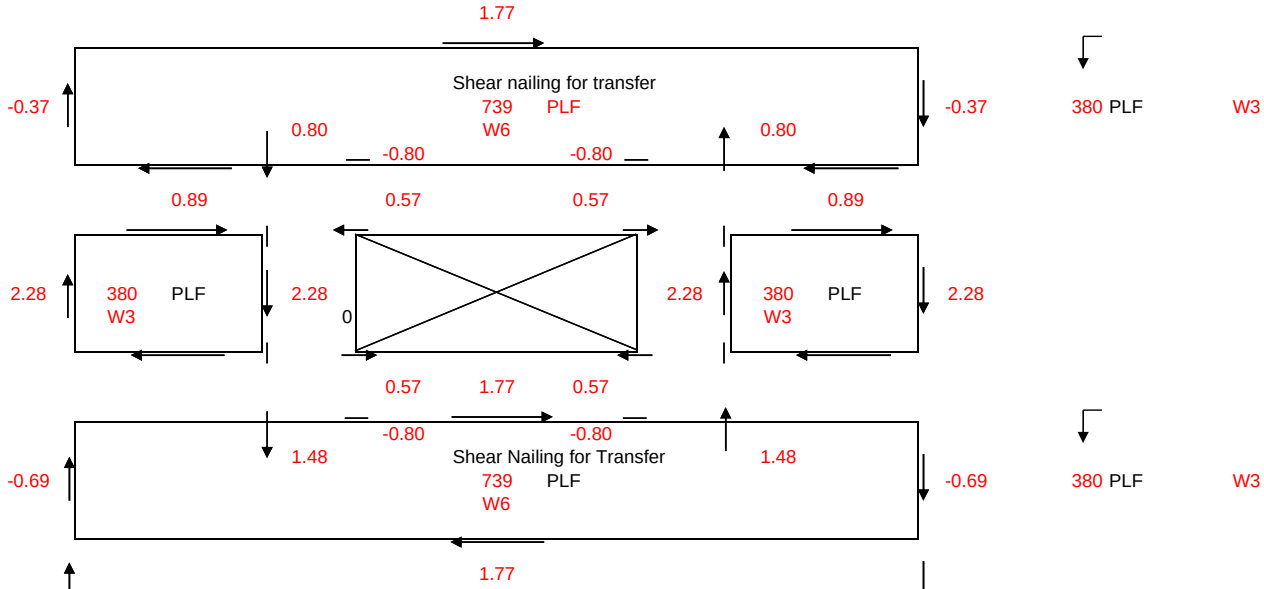
P= 1.773 Kips
380 plf
380 plf



h_1= 1.083333

h_o= 6 h= 9.083333

h_2= 2



1.22 OK
2.65 HDU5 Capacity 4065 OK
3.88 (2)MST48 Capacity 4670 OK

weight of wall
1.044545 kips

1.22 OK
2.65 HDU5 Capacity 4065 OK
3.88 (2)MST48 Capacity 4670 OK

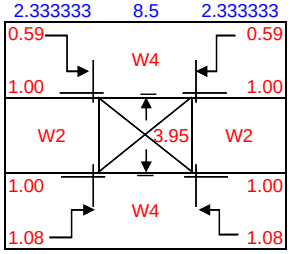
Shear Wall Line 2B-L3-2 3rd

W Designation

b= 13.16667 (2) CS14

b_1= 2.333333 b_o= 8.5 b_2= 2.333333

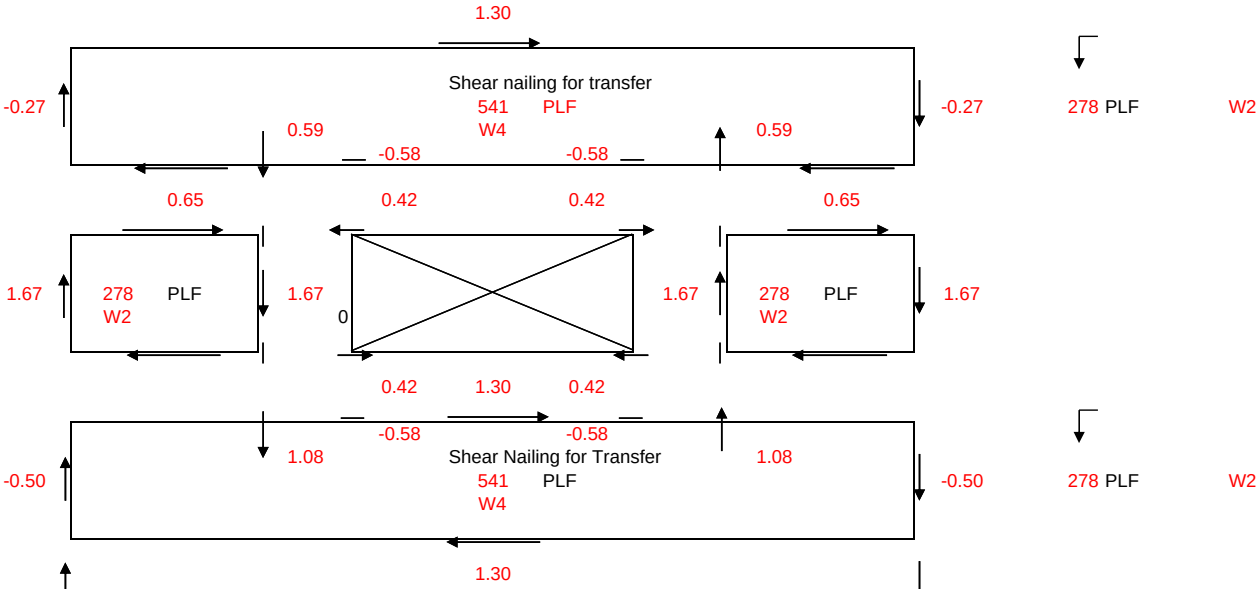
P= 1.297 Kips
278 plf
278 plf



h_1= 1.083333

h_o= 6 h= 9.083333

h_2= 2



0.89 OK
0.40
1.30 MST48 Capacity 2335 OK

weight of wall
1.044545 kips

0.89 OK
0.40
1.30 MST48 Capacity 2335 OK

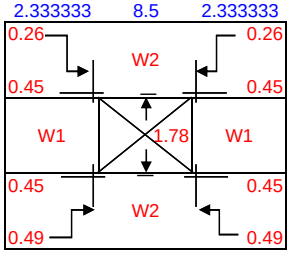
Shear Wall Line 2B-L3-2 roof

W Designation

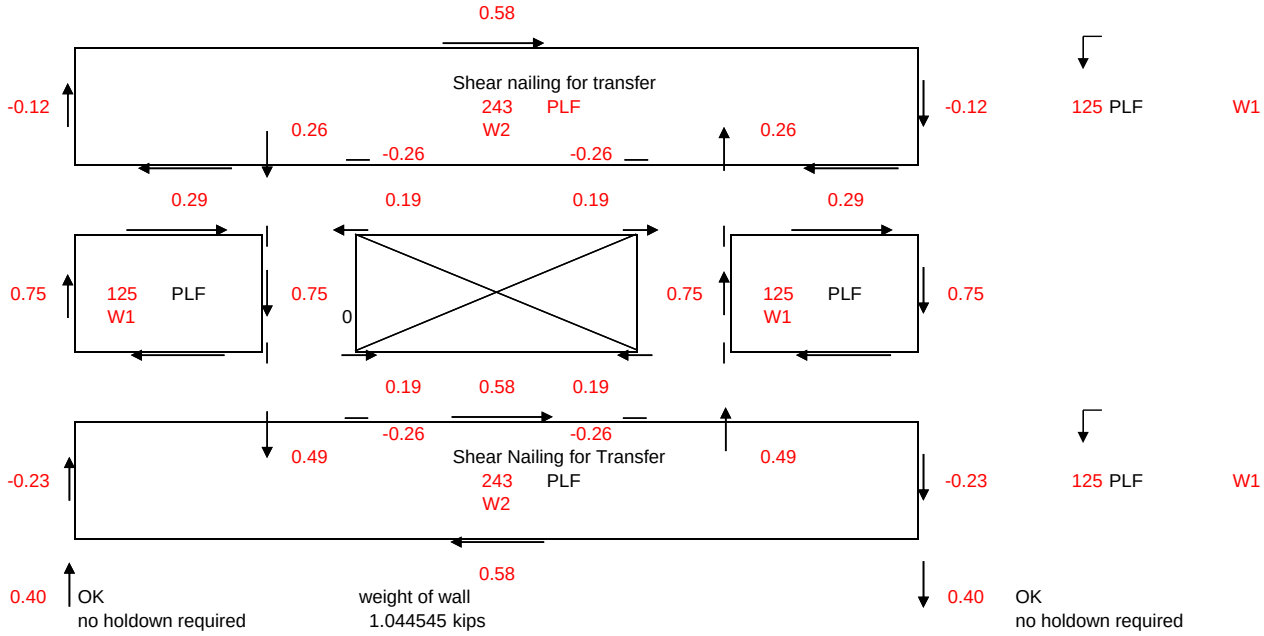
b= 13.16667 CS14

b_1= 2.333333 b_o= 8.5 b_2= 2.333333

P= 0.583 Kips
125 plf
125 plf



h_1= 1.083333
h_o= 6
h= 9.083333
h_2= 2



weight of wall
1.044545 kips

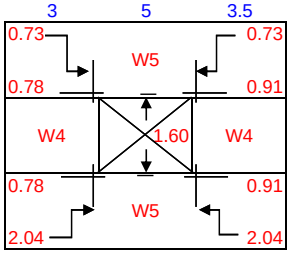
Shear Wall Line 2B-L3-3 1st

W Designation

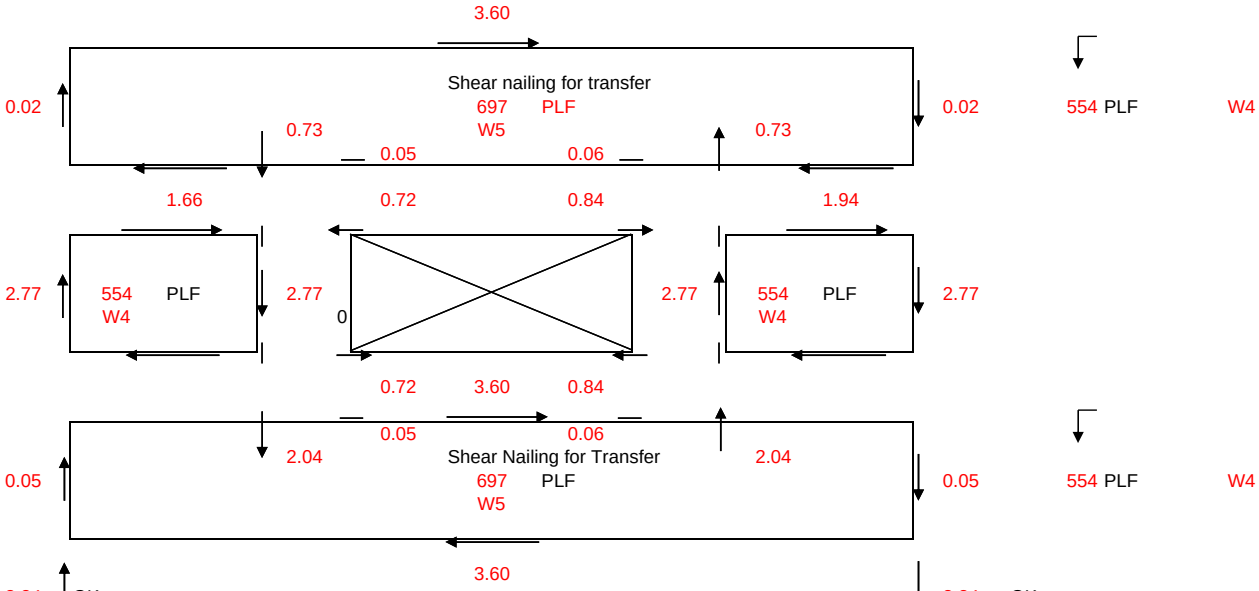
b= 11.5 CS16

b_1= 3 b_o= 5 b_2= 3.5

P= 3.601 Kips
554 plf
554 plf



h_1= 1.083333
h_o= 5 h= 9.083333
h_2= 3



2.84 OK
5.16
8.01 HDU8 Capacity 6970 OK

weight of wall
1.044545 kips

2.84 OK
5.16
8.01 HDU8 Capacity 6970 OK

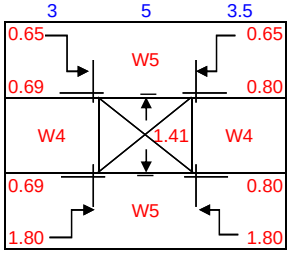
Shear Wall Line 2B-L3-3 2nd

W Designation

b= 11.5 CS16

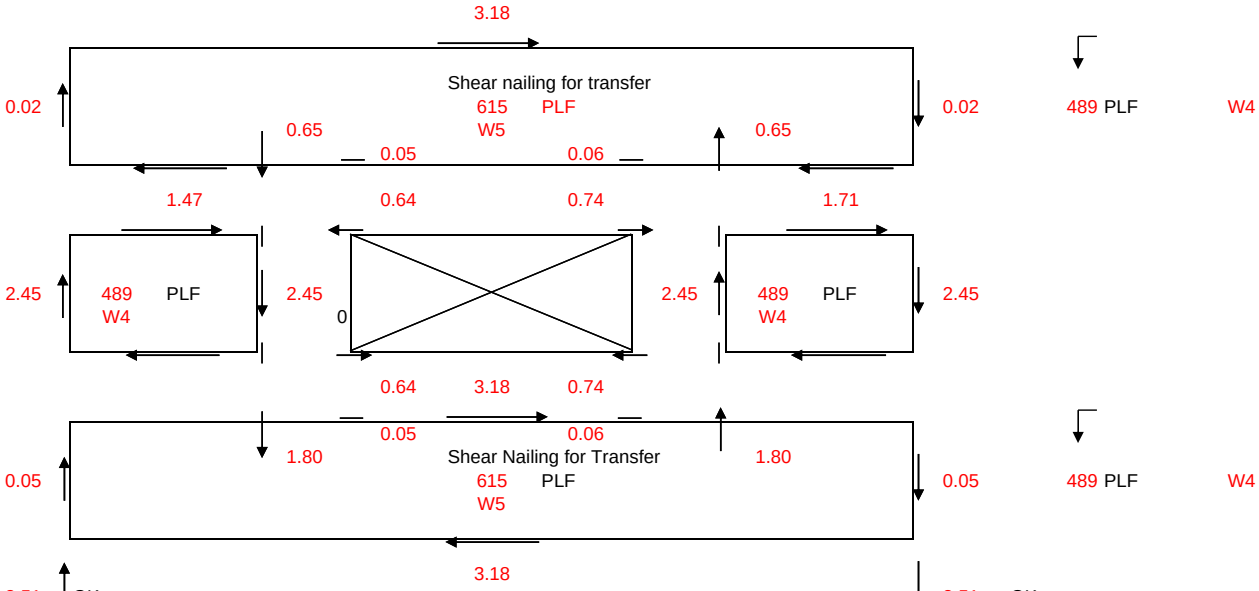
b_1= 3 b_o= 5 b_2= 3.5

P= 3.179 Kips
489 plf
489 plf



h_1= 1.083333
h_o= 5 h= 9.083333
h_2= 3

Use W4



2.51 OK
2.65 HDU5 Capacity 4065 OK
5.16 (2)MST48 Capacity 4670 OK

weight of wall
1.044545 kips

2.51 OK
2.65 HDU5 Capacity 4065 OK
5.16 (2)MST48 Capacity 4670 OK

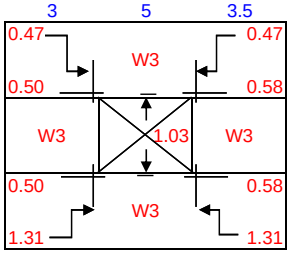
Shear Wall Line 2B-L3-3 3rd

W Designation

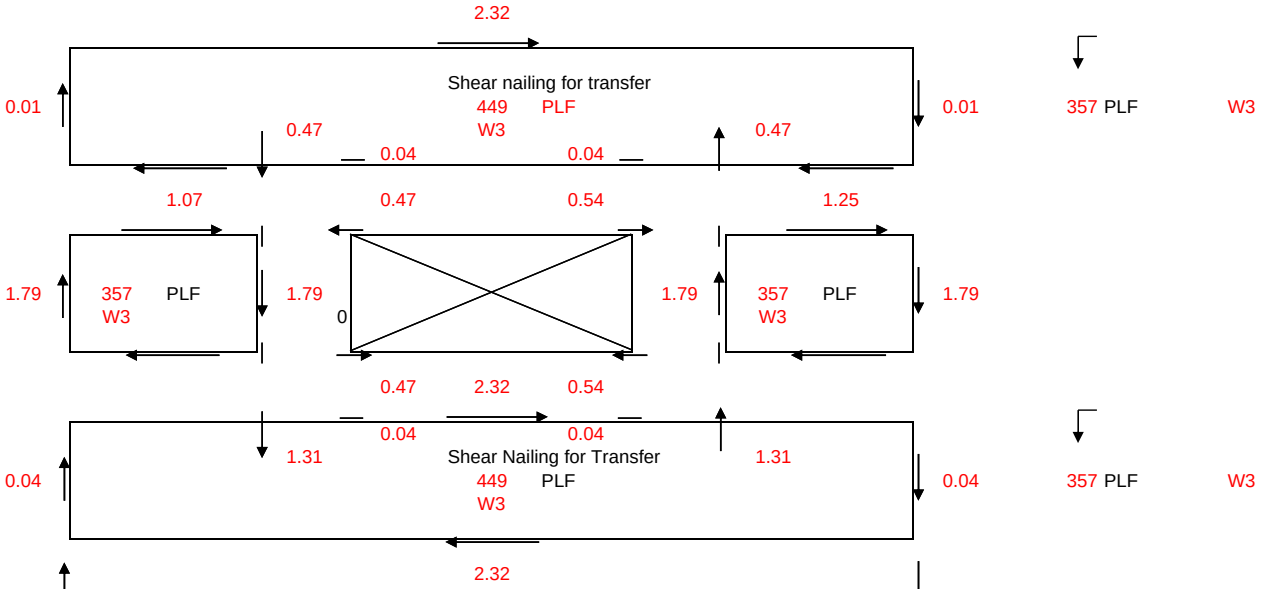
b= 11.5 CS16

b_1= 3 b_o= 5 b_2= 3.5

P= 2.321 Kips
357 plf
357 plf



h_1= 1.083333
h_o= 5 h= 9.083333
h_2= 3



1.83 OK
0.82
2.65 MST48 Capacity 2335 OK

weight of wall
1.044545 kips

1.83 OK
0.82
2.65 MST48 Capacity 2335 OK

Shear Wall Line 2B-L3-3 roof

W Designation

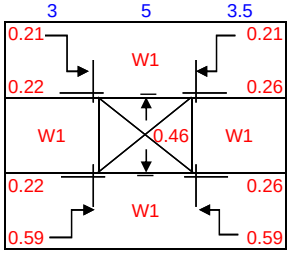
b= 11.5 CS16

b_1= 3 b_o= 5 b_2= 3.5

P= 1.040 Kips

160 plf

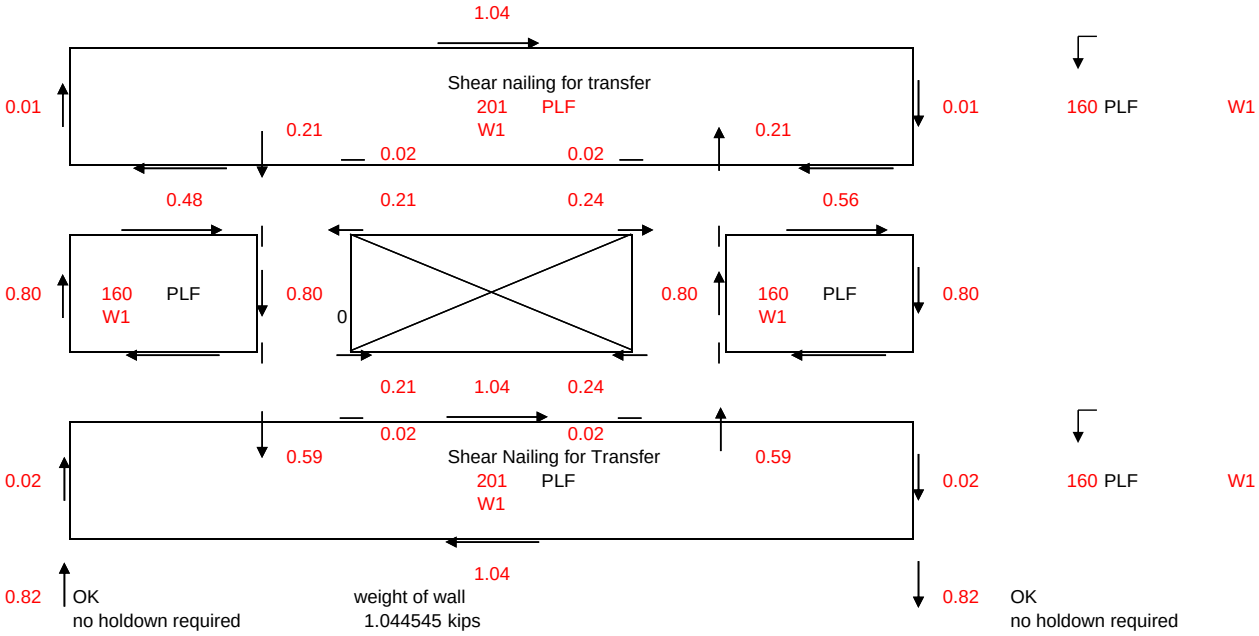
160 plf



h_1= 1.083333

h_o= 5 h= 9.083333

h_2= 3



weight of wall 1.044545 kips

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 Sheet:

Designed TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

B-T1 end (3 story + Basement)

0.5 (ft) holdown dist from end

Roof: W1			Wind (ASD): 2.857 kips		77 #/ft										77 #/ft	
			Seismic (ASD): 5.498 kips		147 #/ft										147 #/ft	
	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		9.083 ft	
Distribution L	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		9.25 ft		9.417 ft	37.33 Actual / Distribu
h/b_s =	0.965	W1	0.982	W1									0.982	W1	0.965	W1
DL w (plf) =	178.8		178.8		0		0		0		0		178.8		178.8	
$0.6M_R$ (#-ft) =	4757		4590		0		0		0		0		4590		4757	
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E
PLF	77	147	77	147	0	0	0	0	0	0	0	0	77	147	77	147
M_{ot} (#-ft) =	6545	12597	6429	12374	0	0	0	0	0	0	0	0	6429	12374	6545	12597
F (#) =	200	879	210	890	0	0	0	0	0	0	0	0	210	890	200	879
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-
	No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK	

3rd Floor: W2			Wind (ASD): 1.866 kips		127 #/ft										127 #/ft	
			Seismic (ASD): 6.388 kips		318 #/ft										318 #/ft	
	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		9.083 ft	
Distribution L	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		9.25 ft		9.417 ft	37.33 Actual / Distribu
h/b_s =	0.965	W2	0.982	W2									0.982	W2	0.965	W2
DL w (plf) =	234.9		221.9		0		0		0		0		221.9		234.9	
$0.6M_R$ (#-ft) =	6249		5696		0		0		0		0		5696		6249	
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E
PLF	127	318	127	318	0	0	0	0	0	0	0	0	127	318	127	318
M_{ot} (#-ft) =	10821	27233	10629	26751	0	0	0	0	0	0	0	0	10629	26751	10821	27233
F (#) =	713	3233	774	3296	0	0	0	0	0	0	0	0	774	3296	713	3233
Holdown	3356	S3	3356	S3	1000	-	1000	-	1000	-	1000	-	3356	S3	3356	S3
	MST60 OK		MST60 OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		MST60 OK		MST60 OK	

with point load ok by inspection

2nd Floor W3			Wind (ASD): 1.851 kips		176 #/ft										176 #/ft	
			Seismic (ASD): 3.771 kips		419 #/ft										419 #/ft	
	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		9.083 ft	
Distribution L	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		9.25 ft		9.417 ft	37.33 Actual / Distribu
h/b_s =	0.965	W3	0.982	W3									0.982	W3	0.965	W3
DL w (plf) =	234.9		221.9		0		0		0		0		221.9		234.9	
$0.6M_R$ (#-ft) =	6249		5696		0		0		0		0		5696		6249	
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E
PLF	176	419	176	419	0	0	0	0	0	0	0	0	176	419	176	419
M_{ot} (#-ft) =	15061	35872	14795	35237	0	0	0	0	0	0	0	0	14795	35237	15061	35872
F (#) =	1701	6555	1814	6672	0	0	0	0	0	0	0	0	1814	6672	1701	6555
Holdown	6970	H4	6970	H4	1000	-	1000	-	1000	-	1000	-	6712	S5	6712	S5
	HDU8 OK		HDU8 OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		(2) MST60 OK		(2) MST60 OK	

Load above to foudation above

1st Floor W4			Wind (ASD): -2.148 kips		237 #/ft		6.574								237 #/ft	
			Seismic (ASD): -6.675 kips		481 #/ft		15.657								481 #/ft	
	0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		9.25 ft		9.083 ft	
Distribution L	0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		9.25 ft		9.417 ft	18.67 Actual / Distribu
h/b_s =													0.982	W4	0.965	W4
DL w (plf) =	0		0		0		0		0		0		221.9		234.9	
$0.6M_R$ (#-ft) =	0		0		0		0		0		0		5696		6249	
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E
PLF	0	0	0	0	0	0	0	0	0	0	0	0	237	481	237	481
M_{ot} (#-ft) =	0	0	0	0	0	0	0	0	0	0	0	0	19922	40427	20281	41156
F (#) =	1701	6555	1814	6672	0	0	0	0	0	0	0	0	3440	10641	3275	10469
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	9535	H5	9535	H5
1.05	No Holdown NG		No Holdown NG		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		HDU11 NG		HDU11 NG	

concrete foundation OK OK By Inspectio OK By Inspection

2 Bedroom Unit 3 story | 2 Bedroom Unit 3 story + Basement

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 ***Sheet:***

Designed TLC ***Date:*** 5/26

Checked: ***Date:***

Project: Bradley Height Apartments

2B-T1 end (3 story)

0.5 (ft) holdown dist from end

Roof:					Wind (ASD):	2.857 kips	77 #/ft												77 #/ft	
W1					Seismic (ASD):	5.498 kips	147 #/ft												147 #/ft	
	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		9.25 ft		9.417 ft		9.083 ft 37.33	Actual
Distribution L	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		9.25 ft		9.417 ft		37.33	Distribu
h/b_s =	0.965	W1	0.982	W1											0.982	W1	0.965	W1		
DL w (plf) =	178.8		178.8		0		0		0		0		0		178.8		178.8			
$0.6M_R$ (#-ft) =	4757		4590		0		0		0		0		0		4590		4757			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	77	147	77	147	0	0	0	0	0	0	0	0	0	0	77	147	77	147		
M_{ot} (#-ft) =	6545	12597	6429	12374	0	0	0	0	0	0	0	0	0	0	6429	12374	6545	12597		
F (#) =	200	879	210	890	0	0	0	0	0	0	0	0	0	0	210	890	200	879		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
	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			

3rd Floor:					Wind (ASD):	1.866 kips	127 #/ft												127 #/ft	
W2					Seismic (ASD):	6.388 kips	318 #/ft												318 #/ft	
	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		9.25 ft		9.417 ft		9.083 ft 37.33	Actual
Distribution L	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		9.25 ft		9.417 ft		37.33	Distribu
h/b_s =	0.965	W2	0.982	W2											0.982	W2	0.965	W2		
DL w (plf) =	234.9		221.9		0		0		0		0		0		221.9		234.9			
$0.6M_R$ (#-ft) =	6249		5696		0		0		0		0		0		5696		6249			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	127	318	127	318	0	0	0	0	0	0	0	0	0	0	127	318	127	318		
M_{ot} (#-ft) =	10821	27233	10629	26751	0	0	0	0	0	0	0	0	0	0	10629	26751	10821	27233		
F (#) =	713	3233	774	3296	0	0	0	0	0	0	0	0	0	0	774	3296	713	3233		
Holdown	3356	S3	3356	S3	1000	-	1000	-	2335	S2	1000	-	1000	-	3356	S3	3356	S3		
	MST60 OK		MST60 OK		No Holdown OK		No Holdown OK		MST48 OK		No Holdown OK		No Holdown OK		MST60 OK		MST60 OK			

2nd Floor					Wind (ASD):	1.851 kips	176 #/ft												176 #/ft	
W3					Seismic (ASD):	3.771 kips	419 #/ft												419 #/ft	
	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		9.25 ft		9.417 ft		9.083 ft 37.33	Actual
Distribution L	9.417 ft		9.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		9.25 ft		9.417 ft		37.33	Distribu
h/b_s =	0.965	W3	0.982	W3											0.982	W3	0.965	W3		
DL w (plf) =	234.9		221.9		0		0		0		0		0		221.9		234.9			
$0.6M_R$ (#-ft) =	6249		5696		0		0		0		0		0		5696		6249			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	176	419	176	419	0	0	0	0	0	0	0	0	0	0	176	419	176	419		
M_{ot} (#-ft) =	15061	35872	14795	35237	0	0	0	0	0	0	0	0	0	0	14795	35237	15061	35872		
F (#) =	1701	6555	1814	6672	0	0	0	0	0	0	0	0	0	0	1814	6672	1701	6555		
Holdown	6970	H4	6970	H4	1000	-	1000	-	1000	-	1000	-	1000	-	6970	H4	6970	H4		
1.05	HDU8 OK		HDU8 OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		HDU8 OK		HDU8 OK			

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 Sheet:

Designed TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

2B-T2 stairs (3 story + Base)

0.5 (ft) holdown dist from end

Roof: W1			Wind (ASD): 3.491 kips		65 #/ft										65 #/ft
			Seismic (ASD): 6.720 kips		126 #/ft										126 #/ft
	17 ft		0 ft	0 ft	0 ft	19.5 ft		0 ft	0 ft	0 ft	17 ft		9.083 ft		
Distribution L	17 ft		0 ft	0 ft	0 ft	19.5 ft		0 ft	0 ft	0 ft	17 ft		53.5	Actual	
h/b_s =	0.534	W1				0.466	W1				0.534	W1			53.5 Distribu
DL w (plf) =	178.8		0	0	0	178.8		0	0	0	178.8				
0.6M_R (#-ft) =	15505		0	0	0	20400		0	0	0	15505				
	W	E	W E	W E	W E	W	E	W E	W E	W E	W	E			
PLF	65	126	0 0	0 0	0 0	65	126	0 0	0 0	0 0	65	126			
M_{ot} (#-ft) =	10077	19396	0 0	0 0	0 0	11559	22248	0 0	0 0	0 0	10077	19396			
F (#) =	-329	236	0 0	0 0	0 0	-465	97	0 0	0 0	0 0	-329	236			
Holdown	1000	-	1000 -	1000 -	1000 -	1000	-	1000 -	1000 -	1000 -	1000	-			
	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				

3rd Floor: W2			Wind (ASD): 2.281 kips		108 #/ft										108 #/ft
			Seismic (ASD): 7.808 kips		272 #/ft										272 #/ft
	17 ft		0 ft	0 ft	0 ft	19.5 ft		0 ft	0 ft	0 ft	17 ft		9.083 ft		
Distribution L	17 ft		0 ft	0 ft	0 ft	19.5 ft		0 ft	0 ft	0 ft	17 ft		53.5	Actual	
h/b_s =	0.534	W2				0.466	W2				0.534	W2			53.5 Distribu
DL w (plf) =	241.4		0	0	0	242.5		0	0	0	241.4				
0.6M_R (#-ft) =	20931		0	0	0	27668		0	0	0	20931				
	W	E	W E	W E	W E	W	E	W E	W E	W E	W	E			
PLF	108	272	0 0	0 0	0 0	108	272	0 0	0 0	0 0	108	272			
M_{ot} (#-ft) =	16661	41931	0 0	0 0	0 0	19111	48097	0 0	0 0	0 0	16661	41931			
F (#) =	-588	1509	0 0	0 0	0 0	-916	1172	0 0	0 0	0 0	-588	1509			
Holdown	2335	S2	1000 -	1000 -	1000 -	2335	S2	1000 -	1000 -	1000 -	2335	S2			
	MST48 OK		No Holdown OK	No Holdown OK	No Holdown OK	MST48 OK		No Holdown OK	No Holdown OK	No Holdown OK	MST48 OK				

with point load ok by inspection

2nd Floor W2			Wind (ASD): 2.262 kips		150 #/ft										150 #/ft
	use W3		Seismic (ASD): 4.609 kips		358 #/ft	use W3					use W3				358 #/ft
	17 ft		0 ft	0 ft	0 ft	19.5 ft		0 ft	0 ft	0 ft	17 ft		9.083 ft		
Distribution L	17 ft		0 ft	0 ft	0 ft	19.5 ft		0 ft	0 ft	0 ft	17 ft		53.5	Actual	
h/b_s =	0.534	W2				0.466	W2				0.534	W2			53.5 Distribu
DL w (plf) =	241.4		0	0	0	242.5		0	0	0	241.4				
0.6M_R (#-ft) =	20931		0	0	0	27668		0	0	0	20931				
	W	E	W E	W E	W E	W	E	W E	W E	W E	W	E			
PLF	150	358	0 0	0 0	0 0	150	358	0 0	0 0	0 0	150	358			
M_{ot} (#-ft) =	23191	55233	0 0	0 0	0 0	26601	63355	0 0	0 0	0 0	23191	55233			
F (#) =	-451	3587	0 0	0 0	0 0	-972	3051	0 0	0 0	0 0	-451	3587			
Holdown	4065	H3	1000 -	1000 -	1000 -	4670	S4	1000 -	1000 -	1000 -	4670	S4			
	HDU5 OK		No Holdown OK	No Holdown OK	No Holdown OK	(2) MST48 OK		No Holdown OK	No Holdown OK	No Holdown OK	(2) MST48 OK				

Load above to foudation HDU5 above

1st Floor W3			Wind (ASD): -2.625 kips		202 #/ft		8.035								202 #/ft
			Seismic (ASD): -8.159 kips		410 #/ft		19.136								410 #/ft
	0 ft		0 ft	0 ft	0 ft	use W4		0 ft	0 ft	0 ft	use W4		9.083 ft		
						9.75 ft					17 ft				
Distribution L	0 ft		0 ft	0 ft	0 ft	9.75 ft		0 ft	0 ft	0 ft	17 ft		26.75	Actual	
h/b_s =						0.932	W3				0.534	W3			26.75 Distribu
DL w (plf) =	0		0	0	0	242.5		0	0	0	241.4				
0.6M_R (#-ft) =	0		0	0	0	6917		0	0	0	20931				
	W	E	W E	W E	W E	W	E	W E	W E	W E	W	E			
PLF	0	0	0 0	0 0	0 0	202	410	0 0	0 0	0 0	202	410			
M_{ot} (#-ft) =	0	0	0 0	0 0	0 0	17910	36344	0 0	0 0	0 0	31227	63369			
F (#) =	-451	3587	0 0	0 0	0 0	217	6232	0 0	0 0	0 0	173	6159			
Holdown	14445	H6	1000 -	1000 -	1000 -	6970	H4	1000 -	1000 -	1000 -	6970	H4			
1.05	HDU14 OK		No Holdown OK	No Holdown OK	No Holdown OK	HDU8 OK		No Holdown OK	No Holdown OK	No Holdown OK	HDU8 OK				

concrete foundation

2 Bedroom Unit 3 story | 2 Bedroom Unit 3 story + Basement

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 ***Sheet:***

Designed TLC ***Date:*** 5/26

Checked: ***Date:***

Project: Bradley Height Apartments

2B-T2 stairs (3 story)

0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	3.491 kips	65 #/ft													65 #/ft	
W1			Seismic (ASD):	6.720 kips	126 #/ft													126 #/ft	
	17 ft		0 ft		0 ft		0 ft		19.5 ft		0 ft		0 ft		0 ft		17 ft		9.083 ft
Distribution L	17 ft		0 ft		0 ft		0 ft		19.5 ft		0 ft		0 ft		0 ft		17 ft		53.5 Actual
h/b_s =	0.534	W1							0.466	W1							0.534	W1	53.5 Distribu
DL w (plf) =	178.8		0		0		0		178.8		0		0		0		178.8		
$0.6M_R$ (#-ft) =	15505		0		0		0		20400		0		0		0		15505		
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	
PLF	65	126	0	0	0	0	0	0	65	126	0	0	0	0	0	0	65	126	
M_{ot} (#-ft) =	10077	19396	0	0	0	0	0	0	11559	22248	0	0	0	0	0	0	10077	19396	
F (#) =	-329	236	0	0	0	0	0	0	-465	97	0	0	0	0	0	0	-329	236	
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	
	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		

3rd Floor:			Wind (ASD):	2.281 kips	108 #/ft													108 #/ft	
W2			Seismic (ASD):	7.808 kips	272 #/ft													272 #/ft	
	17 ft		0 ft		0 ft		0 ft		19.5 ft		0 ft		0 ft		0 ft		17 ft		9.083 ft
Distribution L	17 ft		0 ft		0 ft		0 ft		19.5 ft		0 ft		0 ft		0 ft		17 ft		53.5 Actual
h/b_s =	0.534	W2							0.466	W2							0.534	W2	53.5 Distribu
DL w (plf) =	241.4		0		0		0		242.5		0		0		0		241.4		
$0.6M_R$ (#-ft) =	20931		0		0		0		27668		0		0		0		20931		
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	
PLF	108	272	0	0	0	0	0	0	108	272	0	0	0	0	0	0	108	272	
M_{ot} (#-ft) =	16661	41931	0	0	0	0	0	0	19111	48097	0	0	0	0	0	0	16661	41931	
F (#) =	-588	1509	0	0	0	0	0	0	-916	1172	0	0	0	0	0	0	-588	1509	
Holdown	2335	S2	1000	-	1000	-	1000	-	2335	S2	1000	-	1000	-	1000	-	2335	S2	
	MST48 OK		No Holdown OK		No Holdown OK		No Holdown OK		MST48 OK		No Holdown OK		No Holdown OK		No Holdown OK		MST48 OK		

2nd Floor			Wind (ASD):	2.262 kips	150 #/ft													150 #/ft	
W2			Seismic (ASD):	4.609 kips	358 #/ft													358 #/ft	
	17 ft		0 ft		0 ft		0 ft		19.5 ft		0 ft		0 ft		0 ft		17 ft		9.083 ft
Distribution L	17 ft		0 ft		0 ft		0 ft		19.5 ft		0 ft		0 ft		0 ft		17 ft		53.5 Actual
h/b_s =	0.534	W2							0.466	W2							0.534	W2	53.5 Distribu
DL w (plf) =	241.4		0		0		0		242.5		0		0		0		241.4		
$0.6M_R$ (#-ft) =	20931		0		0		0		27668		0		0		0		20931		
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	
PLF	150	358	0	0	0	0	0	0	150	358	0	0	0	0	0	0	150	358	
M_{ot} (#-ft) =	23191	55233	0	0	0	0	0	0	26601	63355	0	0	0	0	0	0	23191	55233	
F (#) =	-451	3587	0	0	0	0	0	0	-972	3051	0	0	0	0	0	0	-451	3587	
Holdown	4065	H3	6970	H4	1000	-	1000	-	9535	H5	1000	-	1000	-	6970	H4	9535	H5	
1.05	HDU5 OK		HDU8 OK		No Holdown OK		No Holdown OK		HDU11 OK		No Holdown OK		No Holdown OK		HDU8 OK		HDU11 OK		

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.002 ***Sheet:***

Designed: TLC ***Date:*** 5/29/23

Checked: ***Date:***

Project: Bradley Heights - 3 Story & basement Story

Vertical Distribution 2 Bedroom units

Fx = Cvx V (12.8-11)

$$C_{vx} = \frac{w_x h_x^{\,k}}{\sum w_i h_i^{\,k}}$$

$T_a = C_t h_n^{\,x} =$ 0.3240544 (12.8-7)

$C_t =$ 0.02 Table 12.8-2

$x =$ 0.75 Table 12.8-2

$H_n =$ 41 ft Structural Height defined in 11.2

k = 1 if period is .5s or less

k = 2 if period is 2.5s or more

k= 1-2 if between

k = 1

2Bx1 ⟶		w_x	h_x	$w_x h_x^K$	C_{vx}	V	F_x
3-story	Roof	34742	29.35417	1019818	0.376456	3856	6095
	3rd Floor	55554	20.27083	1126119	0.415696	6166	6730
	2nd Floor	55554	10.13542	563059.7	0.207848	6166	3365
			Σ	2708997	Σ	16189	
2Bx1 ↑		w_x	h_x	$w_x h_x^K$	C_{vx}	V	F_x
3-story	Roof	33849	29.35417	993608.6	0.378015	3757	5932
	3rd Floor	53768	20.27083	1089921	0.414657	5968	6508
	2nd Floor	53768	10.13542	544960.7	0.207328	5968	3254
			Σ	2628491	Σ	15694	

2Bx1 ⟶		w_x	h_x	$w_x h_x^K$	C_{vx}	V	F_x
3-story	Roof	34742	39.48958	1371941	0.288811	3856	6457
+ Basement	3rd Floor	55554	30.40625	1689179	0.355594	6166	7950
	2nd Floor	55554	20.27083	1126119	0.237063	6166	5300
	1st floor	55554	10.13542	563059.7	0.118531	6166	2650
			Σ	4750299	Σ	22356	
2Bx1 ↑		w_x	h_x	$w_x h_x^K$	C_{vx}	V	F_x
3-story	Roof	33849	39.48958	1336682	0.290176	3757	6286
+ Basement	3rd Floor	53768	30.40625	1634882	0.354912	5968	7688
	2nd Floor	53768	20.27083	1089921	0.236608	5968	5125
	1st Floor	53768	10.13542	544960.7	0.118304	5968	2563
			Σ	4606446	Σ	21662	

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.002 ***Sheet:***

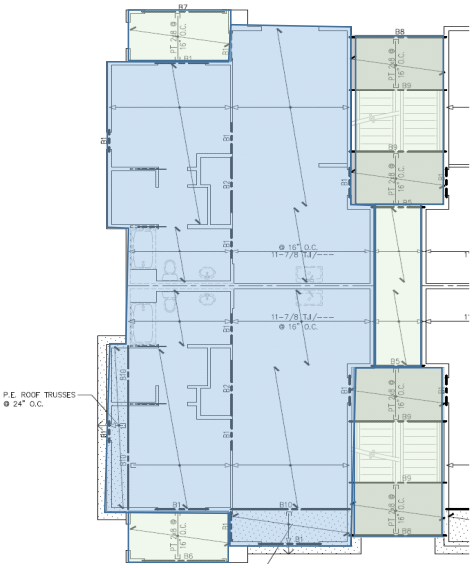
Designed: TLC ***Date:*** 5/29/23

Checked: ***Date:***

Project: Bradley Heights - 3 Story & basement Story

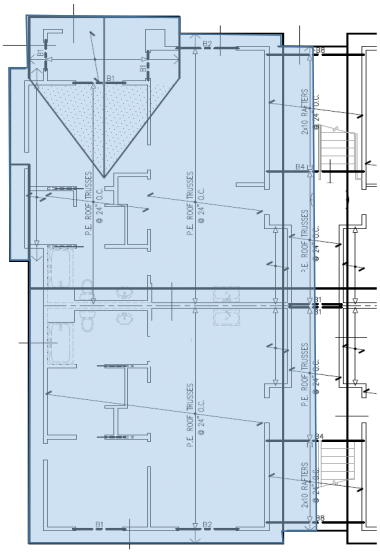
Seismic Design: 1 Bedroom units

Low Flat roof
Typ Roof/Floor
Exit 3" Concrete
not used



2.083 26 2.5

2nd - 3rd Floors



31.00

31.00

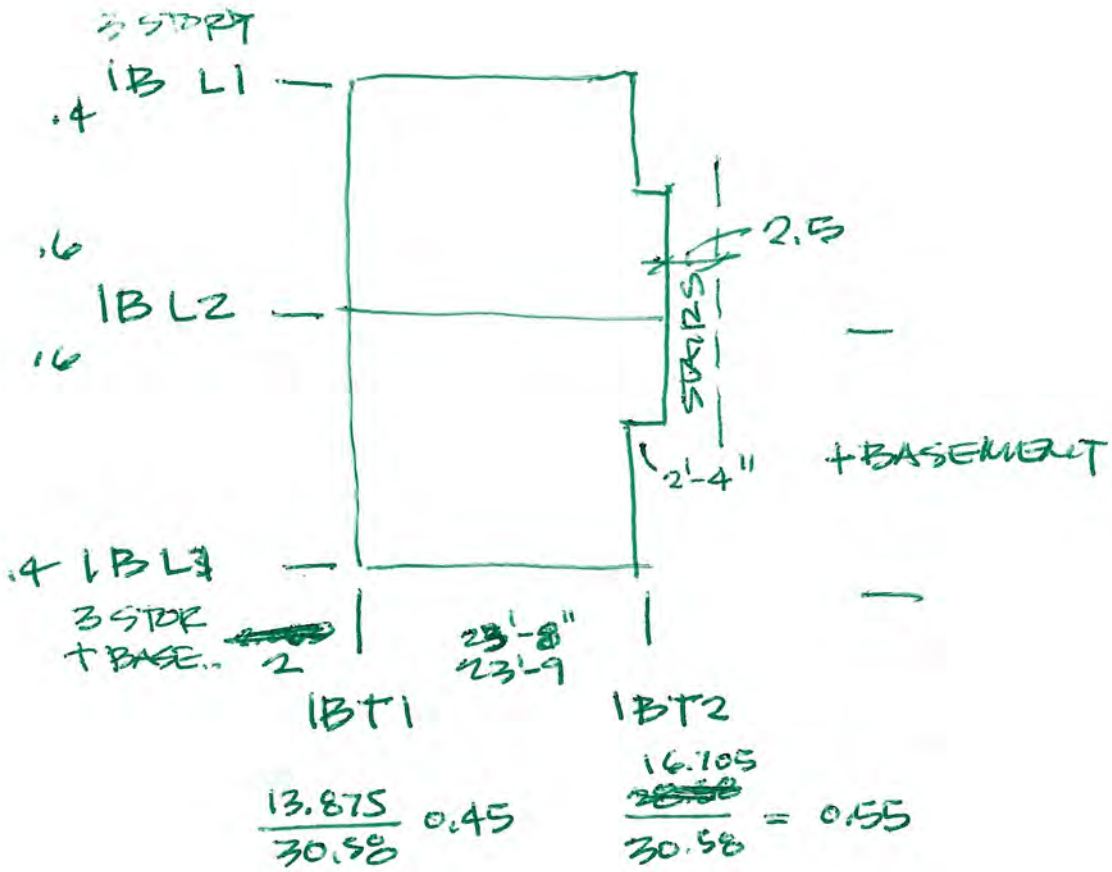
2.083 26 2.5

Roof

$C_s/1.4$ = 0.111 Typ. Roof (psf) = 22 Low Roof (psf) = 22 Typ Floor (psf)= 26 Other Floor (psf)= 47 Ext. wall (psf) = 10 Int. wall (psf) = 10 Ext. wall (psf) = 20 Int. wall (psf) = 13

						1hr			2hr				Wind:	
1Bx1	**Roof**	L (ft)	W or h(ft)	psf	W (#)		0.1110W		With			**156**	plf	
3 story	Typ Roof	949	1	22	20878	20878	2317		Vertical Distribution			0.615385	0.384615	
	Low Roof	0	1	22	0						L(ft)	windward	leeward	
	Ext	64	4.5415	10	2906.56	4359.84	484	→	2801	4514	31.00	2984	1865	2984
	Int	32	4.5415	10	1453.28					145.5968				96
	Ext	38.17	4.5415	10	1733.491	3466.981	385	↑	2702	4352	30.58	2944	1840	2944
	Int	38.17	4.5415	10	1733.491					142.304				96
	3rd Floor	L (ft)	W or h(ft)	psf	W (#)		0.1110W					**102**	plf	
	Typ Floor	755	1	26	19630	37866	4203							
d1, d2	Other Floor	388	1	47	18236						L(ft)	windward	leeward	
	Ext	64	9.083	10	5813.12	8719.68	968	→	5171	5753	31.00	1950	1218	1950
	Int	32	9.083	10	2906.56					185.5897				63
	Ext	38.17	9.083	10	3466.981	6933.962	770	↑	4973	5531	30.58	1923	1202	1923
	Int	38.17	9.083	10	3466.981					180.8369				63
	2nd Floor	L (ft)	W or h(ft)	psf	W (#)		0.1110W					**101**	plf	
	Typ Floor	755	1	26	19630	37866	4203							
d1, d2	Other Floor	388	1	47	18236									
	Ext	64	9.083	10	5813.12	8719.68	968	→	5171	2877	31.00	1934	1208	1934
	Int	32	9.083	10	2906.56				1.797587	92.79485				62
	Ext	38.17	9.083	10	3466.981	6933.962	770	↑	4973	2765	30.58	1908	1192	1908
	Int	38.17	9.083	10	3466.981				1.798306	90.41845				62
										2hr			Wind:	

1 BEDROOM


3 STORY
1B L1
.4
.6
1B L2
.6
2.5
STAIRS
2'-4"
+BASEMENT
.4 1B L3
3 STOR
+BASE.
2
23'-8"
23'-9
1BT1
1BT2
13.875
30.58
0.45
16.705
30.58
= 0.55

1Bx1	Roof	L (ft)	W or h(ft)	psf	W (#)		0.1110W			With		156 plf			
3 story + B	Typ Roof	949	1	22	20878	20878	2317			Vertical Distribution					
	Low Roof	0	1	22	0							L(ft)	windward	leeward	
	Ext	64	4.5415	10	2906.56	4359.84	484	→		2801	4766	31.00	2984	1865	2984
	Int	32	4.5415	10	1453.28				↑		153.7483				
	Ext	38.17	4.5415	10	1733.491	3466.981	385			2702	4596	30.58	2944	1840	2944
	Int	38.17	4.5415	10	1733.491						150.2818				
	3rd Floor	L (ft)	W or h(ft)	psf	W (#)		0.1110W					**102** plf			
	Typ Floor	755	1	26	19630	37866	4203								
e	Other Floor	388	1	47	18236							L(ft)	windward	leeward	
	Ext	64	9.083	10	5813.12	8719.68	968	→		5171	6774	31.00	1950	1218	1950
	Int	32	9.083	10	2906.56				↑		218.5199				
	Ext	38.17	9.083	10	3466.981	6933.962	770			4973	6512	30.58	1923	1202	1923
	Int	38.17	9.083	10	3466.981						212.9388				
	2nd Floor	L (ft)	W or h(ft)	psf	W (#)		0.1110W					**101** plf			
	Typ Floor	755	1	26	19630	37866	4203								
e	Other Floor	388	1	47	18236							L(ft)	windward	leeward	
	Ext	64	9.083	10	5813.12	8719.68	968	→		5171	4516	31.00	1934	1208	1934
	Int	32	9.083	10	2906.56				↑		145.6799				
	Ext	38.17	9.083	10	3466.981	6933.962	770			4973	4342	30.58	1908	1192	1908
	Int	38.17	9.083	10	3466.981						141.9592				
	1st Floor	L (ft)	W or h(ft)	psf	W (#)		0.1110W					**101** plf			
	Typ Floor	755	1	26	19630	37866	4203								
b1, b2	Other Floor	388	1	47	18236							L(ft)	windward	leeward	
	Ext	64	9.083	10	5813.12	8719.68	968	→		5171	2258	31.00	1934	1208	1934
	Int	32	9.083	10	2906.56				↑		72.83996				
	Ext	38.17	9.083	10	3466.981	6933.962	770			4973	2171	30.58	1908	1192	1908
	Int	38.17	9.083	10	3466.981						70.97959				

Unit B1							
Roof →	2984	Wind	Roof ↑	1840	Roof ↓	2944	Wind
	4514	Seismic		4352		4352	Seismic
3rd →	1950	Wind	3rd ↑	1202	3rd ↓	1923	Wind
	5753	Seismic		5531		5531	Seismic
2nd →	1934	Wind	2nd ↑	1192	2nd ↓	1908	Wind
	2877	Seismic		2765		2765	Seismic

Unit B1							
Roof →	2984	Wind	Roof ↑	2944	Roof ↓	1840	Wind
	4766	Seismic		4596		4596	Seismic
3rd →	1950	Wind	3rd ↑	1923	3rd ↓	1202	Wind
	6774	Seismic		6512		6512	Seismic
2nd →	1934	Wind	2nd ↑	1908	2nd ↓	1192	Wind
	4516	Seismic		4342		4342	Seismic
1st →	1934	Wind	2nd ↑	1908	2nd ↓	1192	Wind
	2258	Seismic		2171		2171	Seismic

B1 + B1 ↑	B1 + B1 ↓	max	
4784	4784	4784	Wind
8948	8948	8948	Seismic
3125	3125	3125	Wind
12043	12043	12043	Seismic
3100	3100	3100	Wind
7107	7107	7107	Seismic
1908	1192	1908	Wind
2171	2171	2171	Seismic

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.002 **Sheet:**

Designed: TLC **Date:** 5/29/23

Checked: **Date:**

Project: Bradley Heights - 3 Story & basement Story

Diaphragm Design Forces 1 Bedroom units

$F_x = C_{vx} V$ (12.8-11)

$$F_{px} = \frac{\sum_{i=x}^{n} F_i}{\sum_{i=x}^{n} w_i} w_{px} \quad (12.10\text{-}1)$$

F_{px} = the diaphragm design force at Level x

F_i = the design force applied to level i

w_i = the weight tributary to Level i

w_{px} = the weight tributary to the diaphragm at Level x

I_e = 1

S_{DS} = 0.8787

Minimum: $F_{px} = 0.2 S_{DS} I_e w_{px}$

Maximum: $F_{px} = 0.4 S_{DS} I_e w_{px}$

3- story B1 →

	F_i	$\sum_{i=x}^{n} F_i$	w_{xp}	$\sum_{i=x}^{n} w_i$	F_{px}	Min	Max	use F_{px}	x factor
Roof	4514	4514	25238	25237.84	4514	4435	8871	4514	1
3rd Floor	5753	10267	46586	71823.52	6659	8187	16374	8187	1.229428
2nd Floor	2877	13143	46586	118409.2	5171	8187	16374	8187	1.583243

3- story B1 ↑

	F_i	$\sum_{i=x}^{n} F_i$	w_i	$\sum_{i=x}^{n} w_i$	F_{px}	Min	Max	use F_{px}	x factor
Roof	4352	4352	24345	24344.98	4352	4278	8557	4352	1
3rd Floor	5531	9883	44800	69144.94	6403	7873	15746	7873	1.229586
2nd Floor	2765	12648	44800	113944.9	4973	7873	15746	7873	1.583243

3- story + B B1 →

	F_i	$\sum_{i=x}^{n} F_i$	w_{xp}	$\sum_{i=x}^{n} w_i$	F_{px}	Min	Max	use F_{px}	x factor
Roof	4766	4766	25238	25237.84	4766	4435	8871	4766	1
3rd Floor	6774	11540	46586	71823.52	7485	8187	16374	8187	1.093754
2nd Floor	4516	16056	46586	118409.2	6317	8187	16374	8187	1.296009
1st Floor	2258	18314	46586	164994.9	5171	8187	16374	8187	1.583243

3- story + B B1 ↑

	F_i	$\sum_{i=x}^{n} F_i$	w_i	$\sum_{i=x}^{n} w_i$	F_{px}	Min	Max	use F_{px}	x factor
Roof	4596	4596	24345	24344.98	4596	4278	8557	4596	1
3rd Floor	6512	11108	44800	69144.94	7197	7873	15746	7873	1.093907
2nd Floor	4342	15450	44800	113944.9	6074	7873	15746	7873	1.296103
1st Floor	2171	17621	44800	158744.9	4973	7873	15746	7873	1.583243

Unit B1														
3 story			3 story + Basement			Combined				Line	Line	Line	Line	Line
Unit B1	→		**Unit B1**	→		B1+B1 combined				1B-T1	1B-T2	**B1-L1**	**B1-L2**	**B1-L3**
										0.45	0.55	0.4	0.6	0.4
Roof	2984	**Wind**	**Roof**	2984	**Wind**	**Roof**	4784	**wind**	**Roof**	2153	2631	1194	3581	1194
	4514	**Seismic**		4766	**Seismic**		8948	**seismic**		4027	4921	1805	5568	1906
3rd Floor	1950	**Wind**	**3rd Floor**	1950	**Wind**	**3rd Floor**	3125	**wind**	**3rd Floor**	1406	1719	780	2339	780
	5753	**Seismic**		6774	**Seismic**		12043	**seismic**		5419	6624	2301	7516	2710
2nd Floor	1934	**Wind**	**2nd Floor**	1934	**Wind**	**2nd Floor**	3100	**wind**	**2nd Floor**	1395	1705	773	2320	773
	2877	**Seismic**		4516	**Seismic**		7107	**seismic**		3198	3909	1151	4436	1806
			1st Floor	1934	**Wind**	**1st Floor**	1908	**wind**	**1st Floor**	858	1049	0	1160	773
				2258	**Seismic**		2171	**seismic**		977	1194	0	1355	903
													to concrete retaining wall	

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 Sheet:

Designed TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

1B-L1

0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	1.194	kips	173	#/ft															173	#/ft
W2			Seismic (ASD):	1.906	kips	276	#/ft															276	#/ft
	use W1P		SW 1B-L3 -1							use W2P		SW 1B-L3 -2						not used					
			5									6								6		9.083	
	5			5						6			6					6			6	ft	
	0 ft		0 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		6.917	Actual
Distribution L	0 ft		0 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		6.917	Distribu
h/b_s =						1.756	W2			1.714	W2												
DL w (plf) =	427.2		427.2		0			382.3		382.3			0		0		429.1		429.1				
0.6M_R (#-ft) =	0		0		0			1339		1405			0		0		0		0				
	W	E	W	E	W	E		W	E	W	E		W	E	W	E	W	E	W	E			
PLF	0	0	0	0	0	0		173	276	173	276		0	0	0	0	0	0	0	0			
M_{ot} (#-ft) =	0	0	0	0	0	0		5356	8554	5486	8763		0	0	0	0	0	0	0	0			
F (#) =	0	0	0	0	0	0		1377	2474	1360	2453		0	0	0	0	0	0	0	0			
Holdown	1000	-	1000	-	1000	-		1256	S1	1256	S1		1000	-	1000	-	1000	-	1000	-			
	No Holdown OK		No Holdown OK		No Holdown OK			MST37 NG		MST37 NG			No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK				
	(see calc next pp OK)							(see calc next pp OK)															

3rd Floor:			Wind (ASD):	0.780	kips	161	#/ft															163	#/ft
W3			Seismic (ASD):	2.71	kips	377	#/ft															382	#/ft
	use W3P		SW 2B-L3 -1							use W4P		SW 2B-L3 -2						not used					
			5																			9.083	
	5			5						6			6					5			5	ft	
	3 ft		2.333 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.25	Actual
Distribution L	3 ft		2.178 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.09	Distribu
h/b_s =	1.667	W3	2.143	W3				1.756	W3	1.714	W3												
DL w (plf) =	108.2		108.2		0			108.2		108.2			0		0		108.2		108.2				
0.6M_R (#-ft) =	292		177		0			379		398			0		0		0		0				
	W	E	W	E	W	E		W	E	W	E		W	E	W	E	W	E	W	E			
PLF	163	382	152	356	0	0		163	382	163	382		0	0	0	0	0	0	0	0			
M_{ot} (#-ft) =	4446	10401	3228	7550	0	0		5064	11845	5187	12134		0	0	0	0	0	0	0	0			
F (#) =	1662	4043	1664	4022	0	0		2983	6405	2957	6365		0	0	0	0	0	0	0	0			
Holdown	2335	S2	2335	S2	1000	-		2335	S2	2335	S2		1000	-	1000	-	1000	-	1000	-			
	MST48 NG		MST48 NG		No Holdown OK			MST48 NG		MST48 NG			No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK				
	(see calc next pp OK)							(see calc next pp OK)															

2nd Floor			Wind (ASD):	0.773	kips	224	#/ft															227	#/ft
W4			Seismic (ASD):	1.806	kips	524	#/ft															531	#/ft
	use W4P		SW 2B-L3 -1							use W6P		SW 2B-L3 -2						not used					
																						9.083	
	5		5							6		6						5		5		ft	
	3 ft		2.333 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.25	Actual
Distribution L	3 ft		2.178 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.09	Distribu
h/b_s =	1.667	W4	2.143	W4				1.756	W4	1.714	W4												
DL w (plf) =	108.2		108.2		0			108.2		108.2			0		0		108.2		108.2				
0.6M_R (#-ft) =	292		177		0			379		398			0		0		0		0				
	W	E	W	E	W	E		W	E	W	E		W	E	W	E	W	E	W	E			
PLF	227	531	212	496	0	0		227	531	227	531		0	0	0	0	0	0	0	0			
M_{ot} (#-ft) =	6189	14471	4493	10505	0	0		7048	16480	7220	16882		0	0	0	0	0	0	0	0			
F (#) =	4020	9715	4018	9655	0	0		5270	11926	5231	11860		0	0	0	0	0	0	0	0			
Holdown	4065	H3	4065	H3	1000	-		4065	H3	4065	H3		1000	-	1000	-	1000	-	1000	-			
	HDU5 NG		HDU5 NG		No Holdown OK			HDU5 NG		HDU5 NG			No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK				
	(see calc next pp OK)							(see calc next pp OK)															

1st Floor			Wind (ASD):	0.773	kips	287	#/ft	Foundation														291	#/ft
W4			Seismic (ASD):	0.903	kips	598	#/ft															606	#/ft
	use W5P		SW 2B-L3 -1							use W6P		SW 2B-L3 -2						not used					
																						9.083	
	5		5							6		6						5		5		ft	
	3 ft		2.333 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.25	Actual
Distribution L	3 ft		2.178 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.09	Distribu
h/b_s =	1.667	W4	2.143	W4				1.756	W4	1.714	W4												
DL w (plf) =	108.2		108.2		0			108.2		108.2			0		0		108.2		108.2				
0.6M_R (#-ft) =	292		177		0			379		398			0		0		0		0				
	W	E	W	E	W	E		W	E	W	E		W	E	W	E	W	E	W	E			
PLF	291	606	272	565	0	0		291	606	291	606		0	0	0	0	0	0	0	0			
M_{ot} (#-ft) =	7931	16506	5758	11982	0	0		9033	18798	9253	19257		0	0	0	0	0	0	0	0			
F (#) =	7076	16200	7062	16095	0	0		8237	18241	8183	18146		0	0	0	0	0	0	0	0			
Holdown	6970	H4	6970	H4	1000	-		6970	H4	6970	H4		1000	-	1000	-	1000	-	1000	-			
1.05	HDU8 NG		HDU8 NG		No Holdown OK			HDU8 NG		HDU8 NG			No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK				
	(see calc next pp OK)							(see calc next pp OK)															

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 *Sheet:*

Designed TLC *Date:* 5/26

Checked: *Date:*

Project: Bradley Height Apartments

1B-L2

0.5 (ft) holdown dist from end

Roof:					Wind (ASD):	3.581 kips	142 #/ft										142 #/ft	
W1					Seismic (ASD):	5.568 kips	221 #/ft										221 #/ft	
									Use W2									
																	9.083 ft	
	0 ft		0 ft		0 ft		0 ft		25.17 ft		0 ft		0 ft		0 ft		25.17	Actual
Distribution L	0 ft		0 ft		0 ft		0 ft		25.17 ft		0 ft		0 ft		0 ft		25.17	Distribu
h/b_s =									0.361 W1									
DL w (plf) =	0		0		0		0		384.2		0		0		0			
$0.6M_R$ (#-ft) =	0		0		0		0		73002		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	0	0	0	0	0	0	0	0	142	221	0	0	0	0	0	0		
M_{ot} (#-ft) =	0	0	0	0	0	0	0	0	32525	50574	0	0	0	0	0	0		
F (#) =	0	0	0	0	0	0	0	0	-1641	-909	0	0	0	0	0	0		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
	No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			

3rd Floor:					Wind (ASD):	2.339 kips	235 #/ft										235 #/ft	
W4					Seismic (ASD):	7.516 kips	520 #/ft										520 #/ft	
																	9.083 ft	
	0 ft		0 ft		0 ft		0 ft		25.17 ft		0 ft		0 ft		0 ft		25.17	Actual
Distribution L	0 ft		0 ft		0 ft		0 ft		25.17 ft		0 ft		0 ft		0 ft		25.17	Distribu
h/b_s =									0.361 W4									
DL w (plf) =	0		0		0		0		108.2		184		0		0			
$0.6M_R$ (#-ft) =	0		0		0		0		23269		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	0	0	0	0	0	0	0	0	235	520	0	0	0	0	0	0		
M_{ot} (#-ft) =	0	0	0	0	0	0	0	0	53775	118849	0	0	0	0	0	0		
F (#) =	0	0	0	0	0	0	0	0	-404	2966	0	0	0	0	0	0		
Holdown	2335	S2	1000	-	1000	-	1000	-	3356	S3	1000	-	1000	-	1000	-	2335	S2
	MST48 OK		No Holdown OK		No Holdown OK		No Holdown OK		MST60 OK		No Holdown OK		No Holdown OK		No Holdown OK		MST48 OK	

2nd Floor					Wind (ASD):	2.320 kips	327 #/ft										327 #/ft	
W5					Seismic (ASD):	4.436 kips	696 #/ft										696 #/ft	
																	9.083 ft	
	0 ft		0 ft		0 ft		0 ft		25.17 ft		0 ft		0 ft		0 ft		25.17	Actual
Distribution L	0 ft		0 ft		0 ft		0 ft		25.17 ft		0 ft		0 ft		0 ft		25.17	Distribu
h/b_s =									0.361 W5									
DL w (plf) =	0		0		0		0		108.2		0		0		0			
$0.6M_R$ (#-ft) =	0		0		0		0		23269		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	0	0	0	0	0	0	0	0	327	696	0	0	0	0	0	0		
M_{ot} (#-ft) =	0	0	0	0	0	0	0	0	74851	159139	0	0	0	0	0	0		
F (#) =	0	0	0	0	0	0	0	0	1687	8474	0	0	0	0	0	0		
Holdown	4065	H3	6970	H4	1000	-	1000	-	9535	H5	1000	-	1000	-	6970	H4	9535	H5
1.05	HDU5 OK		HDU8 OK		No Holdown OK		No Holdown OK		HDU11 OK		No Holdown OK		No Holdown OK		HDU8 OK		HDU11 OK	

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 Sheet:

Designed TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

1B-L3

0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	1.194	kips	173	#/ft															173	#/ft
W2			Seismic (ASD):	1.906	kips	276	#/ft															276	#/ft
	use W1P		SW 1B-L3 -1							use W2P		SW 1B-L3 -2						not used					
			5									6								6		9.083	
	5			5						6			6					6			6	ft	
	0 ft		0 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		6.917	Actual
Distribution L	0 ft		0 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		6.917	Distribu
h/b_s =						1.756	W2			1.714	W2												
DL w (plf) =	427.2		427.2		0			382.3		382.3				0		0		429.1		429.1			
0.6M_R (#-ft) =	0		0		0			1339		1405				0		0		0		0			
	W	E	W	E	W	E		W	E	W	E			W	E	W	E	W	E	W	E		
PLF	0	0	0	0	0	0		173	276	173	276			0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	0	0	0	0	0	0		5356	8554	5486	8763			0	0	0	0	0	0	0	0		
F (#) =	0	0	0	0	0	0		1377	2474	1360	2453			0	0	0	0	0	0	0	0		
Holdown	1000	-	1000	-	1000	-		1256	S1	1256	S1			1000	-	1000	-	1000	-	1000	-		
	No Holdown OK		No Holdown OK		No Holdown OK			MST37 NG		MST37 NG				No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			
	(see calc next pp OK)							(see calc next pp OK)															
3rd Floor:			Wind (ASD):	0.780	kips	161	#/ft															163	#/ft
W3			Seismic (ASD):	2.71	kips	377	#/ft															382	#/ft
	use W3P		SW 2B-L3 -1							use W4P		SW 2B-L3 -2						not used					
			5																			9.083	
	5			5						6			6					5			5	ft	
	3 ft		2.333 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.25	Actual
Distribution L	3 ft		2.178 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.09	Distribu
h/b_s =	1.667	W3	2.143	W3				1.756	W3	1.714	W3												
DL w (plf) =	108.2		108.2		0			108.2		108.2				0		0		108.2		108.2			
0.6M_R (#-ft) =	292		177		0			379		398				0		0		0		0			
	W	E	W	E	W	E		W	E	W	E			W	E	W	E	W	E	W	E		
PLF	163	382	152	356	0	0		163	382	163	382			0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	4446	10401	3228	7550	0	0		5064	11845	5187	12134			0	0	0	0	0	0	0	0		
F (#) =	1662	4043	1664	4022	0	0		2983	6405	2957	6365			0	0	0	0	0	0	0	0		
Holdown	2335	S2	2335	S2	1000	-		2335	S2	2335	S2			1000	-	1000	-	1000	-	1000	-		
	MST48 NG		MST48 NG		No Holdown OK			MST48 NG		MST48 NG				No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			
	(see calc next pp OK)							(see calc next pp OK)															
2nd Floor			Wind (ASD):	0.773	kips	224	#/ft															227	#/ft
W4			Seismic (ASD):	1.806	kips	524	#/ft															531	#/ft
	use W4P		SW 2B-L3 -1							use W6P		SW 2B-L3 -2						not used					
			5																			9.083	
	5			5						6			6					5			5	ft	
	3 ft		2.333 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.25	Actual
Distribution L	3 ft		2.178 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.09	Distribu
h/b_s =	1.667	W4	2.143	W4				1.756	W4	1.714	W4												
DL w (plf) =	108.2		108.2		0			108.2		108.2				0		0		108.2		108.2			
0.6M_R (#-ft) =	292		177		0			379		398				0		0		0		0			
	W	E	W	E	W	E		W	E	W	E			W	E	W	E	W	E	W	E		
PLF	227	531	212	496	0	0		227	531	227	531			0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	6189	14471	4493	10505	0	0		7048	16480	7220	16882			0	0	0	0	0	0	0	0		
F (#) =	4020	9715	4018	9655	0	0		5270	11926	5231	11860			0	0	0	0	0	0	0	0		
Holdown	4670	S4	4670	S4	1000	-		4670	S4	4670	S4			1000	-	1000	-	1000	-	1000	-		
	(2) MST48 NG		(2) MST48 NG		No Holdown OK			(2) MST48 NG		(2) MST48 NG				No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			
	(see calc next pp OK)							(see calc next pp OK)															
1st Floor			Wind (ASD):	0.773	kips	287	#/ft															291	#/ft
W4			Seismic (ASD):	0.903	kips	598	#/ft															606	#/ft
	use W5P		SW 2B-L3 -1							use W6P		SW 2B-L3 -2						not used					
			5																			9.083	
	5			5						6			6					5			5	ft	
	3 ft		2.333 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.25	Actual
Distribution L	3 ft		2.178 ft		0 ft					3.417 ft		3.5 ft		0 ft		0 ft		0 ft		0 ft		12.09	Distribu
h/b_s =	1.667	W4	2.143	W4				1.756	W4	1.714	W4												
DL w (plf) =	108.2		108.2		0			108.2		108.2				0		0		108.2		108.2			
0.6M_R (#-ft) =	292		177		0			379		398				0		0		0		0			
	W	E	W	E	W	E		W	E	W	E			W	E	W	E	W	E	W	E		
PLF	291	606	272	565	0	0		291	606	291	606			0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	7931	16506	5758	11982	0	0		9033	18798	9253	19257			0	0	0	0	0	0	0	0		
F (#) =	7076	16200	7062	16095	0	0		8237	18241	8183	18146			0	0	0	0	0	0	0	0		
Holdown	6970	H4	6970	H4	1000	-		6970	H4	6970	H4			1000	-	1000	-	1000	-	1000	-		
1.05	HDU8 NG		HDU8 NG		No Holdown OK			HDU8 NG		HDU8 NG				No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			
	(see calc next pp OK)							(see calc next pp OK)															

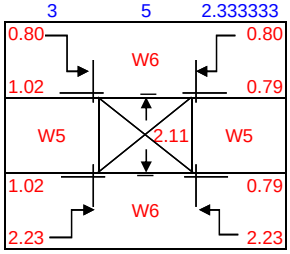
Shear Wall Line 2B-L3-1 1st

W Designation

b= 10.33333 CS16x2

b_1= 3 b_o= 5 b_2= 2.333333

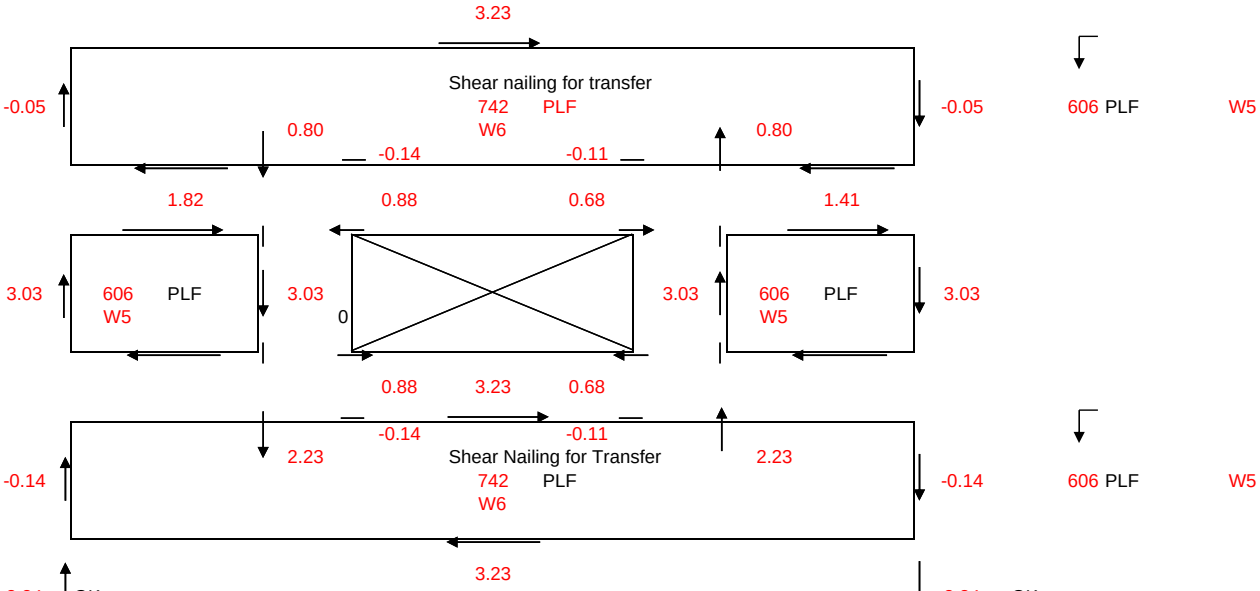
P= 3.232 Kips
606 plf
606 plf



h_1= 1.083333

h_o= 5 h= 9.083333

h_2= 3



2.84 OK
4.28
7.12 HDU8 Capacity 6970 OK

weight of wall
0.99913 kips

2.84 OK
4.28
7.12 HDU8 Capacity 6970 OK

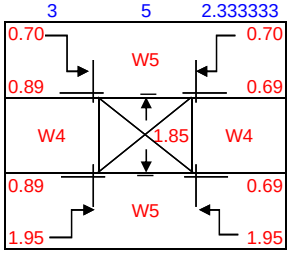
Shear Wall Line 2B-L3-1 2nd

W Designation

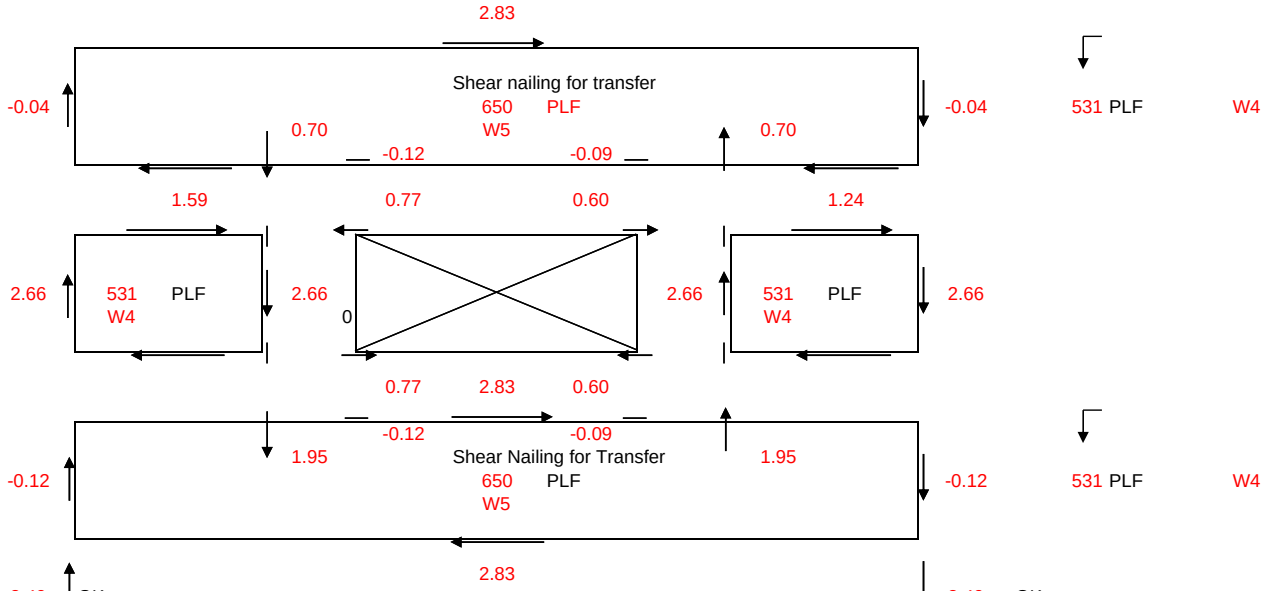
b= 10.33333 CS16x2

b_1= 3 b_o= 5 b_2= 2.333333

P= 2.832 Kips
531 plf
531 plf



h_1= 1.083333
h_o= 5 h= 9.083333
h_2= 3



2.49 OK
1.79 HDU5 Capacity 4065 OK
4.28 (2)MST48 Capacity 4670 OK

weight of wall
0.99913 kips

2.49 OK
1.79 HDU5 Capacity 4065 OK
4.28 (2)MST48 Capacity 4670 OK

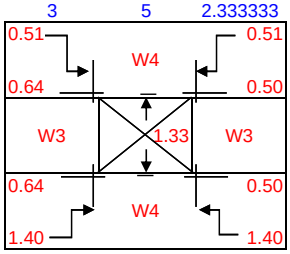
Shear Wall Line 1B-L3-1 3rd

W Designation

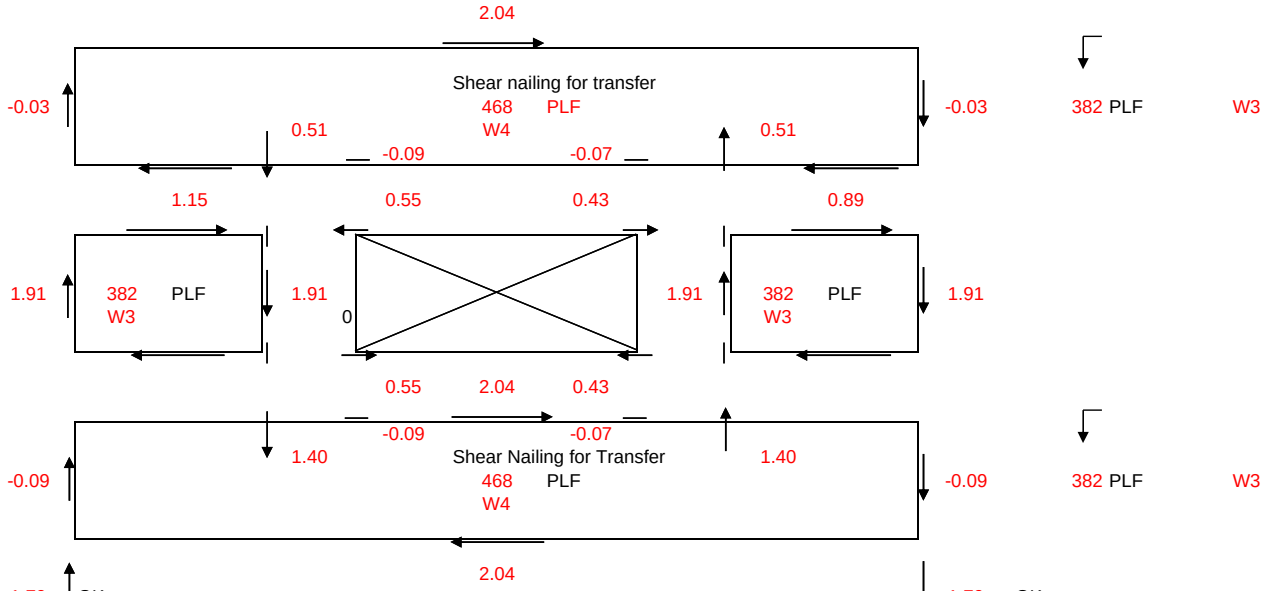
b= 10.33333 CS16

b_1= 3 b_o= 5 b_2= 2.333333

P= 2.037 Kips
382 plf
382 plf



h_1= 1.083333
h_o= 5 h= 9.083333
h_2= 3



1.79 OK
0.00
1.79 MST48 Capacity 2335 OK

weight of wall
0.99913 kips

1.79 OK
0.00
1.79 MST48 Capacity 2335 OK

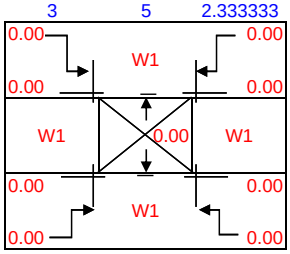
Shear Wall Line 1B-L3-1 roof not used

W Designation

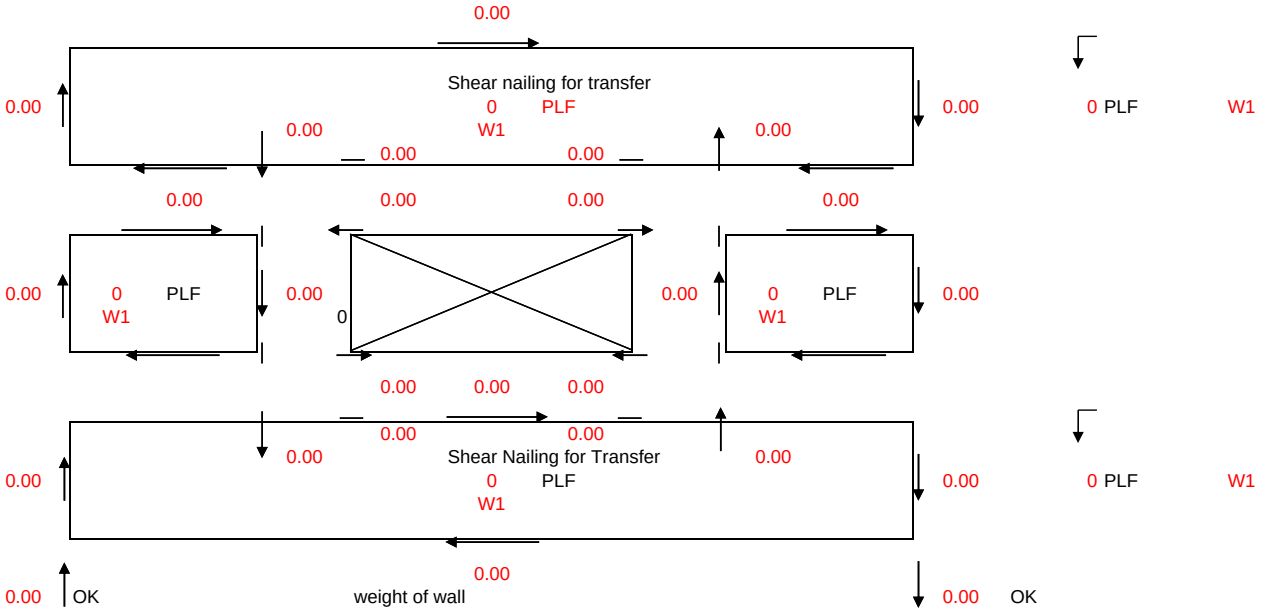
b= 10.33333 CS16

b_1= 3 b_o= 5 b_2= 2.333333

P= 0.000 Kips
0 plf
0 plf



h_1= 1.083333
h_o= 5 h= 9.083333
h_2= 3



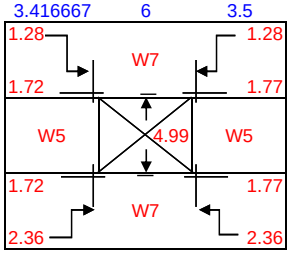
Shear Wall Line 1B-L3-2 1st

W Designation

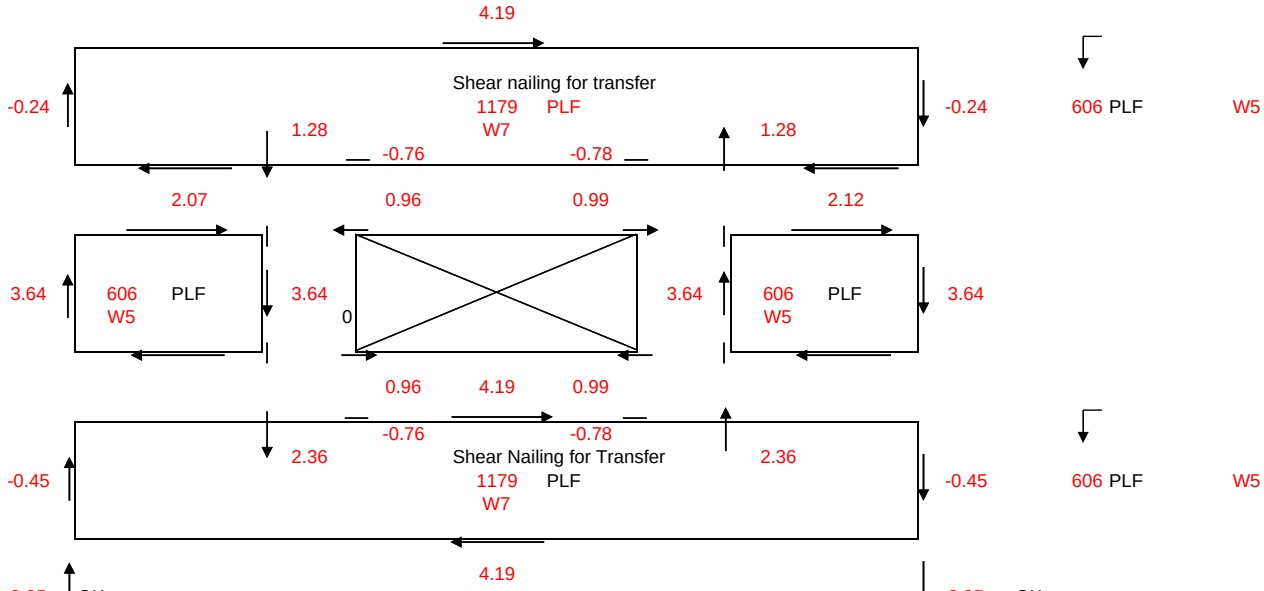
b= 12.91667 CS14x2

b_1= 3.416667 b_o= 6 b_2= 3.5

P= 4.192 Kips
606 plf
606 plf



h_1= 1.083333
h_o= 6 h= 9.083333
h_2= 2



2.95 OK
4.37
7.32 HDU8 Capacity 6970 OK

weight of wall
1.173221 kips

2.95 OK
4.37
7.32 HDU8 Capacity 6970 OK

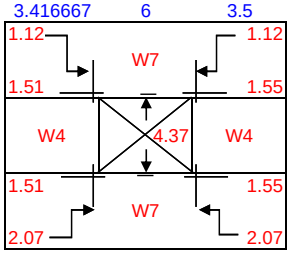
Shear Wall Line 1B-L3-2 2nd

W Designation

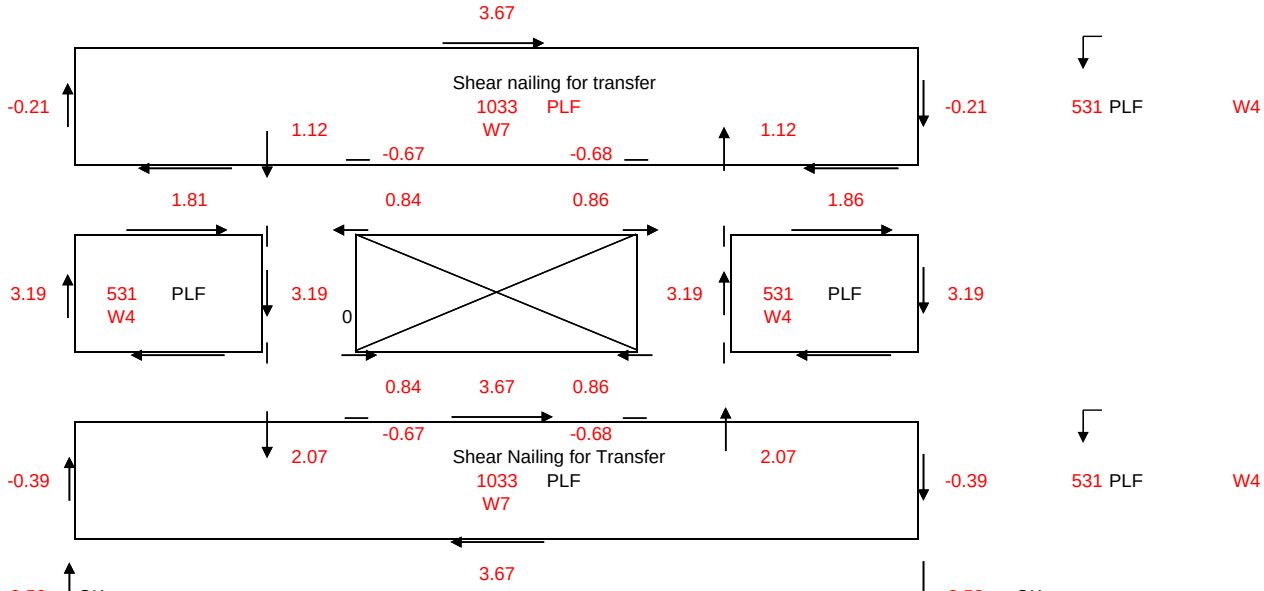
b= 12.91667 CS14x2

b_1= 3.416667 b_o= 6 b_2= 3.5

P= 3.673 Kips
531 plf
531 plf



h_1= 1.083333
h_o= 6 h= 9.083333
h_2= 2



2.58 OK
1.79 HDU5 Capacity 4065 OK
4.37 (2)MST48 Capacity 4670 OK

weight of wall
1.173221 kips

2.58 OK
1.79 HDU5 Capacity 4065 OK
4.37 (2)MST48 Capacity 4670 OK

Shear Wall Line 1B-L3-2 3rd

W Designation

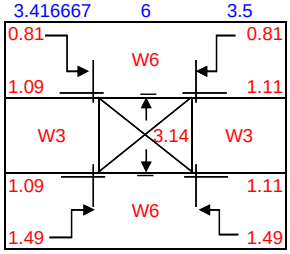
b= 12.91667 CS16x2

b_1= 3.416667 b_o= 6 b_2= 3.5

P= 2.642 Kips

382 plf

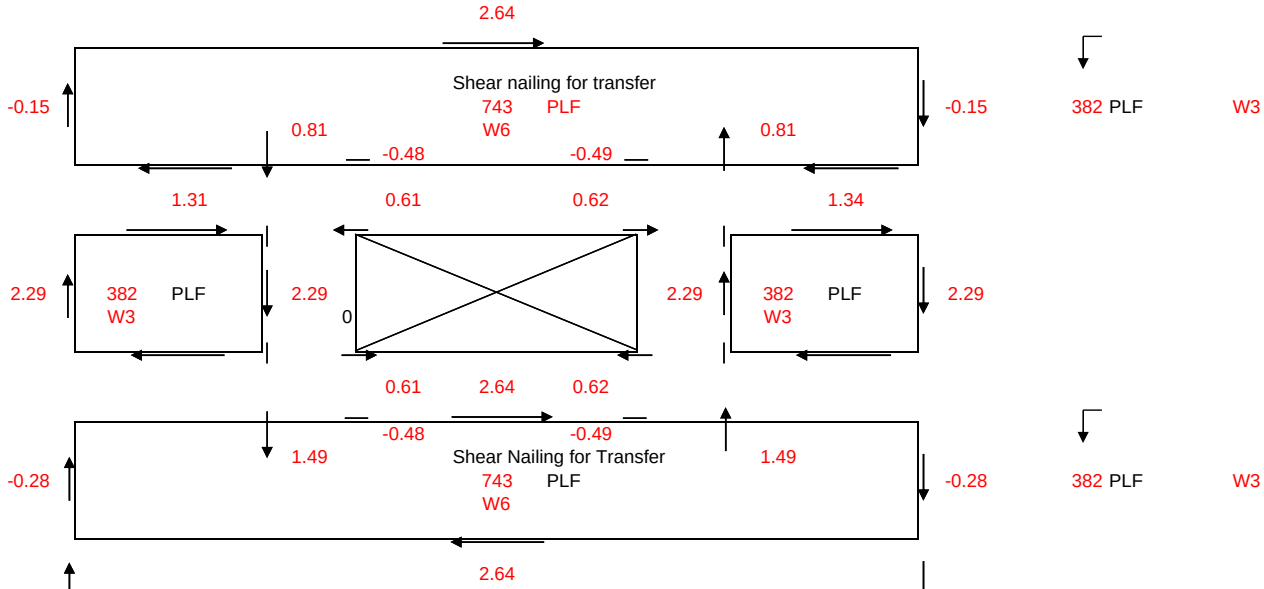
382 plf



h_1= 1.083333

h_o= 6 h= 9.083333

h_2= 2



1.86 OK
1.34
3.20 MST60 Capacity 3356 OK

weight of wall
1.173221 kips

1.86 OK
1.34
3.20 MST60 Capacity 3356 OK

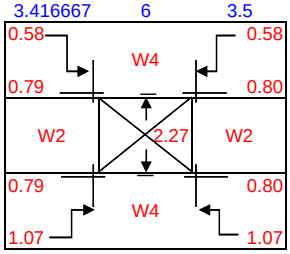
Shear Wall Line 1B-L3-2 roof

W Designation

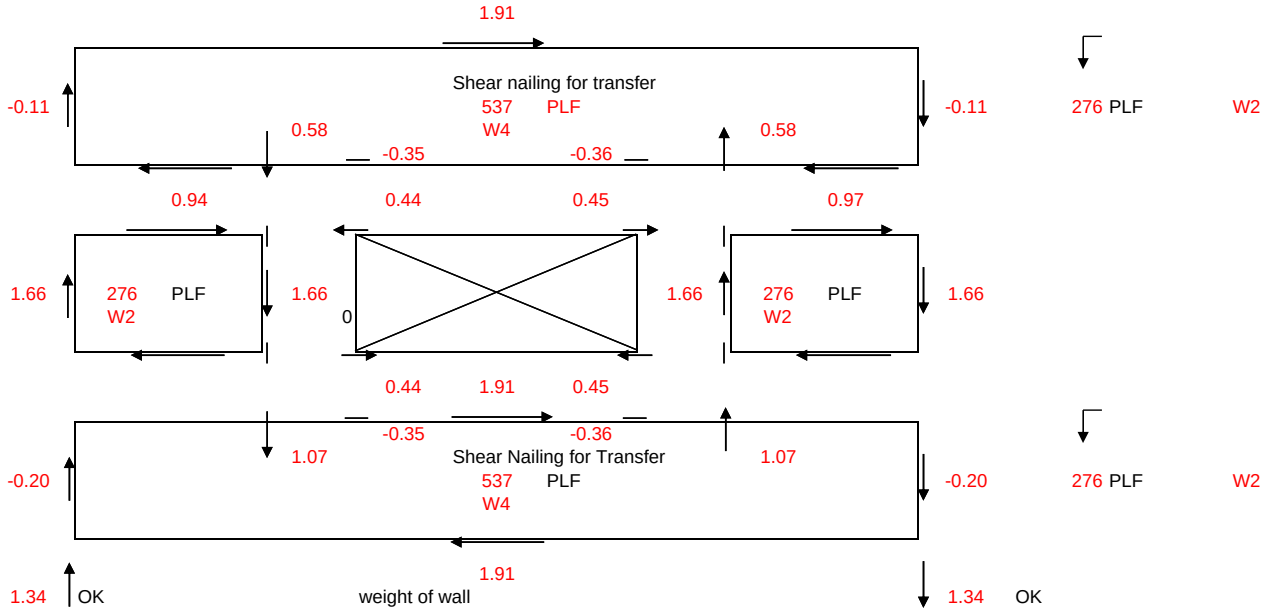
b= 12.91667 CS14

b_1= 3.416667 b_o= 6 b_2= 3.5

P= 1.909 Kips
276 plf
276 plf



h_1= 1.083333
h_o= 6 h= 9.083333
h_2= 2



MST37 Capacity 1256 OK

weight of wall
1.173221 kips

MST37 Capacity 1256 OK

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 Sheet:

Designed TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

B-T1 end (3 story + Basement)

0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	2.153 kips		43 #/ft															43 #/ft	
W1			Seismic (ASD):	4.027 kips		81 #/ft															81 #/ft	
																					9.083 ft	
	8.417 ft		9.417 ft		0 ft		0 ft		13.92 ft		0 ft		0 ft		9.417 ft		8.417 ft				49.58	Actual
Distribution L	8.417 ft		9.417 ft		0 ft		0 ft		13.92 ft		0 ft		0 ft		9.417 ft		8.417 ft				49.58	Distribu
h/b_s =	1.079	W1	0.965	W1					0.653	W1					0.965	W1	1.079	W1				
DL w (plf) =	178.8		178.8		0		0		178.8		0		0		178.8		178.8					
0.6M_R (#-ft) =	3801		4757		0		0		10391		0		0		4757		3801					
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E				
PLF	43	81	43	81	0	0	0	0	43	81	0	0	0	0	43	81	43	81				
M_{ot} (#-ft) =	3319	6209	3714	6946	0	0	0	0	5488	10266	0	0	0	0	3714	6946	3319	6209				
F (#) =	-61	304	-117	245	0	0	0	0	-365	-9	0	0	0	0	-117	245	-61	304				
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-				
	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					

3rd Floor:			Wind (ASD):	1.406 kips		72 #/ft															72 #/ft	
W1			Seismic (ASD):	5.419 kips		191 #/ft															191 #/ft	
	Use W2																				9.083 ft	
	8.417 ft		9.417 ft		0 ft		0 ft		13.92 ft		0 ft		0 ft		9.417 ft		8.417 ft				49.58	Actual
Distribution L	8.417 ft		9.417 ft		0 ft		0 ft		13.92 ft		0 ft		0 ft		9.417 ft		8.417 ft				49.58	Distribu
h/b_s =	1.079	W1	0.965	W1					0.653	W1					0.965	W1	1.079	W1				
DL w (plf) =	255.5		255.5		0		0		231.6		0		0		255.5		255.5					
0.6M_R (#-ft) =	5431		6798		0		0		13458		0		0		6798		5431					
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E				
PLF	72	191	72	191	0	0	0	0	72	191	0	0	0	0	72	191	72	191				
M_{ot} (#-ft) =	5488	14564	6140	16295	0	0	0	0	9074	24082	0	0	0	0	6140	16295	5488	14564				
F (#) =	-54	1458	-191	1311	0	0	0	0	-692	783	0	0	0	0	-191	1311	-54	1458				
Holdown	2335	S2	2335	S2	1000	-	1000	-	2335	S2	1000	-	1000	-	2335	S2	2335	S2				
	MST48 OK		MST48 OK		No Holdown OK		No Holdown OK		MST48 OK		No Holdown OK		No Holdown OK		MST48 OK		MST48 OK					
	with point load ok by inspection																					

2nd Floor			Wind (ASD):	1.395 kips		100 #/ft															100 #/ft	
W2			Seismic (ASD):	3.198 kips		255 #/ft															255 #/ft	
	Use W3				combined top floor																9.083 ft	
	8.417 ft		9.417 ft		0 ft		0 ft		13.92 ft		0 ft		0 ft		9.417 ft		8.417 ft				49.58	Actual
Distribution L	8.417 ft		9.417 ft		0 ft		0 ft		13.92 ft		0 ft		0 ft		9.417 ft		8.417 ft				49.58	Distribu
h/b_s =	1.079	W2	0.965	W2					0.653	W2					0.965	W2	1.079	W2				
DL w (plf) =	255.5		255.5		0		0		231.6		0		0		255.5		255.5					
0.6M_R (#-ft) =	5431		6798		0		0		13458		0		0		6798		5431					
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E				
PLF	100	255	100	255	0	0	0	0	100	255	0	0	0	0	100	255	100	255				
M_{ot} (#-ft) =	7638	19496	8546	21812	0	0	0	0	12630	32235	0	0	0	0	8546	21812	7638	19496				
F (#) =	225	3234	5	2994	0	0	0	0	-754	2182	0	0	0	0	5	2994	225	3234				
Holdown	4065	H3	4065	H3	1000	-	1000	-	1000	-	1000	-	1000	-	3356	S3	3356	S3				
	HDU5 OK		HDU5 OK		No Holdown OK		No Holdown OK		No Holdown NG		No Holdown OK		No Holdown OK		MST60 OK		MST60 OK					
	Load above to foudation								above													

1st Floor			Wind (ASD):	-1.619 kips		135 #/ft			4.954												135 #/ft	
W2			Seismic (ASD):	-5.345 kips		294 #/ft			12.644												294 #/ft	
															use W3						9.083 ft	
	0 ft		0 ft		0 ft		0 ft		6.958 ft		0 ft		0 ft		9.417 ft		8.417 ft				24.79	Actual
Distribution L	0 ft		0 ft		0 ft		0 ft		6.958 ft		0 ft		0 ft		9.417 ft		8.417 ft				24.79	Distribu
h/b_s =									1.305	W2					0.965	W2	1.079	W2				
DL w (plf) =	0		0		0		0		0		0		0		221.9		234.9					
0.6M_R (#-ft) =	0		0		0		0		0		0		0		5903		4992					
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E				
PLF	0	0	0	0	0	0	0	0	135	294	0	0	0	0	135	294	135	294				
M_{ot} (#-ft) =	0	0	0	0	0	0	0	0	8503	18608	0	0	0	0	11507	25182	10285	22508				
F (#) =	225	3234	5	2994	0	0	0	0	563	5063	0	0	0	0	634	5156	894	5447				
Holdown	1000	-	1000	-	1000	-	1000	-	6970	H4	1000	-	1000	-	6970	H4	6970	H4				
1.05	No Holdown NG		No Holdown NG		No Holdown OK		No Holdown OK		HDU8 OK		No Holdown OK		No Holdown OK		HDU8 OK		HDU8 OK					
	concrete foundation OK														OK By Inspectio		OK By Inspection					

2 Bedroom Unit 3 story | 2 Bedroom Unit 3 story + Basement

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 Sheet:

Designed: TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

1B-T1 x2 backs (3 story + Base)

0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	4.305 kips		83 #/ft															83 #/ft	
W1			Seismic (ASD):	8.053 kips		154 #/ft															154 #/ft	
	26.08 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26.08 ft		9.083 ft	
Distribution L	26.08 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26.08 ft		52.17	Actual
																					52.17	Distribu
h/b_s =	0.348	W1																	0.348	W1		
DL w (plf) =	112.8		0		0		0		0		0		0		0				112.8			
$0.6M_R$ (#-ft) =	23030		0		0		0		0		0		0		0				23030			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E			W	E		
PLF	83	154	0	0	0	0	0	0	0	0	0	0	0	0	0	0			83	154		
M_{ot} (#-ft) =	19554	36576	0	0	0	0	0	0	0	0	0	0	0	0	0	0			19554	36576		
F (#) =	-136	529	0	0	0	0	0	0	0	0	0	0	0	0	0	0			-136	529		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-			1000	-		
	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			

3rd Floor:			Wind (ASD):	2.813 kips		136 #/ft															136 #/ft	
W2			Seismic (ASD):	10.839 kips		362 #/ft															362 #/ft	
	26.08 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26.08 ft		9.083 ft	
Distribution L	26.08 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26.08 ft		52.17	Actual
																					52.17	Distribu
h/b_s =	0.348	W2																	0.348	W2		
DL w (plf) =	108.2		0		0		0		0		0		0		0				108.2			
$0.6M_R$ (#-ft) =	22077		0		0		0		0		0		0		0				22077			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E			W	E		
PLF	136	362	0	0	0	0	0	0	0	0	0	0	0	0	0	0			136	362		
M_{ot} (#-ft) =	32328	85801	0	0	0	0	0	0	0	0	0	0	0	0	0	0			32328	85801		
F (#) =	265	3020	0	0	0	0	0	0	0	0	0	0	0	0	0	0			265	3020		
Holdown	3356	S3	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	3356	S3			3356	S3		
	MST60 OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		MST60 OK				MST60 OK			

with point load ok by inspection

2nd Floor			Wind (ASD):	2.790 kips		190 #/ft															190 #/ft	
W4			Seismic (ASD):	6.396 kips		485 #/ft															485 #/ft	
	26.08 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26.08 ft		9.083 ft	
Distribution L	26.08 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26.08 ft		52.17	Actual
																					52.17	Distribu
h/b_s =	0.348	W4																	0.348	W4		
DL w (plf) =	108.2		0		0		0		0		0		0		0				108.2			
$0.6M_R$ (#-ft) =	22077		0		0		0		0		0		0		0				22077			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E			W	E		
PLF	190	485	0	0	0	0	0	0	0	0	0	0	0	0	0	0			190	485		
M_{ot} (#-ft) =	44999	114850	0	0	0	0	0	0	0	0	0	0	0	0	0	0			44999	114850		
F (#) =	1161	6647	0	0	0	0	0	0	0	0	0	0	0	0	0	0			1161	6647		
Holdown	6970	H4	6970	H4	1000	-	1000	-	1000	-	1000	-	1000	-	6712	S5			6712	S5		
	HDU8 OK		HDU8 OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		(2) MST60 OK				(2) MST60 OK			

Load above to foudation above

1st Floor			Wind (ASD):	-3.237 kips		256 #/ft		9.908													256 #/ft	
W4			Seismic (ASD):	-10.690 kips		560 #/ft		25.288													560 #/ft	
	0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26.08 ft		9.083 ft	
Distribution L	0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26.08 ft		26.08	Actual
																					26.08	Distribu
h/b_s =																			0.348	W4		
DL w (plf) =	0		0		0		0		0		0		0		0				108.2			
$0.6M_R$ (#-ft) =	0		0		0		0		0		0		0		0				22077			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E			W	E		
PLF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			256	560		
M_{ot} (#-ft) =	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			60593	132596		
F (#) =	1161	6647	0	0	0	0	0	0	0	0	0	0	0	0	0	0			2666	10967		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-			14445	H6		
1.05	No Holdown NG		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK				HDU14 OK			

concrete foundation OK OK By Inspection

2 Bedroom Unit 3 story | 2 Bedroom Unit 3 story + Basement

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 *Sheet:*

Designed TLC *Date:* 5/26

Checked: *Date:*

Project: Bradley Height Apartments

T1 x 2 backs (3 story)

0.5 (ft) holdown dist from end

Roof:			Wind (ASD): 4.305 kips		83 #/ft										83 #/ft	
W1			Seismic (ASD): 8.053 kips		154 #/ft										154 #/ft	
	 26.08 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		 26.08 ft		9.083 ft 52.17	Actual
Distribution L	26.08 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26.08 ft		52.17	Distribu
h/b_s =	0.348 W1														0.348 W1			
DL w (plf) =	112.8		0		0		0		0		0		0		112.8			
$0.6M_R$ (#-ft) =	23030		0		0		0		0		0		0		23030			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	83	154	0	0	0	0	0	0	0	0	0	0	0	0	0	0	83	154		
M_{ot} (#-ft) =	19554	36576	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19554	36576		
F (#) =	-136	529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-136	529		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
	No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			

3rd Floor:			Wind (ASD): 2.813 kips		136 #/ft										136 #/ft	
W2			Seismic (ASD): 10.839 kips		362 #/ft										362 #/ft	
	use W2  26.08 ft		 0 ft		 0 ft		 0 ft		use W2  0 ft		 0 ft		 0 ft		use W2  26.08 ft		9.083 ft 52.17	Actual
Distribution L	26.08 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26.08 ft		52.17	Distribu
h/b_s =	0.348 W2														0.348 W2			
DL w (plf) =	108.2		0		0		0		0		0		0		108.2			
$0.6M_R$ (#-ft) =	22077		0		0		0		0		0		0		22077			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	136	362	0	0	0	0	0	0	0	0	0	0	0	0	0	0	136	362		
M_{ot} (#-ft) =	32328	85801	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32328	85801		
F (#) =	265	3020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	265	3020		
Holdown	3356	S3	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	3356	S3		
	MST60 OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		MST60 OK			

2nd Floor			Wind (ASD): 2.790 kips		190 #/ft										190 #/ft	
W4			Seismic (ASD): 6.396 kips		485 #/ft										485 #/ft	
	use W3  26.08 ft		 0 ft		 0 ft		 0 ft		use W3  0 ft		 0 ft		 0 ft		use W3  26.08 ft		9.083 ft 52.17	Actual
Distribution L	26.08 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26.08 ft		52.17	Distribu
h/b_s =	0.348 W4														0.348 W4			
DL w (plf) =	108.2		0		0		0		0		0		0		108.2			
$0.6M_R$ (#-ft) =	22077		0		0		0		0		0		0		22077			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	190	485	0	0	0	0	0	0	0	0	0	0	0	0	0	0	190	485		
M_{ot} (#-ft) =	44999	114850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44999	114850		
F (#) =	1161	6647	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1161	6647		
Holdown	6970	H4	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	6970	H4		
1.05	HDU8 OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		HDU8 OK			

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 Sheet:

Designed TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

1B-T2 stairs (3 story + Base)

0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	2.631	kips	49	#/ft														49	#/ft
W1			Seismic (ASD):	4.921	kips	92	#/ft														92	#/ft
																					9.083 ft	
	17	ft	0	ft	0	ft	0	ft	19.5	ft	0	ft	0	ft	0	ft	17	ft			53.5	Actual
Distribution L	17	ft	0	ft	0	ft	0	ft	19.5	ft	0	ft	0	ft	0	ft	17	ft			53.5	Distribu
h/b_s =	0.534	W1							0.466	W1							0.534	W1				
DL w (plf) =	178.8		0		0		0		178.8		0		0		0		178.8					
$0.6M_R$ (#-ft) =	15505		0		0		0		20400		0		0		0		15505					
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E				
PLF	49	92	0	0	0	0	0	0	49	92	0	0	0	0	0	0	49	92				
M_{ot} (#-ft) =	7594	14205	0	0	0	0	0	0	8711	16294	0	0	0	0	0	0	7594	14205				
F (#) =	-479	-79	0	0	0	0	0	0	-615	-216	0	0	0	0	0	0	-479	-79				
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-				
	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					

3rd Floor:			Wind (ASD):	1.719	kips	81	#/ft														81	#/ft
W1			Seismic (ASD):	6.624	kips	216	#/ft														216	#/ft
	use W2								use W2								use W2					
																					9.083 ft	
	17	ft	0	ft	0	ft	0	ft	19.5	ft	0	ft	0	ft	0	ft	17	ft			53.5	Actual
Distribution L	17	ft	0	ft	0	ft	0	ft	19.5	ft	0	ft	0	ft	0	ft	17	ft			53.5	Distribu
h/b_s =	0.534	W1							0.466	W1							0.534	W1				
DL w (plf) =	252.3		0		0		0		282.6		0		0		0		252.3					
$0.6M_R$ (#-ft) =	21870		0		0		0		32236		0		0		0		21870					
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E				
PLF	81	216	0	0	0	0	0	0	81	216	0	0	0	0	0	0	81	216				
M_{ot} (#-ft) =	12555	33322	0	0	0	0	0	0	14402	38223	0	0	0	0	0	0	12555	33322				
F (#) =	-1044	615	0	0	0	0	0	0	-1554	99	0	0	0	0	0	0	-1044	615				
Holdown	2335	S2	1000	-	1000	-	1000	-	2335	S2	1000	-	1000	-	1000	-	2335	S2				
	MST48 OK		No Holdown OK		No Holdown OK		No Holdown OK		MST48 OK		No Holdown OK		No Holdown OK		No Holdown OK		MST48 OK					

with point load ok by inspection

2nd Floor			Wind (ASD):	1.705	kips	113	#/ft														113	#/ft
W2			Seismic (ASD):	3.909	kips	289	#/ft														289	#/ft
	use W3								use W3								use W3					
																					9.083 ft	
	17	ft	0	ft	0	ft	0	ft	19.5	ft	0	ft	0	ft	0	ft	17	ft			53.5	Actual
Distribution L	17	ft	0	ft	0	ft	0	ft	19.5	ft	0	ft	0	ft	0	ft	17	ft			53.5	Distribu
h/b_s =	0.534	W2							0.466	W2							0.534	W2				
DL w (plf) =	252.3		0		0		0		282.6		0		0		0		252.3					
$0.6M_R$ (#-ft) =	21870		0		0		0		32236		0		0		0		21870					
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E				
PLF	113	289	0	0	0	0	0	0	113	289	0	0	0	0	0	0	113	289				
M_{ot} (#-ft) =	17476	44604	0	0	0	0	0	0	20046	51164	0	0	0	0	0	0	17476	44604				
F (#) =	-1310	1993	0	0	0	0	0	0	-2195	1095	0	0	0	0	0	0	-1310	1993				
Holdown	4065	H3	1000	-	1000	-	1000	-	4670	S4	1000	-	1000	-	1000	-	4670	S4				
	HDU5 OK		No Holdown OK		No Holdown OK		No Holdown OK		(2) MST48 OK		No Holdown OK		No Holdown OK		No Holdown OK		(2) MST48 OK					

Load above to foudation HDU5 above

1st Floor			Wind (ASD):	-1.978	kips	152	#/ft		6.055												152	#/ft
W2			Seismic (ASD):	-6.533	kips	333	#/ft		15.454												333	#/ft
									use W4								use W4					
																					9.083 ft	
	0	ft	0	ft	0	ft	0	ft	9.75	ft	0	ft	0	ft	0	ft	17	ft			26.75	Actual
Distribution L	0	ft	0	ft	0	ft	0	ft	9.75	ft	0	ft	0	ft	0	ft	17	ft			26.75	Distribu
h/b_s =									0.932	W2							0.534	W2				
DL w (plf) =	0		0		0		0		282.6		0		0		0		252.3					
$0.6M_R$ (#-ft) =	0		0		0		0		8059		0		0		0		21870					
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E				
PLF	0	0	0	0	0	0	0	0	152	333	0	0	0	0	0	0	152	333				
M_{ot} (#-ft) =	0	0	0	0	0	0	0	0	13496	29535	0	0	0	0	0	0	23532	51496				
F (#) =	-1310	1993	0	0	0	0	0	0	-1608	3417	0	0	0	0	0	0	-1210	3789				
Holdown	14445	H6	1000	-	1000	-	1000	-	6970	H4	1000	-	1000	-	1000	-	6970	H4				
1.05	HDU14 OK		No Holdown OK		No Holdown OK		No Holdown OK		HDU8 OK		No Holdown OK		No Holdown OK		No Holdown OK		HDU8 OK					

concrete foundation

2 Bedroom Unit 3 story | 2 Bedroom Unit 3 story + Basement

Job # 23.007 **Sheet:**

Designer TLC **Date:** 5/26

Checked: **Date:**

Project: Bradley Height Apartments

1B-T2 stairs (3 story)

0.5 (ft) holdown dist from end

Roof:				Wind (ASD):	2.631 kips	49 #/ft													49 #/ft	
W1				Seismic (ASD):	4.921 kips	92 #/ft													92 #/ft	
	17 ft		0 ft		0 ft		0 ft		19.5 ft		0 ft		0 ft		0 ft		17 ft		9.083 ft 53.5	Actual
Distribution L	17 ft		0 ft		0 ft		0 ft		19.5 ft		0 ft		0 ft		0 ft		17 ft		53.5	Distribu
h/b_s =	0.534	W1							0.466	W1							0.534	W1		
DL w (plf) =	178.8		0		0		0		178.8		0		0		0		178.8			
$0.6M_R$ (#-ft) =	15505		0		0		0		20400		0		0		0		15505			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	49	92	0	0	0	0	0	0	49	92	0	0	0	0	0	0	49	92		
M_{ot} (#-ft) =	7594	14205	0	0	0	0	0	0	8711	16294	0	0	0	0	0	0	7594	14205		
F (#) =	-479	-79	0	0	0	0	0	0	-615	-216	0	0	0	0	0	0	-479	-79		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
	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			

3rd Floor:				Wind (ASD):	1.719 kips	81 #/ft													81 #/ft	
W1				Seismic (ASD):	6.624 kips	216 #/ft													216 #/ft	
	use W2 17 ft		0 ft		0 ft		0 ft		use W2 19.5 ft		0 ft		0 ft		0 ft		use W2 17 ft		9.083 ft 53.5	Actual
Distribution L	17 ft		0 ft		0 ft		0 ft		19.5 ft		0 ft		0 ft		0 ft		17 ft		53.5	Distribu
h/b_s =	0.534	W1							0.466	W1							0.534	W1		
DL w (plf) =	252.3		0		0		0		282.6		0		0		0		252.3			
$0.6M_R$ (#-ft) =	21870		0		0		0		32236		0		0		0		21870			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	81	216	0	0	0	0	0	0	81	216	0	0	0	0	0	0	81	216		
M_{ot} (#-ft) =	12555	33322	0	0	0	0	0	0	14402	38223	0	0	0	0	0	0	12555	33322		
F (#) =	-1044	615	0	0	0	0	0	0	-1554	99	0	0	0	0	0	0	-1044	615		
Holdown	2335	S2	1000	-	1000	-	1000	-	2335	S2	1000	-	1000	-	1000	-	2335	S2		
	MST48 OK		No Holdown OK		No Holdown OK		No Holdown OK		MST48 OK		No Holdown OK		No Holdown OK		No Holdown OK		MST48 OK			

2nd Floor				Wind (ASD):	1.705 kips	113 #/ft													113 #/ft	
W2				Seismic (ASD):	3.909 kips	289 #/ft													289 #/ft	
	use W3 17 ft		0 ft		0 ft		0 ft		use W3 19.5 ft		0 ft		0 ft		0 ft		use W3 17 ft		9.083 ft 53.5	Actual
Distribution L	17 ft		0 ft		0 ft		0 ft		19.5 ft		0 ft		0 ft		0 ft		17 ft		53.5	Distribu
h/b_s =	0.534	W2							0.466	W2							0.534	W2		
DL w (plf) =	252.3		0		0		0		282.6		0		0		0		252.3			
$0.6M_R$ (#-ft) =	21870		0		0		0		32236		0		0		0		21870			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	113	289	0	0	0	0	0	0	113	289	0	0	0	0	0	0	113	289		
M_{ot} (#-ft) =	17476	44604	0	0	0	0	0	0	20046	51164	0	0	0	0	0	0	17476	44604		
F (#) =	-1310	1993	0	0	0	0	0	0	-2195	1095	0	0	0	0	0	0	-1310	1993		
Holdown	4065	H3	6970	H4	1000	-	1000	-	4065	H3	1000	-	1000	-	6970	H4	4065	H3		
1.05	HDU5 OK		HDU8 OK		No Holdown OK		No Holdown OK		HDU5 OK		No Holdown OK		No Holdown OK		HDU8 OK		HDU5 OK			

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.002 ***Sheet:***

Designed: TLC ***Date:*** 5/29/23

Checked: ***Date:***

Project: Bradley Heights - 3 Story & basement Story

Vertical Distribution 1 Bedroom units

Fx = Cvx V (12.8-11)

$$C_{vx} = \frac{w_x h_x^k}{\Sigma w_i h_i^k}$$

$T_a = C_t h_n^x =$ 0.3240544 (12.8-7)

$C_t =$ 0.02 Table 12.8-2

$x =$ 0.75 Table 12.8-2

$H_n =$ 41 ft Structural Height defined in 11.2

k = 1 if period is .5s or less

k = 2 if period is 2.5s or more

k= 1-2 if between

k = 1

1Bx1 ⟶		w_x	h_x	$w_x h_x^K$	C_{vx}	V	F_x
3-story	Roof	25238	29.35417	740835.8	0.343404	2801	4514
	3rd Floor	46586	20.27083	944330.6	0.437731	5171	5753
	2nd Floor	46586	10.13542	472165.3	0.218865	5171	2877
			Σ	2157332	Σ	13143	

1Bx1 ↑		w_x	h_x	$w_x h_x^K$	C_{vx}	V	F_x
3-story	Roof	24345	29.35417	714626.6	0.344096	2702	4352
	3rd Floor	44800	20.27083	908132.6	0.43727	4973	5531
	2nd Floor	44800	10.13542	454066.3	0.218635	4973	2765
			Σ	2076825	Σ	12648	

1Bx1 ⟶		w_x	h_x	$w_x h_x^K$	C_{vx}	V	F_x
3-story	Roof	25238	39.48958	996631.8	0.260243	2801	4766
+ Basement	3rd Floor	46586	30.40625	1416496	0.369879	5171	6774
	2nd Floor	46586	20.27083	944330.6	0.246586	5171	4516
	1st floor	46586	10.13542	472165.3	0.123293	5171	2258
			Σ	3829623	Σ	18314	

1Bx1 ↑		w_x	h_x	$w_x h_x^K$	C_{vx}	V	F_x
3-story	Roof	24345	39.48958	961373.2	0.260834	2702	4596
+ Basement	3rd Floor	44800	30.40625	1362199	0.369583	4973	6512
	2nd Floor	44800	20.27083	908132.6	0.246389	4973	4342
	1st Floor	44800	10.13542	454066.3	0.123194	4973	2171
			Σ	3685771	Σ	17621	

No Holdow	1000	-	
MST37	1256	S1	MSTC48B3
MST48	2335	S2	MSTC48B3
MST60	3356	S3	MSTC66B3
(2) MST48	4670	S4	S8
(2) MST60	6712	S5	S9
MSTC66B3	3875	S6	
2)MSTC66B	13424	S7	
NA	7750	S8	
NA	26848	S9	

No Holdow	1000	-
HDU2	2215	H1
HDU4	3285	H2
HDU5	4065	H3
HDU8	6970	H4
HDU11	9535	H5
HDU14	14445	H6
(2) HDU11	19070	H7
(2) HDU14	28890	H8