

Structural Calculations for Vertical and Lateral Design of Building A

Project & Location:

Structural Calculations Bradley Heights Apartments

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

City of Puyallup
Building
ACCEPTED

JMontgomery
05/08/2024
1:26:29 PM

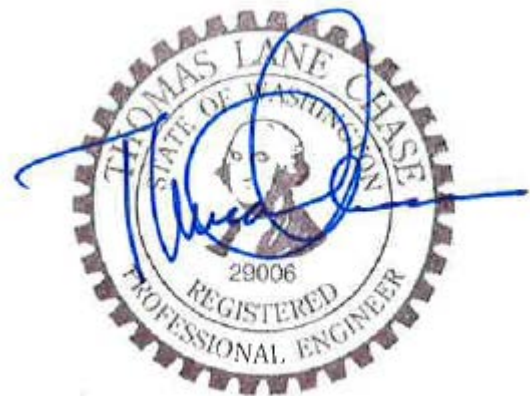


Client:

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



Project Number:

23.007

Code / Location:

2018 IBC

02-20-24

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

I_w = 1.0, K_{zt} = 1.0

Seismic Criteria

Seismic Design Category "D"

Site Class C

I_E = 1.0, S_s = 1.263, S₁ = 0.435

SDS = 1.010, SD1 = 0.435

Building Response R = 5, C_s = 0.111 (ASD)

3. Soils Data (per GeoResources Inc. dated 02/10/2022)

Bearing Capacity = 2,000 PSF

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

ROOF LOADS:

Roof 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:

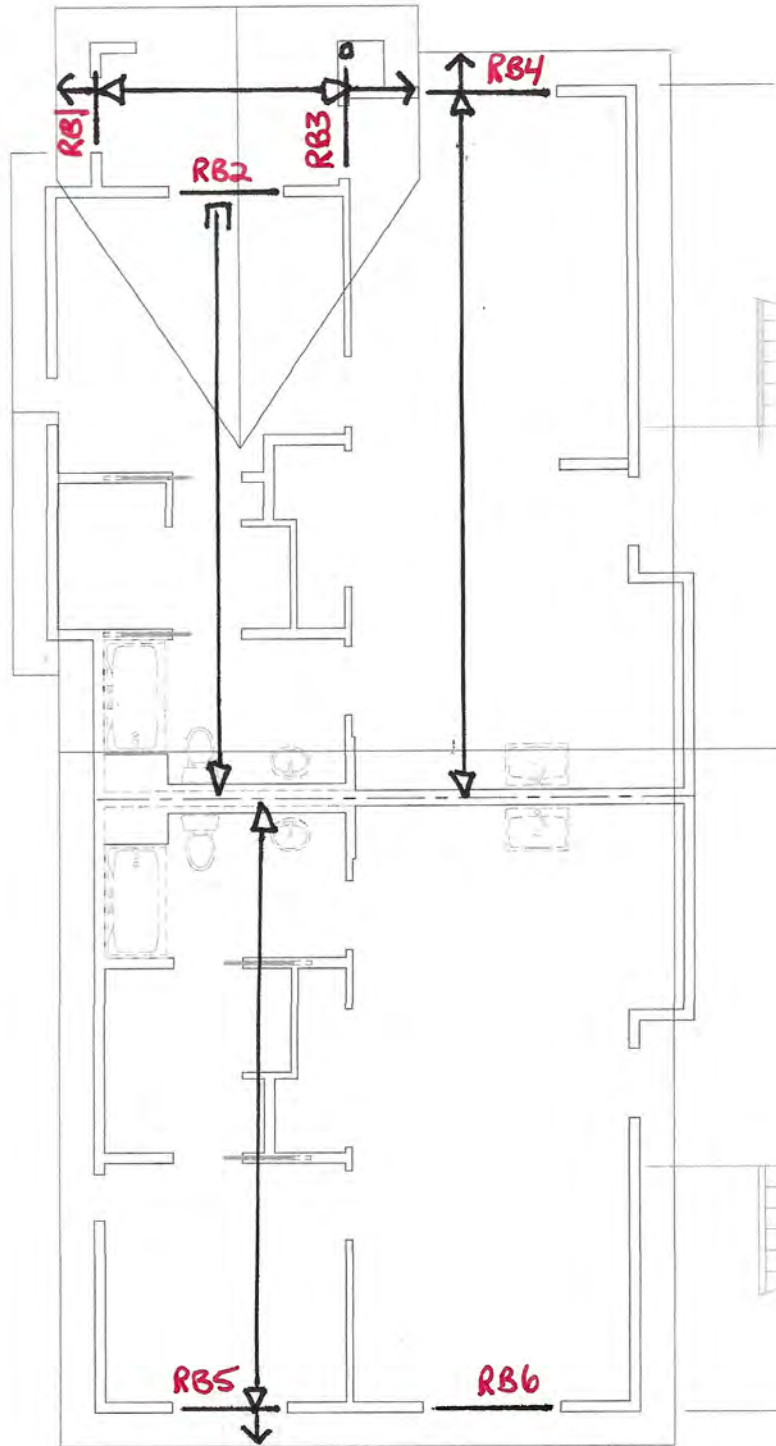
Deck Dead Loads:	
3" Concrete Topping (145 pcf)	36.30 PSF
Waterproof membrane (per Arch)	0.50 PSF
PT 3/4" T&G Plywood	3.00 PSF
2 x 8 Joists @16" o.c.	2.00 PSF
(1) Layer of 5/8" Gypsum Board	2.80 PSF
Mechanical & Electrical	1.00 PSF
Miscellaneous	1.40 PSF
Total Floor Dead Load:	47.00 PSF
Total Live /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

DECK LOADS:

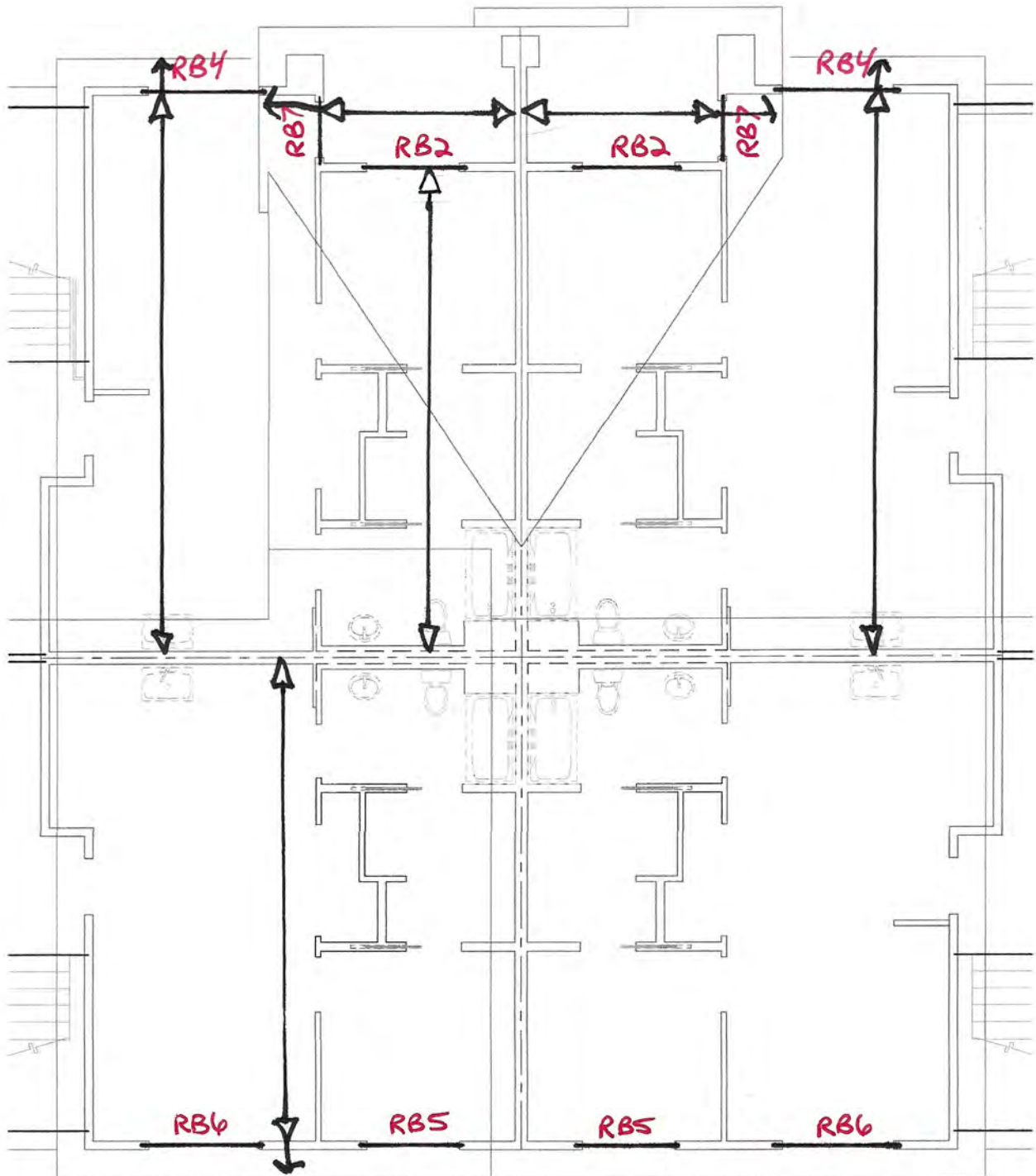
Deck Dead Loads:	
Decking/Ply & Topping TBD	20.00 PSF
Waterproof membrane (per Arch)	0.50 PSF
2 x 8 Joists @16" o.c.	2.00 PSF
Deck soffit	1.50 PSF
Miscellaneous	1.00 PSF
Total Dead Load:	25.00 PSF
Total Load:	60.00 PSF
Total Deck Load:	85.00 PSF

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

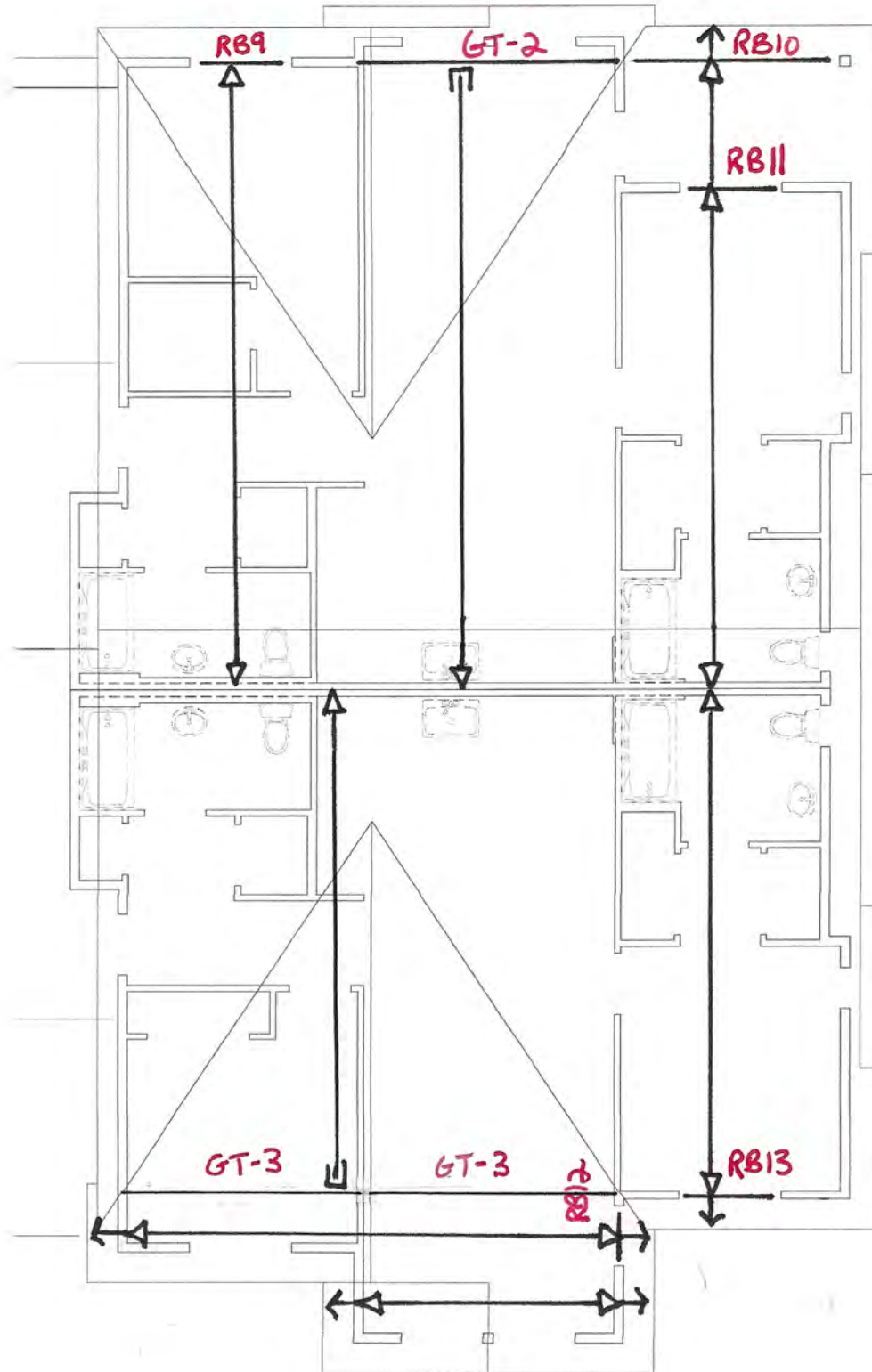
WALL LOADS:		
Wall Dead Loads: EXT. Wall Assembly		
Exterior siding	3.00	PSF
Moisture barrier	0.20	PSF
1/2" Plywood/OSB	1.70	PSF
2 x 6 or 2 x 4 Studs @ 16" o.c.	1.70	PSF
Top & Bottom Wall Plates	0.30	PSF
Insulation	1.00	PSF
(1) Layer of 5/8" Gypsum Board	2.80	PSF
Miscellaneous	1.30	PSF
Total Wall Dead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



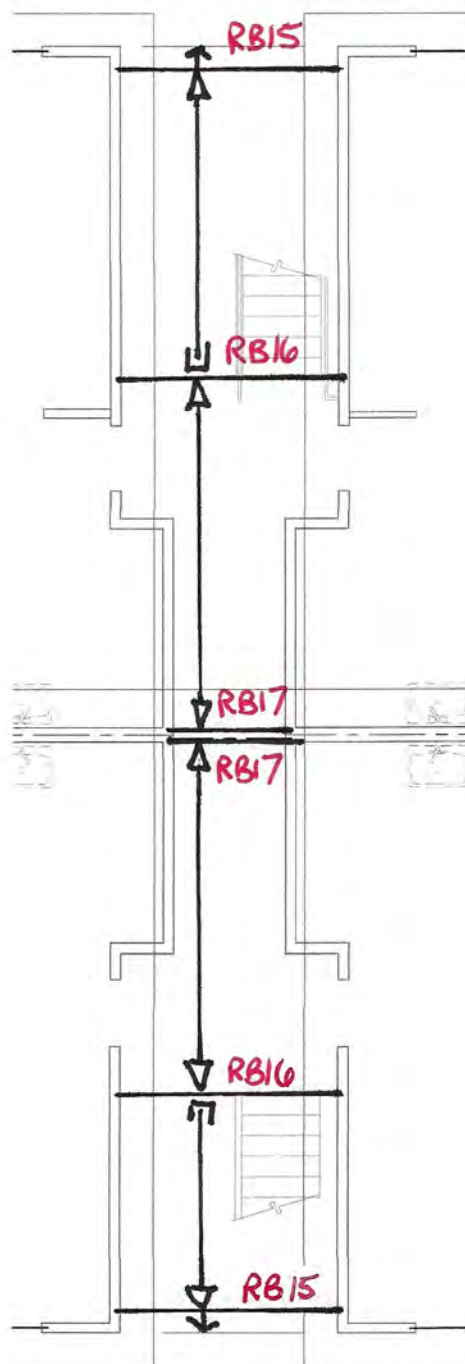
ROOF TYPE 1



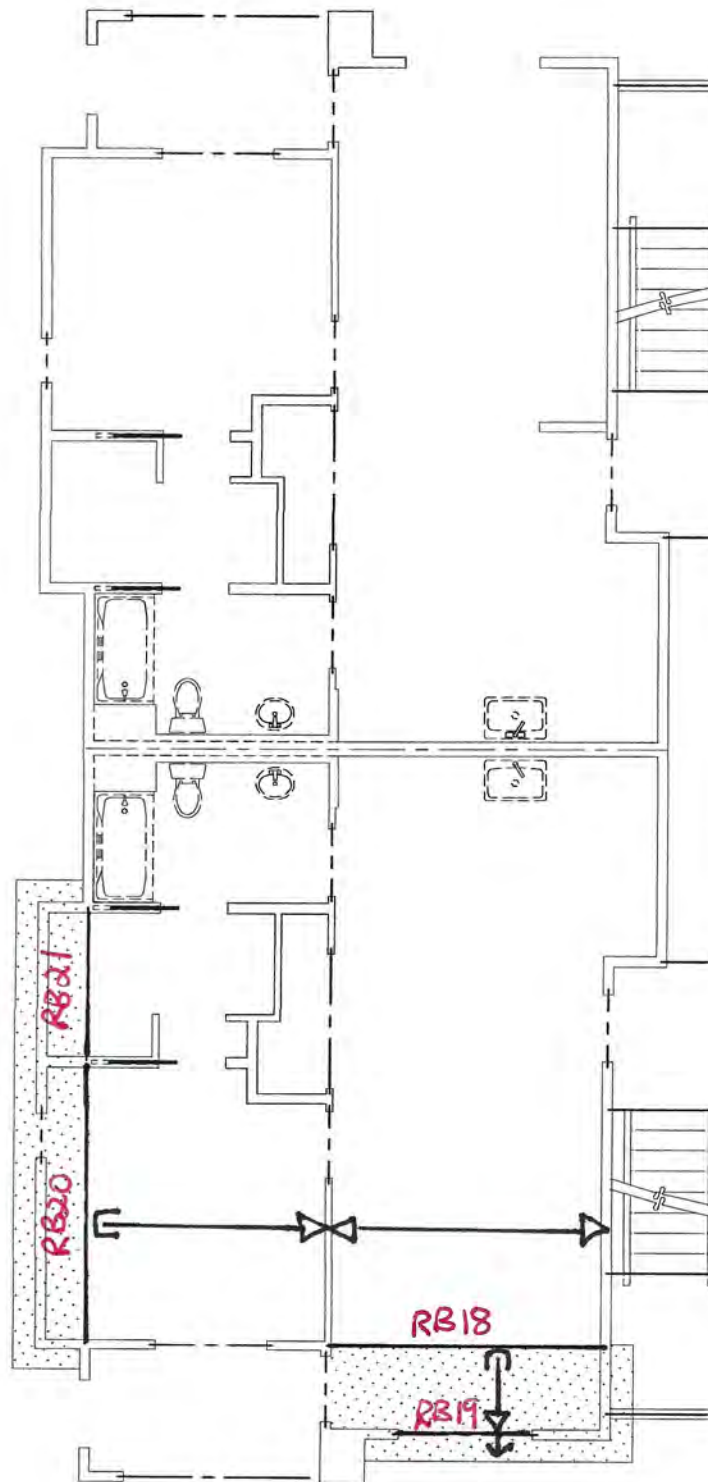
ROOF TYPE 2



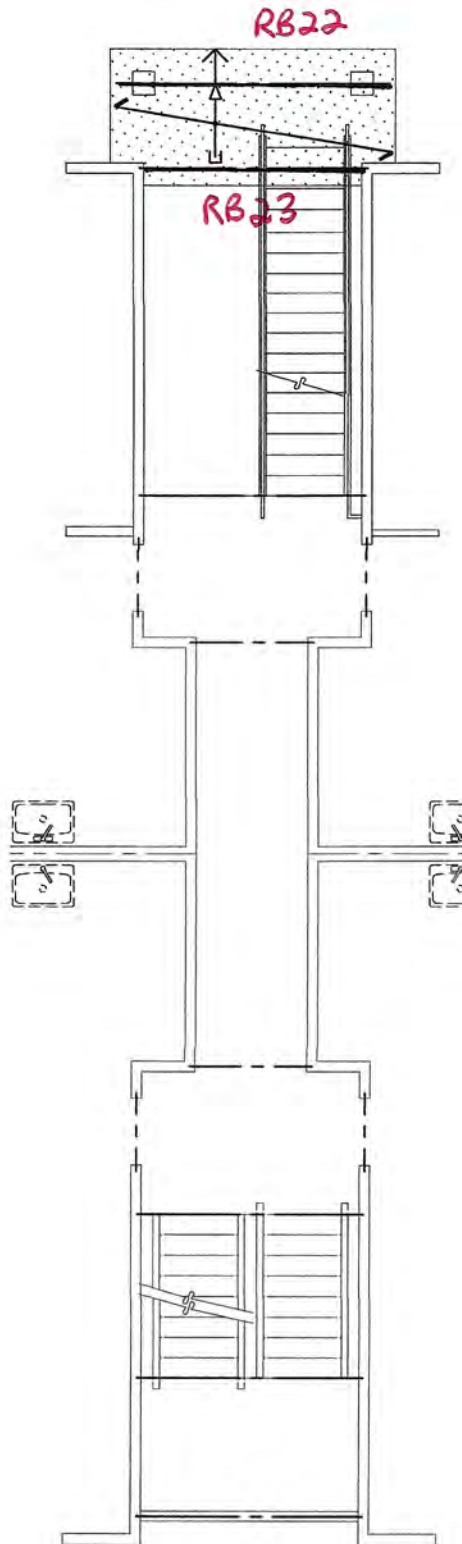
Roof Type 3



TYPICAL CORRIDOR ROOF



3RD FLOOR LOW ROOFS



2ND FLOOR ENTRANCE ROOFS


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

ROOF FRAMING

2018 NDS/2018 IBC

C_r =	1.15	repetitive
C_D =	1.15	SNOW
C_F =	(varies)	size

2 x 6	Pressure Treated Incising	Hem Fir	#2				
2 x 6	▼	A =	8.25 in ²	Snow	25.00	psf	
Hem Fir	▼	S =	7.56 in ³	Dead	17.00	psf	
#2	▼	I =	20.80 in ⁴	Other	-	psf	
Incising? Yes	▼	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
		$L_{v\text{allow}} = \{[A \cdot F_v \cdot C_D / (1.5 \cdot w)] + d\} \cdot 2$	Lv (ft) =	46.55	35.14	23.73	1.00%
		$L_{b\text{allow}} = (S \cdot F_b \cdot C_D \cdot C_r \cdot C_i \cdot 8 / w)^{1/2}$	Lb (ft) =	12.08	10.46	8.54	4.00%
		$L_{d\text{allow}} = [384 \cdot E \cdot C_i \cdot I / (5 \cdot LL \cdot 360)]^{1/3}$	Ld (ft) =	11.50	10.45	9.13	360
		$L_{d\text{allow}} = [384 \cdot E \cdot C_i \cdot I / (5 \cdot TL \cdot 240)]^{1/3}$	Ld (ft) =	11.08	10.06	8.79	240
			TL Defl.	TL Defl.	bending		

2 x 8		Hem Fir		#2			
2 x 8	▼	A =	10.88	in ²	Snow	25.00	psf
Hem Fir	▼	S =	13.14	in ³	Dead	17.00	psf
#2	▼	I =	47.63	in ⁴	Other	-	psf
Incising? No	▼	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
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*C _F *Ci*8/w) ^{1/2}		Lb (ft) =	17.11	14.81	12.10	Bending	4.00%
Ld _{allow} =[384*E*Ci*I/(5*LL*360)] ^{1/3}		Ld (ft) =	15.42	14.01	12.24	LL Deflection	360
Ld _{allow} =[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	▼	A =	13.88 in ²	Snow	25.00	psf	
Hem Fir	▼	S =	21.39 in ³	Dead	17.00	psf	
#2	▼	I =	98.93 in ⁴	Other	-	psf	
Incising? No	▼	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
		Lv _{allow} = [(A*F _v *C _D /(1.5*w))+d]*2	Lv (ft) =	78.28	59.10	39.91	Shear
		Lb _{allow} =(S*F _b *C _D *Cr*C _F *C _i *8/w) ^{1/2}	Lb (ft) =	20.90	18.10	14.78	Bending
		Ld _{allow} =[384*E*C _i I/(5*LL*360)] ^{1/3}	Ld (ft) =	19.68	17.88	15.62	LL Deflection
		Ld _{allow} =[384*E*C _i I/(5*TL*240)] ^{1/3}	Ld (ft) =	18.95	17.22	15.04	TL Deflection
			TL Defl	TL Defl	bending		

SOLUTIONS 4 STRUCTURES

LOADS ONLY

RB1 4x8

$$W_1 = DL \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 8.0 \\ 8.0 \end{pmatrix} + DL \begin{pmatrix} 40 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 216 \\ 200 \end{pmatrix} \begin{pmatrix} \text{PLF} \\ \text{SL} \end{pmatrix} \begin{pmatrix} \Sigma \\ 416 \end{pmatrix}$$

$$R_1 = DL \begin{pmatrix} 0.32 \\ 0.30 \end{pmatrix} \quad R_2 = \begin{pmatrix} 0.32 \\ 0.30 \end{pmatrix}$$

$$\Sigma \quad 0.62 \text{ k} \quad \Sigma \quad 0.62 \text{ k}$$

RB2 4x8

$$W_1 = DL \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 14.5 \\ 14.5 \end{pmatrix} + DL \begin{pmatrix} 0 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 319 \\ 363 \end{pmatrix} \begin{pmatrix} \text{PLF} \\ \text{SL} \end{pmatrix} \begin{pmatrix} \Sigma \\ 682 \end{pmatrix}$$

$$R_1 = DL \begin{pmatrix} 0.80 \\ 0.91 \end{pmatrix} \quad R_2 = \begin{pmatrix} 0.80 \\ 0.91 \end{pmatrix}$$

$$\Sigma \quad 1.70 \text{ k} \quad \Sigma \quad 1.70 \text{ k}$$

RB3 4x8

$$W_1 = DL \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 8.0 \\ 8.0 \end{pmatrix} + DL \begin{pmatrix} 40 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 216 \\ 200 \end{pmatrix} \begin{pmatrix} \text{PLF} \\ \text{SL} \end{pmatrix} \begin{pmatrix} \Sigma \\ 416 \end{pmatrix}$$

$$R_1 = DL \begin{pmatrix} 0.76 \\ 0.70 \end{pmatrix} \quad R_2 = \begin{pmatrix} 0.76 \\ 0.70 \end{pmatrix}$$

$$\Sigma \quad 1.46 \text{ k} \quad \Sigma \quad 1.46 \text{ k}$$

RB4 4x10

$$W_1 = DL \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 17.0 \\ 17.0 \end{pmatrix} + DL \begin{pmatrix} 0 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 375 \\ 426 \end{pmatrix} \begin{pmatrix} \text{PLF} \\ \text{SL} \end{pmatrix} \begin{pmatrix} \Sigma \\ 801 \end{pmatrix}$$

$$R_1 = DL \begin{pmatrix} 1.12 \\ 1.28 \end{pmatrix} \quad R_2 = \begin{pmatrix} 1.12 \\ 1.28 \end{pmatrix}$$

$$\Sigma \quad 2.40 \text{ k} \quad \Sigma \quad 2.40 \text{ k}$$

RB5 4x8

$$W_1 = DL \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 15.0 \\ 15.0 \end{pmatrix} + DL \begin{pmatrix} 0 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 331 \\ 376 \end{pmatrix} \begin{pmatrix} \text{PLF} \\ \text{SL} \end{pmatrix} \begin{pmatrix} \Sigma \\ 707 \end{pmatrix}$$

$$R_1 = DL \begin{pmatrix} 0.83 \\ 0.94 \end{pmatrix} \quad R_2 = \begin{pmatrix} 0.83 \\ 0.94 \end{pmatrix}$$

$$\Sigma \quad 1.77 \text{ k} \quad \Sigma \quad 1.77 \text{ k}$$

RB6 4x10

$$W_1 = DL \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 15.0 \\ 15.0 \end{pmatrix} + DL \begin{pmatrix} 0 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 331 \\ 376 \end{pmatrix} \begin{pmatrix} \text{PLF} \\ \text{SL} \end{pmatrix} \begin{pmatrix} \Sigma \\ 707 \end{pmatrix}$$

$$R_1 = DL \begin{pmatrix} 0.99 \\ 1.13 \end{pmatrix} \quad R_2 = \begin{pmatrix} 0.99 \\ 1.13 \end{pmatrix}$$

$$\Sigma \quad 2.12 \text{ k} \quad \Sigma \quad 2.12 \text{ k}$$

SOLUTIONS 4 STRUCTURES

LOADS ONLY

RB7 4x8

$L = 6.00$ ft

$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0.77 \\ 0.67 \end{pmatrix}$
 $\Sigma \quad 1.44 \text{ k}$

$R_2 = \begin{pmatrix} 0.77 \\ 0.67 \end{pmatrix}$
 $\Sigma \quad 1.44 \text{ k}$

$W_1 = \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 8.9 \\ 8.9 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 60 \end{pmatrix} + \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 256 \\ 223 \\ 479 \end{pmatrix}$

RB8 4x10

$L = 7.00$ ft

$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0.83 \\ 0.78 \end{pmatrix}$
 $\Sigma \quad 1.61 \text{ k}$

$R_2 = \begin{pmatrix} 0.83 \\ 0.78 \end{pmatrix}$
 $\Sigma \quad 1.61 \text{ k}$

$W_1 = \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 8.9 \\ 8.9 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 40 \end{pmatrix} + \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 236 \\ 223 \\ 459 \end{pmatrix}$

RB9 4x8

$L = 5.00$ ft

$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0.94 \\ 1.07 \end{pmatrix}$
 $\Sigma \quad 2.00 \text{ k}$

$R_2 = \begin{pmatrix} 0.94 \\ 1.07 \end{pmatrix}$
 $\Sigma \quad 2.00 \text{ k}$

$W_1 = \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 17.0 \\ 17.0 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 375 \\ 426 \\ 801 \end{pmatrix}$

RB10 PT 6x10 HF 1

$L = 11.00$ ft

$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} -0.71 \\ -0.81 \end{pmatrix}$
 $\Sigma \quad -1.53 \text{ k}$

$R_2 = \begin{pmatrix} -0.71 \\ -0.81 \end{pmatrix}$
 $\Sigma \quad -1.53 \text{ k}$

$W_1 = \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} -5.9 \\ -5.9 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} -130 \\ -148 \\ -277 \end{pmatrix}$

RB11 4x10

$L = 5.00$ ft

$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 1.16 \\ 1.32 \end{pmatrix}$
 $\Sigma \quad 2.48 \text{ k}$

$R_2 = \begin{pmatrix} 1.16 \\ 1.32 \end{pmatrix}$
 $\Sigma \quad 2.48 \text{ k}$

$W_1 = \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 21.1 \\ 21.1 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 465 \\ 528 \\ 993 \end{pmatrix}$

RB12 4x8

$L = 3.00$ ft

$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0.52 \\ 0.53 \end{pmatrix}$
 $\Sigma \quad 1.05 \text{ k}$

$R_2 = \begin{pmatrix} 0.52 \\ 0.53 \end{pmatrix}$
 $\Sigma \quad 1.05 \text{ k}$

$W_1 = \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 14.0 \\ 14.0 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 40 \end{pmatrix} + \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 348 \\ 350 \\ 698 \end{pmatrix}$

SOLUTIONS 4 STRUCTURES

LOADS ONLY

RB13 4x8

$L = 5.00$ ft

$$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0.77 \\ 0.88 \end{pmatrix} \quad \Sigma \quad 1.65 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.77 \\ 0.88 \end{pmatrix} \quad \Sigma \quad 1.65 \text{ k}$$

$$W_1 = \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 14.0 \\ 25 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0.0 \\ 0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 309 \\ 351 \\ 660 \end{pmatrix}$$

RB14 PT 4x10

$L = 9.00$ ft

$$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} -0.58 \\ -0.66 \end{pmatrix} \quad \Sigma \quad -1.25 \text{ k}$$

$$R_2 = \begin{pmatrix} -0.58 \\ -0.66 \end{pmatrix} \quad \Sigma \quad -1.25 \text{ k}$$

$$W_1 = \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ -5.9 \\ 25 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0.0 \\ 0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} -130 \\ -148 \\ -277 \end{pmatrix}$$

RB15 PT 3-1/8x10.5 GLB

$L = 10.00$ ft

$$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0.92 \\ 1.04 \end{pmatrix} \quad \Sigma \quad 1.96 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.92 \\ 1.04 \end{pmatrix} \quad \Sigma \quad 1.96 \text{ k}$$

$$W_1 = \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 8.3 \\ 25 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0.0 \\ 0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 183 \\ 208 \\ 392 \end{pmatrix}$$

RB16 3-1/8x10.5 GLB

$L = 10.00$ ft

$$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 1.61 \\ 1.83 \end{pmatrix} \quad \Sigma \quad 3.45 \text{ k}$$

$$R_2 = \begin{pmatrix} 1.61 \\ 1.83 \end{pmatrix} \quad \Sigma \quad 3.45 \text{ k}$$

$$W_1 = \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 14.7 \\ 25 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0.0 \\ 0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 323 \\ 367 \\ 689 \end{pmatrix}$$

RB17 4x8

$L = 5.50$ ft

$$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0.48 \\ 0.55 \end{pmatrix} \quad \Sigma \quad 1.03 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.48 \\ 0.55 \end{pmatrix} \quad \Sigma \quad 1.03 \text{ k}$$

$$W_1 = \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 8.0 \\ 25 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Roof} \\ \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0.0 \\ 0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 176 \\ 200 \\ 376 \end{pmatrix}$$

SOLUTIONS 4 STRUCTURES

LOADS ONLY

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

Roof

PSF Tributary

$$W_1 = DL \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 15.0 \\ 15.0 \end{pmatrix} + DL \begin{pmatrix} 100 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 22 \\ 35 \end{pmatrix} \begin{pmatrix} 2.0 \\ 2.0 \end{pmatrix} = DL \begin{pmatrix} 475 \\ 446 \end{pmatrix}$$

PLF

$$\Sigma \begin{pmatrix} 921 \end{pmatrix}$$

L = 12.00 ft

R₁ = DL $\begin{pmatrix} 2.85 \\ 2.68 \end{pmatrix}$
SL $\begin{pmatrix} 2.85 \\ 2.68 \end{pmatrix}$
 $\Sigma \begin{pmatrix} 5.53 \end{pmatrix}$ k

R₂ = $\begin{pmatrix} 2.85 \\ 2.68 \end{pmatrix}$
 $\Sigma \begin{pmatrix} 5.53 \end{pmatrix}$ k

RB19 4x8

Roof

PSF Tributary

$$W_1 = DL \begin{pmatrix} 22 \\ 35 \end{pmatrix} \begin{pmatrix} 4.0 \\ 4.0 \end{pmatrix} + DL \begin{pmatrix} 0 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 88 \\ 140 \end{pmatrix}$$

PLF

$$\Sigma \begin{pmatrix} 228 \end{pmatrix}$$

L = 6.00 ft

R₁ = DL $\begin{pmatrix} 0.26 \\ 0.42 \end{pmatrix}$
SL $\begin{pmatrix} 0.26 \\ 0.42 \end{pmatrix}$
 $\Sigma \begin{pmatrix} 0.68 \end{pmatrix}$ k

R₂ = $\begin{pmatrix} 0.26 \\ 0.42 \end{pmatrix}$
 $\Sigma \begin{pmatrix} 0.68 \end{pmatrix}$ k

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

Roof

PSF Tributary

$$W_1 = DL \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 3.8 \\ 3.8 \end{pmatrix} + DL \begin{pmatrix} 100 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 5.5 \\ 5.5 \end{pmatrix} = DL \begin{pmatrix} 327 \\ 220 \end{pmatrix}$$

PLF

$$\Sigma \begin{pmatrix} 563 \end{pmatrix}$$

L = 12.50 ft

R₁ = DL $\begin{pmatrix} 2.04 \\ 1.38 \\ 0.60 \end{pmatrix}$
SL $\begin{pmatrix} 2.04 \\ 1.38 \\ 0.60 \end{pmatrix}$
 $\Sigma \begin{pmatrix} 3.52 \end{pmatrix}$ k

R₂ = $\begin{pmatrix} 2.04 \\ 1.38 \\ 0.60 \end{pmatrix}$
 $\Sigma \begin{pmatrix} 3.52 \end{pmatrix}$ k

RB21 4x10

Roof

PSF Tributary

$$W_1 = DL \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 3.8 \\ 3.8 \end{pmatrix} + DL \begin{pmatrix} 100 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 5.5 \\ 5.5 \end{pmatrix} = DL \begin{pmatrix} 327 \\ 220 \end{pmatrix}$$

PLF

$$\Sigma \begin{pmatrix} 563 \end{pmatrix}$$

L = 7.00 ft

R₁ = DL $\begin{pmatrix} 1.14 \\ 0.77 \\ 0.33 \end{pmatrix}$
SL $\begin{pmatrix} 1.14 \\ 0.77 \\ 0.33 \end{pmatrix}$
 $\Sigma \begin{pmatrix} 1.97 \end{pmatrix}$ k

R₂ = $\begin{pmatrix} 1.14 \\ 0.77 \\ 0.33 \end{pmatrix}$
 $\Sigma \begin{pmatrix} 1.97 \end{pmatrix}$ k

RB22 4x10

Roof

PSF Tributary

$$W_1 = DL \begin{pmatrix} 22 \\ 35 \end{pmatrix} \begin{pmatrix} 3.6 \\ 3.6 \end{pmatrix} + DL \begin{pmatrix} 0 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 79 \\ 125 \end{pmatrix}$$

PLF

$$\Sigma \begin{pmatrix} 203 \end{pmatrix}$$

L = 10.00 ft

R₁ = DL $\begin{pmatrix} 0.39 \\ 0.62 \end{pmatrix}$
SL $\begin{pmatrix} 0.39 \\ 0.62 \end{pmatrix}$
 $\Sigma \begin{pmatrix} 1.02 \end{pmatrix}$ k

R₂ = $\begin{pmatrix} 0.39 \\ 0.62 \end{pmatrix}$
 $\Sigma \begin{pmatrix} 1.02 \end{pmatrix}$ k

SOLUTIONS 4 STRUCTURES

Inc.

LOADS ONLY

RB23 4x8

$L = 10.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0.27 \\ 0.43 \end{pmatrix} \quad \Sigma \quad 0.69 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.27 \\ 0.43 \end{pmatrix} \quad \Sigma \quad 0.69 \text{ k}$$

$$W_1 = \begin{matrix} \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 35 \end{pmatrix} \begin{pmatrix} 2.4 \\ 2.4 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 53 \\ 85 \\ 139 \end{pmatrix}$$

GT-1

$L = 11.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 1.48 \\ 1.68 \end{pmatrix} \quad \Sigma \quad 3.17 \text{ k}$$

$$R_2 = \begin{pmatrix} 1.48 \\ 1.68 \end{pmatrix} \quad \Sigma \quad 3.17 \text{ k}$$

$$W_1 = \begin{matrix} \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 12.3 \\ 12.3 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 270 \\ 306 \\ 576 \end{pmatrix}$$

GT-2

$L = 13.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 2.36 \\ 2.68 \end{pmatrix} \quad \Sigma \quad 5.04 \text{ k}$$

$$R_2 = \begin{pmatrix} 2.36 \\ 2.68 \end{pmatrix} \quad \Sigma \quad 5.04 \text{ k}$$

$$W_1 = \begin{matrix} \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 16.5 \\ 16.5 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 363 \\ 413 \\ 776 \end{pmatrix}$$

GT-3

$L = 12.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 1.78 \\ 2.03 \end{pmatrix} \quad \Sigma \quad 3.81 \text{ k}$$

$$R_2 = \begin{pmatrix} 1.78 \\ 2.03 \end{pmatrix} \quad \Sigma \quad 3.81 \text{ k}$$

$$W_1 = \begin{matrix} \text{PSF Tributary} \\ \text{SL} \end{matrix} \begin{pmatrix} 22 \\ 25 \end{pmatrix} \begin{pmatrix} 13.5 \\ 13.5 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{SL} \end{matrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 297 \\ 338 \\ 635 \end{pmatrix}$$

PRMU20240286

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

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

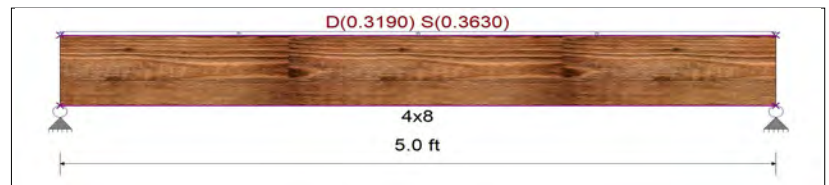
Unif Load: D = 0.3190, S = 0.3630 k/ft, Trib= 1.0 ft

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:

PRMU20240286

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

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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:

PRMU20240286

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

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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

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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:

PRMU20240286

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

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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

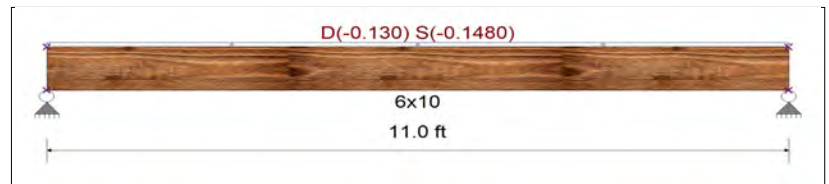
Unif Load: D = -0.130, S = -0.1480 k/ft, Trib= 1.0 ft

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

PRMU20240286

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

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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:

PRMU20240286

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

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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

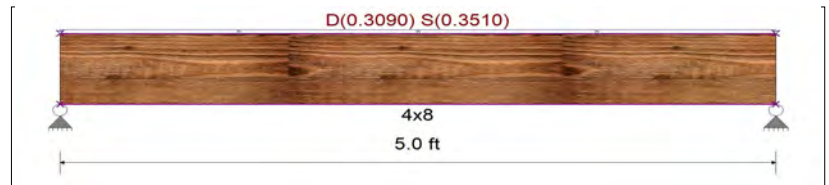
Unif Load: D = 0.3090, S = 0.3510 k/ft, Trib= 1.0 ft

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	

PRMU20240286

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

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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

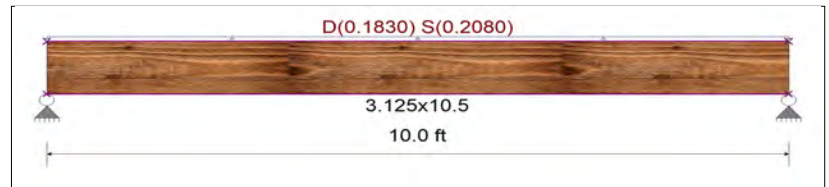
Unif Load: D = 0.1830, S = 0.2080 k/ft, Trib= 1.0 ft

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

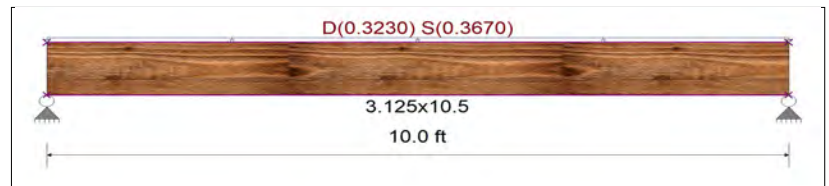
Unif Load: D = 0.3230, S = 0.3670 k/ft, Trib= 1.0 ft

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:

PRMU20240286

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

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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

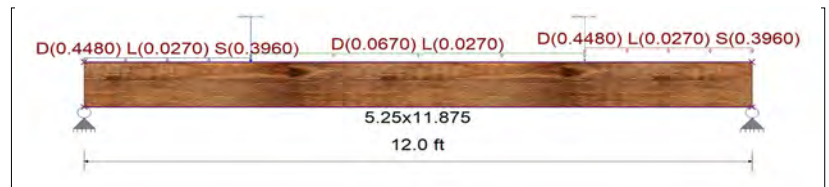
Point: D = 0.990, S = 1.130 k @ 9.0 ft

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:

PRMU20240286

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

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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

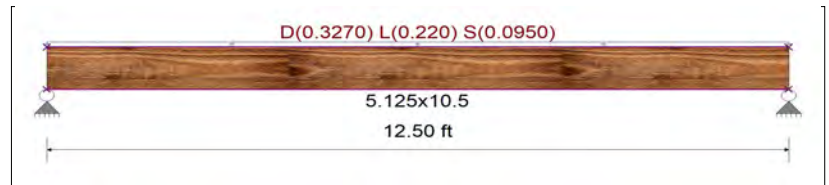
Unif Load: D = 0.3270, L = 0.220, S = 0.0950 k/ft, Trib= 1.0 ft

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		LC: +D+0.750L+0.750S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

PRMU20240286

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

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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

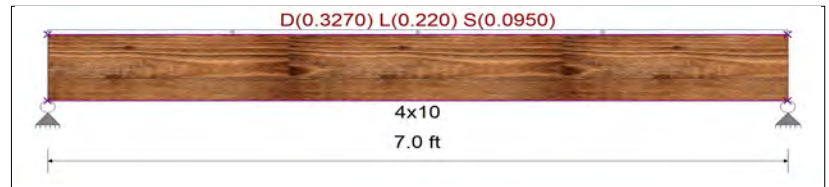
Unif Load: D = 0.3270, L = 0.220, S = 0.0950 k/ft, Trib= 1.0 ft

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

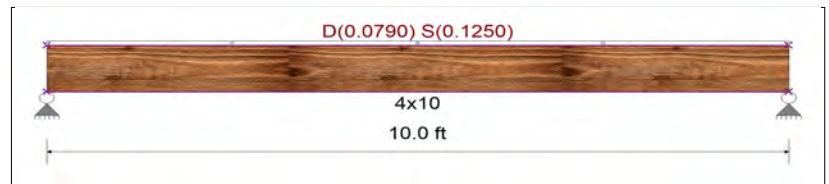
Unif Load: D = 0.0790, S = 0.1250 k/ft, Trib= 1.0 ft

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:

PRMU20240286

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
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

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

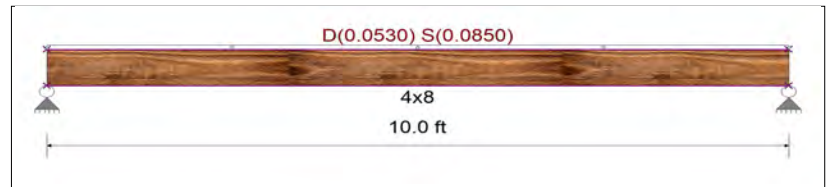
Unif Load: D = 0.0530, S = 0.0850 k/ft, Trib= 1.0 ft

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

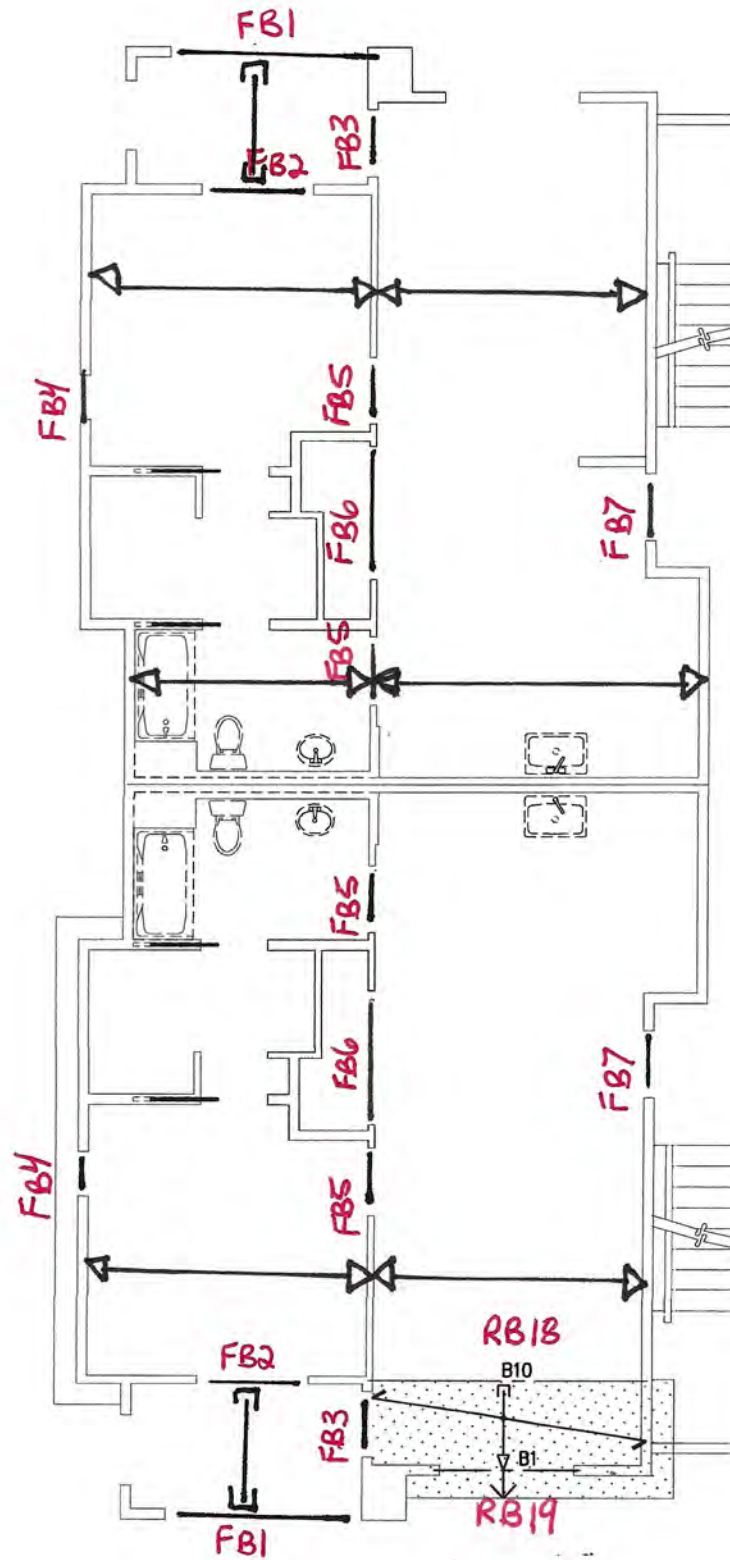
Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.29			0.43			
Right Support	0.29			0.43			



Max Deflections

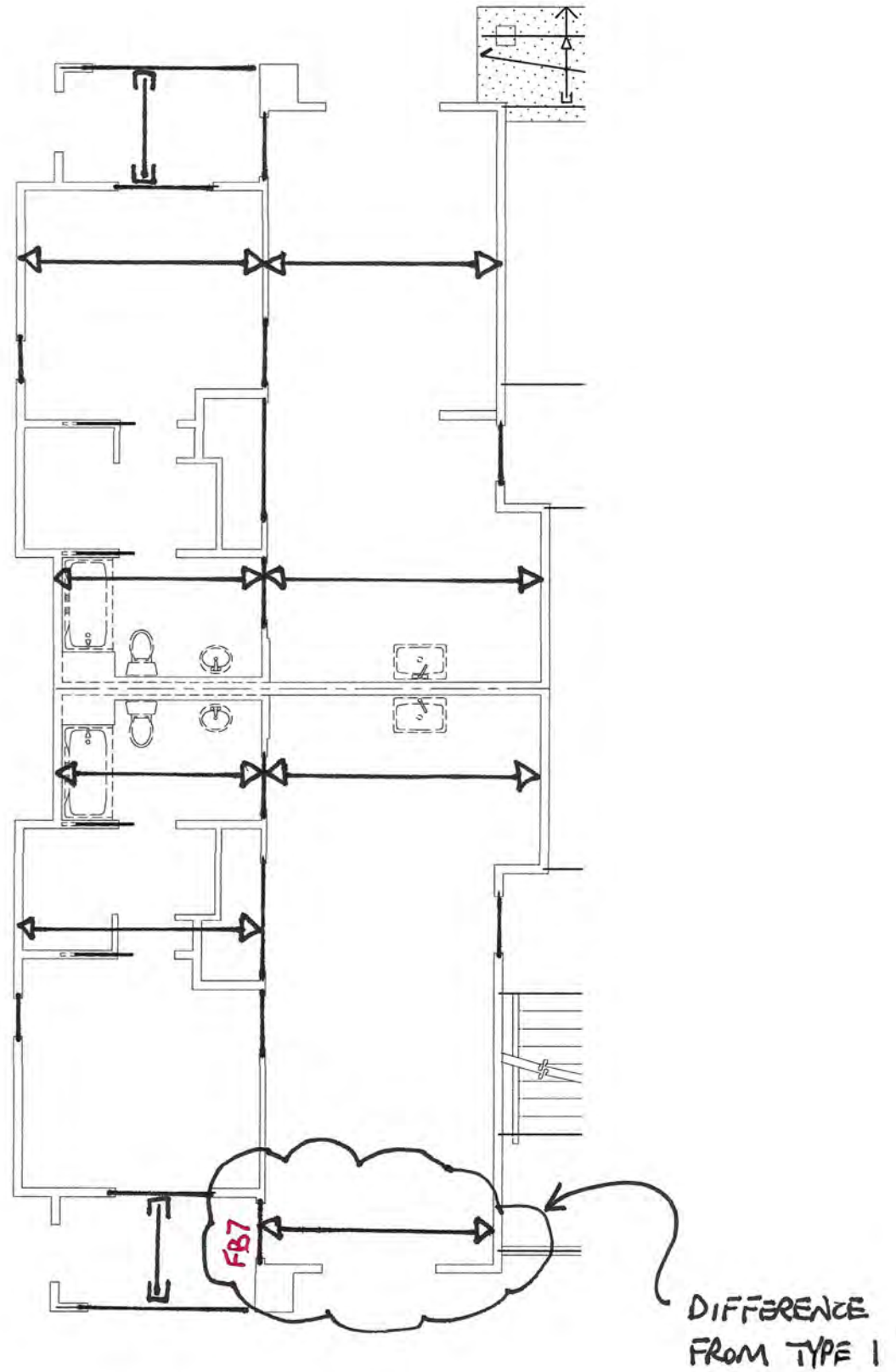
Transient Downward	0.133 in	Total Downward	0.223 in
Ratio	901	Ratio	537
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

PRMU20240286

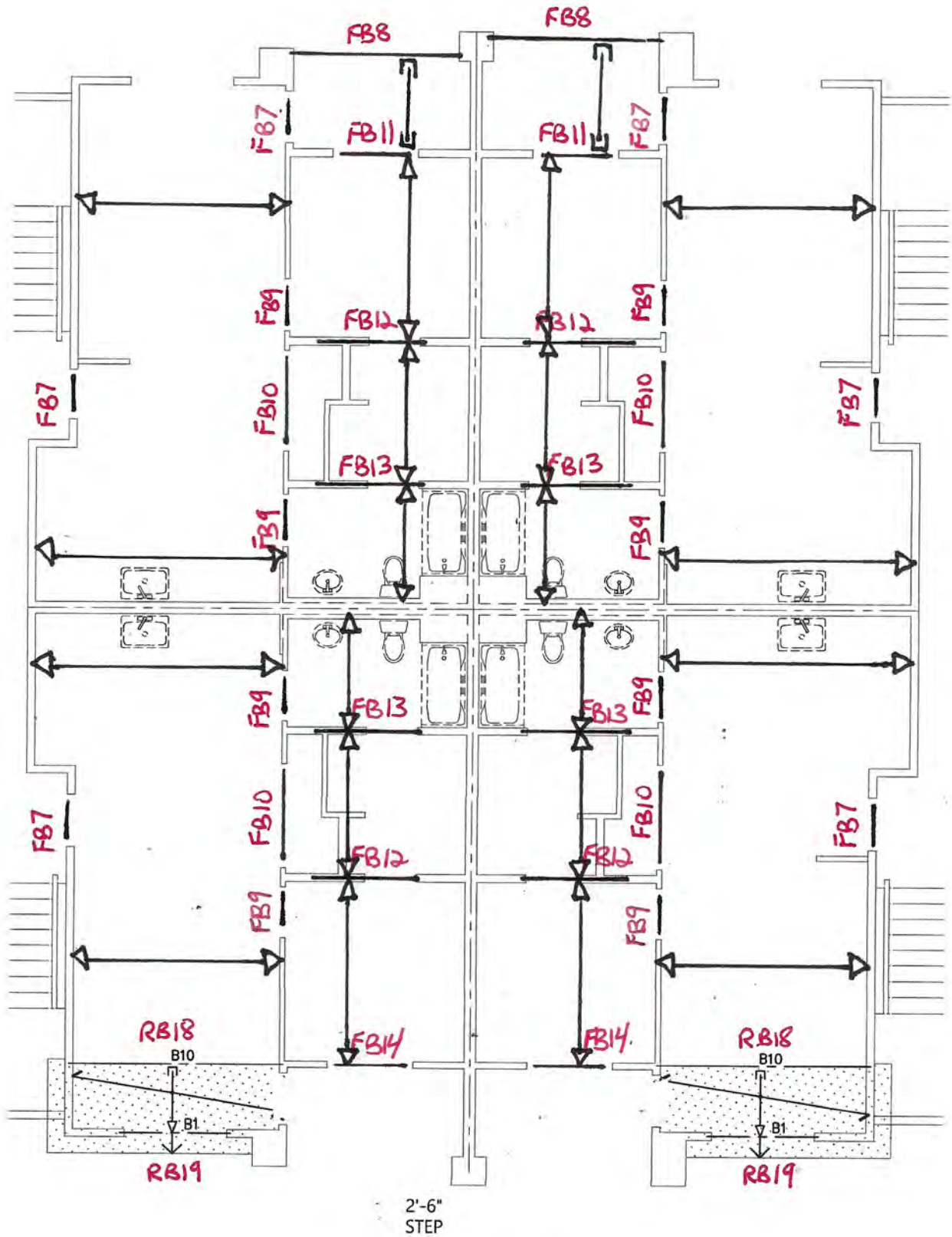


FLOOR TYPE 1

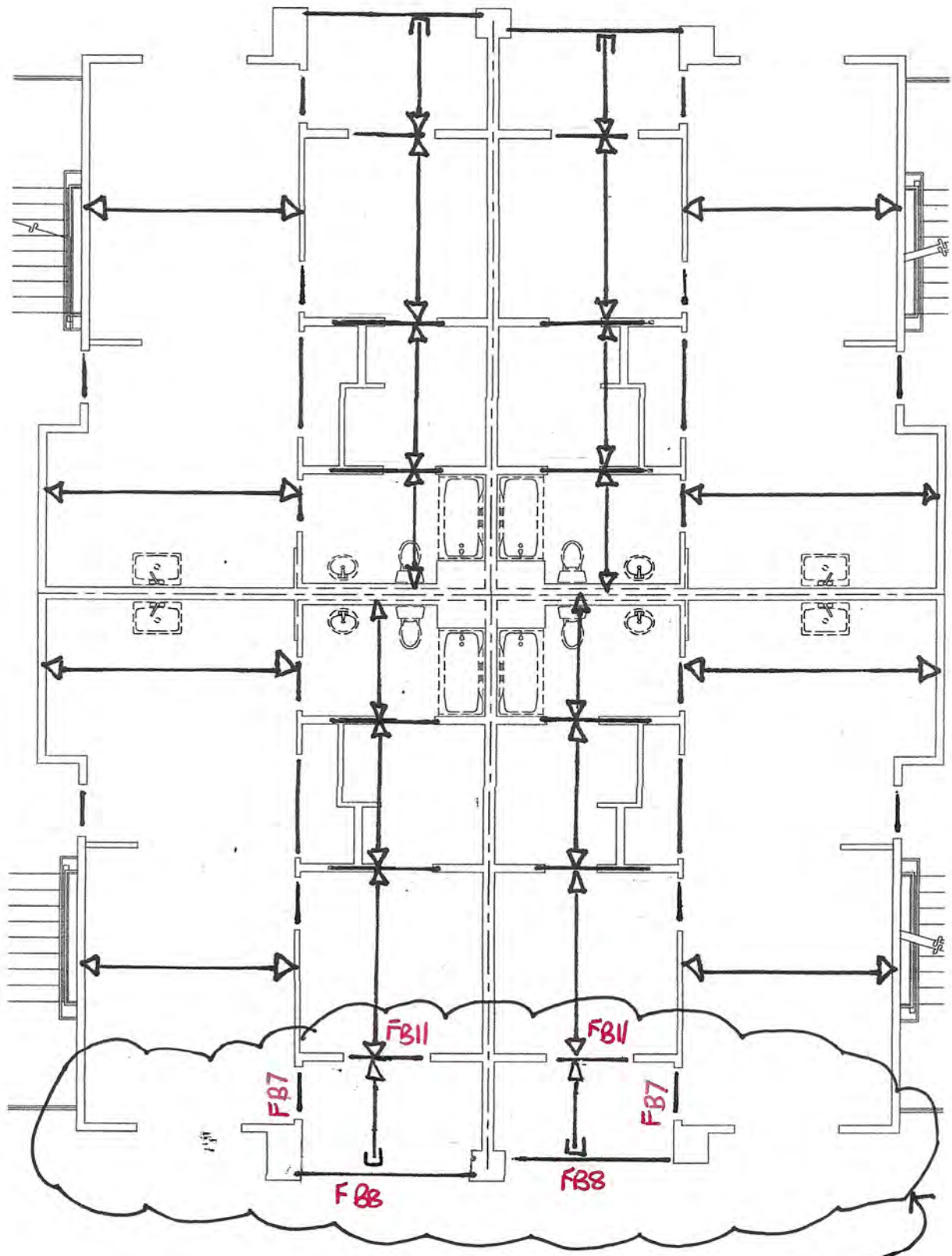
PRMU20240286



FLOOR TYPE 1B



FLOOR TYPE 2

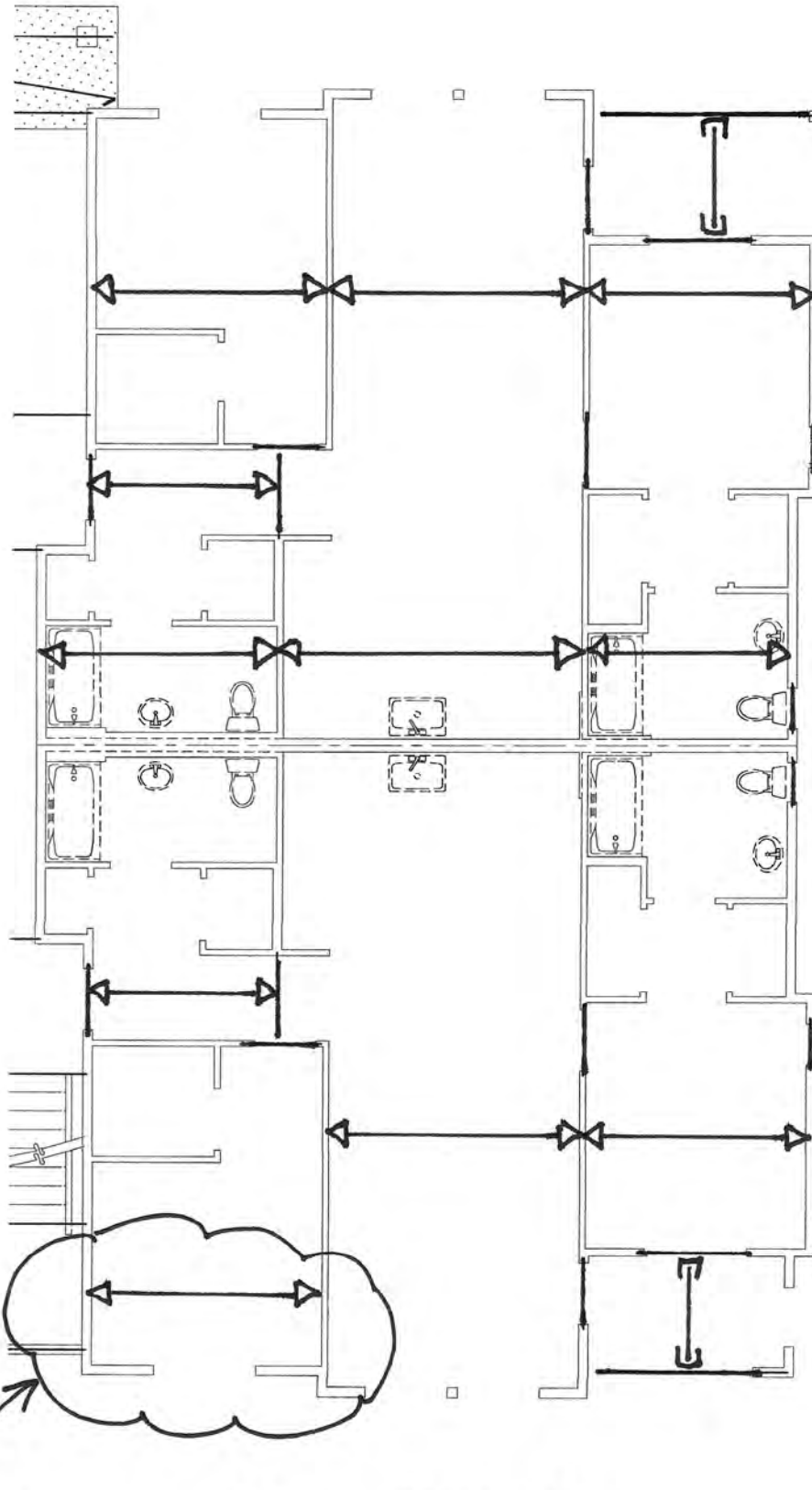


FLOOR TYPE 2B

DIFFERENCE
FROM TYPE 2

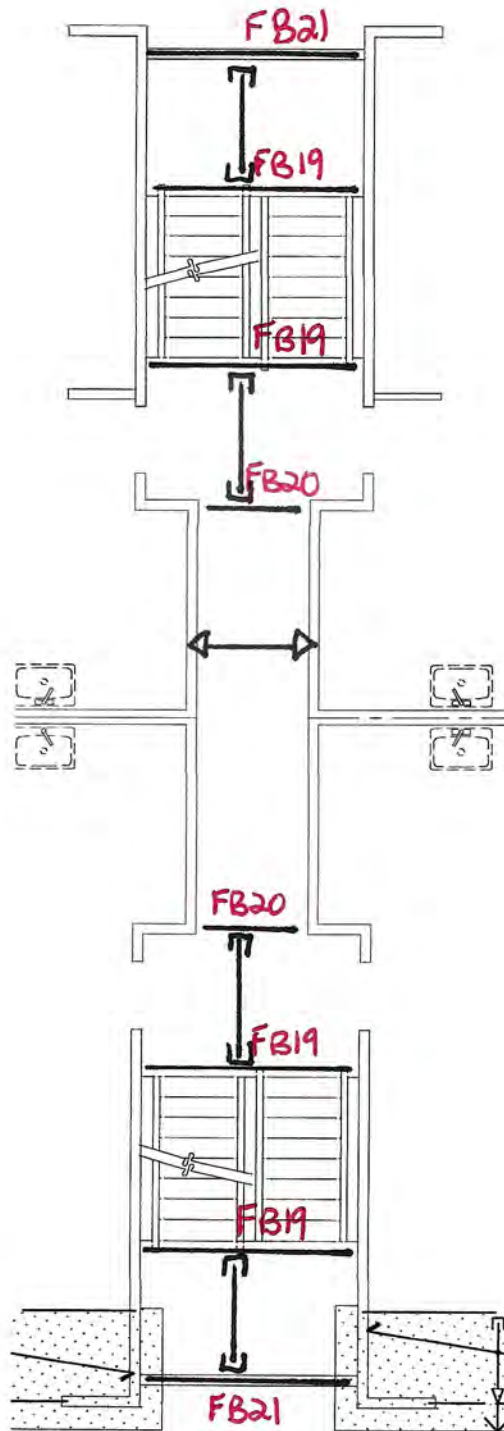


FLOOR TYPE 3

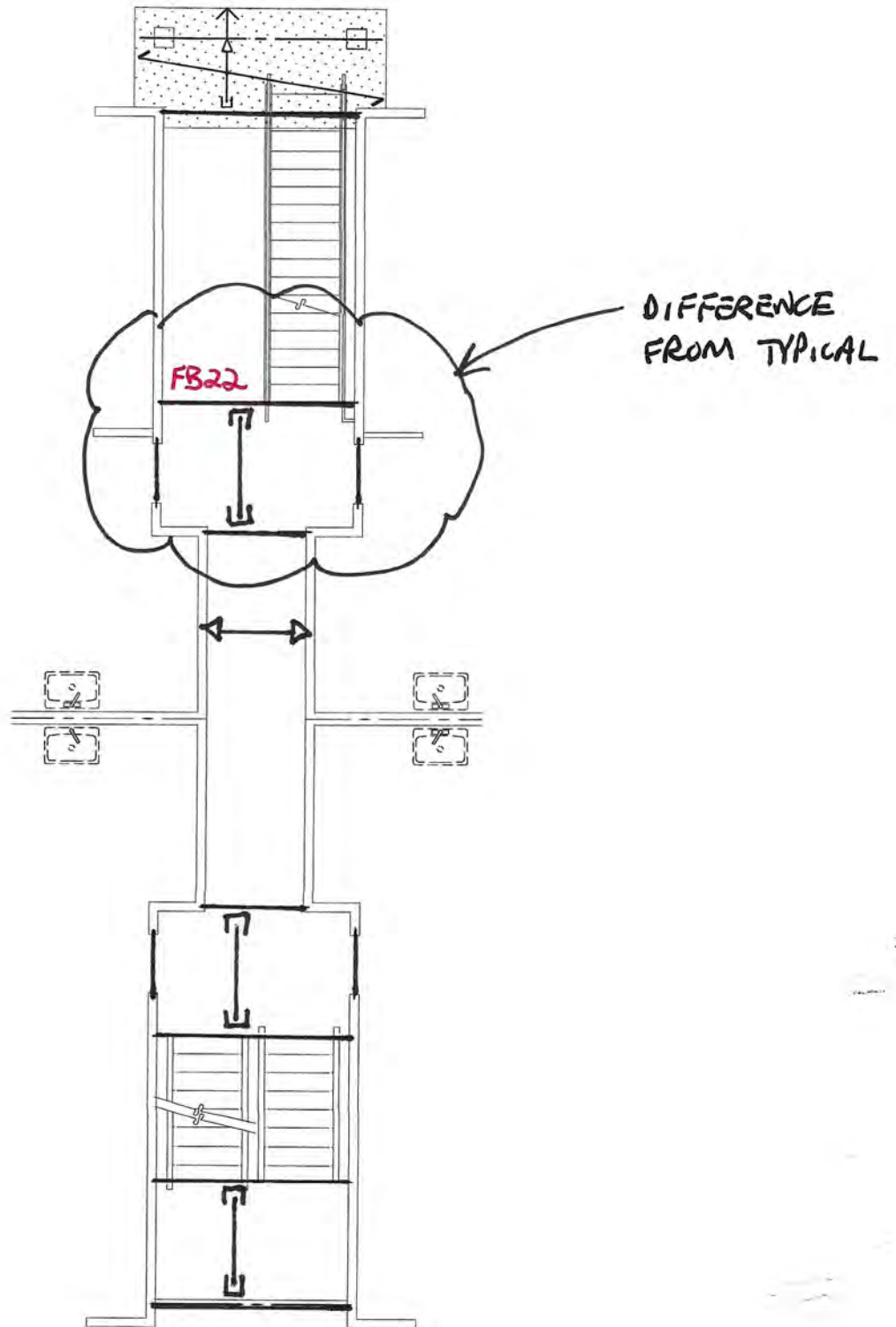


DIFFERENCE
FROM TYPE 3

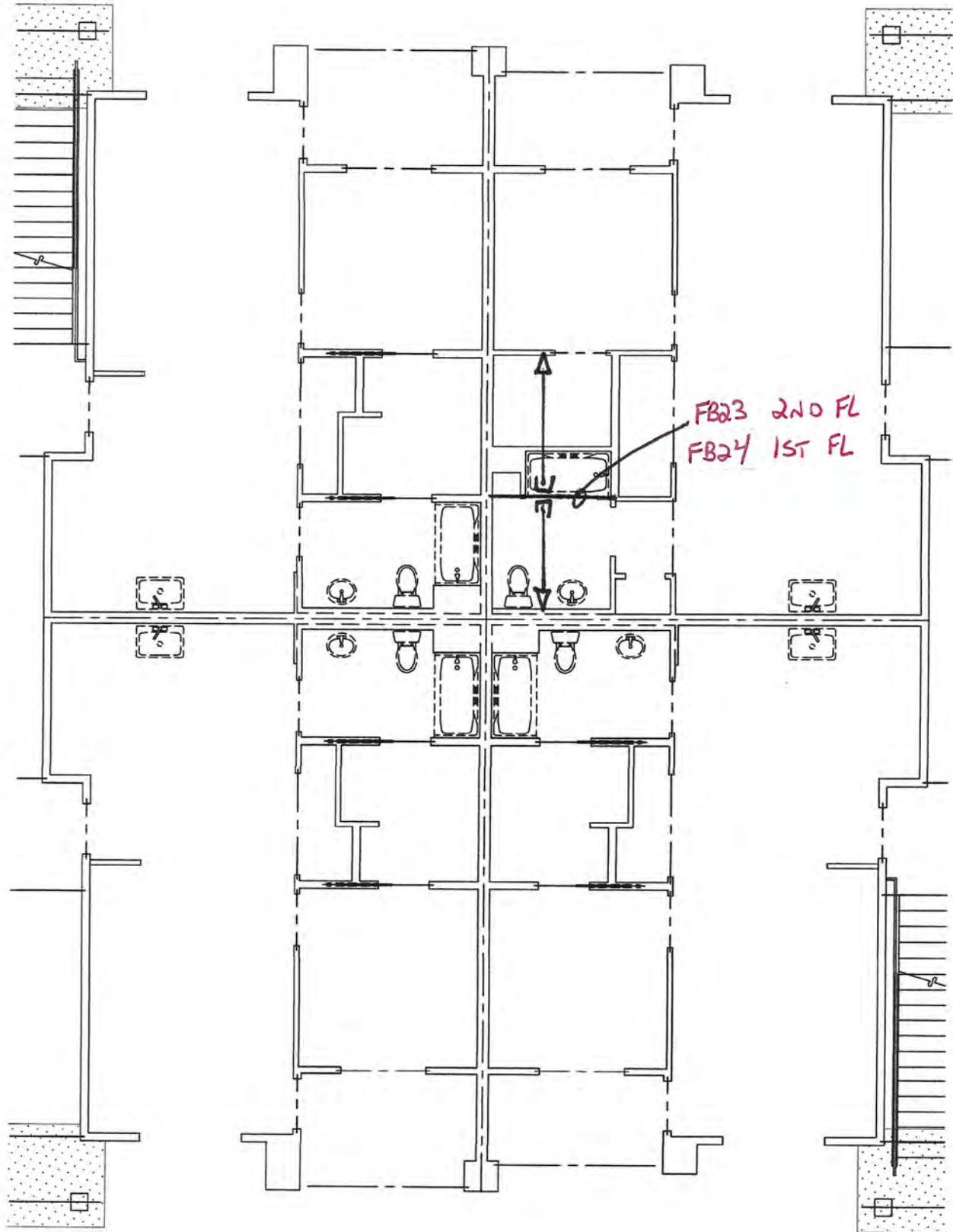
FLOOR TYPE 3B



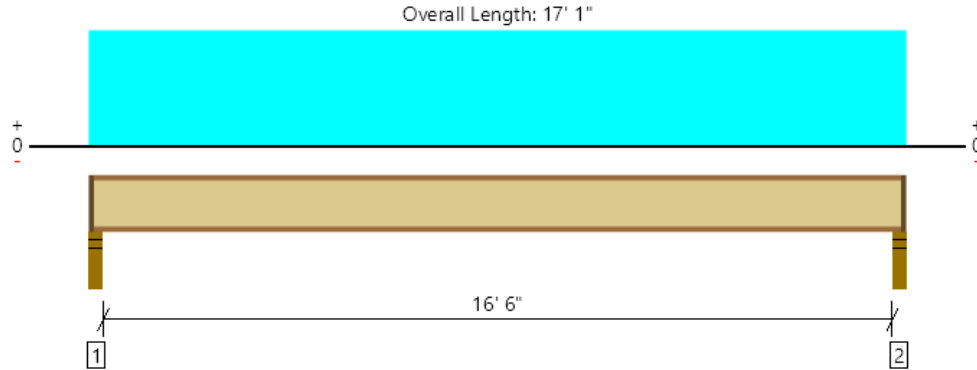
TYPICAL STAIR/CORRIDOR



STAIR CORRIDOR (2ND FLOOR)



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	





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

FLOOR FRAMING

2018 NDS/2018 IBC

$C_r =$	1.15	repetitive
$C_D =$	1.0	LIVE
$C_F =$	(varies)	size

2 x 6	Pressure Treated Incising	Hem Fir	#2				
2 x 6		A = 8.25	in ²	Live	60.00	psf	
Hem Fir		S = 7.56	in ³	Dead	14.00	psf	
#2		I = 20.80	in ⁴	Partition	-	psf	
Incising? Yes		$C_F =$ 1.30		Total	74.00	psf	
Wet Use? No		$F_b =$ 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
$L_{v\text{allow}} = \{[A \cdot F_v \cdot C_D / (1.5 \cdot w)] + d\} \cdot 2$		Lv (ft) =	34.70	23.44	17.81	Shear	1.00%
$L_{b\text{allow}} = (S \cdot F_b \cdot C_D \cdot C_r \cdot C_i \cdot 8/w)^{1/2}$		Lb (ft) =	10.39	8.49	7.35	Bending	4.00%
$L_{d\text{allow}} = [384 \cdot E \cdot C_i \cdot I / (5 \cdot LL \cdot 360)]^{1/3}$		Ld (ft) =	9.83	8.59	7.81	LL Deflection	360
$L_{d\text{allow}} = [384 \cdot E \cdot C_i \cdot I / (5 \cdot TL \cdot 240)]^{1/3}$		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		A = 10.88	in ²	Live	60.00	psf	
Hem Fir		S = 13.14	in ³	Dead	14.00	psf	
#2		I = 47.63	in ⁴	Partition	-	psf	
Incising? Yes		$C_F =$ 1.20		Total	74.00	psf	
Wet Use? No		$F_b =$ 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
$L_{v\text{allow}} = \{[A \cdot F_v \cdot C_D / (1.5 \cdot w)] + d\} \cdot 2$		Lv (ft) =	45.74	30.89	23.47	Shear	1.00%
$L_{b\text{allow}} = (S \cdot F_b \cdot C_D \cdot C_r \cdot C_i \cdot 8/w)^{1/2}$		Lb (ft) =	13.16	10.75	9.31	Bending	4.00%
$L_{d\text{allow}} = [384 \cdot E \cdot C_i \cdot I / (5 \cdot LL \cdot 360)]^{1/3}$		Ld (ft) =	12.96	11.33	10.29	LL Deflection	360
$L_{d\text{allow}} = [384 \cdot E \cdot C_i \cdot I / (5 \cdot TL \cdot 240)]^{1/3}$		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		A = 13.88	in ²	Live	60.00	psf	
Hem Fir		S = 21.39	in ³	Dead	14.00	psf	
#2		I = 98.93	in ⁴	Partition	-	psf	
Incising? Yes		$C_F =$ 1.10		Total	74.00	psf	
Wet Use? No		$F_b =$ 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
$L_{v\text{allow}} = \{[A \cdot F_v \cdot C_D / (1.5 \cdot w)] + d\} \cdot 2$		Lv (ft) =	58.35	39.42	29.95	Shear	1.00%
$L_{b\text{allow}} = (S \cdot F_b \cdot C_D \cdot C_r \cdot C_i \cdot 8/w)^{1/2}$		Lb (ft) =	16.08	13.13	11.37	Bending	4.00%
$L_{d\text{allow}} = [384 \cdot E \cdot C_i \cdot I / (5 \cdot LL \cdot 360)]^{1/3}$		Ld (ft) =	16.54	14.45	13.13	LL Deflection	360
$L_{d\text{allow}} = [384 \cdot E \cdot C_i \cdot I / (5 \cdot TL \cdot 240)]^{1/3}$		Ld (ft) =	17.66	15.42	14.01	TL Deflection	240
		bending	bending	bending			



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

FLOOR FRAMING

2018 NDS/2018 IBC

$C_r =$	1.15	repetitive
$C_D =$	1.0	LIVE
$C_F =$	(varies)	size

2 x 6		Pressure Treated Incising		Hem Fir		#2		
2 x 6	▼	A =	8.25	in ²	Live	100.00	psf	
Hem Fir	▼	S =	7.56	in ³	Dead	47.00	psf	
#2	▼	I =	20.80	in ⁴	Partition	-	psf	
Incising? Yes	▼	C _F =	1.30		Total	147.00	psf	
Wet Use? No	▼	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*C _f *C _i *8/w) ^{1/2}		Lb (ft) =	7.38	6.02	5.21	Bending	4.00%	
Ld _{allow} =[384*E*C _i *I/(5*L*L*360)] ^{1/3}		Ld (ft) =	8.30	7.25	6.58	LL Deflection	360	
Ld _{allow} =[384*E*C _i *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	▼	A =	10.88	in ²	Live	100.00	psf	
Hem Fir	▼	S =	13.14	in ³	Dead	47.00	psf	
#2	▼	I =	47.63	in ⁴	Partition	-	psf	
Incising? Yes	▼	C _F =	1.20		Total	147.00	psf	
Wet Use? No	▼	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 *C _r *C _i *8/w) ^{1/2}		Lb (ft) =		9.34	7.63	6.60	Bending	4.00%
Ld _{allow} =[384*E*C _i *I/(5*LL*360)] ^{1/3}		Ld (ft) =		10.93	9.55	8.68	LL Deflection	360
Ld _{allow} =[384*E*C _i *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	▼	A =	13.88	in ²	Live	100.00	psf		
Hem Fir	▼	S =	21.39	in ³	Dead	47.00	psf		
#2	▼	I =	98.93	in ⁴	Partition	-	psf		
Incising? Yes	▼	C _F =	1.10		Total	147.00	psf		
Wet Use? No	▼	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 *C _r *C _f *C _i *8/w) ^{1/2}		Lb (ft) =		11.41	9.32	8.07	Bending	4.00%	
Ld _{allow} =[384*E*C _i *I/(5*LL*360)]^1/3		Ld (ft) =		13.95	12.19	11.07	LL Deflection	360	
Ld _{allow} =[384*E*C _i *I/(5*TL*240)]^1/3		Ld (ft) =		14.04	12.27	11.15	TL Deflection	240	
		bending		bending	bending				

SOLUTIONS 4 STRUCTURES

LOADS ONLY

FB1 PT 4 x 10

$L = 8.00$ ft

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.32 \\ 0.76 \end{pmatrix} \quad \Sigma \quad 1.08 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.32 \\ 0.76 \end{pmatrix} \quad \Sigma \quad 1.08 \text{ k}$$

$$W_1 = \begin{matrix} \text{Deck} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 25 \\ 3.2 \\ 60 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 0.0 \\ 40 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{LL} \\ \Sigma \end{matrix} \begin{pmatrix} 79 \\ 190 \\ 269 \end{pmatrix}$$

FB2 4 x 8

$L = 5.00$ ft

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.34 \\ 0.54 \end{pmatrix} \quad \Sigma \quad 0.88 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.34 \\ 0.54 \end{pmatrix} \quad \Sigma \quad 0.88 \text{ k}$$

$$W_1 = \begin{matrix} \text{Deck} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 25 \\ 3.2 \\ 60 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 40 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 0.7 \\ 40 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 136 \\ 217 \\ 353 \end{pmatrix}$$

FB3 4 x 8

$L = 3.00$ ft

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.33 \\ 0.43 \end{pmatrix} \quad \Sigma \quad 0.76 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.33 \\ 0.43 \end{pmatrix} \quad \Sigma \quad 0.76 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 6.3 \\ 40 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 40 \end{pmatrix} + \begin{matrix} \text{Deck} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 25 \\ 0.7 \\ 60 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{LL} \\ \Sigma \end{matrix} \begin{pmatrix} 219 \\ 290 \\ 509 \end{pmatrix}$$

FB4 4 x 8

$L = 2.00$ ft

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.21 \\ 0.26 \end{pmatrix} \quad \Sigma \quad 0.47 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.21 \\ 0.26 \end{pmatrix} \quad \Sigma \quad 0.47 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 6.5 \\ 40 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 40 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 0.0 \\ 40 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 209 \\ 260 \\ 469 \end{pmatrix}$$

FB5 4 x 8

$L = 3.00$ ft

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.51 \\ 0.78 \end{pmatrix} \quad \Sigma \quad 1.29 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.51 \\ 0.78 \end{pmatrix} \quad \Sigma \quad 1.29 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 13.0 \\ 40 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 0.0 \\ 40 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{LL} \\ \Sigma \end{matrix} \begin{pmatrix} 338 \\ 520 \\ 858 \end{pmatrix}$$

FB6 4 x 10

$L = 6.00$ ft

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 1.01 \\ 1.56 \end{pmatrix} \quad \Sigma \quad 2.57 \text{ k}$$

$$R_2 = \begin{pmatrix} 1.01 \\ 1.56 \end{pmatrix} \quad \Sigma \quad 2.57 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 13.0 \\ 40 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 0.0 \\ 40 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 338 \\ 520 \\ 858 \end{pmatrix}$$

SOLUTIONS 4 STRUCTURES

LOADS ONLY

FB7 4 x 8

$L = 3.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.37 \\ 0.50 \end{pmatrix} \quad \Sigma \quad 0.88 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.37 \\ 0.50 \end{pmatrix} \quad \Sigma \quad 0.88 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 6.8 \\ 6.8 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 40 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 47 \\ 100 \end{pmatrix} \begin{pmatrix} 0.7 \\ 0.7 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 247 \\ 337 \\ 583 \end{pmatrix}$$

FB8 PT 6 x 10 HF1

$L = 10.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.44 \\ 1.05 \end{pmatrix} \quad \Sigma \quad 1.49 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.44 \\ 1.05 \end{pmatrix} \quad \Sigma \quad 1.49 \text{ k}$$

$$W_1 = \begin{matrix} \text{Deck} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 25 \\ 60 \end{pmatrix} \begin{pmatrix} 3.5 \\ 3.5 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{LL} \\ \Sigma \end{matrix} \begin{pmatrix} 88 \\ 210 \\ 298 \end{pmatrix}$$

FB9 4 x 8

$L = 3.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.34 \\ 0.53 \end{pmatrix} \quad \Sigma \quad 0.87 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.34 \\ 0.53 \end{pmatrix} \quad \Sigma \quad 0.87 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 8.2 \\ 8.2 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 0.7 \\ 0.7 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 230 \\ 353 \\ 583 \end{pmatrix}$$

FB10 4 x 8

$L = 6.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.59 \\ 0.91 \end{pmatrix} \quad \Sigma \quad 1.50 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.59 \\ 0.91 \end{pmatrix} \quad \Sigma \quad 1.50 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 6.9 \\ 6.9 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 0.7 \\ 0.7 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 197 \\ 303 \\ 501 \end{pmatrix}$$

FB11 4 x 8

$L = 5.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.58 \\ 1.08 \end{pmatrix} \quad \Sigma \quad 1.65 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.58 \\ 1.08 \end{pmatrix} \quad \Sigma \quad 1.65 \text{ k}$$

$$W_1 = \begin{matrix} \text{Deck} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 25 \\ 60 \end{pmatrix} \begin{pmatrix} 3.5 \\ 3.5 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 5.5 \\ 5.5 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{LL} \\ \Sigma \end{matrix} \begin{pmatrix} 231 \\ 430 \\ 661 \end{pmatrix}$$

FB12 4 x 10

$L = 6.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.76 \\ 1.17 \end{pmatrix} \quad \Sigma \quad 1.93 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.76 \\ 1.17 \end{pmatrix} \quad \Sigma \quad 1.93 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 9.8 \\ 9.8 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 254 \\ 390 \\ 644 \end{pmatrix}$$

SOLUTIONS 4 STRUCTURES

LOADS ONLY

FB13 4 x 10

$L = 6.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.60 \\ 0.93 \end{pmatrix} \quad \Sigma \quad 1.53 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.60 \\ 0.93 \end{pmatrix} \quad \Sigma \quad 1.53 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 7.8 \\ 7.8 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 202 \\ 310 \\ 512 \end{pmatrix}$$

FB14 4 x 8

$L = 5.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.36 \\ 0.55 \end{pmatrix} \quad \Sigma \quad 0.91 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.36 \\ 0.55 \end{pmatrix} \quad \Sigma \quad 0.91 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 5.5 \\ 5.5 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 143 \\ 220 \\ 363 \end{pmatrix}$$

FB15 4 x 8

$L = 3.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.22 \\ 0.37 \end{pmatrix} \quad \Sigma \quad 0.59 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.22 \\ 0.37 \end{pmatrix} \quad \Sigma \quad 0.59 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 4.5 \\ 4.5 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Stair} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 47 \\ 100 \end{pmatrix} \begin{pmatrix} 0.7 \\ 0.7 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 148 \\ 247 \\ 395 \end{pmatrix}$$

FB16 4 x 8

$L = 4.50 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.70 \\ 1.08 \end{pmatrix} \quad \Sigma \quad 1.78 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.70 \\ 1.08 \end{pmatrix} \quad \Sigma \quad 1.78 \text{ k}$$

$$W_1 = \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 12.0 \\ 12.0 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 312 \\ 480 \\ 792 \end{pmatrix}$$

FB17 See Hand Drawn Diagram

FB18 PT 6 x 10 HF 1

$L = 11.00 \text{ ft}$

$$R_1 = \begin{matrix} \text{DL} \\ \text{LL} \end{matrix} \begin{pmatrix} 0.44 \\ 1.04 \end{pmatrix} \quad \Sigma \quad 1.48 \text{ k}$$

$$R_2 = \begin{pmatrix} 0.44 \\ 1.04 \end{pmatrix} \quad \Sigma \quad 1.48 \text{ k}$$

$$W_1 = \begin{matrix} \text{Deck} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 25 \\ 60 \end{pmatrix} \begin{pmatrix} 3.2 \\ 3.2 \end{pmatrix} + \begin{matrix} \text{DL} \\ \text{Wall} \end{matrix} \begin{pmatrix} 0 \end{pmatrix} + \begin{matrix} \text{Floor} \\ \text{PSF Tributary} \\ \text{LL} \end{matrix} \begin{pmatrix} 26 \\ 40 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = \begin{matrix} \text{DL} \\ \text{SL} \\ \Sigma \end{matrix} \begin{pmatrix} 79 \\ 190 \\ 269 \end{pmatrix}$$

SOLUTIONS 4 STRUCTURES

LOADS ONLY

FB19 PT 5-1/8 x 10.5 GLB

$$W_1 = DL \begin{pmatrix} 47 \\ 100 \end{pmatrix} \begin{pmatrix} 6.8 \\ 6.8 \end{pmatrix} + DL \begin{pmatrix} 0 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 47 \\ 100 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 317 \\ 675 \end{pmatrix} \begin{pmatrix} \text{PLF} \\ \text{SL} \end{pmatrix} \begin{pmatrix} \Sigma \\ 992 \end{pmatrix}$$

$$R_1 = DL \begin{pmatrix} 1.59 \\ 3.38 \end{pmatrix} \quad R_2 = \begin{pmatrix} 1.59 \\ 3.38 \end{pmatrix}$$

$$\Sigma \quad 4.96 \text{ k} \quad \Sigma \quad 4.96 \text{ k}$$

FB20 PT 4 x 8

$$W_1 = DL \begin{pmatrix} 47 \\ 100 \end{pmatrix} \begin{pmatrix} 3.9 \\ 3.9 \end{pmatrix} + DL \begin{pmatrix} 0 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 47 \\ 100 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 184 \\ 392 \end{pmatrix} \begin{pmatrix} \text{PLF} \\ \text{SL} \end{pmatrix} \begin{pmatrix} \Sigma \\ 576 \end{pmatrix}$$

$$R_1 = DL \begin{pmatrix} 0.46 \\ 0.98 \end{pmatrix} \quad R_2 = \begin{pmatrix} 0.46 \\ 0.98 \end{pmatrix}$$

$$\Sigma \quad 1.44 \text{ k} \quad \Sigma \quad 1.44 \text{ k}$$

FB21 PT 3-1/8 x 10.5 GLB

$$W_1 = DL \begin{pmatrix} 47 \\ 100 \end{pmatrix} \begin{pmatrix} 3.3 \\ 3.3 \end{pmatrix} + DL \begin{pmatrix} 100 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 47 \\ 100 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 253 \\ 325 \end{pmatrix} \begin{pmatrix} \text{PLF} \\ \text{SL} \end{pmatrix} \begin{pmatrix} \Sigma \\ 578 \end{pmatrix}$$

$$R_1 = DL \begin{pmatrix} 1.26 \\ 1.63 \end{pmatrix} \quad R_2 = \begin{pmatrix} 1.26 \\ 1.63 \end{pmatrix}$$

$$\Sigma \quad 2.89 \text{ k} \quad \Sigma \quad 2.89 \text{ k}$$

FB22 PT 5-1/8 x 10.5 GLB

$$W_1 = DL \begin{pmatrix} 47 \\ 100 \end{pmatrix} \begin{pmatrix} 6.3 \\ 6.3 \end{pmatrix} + DL \begin{pmatrix} 0 \\ \text{Wall} \end{pmatrix} + DL \begin{pmatrix} 47 \\ 100 \end{pmatrix} \begin{pmatrix} 0.0 \\ 0.0 \end{pmatrix} = DL \begin{pmatrix} 294 \\ 625 \end{pmatrix} \begin{pmatrix} \text{PLF} \\ \text{SL} \end{pmatrix} \begin{pmatrix} \Sigma \\ 919 \end{pmatrix}$$

$$R_1 = DL \begin{pmatrix} 1.47 \\ 3.13 \end{pmatrix} \quad R_2 = \begin{pmatrix} 1.47 \\ 3.13 \end{pmatrix}$$

$$\Sigma \quad 4.59 \text{ k} \quad \Sigma \quad 4.59 \text{ k}$$

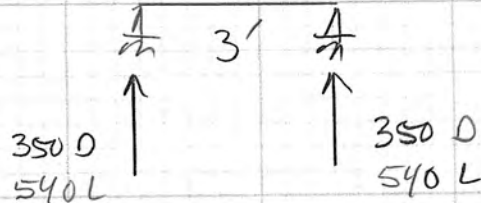
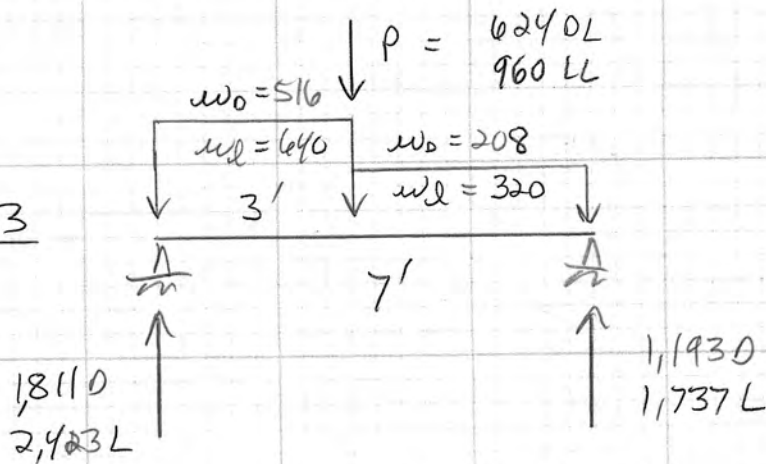
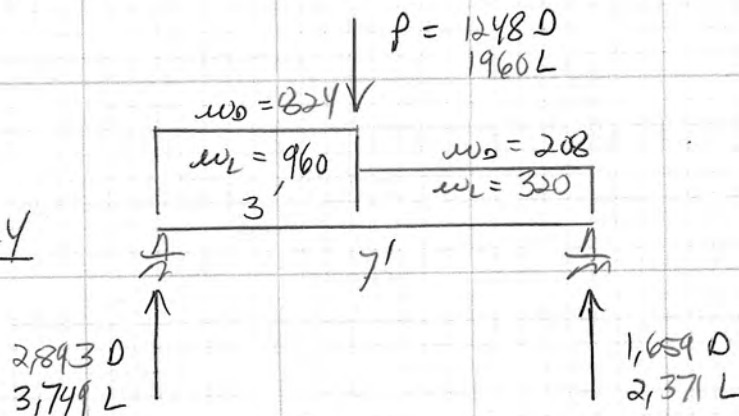
FB23 See Hand Drawn Diagram

FB24 See Hand Drawn Diagram

SOLUTIONS 4 STRUCTURES Inc.

JOB # 23.007DESIGNED MRO DATE 5-29-23PROJECT: BRADLEY HEIGHTS APTSFB17

FB16 = 700 lbs DL
1080 lbs LL

FB23FB24

PRMU20240286

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
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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

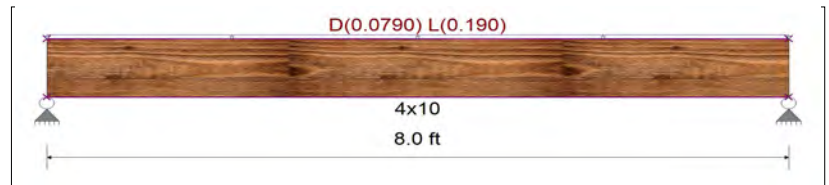
Unif Load: D = 0.0790, L = 0.190 k/ft, Trib= 1.0 ft

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

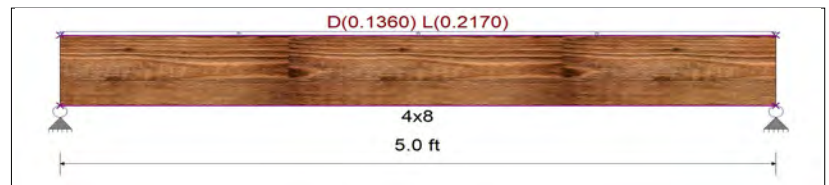
Unif Load: D = 0.1360, L = 0.2170 k/ft, Trib= 1.0 ft

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:

PRMU20240286

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

Printed: 29 MAY 2023, 3:47PM

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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

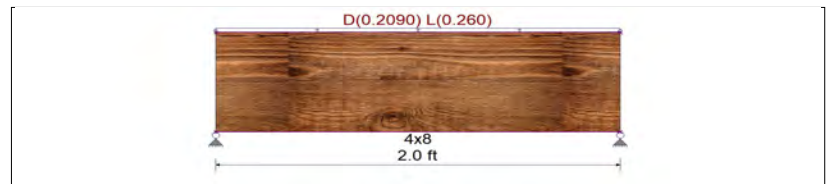
Unif Load: D = 0.2090, L = 0.260 k/ft, Trib= 1.0 ft

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:

PRMU20240286

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 : 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:

PRMU20240286

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

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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

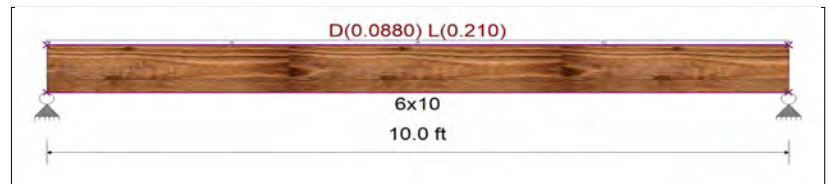
Unif Load: D = 0.0880, L = 0.210 k/ft, Trib= 1.0 ft

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:

PRMU20240286

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

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Solutions 4 Structures, Inc

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

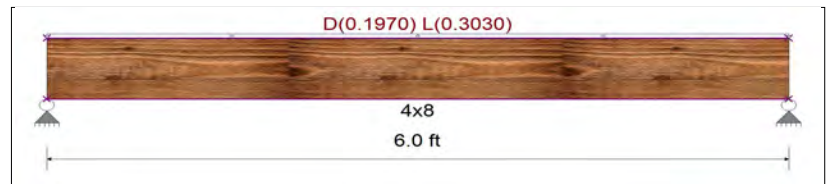
Unif Load: D = 0.1970, L = 0.3030 k/ft, Trib= 1.0 ft

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:

PRMU20240286

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

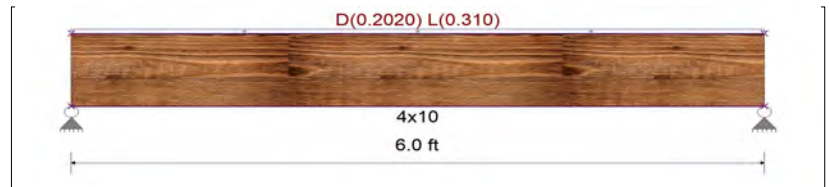
Unif Load: D = 0.2020, L = 0.310 k/ft, Trib= 1.0 ft

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

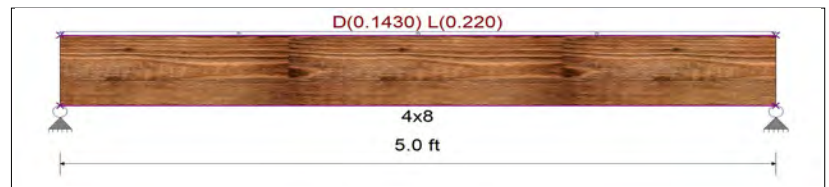
Unif Load: D = 0.1430, L = 0.220 k/ft, Trib= 1.0 ft

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:

PRMU20240286

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:

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

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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

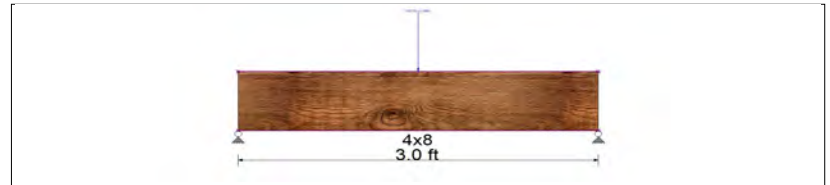
Point: D = 0.70, L = 1.080 k @ 1.50 ft

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:

PRMU20240286

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
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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

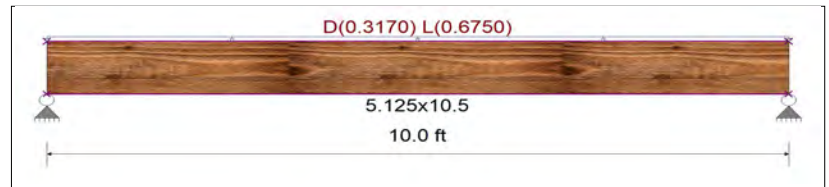
Unif Load: D = 0.3170, L = 0.6750 k/ft, Trib= 1.0 ft

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

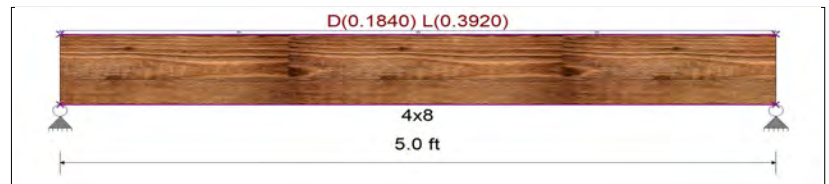
Unif Load: D = 0.1840, L = 0.3920 k/ft, Trib= 1.0 ft

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:

PRMU20240286

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

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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

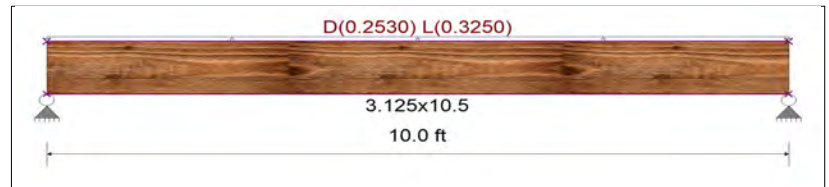
Unif Load: D = 0.2530, L = 0.3250 k/ft, Trib= 1.0 ft

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

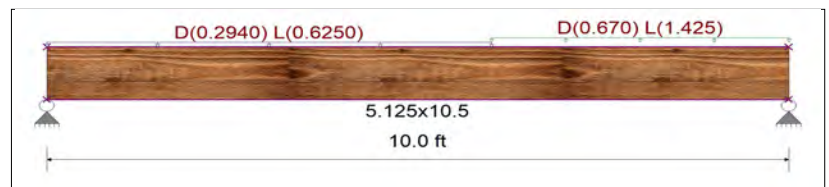
Unif Load: D = 0.670, L = 1.425 k/ft, 6.0 to 10.0 ft, Trib= 1.0 ft

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

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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

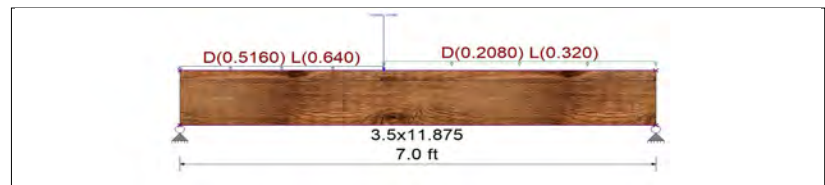
Point: D = 0.6240, L = 0.960 k @ 3.0 ft

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

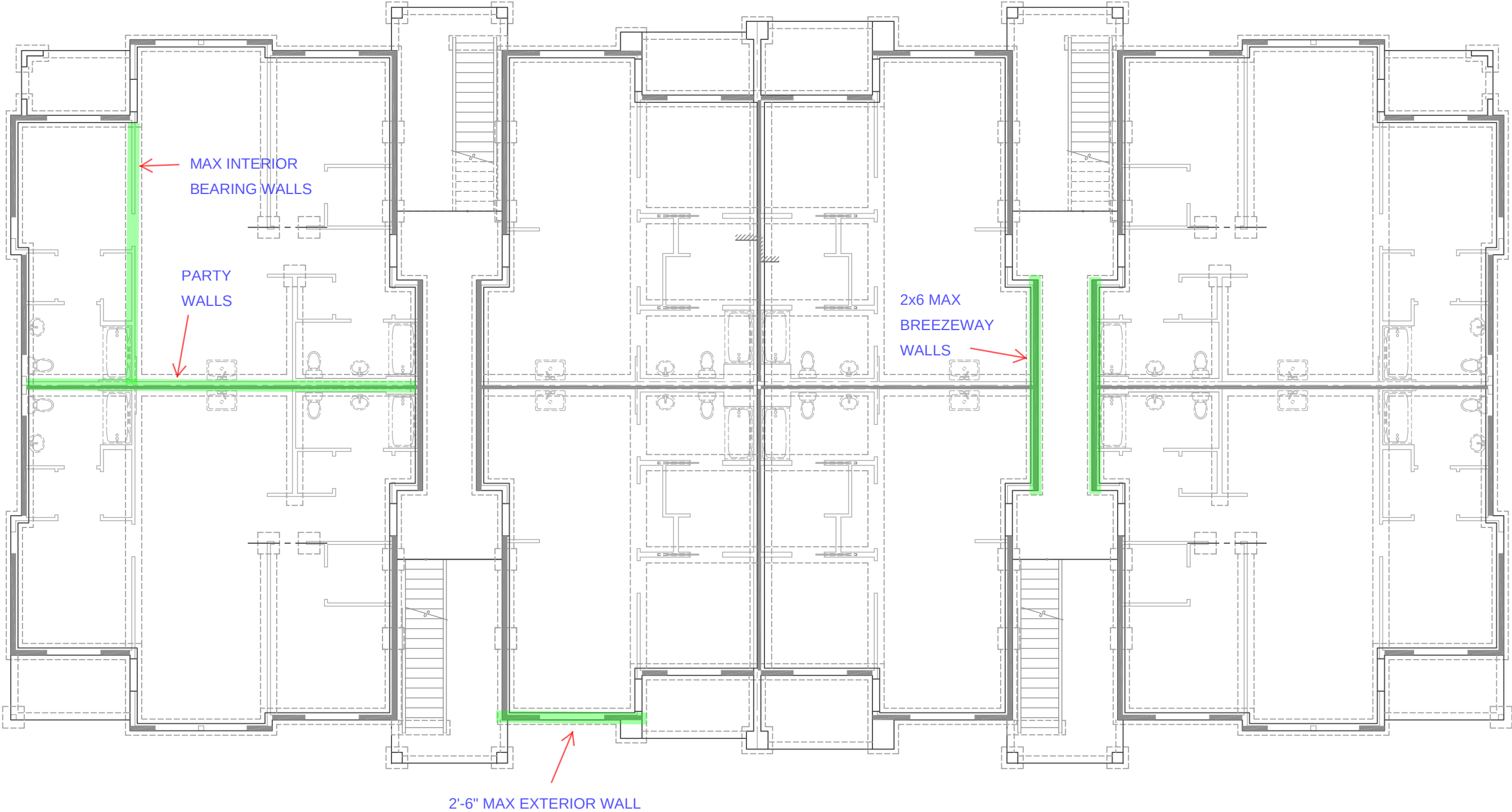
Max fb/Fb Ratio = 0.750 : 1
 fb : Actual : 1,744.39 psi at 2.987 ft in Span # 1
 Fb : Allowable : 2,325.00 psi
 Load Comb : +D+L+H

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							
DL/LL Level	Tributary Widths				Wall Loading		
	22/25 Roof	26/40 Floor	25/60 Deck	47/100 Corridor	+12 psf self Wt		
					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							
DL/LL Level	Tributary Widths				Wall Loading		
	22/25 Roof	26/40 Floor	25/60 Deck	47/100 Corridor	+12 psf self Wt		
					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							
DL/LL Level	Tributary Widths				Wall Loading		
	22/25 Roof	26/40 Floor	25/60 Deck	47/100 Corridor	+9 psf self Wt		
					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							
DL/LL Level	Tributary Widths				Wall Loading		
	22/25 Roof	26/40 Floor	25/60 Deck	47/100 Corridor	+9 psf self Wt		
					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							
DL/LL Level	Tributary Widths				Wall Loading		
	22/25 Roof	26/40 Floor	25/60 Deck	47/100 Corridor	+9 psf self Wt		
					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



JOB #: 23.007

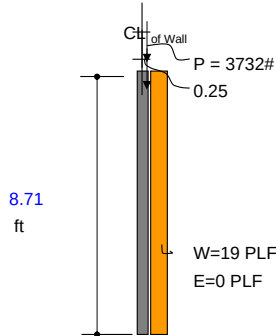
DESIGNED: MRO

DATE: 05/31/23

PROJECT: Bradley Hts Apartments Typical Exterior - 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P

 $P_{DL} \text{ (#/ft)} = 1,419$ $P_{SL} \text{ (#/ft)} = 375$ $P_{LL} \text{ (#/ft)} = 1,095$ $P_{TOT} \text{ (#/ft)} = 2,889$ $e \text{ (IN)} = 0.5$

TRIB. (IN) = 16

LATERAL LOADS W

 $W \text{ (PSF)} = 15.00$ $E \text{ (PSF)} = 0.00$

TRIB. (IN) = 16

DESIGN VALUES

 $F_b \text{ (psi)} = 675$ $F_v \text{ (psi)} = 150$ $F_c \text{ (psi)} = 800$ $F_{cL} \text{ (psi)} = 405$ $E \text{ (psi)} = 1.20E+06$ $E_{min} \text{ (psi)} = 4.40E+05$ $C_r = 1.15$ $L_u \text{ (in)} = 104.5$ $c = 0.8$ $K_e = 1$ $C_b = 1.00$

Hem Fir

Stud Grade

Bending X-X axis

405

Incised, No

Wet Use, No

Repetitive, Yes

Full Bracing, Yes

(Sawn Lumber)

(Appendix G)

(Bearing Area Factor)

Bearing wall Fire rated ?

No

Fire Retardant FirePRO?

No

Header Bearing Area (in²) =

8.25

405 = F_{cL} (psi)

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

MEMBER SIZE		SECTION PROPERTIES			
QUANTITY	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)
$L_u \text{ (ft)} =$	8.708	8.708	8.708	8.708	8.708
$V_{\text{applied}} \text{ (\#)} =$	16	11	16	93	79
$M_{\text{applied}} \text{ (ft-\#)} =$	68	48	68	237	226
$P_{\text{applied}} \text{ (\#)} =$	3247	2317	3257	1833	3257
$C_D =$	1	1.15	1.15	1.6	1.6
BENDING STRESS CALCS	$F_{bE} \text{ (psi)} = 17476$		$C_{bF} = 1$		
$F_b^* \text{ (psi)} =$	776	893	893	1242	1242
$C_L =$	1.000	1.000	1.000	1.000	1.000
$F_b' \text{ (psi)} =$	776	893	893	1242	1242
AXIAL STRESS CALCS	$F_{cE} = 1002$		$C_{cF} = 1$		
$L_e/d =$	19.00	19.00	19.00	19.00	19.00
$F_c^* \text{ (psi)} =$	800	920	920	1280	1280
$C_P =$	0.7626	0.7196	0.7196	0.6013	0.6013
$F_c' \text{ (psi)} =$	610	662	662	770	770
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)
$V_{\text{allow}} \text{ (\#)} =$	825	949	949	1321	1321
$M_{\text{allow}} \text{ (ft - \#)} =$	489	563	563	783	783
$P_{\text{allow}} \text{ (\#)} =$	5,035	5,465	5,465	6,353	6,353
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE})) =$	0.64	0.30	0.55	0.47	0.74
$(f_t/F_{cE}) + (f_t/F_{bE})^2 =$	0.39	0.28	0.39	0.22	0.39
$P_{c, \text{allow}} \text{ on PL (\#)} =$	3,343	3,343	3,343	3,343	3,343
$P_{c, \text{allow}} \text{ on Beam (\#)} =$	3,341	3,341	3,341	3,341	3,341
Deflection L/	NA	NA	NA	L/1040	L/1387
240	0.00	0.00	0.00	0.10	0.08
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)
SHEAR V	OK	OK	OK	OK	OK
$V_{\text{applied}}/V_{\text{allow}} =$	1.9%	1.2%	1.6%	7.1%	6.0%
MOMENT M	OK	OK	OK	OK	OK
$M_{\text{applied}}/M_{\text{allow}} =$	13.8%	8.6%	12.1%	30.3%	28.9%
AXIAL P	OK	OK	OK	OK	OK
$P_{\text{applied}}/P_{\text{allow}} =$	64.5%	42.4%	59.6%	28.9%	51.3%
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE})) =$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2 =$	64.4%	29.9%	55.4%	47.3%	73.9%
$(f_t/F_{cE}) + (f_t/F_{bE})^2 =$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2 =$	39.3%	28.0%	39.4%	22.2%	39.4%
AXIAL $P_{\perp}$ on PL	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}} =$	97.1%	69.3%	97.4%	54.8%	97.4%
AXIAL $P_{\perp}$ on Beam	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}} =$	97.2%	69.4%	97.5%	54.9%	97.5%
DEFLECTION	OK	OK	OK	OK	OK
$D_{\text{actual}}/D_{\text{allowed}} =$	0.0%	0.0%	0.0%	23.1%	17.3%
Overall Check	OK	OK	OK	OK	OK

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{\text{allow}} = A * F_v * C_D / 1.5$ $M_{\text{allow}} = S * F_b * C_D * C_F * C_L * C_r$ $P_{\text{allow}} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c, \text{allow}} = A * F_c * C_b$ $P_{c, \text{allow}} = A * F_c$ $L/(I * E / 15 * L * M_{\text{applied}})$

(1.0) x W Table 1604.3(f)

Actual Δ

Axial + Ber

Bearing on

Bearing on



JOB #: 23.007

DESIGNED: MRO

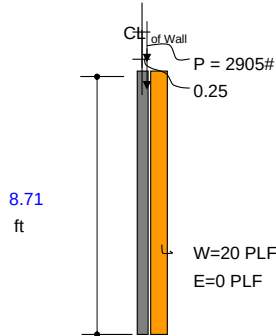
DATE: 05/31/23

PROJECT: Bradley Hts Apartments

Breezeway - 2nd

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P

$P_{DL} \text{ (\#/ft)} = 1.029$
 $P_{SL} \text{ (\#/ft)} = 50$
 $P_{LL} \text{ (\#/ft)} = 1.100$
 $P_{TOT} \text{ (\#/ft)} = 2.179$
 $e \text{ (IN)} = 0.5$
 $TRIB. \text{ (IN)} = 16$

LATERAL LOADS W

$W \text{ (PSF)} = 15.00$
 $E \text{ (PSF)} = 0.00$
 $TRIB. \text{ (IN)} = 16$

DESIGN VALUES

$F_b \text{ (psi)} = 675$
 $F_v \text{ (psi)} = 150$
 $F_c \text{ (psi)} = 800$
 $F_{cL} \text{ (psi)} = 405$
 $E \text{ (psi)} = 1.20E+06$
 $E_{min} \text{ (psi)} = 4.40E+05$
 $C_r = 1.15$
 $L_u \text{ (in)} = 104.5$
 $c = 0.8$
 $K_e = 1$
 $C_b = 1.00$

Hem Fir
 Stud Grade
 Bending X-X axis
 405
 Incised, No
 Wet Use, No
 Repetitive, Yes
 Full Bracing, Yes
 (Sawn Lumber)
 (Appendix G)
 (Bearing Area Factor)

Bearing wall Fire rated ?

No

Fire Retardant FirePRO?

No

Header Bearing Area (in²) =

8.25

405 = F_{cL} (psi)

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

MEMBER SIZE		SECTION PROPERTIES			
QUANTITY	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)
$L_u \text{ (ft)}$	8.708	8.708	8.708	8.708	8.708
$V_{\text{applied}} \text{ (\#)}$	14	7	12	94	77
$M_{\text{applied}} \text{ (ft-\#)}$	59	30	53	230	211
$P_{\text{applied}} \text{ (\#)}$	2839	1439	2522	1372	2522
C_D	1	1.15	1.15	1.6	1.6
BENDING STRESS CALCS	$F_{bE} \text{ (psi)} = 17476$		$C_{bF} = 1$		
$F_b^* \text{ (psi)}$	776	893	893	1242	1242
C_L	1.000	1.000	1.000	1.000	1.000
$F_b' \text{ (psi)}$	776	893	893	1242	1242
AXIAL STRESS CALCS	$F_{cE} = 1002$		$C_{cF} = 1$		
L_e/d	19.00	19.00	19.00	19.00	19.00
$F_c^* \text{ (psi)}$	800	920	920	1280	1280
C_P	0.7626	0.7196	0.7196	0.6013	0.6013
$F_c' \text{ (psi)}$	610	662	662	770	770
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)
$V_{\text{allow}} \text{ (\#)}$	825	949	949	1320	1320
$M_{\text{allow}} \text{ (ft - \#)}$	489	563	563	783	783
$P_{\text{allow}} \text{ (\#)}$	5,033	5,462	5,462	6,350	6,350
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	0.50	0.13	0.35	0.40	0.55
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	0.34	0.17	0.31	0.17	0.31
$P_{c, \text{allow}} \text{ on PL (\#)}$	3,341	3,341	3,341	3,341	3,341
$P_{c, \text{allow}} \text{ on Beam (\#)}$	3,341	3,341	3,341	3,341	3,341
Deflection L/	NA	NA	NA	L/1008	L/1344
240	0.00	0.00	0.00	0.10	0.08
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)
SHEAR V	OK	OK	OK	OK	OK
$V_{\text{applied}}/V_{\text{allow}}$	1.6%	0.7%	1.3%	7.1%	5.9%
MOMENT M	OK	OK	OK	OK	OK
$M_{\text{applied}}/M_{\text{allow}}$	12.1%	5.3%	9.3%	29.4%	27.0%
AXIAL P	OK	OK	OK	OK	OK
$P_{\text{applied}}/P_{\text{allow}}$	56.4%	26.3%	46.2%	21.6%	39.7%
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	OK	OK	OK	OK	OK
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	50.2%	13.4%	34.8%	39.9%	54.6%
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	34.3%	17.4%	30.5%	16.6%	30.5%
AXIAL $P_{\perp}$ on PL	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	85.0%	43.1%	75.5%	41.1%	75.5%
AXIAL $P_{\perp}$ on Beam	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	85.0%	43.1%	75.5%	41.1%	75.5%
DEFLECTION	OK	OK	OK	OK	OK
$D_{\text{actual}}/D_{\text{allowed}}$	0.0%	0.0%	0.0%	23.8%	17.9%
Overall Check	OK	OK	OK	OK	OK

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4)

<50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{\text{allow}} = A * F_v * C_D / 1.5$ $M_{\text{allow}} = S * F_b * C_D * C_F * C_L * C_r$ $P_{\text{allow}} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c, \text{allow}} = A * F_c * C_b$ $P_{c, \text{allow}} = A * F_c$ $L/(I * E / 15 * L * M_{\text{applied}})$

(1.0) x W Table 1604.3(f)

Actual Δ

Axial + Ber

Bearing on

Bearing on



JOB #: 23.007

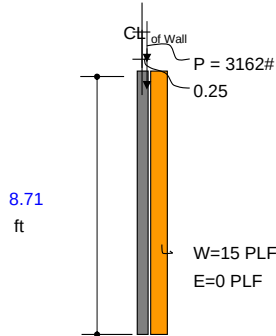
DESIGNED: MRO

DATE: 05/31/23

PROJECT: Bradley Hts Apartments Breezway - 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P

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

LATERAL LOADS W

$W \text{ (PSF)} = 15.00$
 $E \text{ (PSF)} = 0.00$
 $TRIB. \text{ (IN)} = 12$

DESIGN VALUES

$F_b \text{ (psi)} = 675$
 $F_v \text{ (psi)} = 150$
 $F_c \text{ (psi)} = 800$
 $F_{cL} \text{ (psi)} = 405$
 $E \text{ (psi)} = 1.20E+06$
 $E_{min} \text{ (psi)} = 4.40E+05$
 $C_r = 1.15$
 $L_u \text{ (in)} = 104.5$
 $c = 0.8$
 $K_e = 1$
 $C_b = 1.00$

Hem Fir
 Stud Grade
 Bending X-X axis
 405
 Incised, No
 Wet Use, No
 Repetitive, Yes
 Full Bracing, Yes
 (Sawn Lumber)
 (Appendix G)
 (Bearing Area Factor)

Bearing wall Fire rated ?

No

Fire Retardant FirePRO?

No

Header Bearing Area (in²) =

8.25

405 = F_{cL} (psi)

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

MEMBER SIZE			SECTION PROPERTIES		
QUANTITY	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)
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)
$L_u \text{ (ft)}$	8.708	8.708	8.708	8.708	8.708
$V_{\text{applied}} \text{ (\#)}$	15	7	13	72	62
$M_{\text{applied}} \text{ (ft-\#)}$	65	32	57	182	177
$P_{\text{applied}} \text{ (\#)}$	3112	1512	2737	1462	2737
C_D	1	1.15	1.15	1.6	1.6
BENDING STRESS CALCS			$F_{bE} \text{ (psi)} = 17476$	$C_{bF} = 1$	
$F_b^* \text{ (psi)}$	776	893	893	1242	1242
C_L	1.000	1.000	1.000	1.000	1.000
$F_b' \text{ (psi)}$	776	893	893	1242	1242
AXIAL STRESS CALCS			$F_{cE} = 1002$	$C_{cF} = 1$	
L_e/d	19.00	19.00	19.00	19.00	19.00
$F_c^* \text{ (psi)}$	800	920	920	1280	1280
C_P	0.7626	0.7196	0.7196	0.6013	0.6013
$F_c' \text{ (psi)}$	610	662	662	770	770
ALLOWABLES			DL + LL	DL + SL	DL+0.75(LL+SL+W)
$V_{\text{allow}} \text{ (\#)}$	825	949	949	1320	1320
$M_{\text{allow}} \text{ (ft - \#)}$	489	563	563	783	783
$P_{\text{allow}} \text{ (\#)}$	5,033	5,462	5,462	6,350	6,350
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	0.59	0.15	0.40	0.34	0.52
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	0.38	0.18	0.33	0.18	0.33
$P_{c, \text{allow}} \text{ on PL (\#)}$	3,341	3,341	3,341	3,341	3,341
$P_{c, \text{allow}} \text{ on Beam (\#)}$	3,341	3,341	3,341	3,341	3,341
Deflection L/	NA	NA	NA	L/1344	L/1792
240	0.00	0.00	0.00	0.08	0.06
CHECKS			DL + LL	DL + SL	DL+0.75(LL+SL+W)
SHEAR V	OK	OK	OK	OK	OK
$V_{\text{applied}}/V_{\text{allow}}$	1.8%	0.8%	1.4%	5.5%	4.7%
MOMENT M	OK	OK	OK	OK	OK
$M_{\text{applied}}/M_{\text{allow}}$	13.3%	5.6%	10.1%	23.3%	22.6%
AXIAL P	OK	OK	OK	OK	OK
$P_{\text{applied}}/P_{\text{allow}}$	61.8%	27.7%	50.1%	23.0%	43.1%
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	59.5%	14.5%	40.3%	33.6%	52.4%
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	37.7%	18.3%	33.1%	17.7%	33.1%
AXIAL P_c on PL	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	93.1%	45.3%	81.9%	43.8%	81.9%
AXIAL P_c on Beam	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	93.1%	45.3%	81.9%	43.8%	81.9%
DEFLECTION	OK	OK	OK	OK	OK
$D_{\text{actual}}/D_{\text{allowed}}$	0.0%	0.0%	0.0%	17.9%	13.4%
Overall Check	OK	OK	OK	OK	OK

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{\text{allow}} = A * F_v * C_D / 1.5$ $M_{\text{allow}} = S * F_b * C_D * C_F * C_r$ $P_{\text{allow}} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c, \text{allow}} = A * F_c * C_b$ $P_{c, \text{allow}} = A * F_c$ $L / (I * E / 15 * L * M_{\text{applied}})$

(1.0) * W Table 1604.3(f)

Actual Δ

Axial + Ber

Bearing on

Bearing on

PRMU20240286



JOB #: 23.007

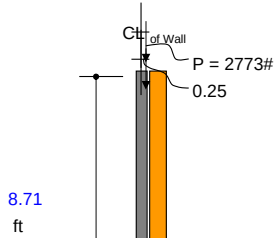
DESIGNED: MRO

DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x6 Bearing- 2nd

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P

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

LATERAL LOADS W

$W \text{ (PSF)} = 0.00$
 $E \text{ (PSF)} = 5.00$
 $TRIB. \text{ (IN)} = 16$

DESIGN VALUES

$F_b \text{ (psi)} = 675$
 $F_v \text{ (psi)} = 150$
 $F_c \text{ (psi)} = 800$
 $F_{cL} \text{ (psi)} = 405$
 $E \text{ (psi)} = 1.20E+06$
 $E_{min} \text{ (psi)} = 4.40E+05$
 $C_r = 1.15$
 $L_u \text{ (in)} = 104.5$
 $c = 0.8$
 $K_e = 1$
 $C_b = 1.00$

Hem Fir
 Stud Grade
 Bending X-X axis
 405
 Incised, No
 Wet Use, No
 Repetitive, Yes
 Full Bracing, Yes
 (Sawn Lumber)
 (Appendix G)
 (Bearing Area Factor)

Bearing wall Fire rated ?

No

Fire Retardant FirePRO?

No

Header Bearing Area (in²) =

8.25

405 = F_{cL} (psi)

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

MEMBER SIZE		SECTION PROPERTIES			
QUANTITY	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)
$L_u \text{ (ft)}$	8.708	8.708	8.708	8.708	8.708
$V_{\text{applied}} \text{ (#)}$	13	7	12	35	33
$M_{\text{applied}} \text{ (ft-#)}$	56	29	50	94	103
$P_{\text{applied}} \text{ (#)}$	2707	1387	2410	1320	2410
C_D	1	1.15	1.15	1.6	1.6
BENDING STRESS CALCS	$F_{bE} \text{ (psi)} = 17476$		$C_{bF} = 1$		
$F_b^* \text{ (psi)}$	776	893	893	1242	1242
C_L	1.000	1.000	1.000	1.000	1.000
$F_b' \text{ (psi)}$	776	893	893	1242	1242
AXIAL STRESS CALCS	$F_{cE} = 1002$		$C_{cF} = 1$		
L_e/d	19.00	19.00	19.00	19.00	19.00
$F_c^* \text{ (psi)}$	800	920	920	1280	1280
C_P	0.7626	0.7196	0.7196	0.6013	0.6013
$F_c' \text{ (psi)}$	610	662	662	770	770
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
$V_{\text{allow}} \text{ (#)}$	825	949	949	1320	1320
$M_{\text{allow}} \text{ (ft - #)}$	489	563	563	783	783
$P_{\text{allow}} \text{ (#)}$	5,033	5,462	5,462	6,350	6,350
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	0.46	0.13	0.32	0.19	0.33
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	0.33	0.17	0.29	0.16	0.29
$P_{c, \text{allow}} \text{ on PL} \text{ (#)}$	3,341	3,341	3,341	3,341	3,341
$P_{c, \text{allow}} \text{ on Beam} \text{ (#)}$	3,341	3,341	3,341	3,341	3,341
Deflection L/	NA	NA	NA	L/3023	L/4031
240	0.00	0.00	0.00	0.03	0.03
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
SHEAR V	OK	OK	OK	OK	OK
$V_{\text{applied}}/V_{\text{allow}}$	1.6%	0.7%	1.2%	2.7%	2.5%
MOMENT M	OK	OK	OK	OK	OK
$M_{\text{applied}}/M_{\text{allow}}$	11.5%	5.1%	8.9%	12.1%	13.1%
AXIAL P	OK	OK	OK	OK	OK
$P_{\text{applied}}/P_{\text{allow}}$	53.8%	25.4%	44.1%	20.8%	38.0%
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	46.1%	12.6%	32.1%	18.7%	32.9%
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	32.7%	16.8%	29.2%	16.0%	29.2%
AXIAL $P_{\perp}$ on PL	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	81.0%	41.5%	72.1%	39.5%	72.1%
AXIAL $P_{\perp}$ on Beam	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	81.0%	41.5%	72.1%	39.5%	72.1%
DEFLECTION	OK	OK	OK	OK	OK
$D_{\text{actual}}/D_{\text{allowed}}$	0.0%	0.0%	0.0%	7.9%	6.0%
Overall Check	OK	OK	OK	OK	OK

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{\text{allow}} = A * F_v * C_D / 1.5$ $M_{\text{allow}} = S * F_b * C_D * C_F * C_L * C_r$ $P_{\text{allow}} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c, \text{allow}} = A * F_c * C_b$ $P_{c, \text{allow}} = A * F_c$ $L / (I * E / 15 * L * M_{\text{applied}})$

(1.0) x E Table 1604.3(f)

Actual Δ

Axial + Ber

Bearing on

Bearing on



JOB #: 23.007

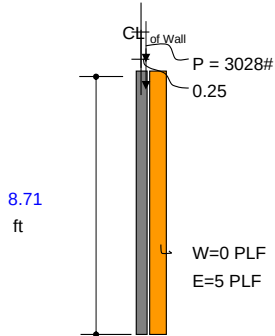
DESIGNED: MRO

DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x6 Bearing- 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P

$$P_{DL} \text{ (#/ft)} = 1,418$$

$$P_{SL} \text{ (#/ft)} = 50$$

$$P_{LL} \text{ (#/ft)} = 1,560$$

$$P_{TOT} \text{ (#/ft)} = 3,028$$

$$e \text{ (IN)} = 0.5$$

$$\text{TRIB. (IN)} = 12$$

LATERAL LOADS W

$$W \text{ (PSF)} = 0.00$$

$$E \text{ (PSF)} = 5.00$$

$$\text{TRIB. (IN)} = 12$$

DESIGN VALUES

$$F_b \text{ (psi)} = 675$$

$$F_v \text{ (psi)} = 150$$

$$F_c \text{ (psi)} = 800$$

$$F_{cL} \text{ (psi)} = 405$$

$$E \text{ (psi)} = 1.20E+06$$

$$E_{min} \text{ (psi)} = 4.40E+05$$

$$C_r = 1.15$$

$$L_u \text{ (in)} = 104.5$$

$$c = 0.8$$

$$K_e = 1$$

$$C_b = 1.00$$

Bearing wall Fire rated ?

No

Fire Retardant FirePRO?

No

Header Bearing Area (in²) =

8.25

405 = F_{cL} (psi)

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

MEMBER SIZE		SECTION PROPERTIES			
QUANTITY	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)
$L_u \text{ (ft)}$	8.708	8.708	8.708	8.708	8.708
$V_{\text{applied}} \text{ (#)}$	14	7	13	29	29
$M_{\text{applied}} \text{ (ft-#)}$	62	31	55	80	94
$P_{\text{applied}} \text{ (#)}$	2978	1468	2626	1418	2626
C_D	1	1.15	1.15	1.6	1.6
BENDING STRESS CALCS	$F_{bE} \text{ (psi)} = 17476$		$C_{bF} = 1$		
$F_b^* \text{ (psi)}$	776	893	893	1242	1242
C_L	1.000	1.000	1.000	1.000	1.000
$F_b' \text{ (psi)}$	776	893	893	1242	1242
AXIAL STRESS CALCS	$F_{cE} = 1002$		$C_{cF} = 1$		
L_e/d	19.00	19.00	19.00	19.00	19.00
$F_c^* \text{ (psi)}$	800	920	920	1280	1280
C_P	0.7626	0.7196	0.7196	0.6013	0.6013
$F_c' \text{ (psi)}$	610	662	662	770	770
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
$V_{\text{allow}} \text{ (#)}$	825	949	949	1320	1320
$M_{\text{allow}} \text{ (ft - #)}$	489	563	563	783	783
$P_{\text{allow}} \text{ (#)}$	5,033	5,462	5,462	6,350	6,350
$(f_c/F_c)^2 + f_d/(F_b(1-(f_d/F_{bE})))$	0.55	0.14	0.37	0.17	0.35
$(f_d/F_{cE}) + (f_d/F_{bE})^2$	0.36	0.18	0.32	0.17	0.32
$P_{c, \text{allow}} \text{ on PL (ft-#)}$	3,341	3,341	3,341	3,341	3,341
$P_{c, \text{allow}} \text{ on Beam (ft-#)}$	3,341	3,341	3,341	3,341	3,341
Deflection L/	NA	NA	NA	L/4031	L/5375
240	0.00	0.00	0.00	0.03	0.02
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
SHEAR V	OK	OK	OK	OK	OK
$V_{\text{applied}}/V_{\text{allow}}$	1.7%	0.7%	1.3%	2.2%	2.2%
MOMENT M	OK	OK	OK	OK	OK
$M_{\text{applied}}/M_{\text{allow}}$	12.7%	5.4%	9.7%	10.2%	12.1%
AXIAL P	OK	OK	OK	OK	OK
$P_{\text{applied}}/P_{\text{allow}}$	59.2%	26.9%	48.1%	22.3%	41.3%
$(f_d/F_c)^2 + f_d/(F_b(1-(f_d/F_{bE})))$	OK	OK	OK	OK	OK
$(f_d/F_{cE}) + (f_d/F_{bE})^2$	54.8%	13.8%	37.4%	17.3%	34.8%
$(f_d/F_{cE}) + (f_d/F_{bE})^2$	OK	OK	OK	OK	OK
$(f_d/F_{cE}) + (f_d/F_{bE})^2$	36.0%	17.8%	31.8%	17.2%	31.8%
AXIAL P_c on PL	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	89.1%	43.9%	78.6%	42.4%	78.6%
AXIAL P_c on Beam	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	89.1%	43.9%	78.6%	42.4%	78.6%
DEFLECTION	OK	OK	OK	OK	OK
$D_{\text{actual}}/D_{\text{allowed}}$	0.0%	0.0%	0.0%	6.0%	4.5%
Overall Check	OK	OK	OK	OK	OK

Hem Fir	▼
Stud Grade	▼
Bending X-X axis	▼
405	▼
Incised, No	▼
Wet Use, No	▼
Repetitive, Yes	▼
Full Bracing, Yes	▼

(Sawn Lumber)
(Appendix G)
(Bearing Area Factor)

No

No

8.25

405 = F_{cL} (psi)

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

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No

No

No

No



JOB #: 23.007

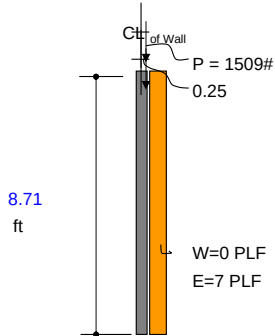
DESIGNED: MRO

DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x4 Bearing- 3rd

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P

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

LATERAL LOADS W

$W \text{ (PSF)} = 0.00$
 $E \text{ (PSF)} = 5.00$
 $TRIB. \text{ (IN)} = 16$

DESIGN VALUES

$F_b \text{ (psi)} = 850$
 $F_v \text{ (psi)} = 150$
 $F_c \text{ (psi)} = 1300$
 $F_{cL} \text{ (psi)} = 405$
 $E \text{ (psi)} = 1.30E+06$
 $E_{min} \text{ (psi)} = 4.70E+05$
 $C_r = 1.15$
 $L_u \text{ (in)} = 104.5$
 $c = 0.8$
 $K_e = 1$
 $C_b = 1.00$

Bearing wall Fire rated? No
 Fire Retardant FirePRO? No
 Header Bearing Area (in²) = 5.25

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

405 = F_{cL} (psi)

MEMBER SIZE		SECTION PROPERTIES			
QUANTITY	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)
$L_u \text{ (ft)}$	8.708	8.708	8.708	8.708	8.708
$V_{applied} \text{ (\#)}$	7	4	6	33	28
$M_{applied} \text{ (ft-\#)}$	30	17	27	87	85
$P_{applied} \text{ (\#)}$	1443	816	1319	749	1319
C_D	1	1.15	1.15	1.6	1.6
BENDING STRESS CALCS	$F_{bE} \text{ (psi)} = 29334$		$C_{bF} = 1.5$		
$F_b^* \text{ (psi)}$	1466	1686	1686	2346	2346
C_L	1.000	1.000	1.000	1.000	1.000
$F_b' \text{ (psi)}$	1466	1686	1686	2346	2346
AXIAL STRESS CALCS	$F_{cE} = 433$		$C_{cF} = 1.15$		
L_e/d	29.86	29.86	29.86	29.86	29.86
$F_c^* \text{ (psi)}$	1495	1719	1719	2392	2392
C_P	0.2699	0.2373	0.2373	0.1739	0.1739
$F_c' \text{ (psi)}$	404	408	408	416	416
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
$V_{allow} \text{ (\#)}$	525	604	604	840	840
$M_{allow} \text{ (ft - \#)}$	374	430	430	599	599
$P_{allow} \text{ (\#)}$	2,119	2,142	2,142	2,183	2,183
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	0.68	0.21	0.53	0.33	0.70
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	0.63	0.36	0.58	0.33	0.58
$P_{c,allow} \text{ on PL (\#)}$	2,126	2,126	2,126	2,126	2,126
$P_{c,allow} \text{ on Beam (\#)}$	2,126	2,126	2,126	2,126	2,126
Deflection L/	NA	NA	NA	L/844	L/1125
240	0.00	0.00	0.00	0.12	0.09
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
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%
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	OK	OK	OK	OK	OK
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	68.3%	20.7%	53.1%	33.3%	70.3%
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	63.4%	35.9%	58.0%	32.9%	58.0%
AXIAL P_c on PL	OK	OK	OK	OK	OK
$P_{c,applied}/P_{c,allow}$	67.9%	38.4%	62.0%	35.2%	62.0%
AXIAL P_c on Beam	OK	OK	OK	OK	OK
$P_{c,applied}/P_{c,allow}$	67.9%	38.4%	62.0%	35.2%	62.0%
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

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{allow} = A * F_v * C_D / 1.5$ $M_{allow} = S * F_b * C_P * C_F * C_r$ $P_{allow} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c,allow} = A * F_c * C_b$ $P_{c,allow} = A * F_c$ $L/(I * E / 15 * L * M_{applied})$

(1.0) x E Table 1604.3(f)

Actual Δ

Axial + Ber

Bearing on

Bearing on



JOB #: 23.007

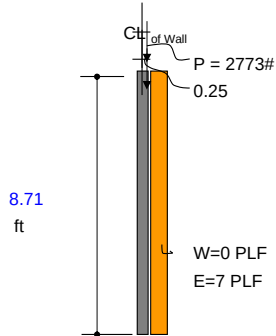
DESIGNED: MRO

DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x4 Bearing- 2nd

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P

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

LATERAL LOADS W

$W \text{ (PSF)} = 0.00$
 $E \text{ (PSF)} = 5.00$
 $TRIB. \text{ (IN)} = 16$

DESIGN VALUES

$F_b \text{ (psi)} = 850$
 $F_v \text{ (psi)} = 150$
 $F_c \text{ (psi)} = 1300$
 $F_{cL} \text{ (psi)} = 405$
 $E \text{ (psi)} = 1.30E+06$
 $E_{min} \text{ (psi)} = 4.70E+05$
 $C_r = 1.15$
 $L_u \text{ (in)} = 104.5$
 $c = 0.8$
 $K_e = 1$
 $C_b = 1.00$

Bearing wall Fire rated ?

No

Fire Retardant FirePRO?

No

Header Bearing Area (in²) =

10.5

405 = F_{cL} (psi)

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

MEMBER SIZE			SECTION PROPERTIES		
QUANTITY 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 STRESS CALCS		F _{bE} (psi) = 29334		C _{bF} = 1.5	
F _b [*] (psi) =	1466	1686	1686	2346	2346
C _L =	1.000	1.000	1.000	1.000	1.000
F _b ' (psi) =	1466	1686	1686	2346	2346
AXIAL STRESS CALCS		F _{cE} = 433		C _{cF} = 1.15	
L _e /d =	29.86	29.86	29.86	29.86	29.86
F _c [*] (psi) =	1495	1719	1719	2392	2392
C _P =	0.2699	0.2373	0.2373	0.1739	0.1739
F' _c (psi) =	404	408	408	416	416
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
M _{allow} (ft - #) =	748	861	861	1197	1197
P _{allow} (#) =	4,237	4,284	4,284	4,367	4,367
(f _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE})) =	0.59	0.15	0.44	0.21	0.49
(f _t /F _{cE}) + (f _t /F _{bE}) ² =	0.59	0.30	0.53	0.29	0.53
P _{c,allow} on PL (#) =	4,253	4,253	4,253	4,253	4,253
P _{c,allow} on Beam (#) =	4,253	4,253	4,253	4,253	4,253
Deflection L/	NA	NA	NA	L/1688	L/2251
240	0.00	0.00	0.00	0.06	0.05
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
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 _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE}))	OK	OK	OK	OK	OK
(f _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE}))	59.4%	15.3%	44.0%	20.6%	49.4%
(f _t /F _{cE}) + (f _t /F _{bE}) ²	OK	OK	OK	OK	OK
(f _t /F _{cE}) + (f _t /F _{bE}) ²	59.5%	30.5%	53.0%	29.0%	53.0%
AXIAL P _⊥ on PL	OK	OK	OK	OK	OK
P _{c*applied} /P _{c,allow}	63.6%	32.6%	56.7%	31.0%	56.7%
AXIAL P _⊥ on Beam	OK	OK	OK	OK	OK
P _{c*applied} /P _{c,allow}	63.6%	32.6%	56.7%	31.0%	56.7%
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

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4)

<50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{\text{allow}} = A * F_v * C_D / 1.5$ $M_{\text{allow}} = S * F_b * C_D * C_F * C_L * C_r$ $P_{\text{allow}} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c, \text{allow}} = A * F_c * C_b$ $P_{c, \text{allow}} = A * F_c$ $L / (I * E / 15 * L * M_{\text{applied}})$

(1.0) * E Table 1604.3(f)

Actual Δ

Axial + Ber

Bearing on

Bearing on



JOB #: 23.007

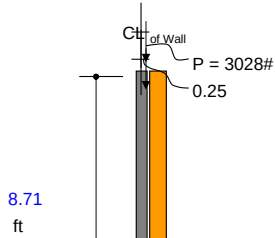
DESIGNED: MRO

DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x4 Bearing- 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P

$$P_{DL} \text{ (#/ft)} = 1,418$$

$$P_{SL} \text{ (#/ft)} = 50$$

$$P_{LL} \text{ (#/ft)} = 1,560$$

$$P_{TOT} \text{ (#/ft)} = 3,028$$

$$e \text{ (IN)} = 0.5$$

$$\text{TRIB. (IN)} = 12$$

LATERAL LOADS W

$$W \text{ (PSF)} = 0.00$$

$$E \text{ (PSF)} = 5.00$$

$$\text{TRIB. (IN)} = 12$$

DESIGN VALUES

$$F_b \text{ (psi)} = 850$$

$$F_v \text{ (psi)} = 150$$

$$F_c \text{ (psi)} = 1300$$

$$F_{cL} \text{ (psi)} = 405$$

$$E \text{ (psi)} = 1.30E+06$$

$$E_{min} \text{ (psi)} = 4.70E+05$$

$$C_r = 1.15$$

$$L_u \text{ (in)} = 104.5$$

$$c = 0.8$$

$$K_e = 1$$

$$C_b = 1.00$$

Bearing wall Fire rated ?

No

Fire Retardant FirePRO?

No

Header Bearing Area (in²) =

10.5

405 = F_{cL} (psi)

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

MEMBER SIZE		SECTION PROPERTIES			
QUANTITY	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)
$L_u \text{ (ft)}$	8.708	8.708	8.708	8.708	8.708
$V_{\text{applied}} \text{ (#)}$	14	7	13	29	29
$M_{\text{applied}} \text{ (ft-#)}$	62	31	55	82	98
$P_{\text{applied}} \text{ (#)}$	2978	1468	2626	1418	2626
C_D	1	1.15	1.15	1.6	1.6
BENDING STRESS CALCS	$F_{bE} \text{ (psi)} = 29334$			$C_{bF} = 1.5$	
$F_b^* \text{ (psi)}$	1466	1686	1686	2346	2346
C_L	1.000	1.000	1.000	1.000	1.000
$F_b' \text{ (psi)}$	1466	1686	1686	2346	2346
AXIAL STRESS CALCS	$F_{cE} = 433$			$C_{cF} = 1.15$	
L_e/d	29.86	29.86	29.86	29.86	29.86
$F_c^* \text{ (psi)}$	1495	1719	1719	2392	2392
C_P	0.2699	0.2373	0.2373	0.1739	0.1739
$F_c' \text{ (psi)}$	404	408	408	416	416
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
$V_{\text{allow}} \text{ (#)}$	1050	1208	1208	1680	1680
$M_{\text{allow}} \text{ (ft-#)}$	748	861	861	1197	1197
$P_{\text{allow}} \text{ (#)}$	4,237	4,284	4,284	4,367	4,367
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	0.73	0.17	0.53	0.21	0.55
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	0.65	0.32	0.58	0.31	0.58
$P_{c, \text{allow}} \text{ on PL (ft-#)}$	4,253	4,253	4,253	4,253	4,253
$P_{c, \text{allow}} \text{ on Beam (ft-#)}$	4,253	4,253	4,253	4,253	4,253
Deflection L/	NA	NA	NA	L/2251	L/3001
240	0.00	0.00	0.00	0.05	0.03
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
SHEAR V	OK	OK	OK	OK	OK
$V_{\text{applied}}/V_{\text{allow}}$	1.4%	0.6%	1.0%	1.7%	1.7%
MOMENT M	OK	OK	OK	OK	OK
$M_{\text{applied}}/M_{\text{allow}}$	8.3%	3.6%	6.4%	6.9%	8.2%
AXIAL P	OK	OK	OK	OK	OK
$P_{\text{applied}}/P_{\text{allow}}$	70.3%	34.3%	61.3%	32.5%	60.1%
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + f_t/(F_b(1-f_t/F_{cE}))$	73.4%	17.0%	52.6%	20.5%	55.5%
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	65.4%	32.3%	57.7%	31.2%	57.7%
AXIAL P_c on PL	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	70.0%	34.5%	61.7%	33.3%	61.7%
AXIAL P_c on Beam	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	70.0%	34.5%	61.7%	33.3%	61.7%
DEFLECTION	OK	OK	OK	OK	OK
$D_{\text{actual}}/D_{\text{allowed}}$	0.0%	0.0%	0.0%	10.7%	8.0%
Overall Check	OK	OK	OK	OK	OK

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

$$V_{\text{allow}} = A * F_v * C_D / 1.5$$

$$M_{\text{allow}} = S * F_b * C_D * C_F * C_L * C_r$$

$$P_{\text{allow}} = A * F_c * C_D * C_F * C_P$$

(Eq 3.9-3)

(Eq 3.9-4)

$$P_{c, \text{allow}} = A * F_c * C_b$$

$$P_{c, \text{allow}} = A * F_c$$

$$L / (I * E / 15 * L * M_{\text{applied}})$$

(1.0) x E Table 1604.3(f)

Actual Δ

Axial + Ber

Bearing on

Bearing on



JOB #: 23.007

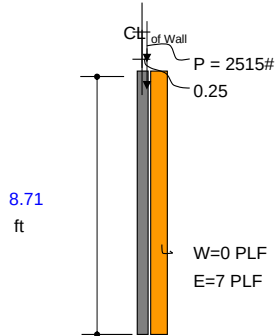
DESIGNED: MRO

DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x6 Party - 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P

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

LATERAL LOADS W

$W \text{ (PSF)} = 0.00$
 $E \text{ (PSF)} = 5.00$
 $TRIB. \text{ (IN)} = 16$

DESIGN VALUES

$F_b \text{ (psi)} = 675$
 $F_v \text{ (psi)} = 150$
 $F_c \text{ (psi)} = 800$
 $F_{cL} \text{ (psi)} = 405$
 $E \text{ (psi)} = 1.20E+06$
 $E_{min} \text{ (psi)} = 4.40E+05$
 $C_r = 1.15$
 $L_u \text{ (in)} = 104.5$
 $c = 0.8$
 $K_e = 1$
 $C_b = 1.00$

Hem Fir
 Stud Grade
 Bending X-X axis
 405
 Incised, No
 Wet Use, No
 Repetitive, Yes
 Full Bracing, Yes
 (Sawn Lumber)
 (Appendix G)
 (Bearing Area Factor)

Bearing wall Fire rated ?

No

Fire Retardant FirePRO?

No

Header Bearing Area (in²) =

8.25

405 = F_{cL} (psi)

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

MEMBER SIZE			SECTION PROPERTIES		
QUANTITY	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 STRESS CALCS		F _{bE} (psi)= 17476		C _{bF} = 1	
F _b [*] (psi)=	776	893	893	1242	1242
C _L =	1.000	1.000	1.000	1.000	1.000
F _b ' (psi)=	776	893	893	1242	1242
AXIAL STRESS CALCS		F _{cE} = 1002		C _{cF} = 1	
L _e /d =	19.00	19.00	19.00	19.00	19.00
F _c [*] (psi)=	800	920	920	1280	1280
C _P =	0.7626	0.7196	0.7196	0.6013	0.6013
F' _c (psi)=	610	662	662	770	770
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
M _{allow} (ft - #) =	489	563	563	783	783
P _{allow} (#) =	5,033	5,462	5,462	6,350	6,350
(f _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE})) =	0.29	0.19	0.28	0.19	0.29
(f _t /F _{cE}) + (f _t /F _{bE}) ² =	0.25	0.22	0.27	0.16	0.27
P _{c,allow} on PL (#) =	3,341	3,341	3,341	3,341	3,341
P _{c,allow} on Beam (#) =	3,341	3,341	3,341	3,341	3,341
Deflection L/	NA	NA	NA	L/3023	L/4031
240	0.00	0.00	0.00	0.03	0.03
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
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 _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE})) =	OK	OK	OK	OK	OK
(f _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE})) =	28.5%	19.3%	27.8%	19.0%	29.5%
(f _t /F _{cE}) + (f _t /F _{bE}) ²	OK	OK	OK	OK	OK
(f _t /F _{cE}) + (f _t /F _{bE}) ²	25.0%	21.7%	26.9%	16.3%	26.9%
AXIAL P _⊥ on PL	OK	OK	OK	OK	OK
P _c [*] applied/P _{c,allow}	61.8%	53.7%	66.5%	40.2%	66.5%
AXIAL P _⊥ on Beam	OK	OK	OK	OK	OK
P _c [*] applied/P _{c,allow}	61.8%	53.7%	66.5%	40.2%	66.5%
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

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{\text{allow}} = A * F_v * C_D / 1.5$ $M_{\text{allow}} = S * F_b * C_D * C_F * C_L * C_r$ $P_{\text{allow}} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c, \text{allow}} = A * F_c * C_b$ $P_{c, \text{allow}} = A * F_c$ $L/(I * E / 15 * L * M_{\text{applied}})$

(1.0) x E Table 1604.3(f)

Actual Δ

Axial + Ber

Bearing on

Bearing on



JOB #: 23.007

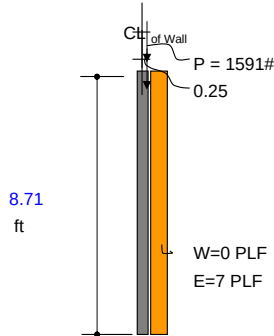
DESIGNED: MRO

DATE: 05/31/23

PROJECT: Bradley Hts Apartments 2x4 Party - 1st

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P

$P_{DL} \text{ (#/ft)} = 735$
 $P_{SL} \text{ (#/ft)} = 338$
 $P_{LL} \text{ (#/ft)} = 120$
 $P_{TOT} \text{ (#/ft)} = 1193$
 $e \text{ (IN)} = 0.5$
 $TRIB. \text{ (IN)} = 16$

LATERAL LOADS W

$W \text{ (PSF)} = 0.00$
 $E \text{ (PSF)} = 5.00$
 $TRIB. \text{ (IN)} = 16$

DESIGN VALUES

$F_b \text{ (psi)} = 850$
 $F_v \text{ (psi)} = 150$
 $F_c \text{ (psi)} = 1300$
 $F_{cL} \text{ (psi)} = 405$
 $E \text{ (psi)} = 1.30E+06$
 $E_{min} \text{ (psi)} = 4.70E+05$
 $C_r = 1.15$
 $L_u \text{ (in)} = 104.5$
 $c = 0.8$
 $K_e = 1$
 $C_b = 1.00$

Bearing wall Fire rated? No
 Fire Retardant FirePRO? No
 Header Bearing Area (in²) = 5.25

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

405 = F_{cL} (psi)

MEMBER SIZE		SECTION PROPERTIES			
QUANTITY	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)
$L_u \text{ (ft)}$	8.708	8.708	8.708	8.708	8.708
$V_{\text{applied}} \text{ (#)}$	5	7	7	34	29
$M_{\text{applied}} \text{ (ft-#)}$	24	30	30	94	88
$P_{\text{applied}} \text{ (#)}$	1140	1431	1438	980	1438
C_D	1	1.15	1.15	1.6	1.6
BENDING STRESS CALCS	$F_{bE} \text{ (psi)} = 29334$		$C_{bF} = 1.5$		
$F_b^* \text{ (psi)}$	1466	1686	1686	2346	2346
C_L	1.000	1.000	1.000	1.000	1.000
$F'_b \text{ (psi)}$	1466	1686	1686	2346	2346
AXIAL STRESS CALCS	$F_{cE} = 433$		$C_{cF} = 1.15$		
L_e/d	29.86	29.86	29.86	29.86	29.86
$F_c^* \text{ (psi)}$	1495	1719	1719	2392	2392
C_P	0.2699	0.2373	0.2373	0.1739	0.1739
$F'_c \text{ (psi)}$	404	408	408	416	416
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
$V_{\text{allow}} \text{ (#)}$	525	604	604	840	840
$M_{\text{allow}} \text{ (ft-#)}$	374	430	430	599	599
$P_{\text{allow}} \text{ (#)}$	2,119	2,142	2,142	2,183	2,183
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	0.42	0.63	0.64	0.48	0.84
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	0.50	0.63	0.63	0.43	0.63
$P_{c, \text{allow}} \text{ on PL} \text{ (#)}$	2,126	2,126	2,126	2,126	2,126
$P_{c, \text{allow}} \text{ on Beam} \text{ (#)}$	2,126	2,126	2,126	2,126	2,126
Deflection L/	NA	NA	NA	L/844	L/1125
240	0.00	0.00	0.00	0.12	0.09
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + E	DL+0.75(LL+SL+E)
SHEAR V	OK	OK	OK	OK	OK
$V_{\text{applied}}/V_{\text{allow}}$	1.0%	1.1%	1.1%	4.0%	3.4%
MOMENT M	OK	OK	OK	OK	OK
$M_{\text{applied}}/M_{\text{allow}}$	6.3%	6.9%	7.0%	15.7%	14.8%
AXIAL P	OK	OK	OK	OK	OK
$P_{\text{applied}}/P_{\text{allow}}$	53.8%	66.8%	67.1%	44.9%	65.9%
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + f_t/(F_b(1-f_t/F_{cE}))$	41.7%	63.3%	64.0%	47.6%	83.5%
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	50.1%	62.9%	63.2%	43.1%	63.2%
AXIAL P_c on PL	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	53.6%	67.3%	67.6%	46.1%	67.6%
AXIAL P_c on Beam	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	53.6%	67.3%	67.6%	46.1%	67.6%
DEFLECTION	OK	OK	OK	OK	OK
$D_{\text{actual}}/D_{\text{allowed}}$	0.0%	0.0%	0.0%	28.4%	21.3%
Overall Check	OK	OK	OK	OK	OK

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{\text{allow}} = A * F_v * C_D / 1.5$ $M_{\text{allow}} = S * F_b * C_P * C_F * C_L * C_r$ $P_{\text{allow}} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c, \text{allow}} = A * F_c * C_b$ $P_{c, \text{allow}} = A * F_c$ $L/(I * E / 15 * L * M_{\text{applied}})$

(1.0) x E Table 1604.3(f)

Actual Δ

Axial + Ber

Bearing on

Bearing on



JOB #: 23.007

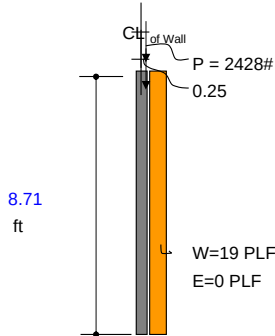
DESIGNED: MRO

DATE: 05/31/23

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

STUD WALL DESIGN

2018 NDS/2018 IBC



AXIAL LOADS P

 $P_{DL} \text{ (#/ft)} = 921$ $P_{SL} \text{ (#/ft)} = 244$ $P_{LL} \text{ (#/ft)} = 714$ $P_{TOT} \text{ (#/ft)} = 1,880$ $e \text{ (IN)} = 0.5$

TRIB. (IN) = 16

LATERAL LOADS W

 $W \text{ (PSF)} = 15.00$ $E \text{ (PSF)} = 0.00$

TRIB. (IN) = 16

DESIGN VALUES

 $F_b \text{ (psi)} = 675$ $F_v \text{ (psi)} = 150$ $F_c \text{ (psi)} = 800$ $F_{cL} \text{ (psi)} = 405$ $E \text{ (psi)} = 1.20E+06$ $E_{min} \text{ (psi)} = 4.40E+05$ $C_r = 1.15$ $L_u \text{ (in)} = 104.5$ $c = 0.8$ $K_e = 1$ $C_b = 1.00$

Hem Fir

Stud Grade

Bending X-X axis

405

Incised, No

Wet Use, No

Repetitive, Yes

Full Bracing, Yes

(Sawn Lumber)

(Appendix G)

(Bearing Area Factor)

0.49

0.13

0.38

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

Bearing wall Fire rated ?

No

Fire Retardant FirePRO?

No

Header Bearing Area (in²) =

5.25

405 = F_{cL} (psi)

MEMBER SIZE			SECTION PROPERTIES		
QUANTITY	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 STRESS CALCS		F _{bE} (psi) = 17476		C _{bF} = 1	
F _b [*] (psi) =	776	893	893	1242	1242
C _L =	1.000	1.000	1.000	1.000	1.000
F _b ' (psi) =	776	893	893	1242	1242
AXIAL STRESS CALCS		F _{cE} = 1002		C _{cF} = 1	
L _e /d =	19.00	19.00	19.00	19.00	19.00
F _c [*] (psi) =	800	920	920	1280	1280
C _p =	0.7626	0.7196	0.7196	0.6013	0.6013
F' _c (psi) =	610	662	662	770	770
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
M _{allow} (ft - #) =	489	563	563	783	783
P _{allow} (#) =	5,035	5,465	5,465	6,353	6,353
(f _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE})) =	0.30	0.14	0.26	0.36	0.45
(f _t /F _{cE}) + (f _t /F _{bE}) ² =	0.26	0.18	0.26	0.14	0.26
P _{c,allow} on PL (#) =	3,343	3,343	3,343	3,343	3,343
P _{c,allow} on Beam (#) =	2,126	2,126	2,126	2,126	2,126
Deflection L/ 240	NA 0.00	NA 0.00	NA 0.00	L/1040 0.10	L/1387 0.08
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)
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 _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE}))	OK	OK	OK	OK	OK
(f _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE}))	29.7%	14.4%	25.6%	36.1%	44.6%
(f _t /F _{cE}) + (f _t /F _{bE}) ²	OK	OK	OK	OK	OK
(f _t /F _{cE}) + (f _t /F _{bE}) ²	25.5%	18.2%	25.6%	14.4%	25.6%
AXIAL P _⊥ on PL	OK	OK	OK	OK	OK
P _{c*applied} /P _{c,allow}	63.2%	45.0%	63.4%	35.6%	63.4%
AXIAL P _⊥ on Beam	OK	OK	OK	OK	OK
P _{c*applied} /P _{c,allow}	99.4%	70.8%	99.6%	56.0%	99.6%
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

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{\text{allow}} = A * F_v * C_D / 1.5$ $M_{\text{allow}} = S * F_b * C_D * C_F * C_L * C_r$ $P_{\text{allow}} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c, \text{allow}} = A * F_c * C_b$ $P_{c, \text{allow}} = A * F_c$ $L/(I * E / 15 * L * M_{\text{applied}})$

(1.0) x W Table 1604.3(f)

Actual Δ

Axial + Ber

Bearing on

Bearing on



JOB #: 23.007

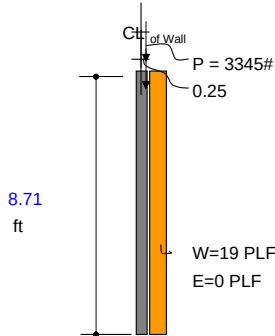
DESIGNED: MRO

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
 F_v (psi) = 150
 F_c (psi) = 800
 F_{cL} (psi) = 405
 E (psi) = 1.20E+06
 E_{min} (psi) = 4.40E+05
 C_r = 1.15
 L_u (in) = 104.5
 c = 0.8
 K_e = 1
 C_b = 1.00

Hem Fir	▼
Stud Grade	▼
Bending X-X axis	▼
405	▼
Incised, No	▼
Wet Use, No	▼
Repetitive, Yes	▼
Full Bracing, Yes	▼

0.49
0.13
0.38

Bearing wall Fire rated? No
 Fire Retardant FirePRO? No
 Header Bearing Area (in²) = 4.69

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

625 = F_{cL} (psi)

MEMBER SIZE		SECTION PROPERTIES			
QUANTITY	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 STRESS CALCS	F_{bE} (psi) = 17476		$C_{bF} = 1$		
F_b^* (psi) =	776	893	893	1242	1242
C_L =	1.000	1.000	1.000	1.000	1.000
F_b' (psi) =	776	893	893	1242	1242
AXIAL STRESS CALCS	$F_{cE} = 1002$		$C_{cF} = 1$		
L_e/d =	19.00	19.00	19.00	19.00	19.00
F_c^* (psi) =	800	920	920	1280	1280
C_P =	0.7626	0.7196	0.7196	0.6013	0.6013
F_c' (psi) =	610	662	662	770	770
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
M_{allow} (ft - #) =	489	563	563	783	783
P_{allow} (#) =	5,035	5,465	5,465	6,353	6,353
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$ =	0.53	0.25	0.45	0.44	0.64
$(f_t/F_{cE}) + (f_t/F_{bE})^2$ =	0.35	0.25	0.35	0.20	0.35
$P_{c,allow}$ on PL (#) =	3,343	3,343	3,343	3,343	3,343
$P_{c,allow}$ on Beam (#) =	2,930	2,930	2,930	2,930	2,930
Deflection L/	NA	NA	NA	L/1040	L/1387
240	0.00	0.00	0.00	0.10	0.08
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)
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%
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	OK	OK	OK	OK	OK
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	52.5%	24.7%	45.2%	43.6%	63.9%
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	35.2%	25.1%	35.3%	19.8%	35.3%
AXIAL P_c on PL	OK	OK	OK	OK	OK
$P_{c,applied}/P_{c,allow}$	87.1%	62.0%	87.3%	49.0%	87.3%
AXIAL P_c on Beam	OK	OK	OK	OK	OK
$P_{c,applied}/P_{c,allow}$	99.3%	70.8%	99.6%	56.0%	99.6%
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

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{allow} = A * F_v * C_D / 1.5$ $M_{allow} = S * F_b * C_D * C_F * C_r$ $P_{allow} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c,allow} = A * F_c * C_b$ $P_{c,allow} = A * F_c$ $L/(I * E / 15 * L * M_{applied})$

(1.0) x W Table 1604.3(f)

Actual △

Axial + Ber

Bearing on

Bearing on



JOB #: 23.007

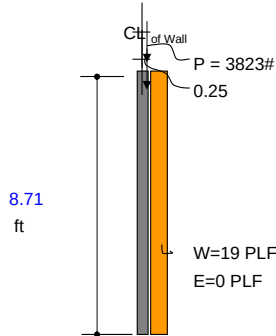
DESIGNED: MRO

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

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

LATERAL LOADS W

$W \text{ (PSF)} = 15.00$
 $E \text{ (PSF)} = 0.00$
 $TRIB. \text{ (IN)} = 16$

DESIGN VALUES

$F_b \text{ (psi)} = 675$
 $F_v \text{ (psi)} = 150$
 $F_c \text{ (psi)} = 800$
 $F_{cL} \text{ (psi)} = 405$
 $E \text{ (psi)} = 1.20E+06$
 $E_{min} \text{ (psi)} = 4.40E+05$
 $C_r = 1.15$
 $L_u \text{ (in)} = 104.5$
 $c = 0.8$
 $K_e = 1$
 $C_b = 1.00$

Hem Fir	▼
Stud Grade	▼
Bending X-X axis	▼
Inched, No	▼
Wet Use, No	▼
Repetitive, Yes	▼
Full Bracing, Yes	▼

0.49
0.13
0.38

Bearing wall Fire rated? No
 Fire Retardant FirePRO? No
 Header Bearing Area (in²) = 7.69

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

625 = F_{cL} (psi)

MEMBER SIZE		SECTION PROPERTIES			
QUANTITY	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)
$L_u \text{ (ft)}$	8.708	8.708	8.708	8.708	8.708
$V_{\text{applied}} \text{ (#)}$	16	11	16	93	79
$M_{\text{applied}} \text{ (ft-#)}$	69	49	69	238	228
$P_{\text{applied}} \text{ (#)}$	3326	2370	3336	1873	3336
C_D	1	1.15	1.15	1.6	1.6
BENDING STRESS CALCS		$F_{bE} \text{ (psi)} = 17476$		$C_{bF} = 1$	
$F_b^* \text{ (psi)}$	776	893	893	1242	1242
C_L	1.000	1.000	1.000	1.000	1.000
$F_b' \text{ (psi)}$	776	893	893	1242	1242
AXIAL STRESS CALCS		$F_{cE} = 1002$		$C_{cF} = 1$	
L_e/d	19.00	19.00	19.00	19.00	19.00
$F_c^* \text{ (psi)}$	800	920	920	1280	1280
C_P	0.7626	0.7196	0.7196	0.6013	0.6013
$F_c' \text{ (psi)}$	610	662	662	770	770
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)
$V_{\text{allow}} \text{ (#)}$	825	949	949	1321	1321
$M_{\text{allow}} \text{ (ft-#)}$	489	563	563	783	783
$P_{\text{allow}} \text{ (#)}$	5,035	5,465	5,465	6,353	6,353
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	0.67	0.31	0.58	0.48	0.76
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	0.40	0.29	0.40	0.23	0.40
$P_{c, \text{allow}} \text{ on PL} \text{ (#)}$	3,343	3,343	3,343	3,343	3,343
$P_{c, \text{allow}} \text{ on Beam} \text{ (#)}$	4,805	4,805	4,805	4,805	4,805
Deflection L/	NA	NA	NA	L/1040	L/1387
240	0.00	0.00	0.00	0.10	0.08
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)
SHEAR V	OK	OK	OK	OK	OK
$V_{\text{applied}}/V_{\text{allow}}$	1.9%	1.2%	1.7%	7.1%	6.0%
MOMENT M	OK	OK	OK	OK	OK
$M_{\text{applied}}/M_{\text{allow}}$	14.2%	8.8%	12.4%	30.5%	29.2%
AXIAL P	OK	OK	OK	OK	OK
$P_{\text{applied}}/P_{\text{allow}}$	66.1%	43.4%	61.0%	29.5%	52.5%
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	67.3%	31.1%	58.0%	48.1%	76.4%
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	40.2%	28.7%	40.3%	22.7%	40.3%
AXIAL $P_{\perp}$ on PL	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	99.5%	70.9%	99.8%	56.0%	99.8%
AXIAL $P_{\perp}$ on Beam	OK	OK	OK	OK	OK
$P_{c, \text{applied}}/P_{c, \text{allow}}$	69.2%	49.3%	69.4%	39.0%	69.4%
DEFLECTION	OK	OK	OK	OK	OK
$D_{\text{actual}}/D_{\text{allowed}}$	0.0%	0.0%	0.0%	23.1%	17.3%
Overall Check	OK	OK	OK	OK	OK

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{\text{allow}} = A * F_v * C_D / 1.5$ $M_{\text{allow}} = S * F_b * C_D * C_F * C_L * C_r$ $P_{\text{allow}} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c, \text{allow}} = A * F_c * C_b$ $P_{c, \text{allow}} = A * F_c$ $L/(I * E / 15 * L * M_{\text{applied}})$

(1.0) x W Table 1604.3(f)

Actual △

Axial + Ber

Bearing on

Bearing on

PRMU20240286



JOB #: 23.007

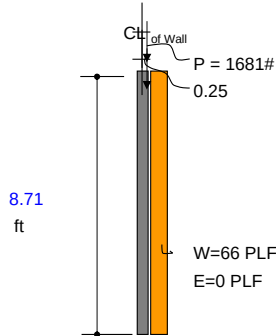
DESIGNED: MRO

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

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

LATERAL LOADS W

$W \text{ (PSF)} = 15.00$
 $E \text{ (PSF)} = 0.00$
 $TRIB. \text{ (IN)} = 53$

DESIGN VALUES

$F_b \text{ (psi)} = 675$
 $F_v \text{ (psi)} = 150$
 $F_c \text{ (psi)} = 800$
 $F_{cL} \text{ (psi)} = 405$
 $E \text{ (psi)} = 1.20E+06$
 $E_{min} \text{ (psi)} = 4.40E+05$
 $C_r = 1.15$
 $L_u \text{ (in)} = 104.5$
 $c = 0.8$
 $K_e = 1$
 $C_b = 1.00$

Hem Fir $\downarrow$ 0.56276
 Stud Grade $\downarrow$ 0.148721
 Bending X-X axis $\downarrow$ 0.434265
 Incised, No $\downarrow$
 Wet Use, No $\downarrow$
 Repetitive, Yes $\downarrow$
 Full Bracing, Yes $\downarrow$
 (Sawn Lumber)
 (Appendix G)
 (Bearing Area Factor)

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

Bearing wall Fire rated? No $\downarrow$
 Fire Retardant FirePRO? No $\downarrow$
 Header Bearing Area (in²) = 5.25

405 = F_{cL} (psi)

MEMBER SIZE			SECTION PROPERTIES		
QUANTITY	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 STRESS CALCS		F _{bE} (psi) = 17476		C _{bF} = 1	
F _b [*] (psi) =	776	893	893	1242	1242
C _L =	1.000	1.000	1.000	1.000	1.000
F _b ' (psi) =	776	893	893	1242	1242
AXIAL STRESS CALCS		F _{cE} = 1002		C _{cF} = 1	
L _e /d =	19.00	19.00	19.00	19.00	19.00
F _c [*] (psi) =	800	920	920	1280	1280
C _P =	0.7626	0.7196	0.7196	0.6013	0.6013
F' _c (psi) =	610	662	662	770	770
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
M _{allow} (ft - #) =	489	563	563	783	783
P _{allow} (#) =	5,035	5,465	5,465	6,353	6,353
(f _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE})) =	0.20	0.10	0.17	1.00	0.94
(f _t /F _{cE}) + (f _t /F _{bE}) ² =	0.20	0.14	0.20	0.11	0.20
P _{c,allow} on PL (#) =	3,343	3,343	3,343	3,343	3,343
P _{c,allow} on Beam (#) =	2,126	2,126	2,126	2,126	2,126
Deflection L/ 240	NA 0.00	NA 0.00	NA 0.00	L/304 0.34	L/406 0.26
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)
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 _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE}))	OK	OK	OK	OK	OK
(f _t /F _c) ² + f _t /(F _b (1-(f _t /F _{cE}))	20.0%	10.0%	17.3%	99.6%	93.9%
(f _t /F _{cE}) + (f _t /F _{bE}) ²	OK	OK	OK	OK	OK
(f _t /F _{cE}) + (f _t /F _{bE}) ²	20.3%	14.5%	20.3%	11.4%	20.3%
AXIAL P _⊥ on PL	OK	OK	OK	OK	OK
P _c [*] applied/P _{c,allow}	50.1%	35.8%	50.3%	28.3%	50.3%
AXIAL P _⊥ on Beam	OK	OK	OK	OK	OK
P _c [*] applied/P _{c,allow}	78.8%	56.2%	79.1%	44.5%	79.1%
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

(Table 4a Bending)

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

 $L_e = (K_e)L$

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

 $V_{allow} = A * F_v * C_D / 1.5$ $M_{allow} = S * F_b * C_D * C_F * C_L * C_r$ $P_{allow} = A * F_c * C_D * C_F * C_P$

(Eq 3.9-3)

(Eq 3.9-4)

 $P_{c,allow} = A * F_c * C_b$ $P_{c,allow} = A * F_c$ $L/(I * E / 15 * L * M_{applied})$ (1.0) x W $\downarrow$ Table 1604.3(f)Actual Δ

Axial + Ber

Bearing on

Bearing on



JOB #: 23.007

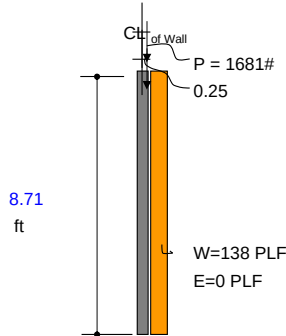
DESIGNED: MRO

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

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

LATERAL LOADS W

$W \text{ (PSF)} = 15.00$
 $E \text{ (PSF)} = 0.00$
 $TRIB. \text{ (IN)} = 110$

DESIGN VALUES

$F_b \text{ (psi)} = 675$
 $F_v \text{ (psi)} = 150$
 $F_c \text{ (psi)} = 800$
 $F_{cL} \text{ (psi)} = 405$
 $E \text{ (psi)} = 1.20E+06$
 $E_{min} \text{ (psi)} = 4.40E+05$
 $C_r = 1.15$
 $L_u \text{ (in)} = 104.5$
 $c = 0.8$
 $K_e = 1$
 $C_b = 1.00$

Hem Fir $\downarrow$ 0.56276
 Stud Grade $\downarrow$ 0.148721
 Bending X-X axis $\downarrow$ 0.434265
 Incised, No $\downarrow$
 Wet Use, No $\downarrow$
 Repetitive, Yes $\downarrow$
 Full Bracing, Yes $\downarrow$
 (Sawn Lumber)
 (Appendix G)
 (Bearing Area Factor)

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

Bearing wall Fire rated? No $\downarrow$
 Fire Retardant FirePRO? No $\downarrow$
 Header Bearing Area (in²) = 5.25

405 = F_{cL} (psi)

MEMBER SIZE			SECTION PROPERTIES		
QUANTITY	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)
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)
$L_u \text{ (ft)}$	8.708	8.708	8.708	8.708	8.708
$V_{applied} \text{ (#)}$	8	6	8	603	457
$M_{applied} \text{ (ft-#)}$	35	25	35	1351	1050
$P_{applied} \text{ (#)}$	1676	1196	1681	946	1681
C_D	1	1.15	1.15	1.6	1.6
BENDING STRESS CALCS			$F_{bE} \text{ (psi)} = 17476$	$C_{bF} = 1$	(Table 4a Bending)
$F_b^* \text{ (psi)}$	776	893	893	1242	1242
C_L	1.000	1.000	1.000	1.000	1.000
$F_b' \text{ (psi)}$	776	893	893	1242	1242
AXIAL STRESS CALCS			$F_{cE} = 1002$	$C_{cF} = 1$	(Table 4a Compression)
L_e/d	19.00	19.00	19.00	19.00	19.00
$F_c^* \text{ (psi)}$	800	920	920	1280	1280
C_P	0.7626	0.7196	0.7196	0.6013	0.6013
$F_c' \text{ (psi)}$	610	662	662	770	770
ALLOWABLES			DL + LL	DL + SL	DL+0.75(LL+SL+W)
$V_{allow} \text{ (#)}$	825	949	949	1321	1321
$M_{allow} \text{ (ft-#)}$	978	1125	1125	1565	1565
$P_{allow} \text{ (#)}$	5,035	5,465	5,465	6,353	6,353
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	0.16	0.07	0.13	1.00	0.91
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	0.20	0.14	0.20	0.11	0.20
$P_{c,allow} \text{ on PL} \text{ (#)}$	3,343	3,343	3,343	3,343	3,343
$P_{c,allow} \text{ on Beam} \text{ (#)}$	2,126	2,126	2,126	2,126	2,126
Deflection L/	NA	NA	NA	L/293	L/391
240	0.00	0.00	0.00	0.36	0.27
CHECKS			DL + LL	DL + SL	DL+0.75(LL+SL+W)
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%
$(f_t/F_c)^2 + f_t/(F_b(1-f_t/F_{cE}))$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	15.6%	7.4%	13.4%	99.7%	91.2%
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	OK	OK	OK	OK	OK
$(f_t/F_{cE}) + (f_t/F_{bE})^2$	20.3%	14.5%	20.3%	11.4%	20.3%
AXIAL P _c on PL	OK	OK	OK	OK	OK
$P_{c,applied}/P_{c,allow}$	50.1%	35.8%	50.3%	28.3%	50.3%
AXIAL P _c on Beam	OK	OK	OK	OK	OK
$P_{c,applied}/P_{c,allow}$	78.8%	56.2%	79.1%	44.5%	79.1%
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

5.25

405 = F_{cL} (psi)

Table 4a Bending

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

(Table 4a Compression)

(3.7.1.4) <50

(Eq 3.7-1)

(Eq 3.7-1)

(Table 4.3.1)

Le = (Ke)L

V_{allow} = A * F_v * C_D / 1.5M_{allow} = S * F_b * C_D * C_F * C_rP_{allow} = A * F_c * C_D * C_F * C_P

(Eq 3.9-3)

(Eq 3.9-4)

P_{c,allow} = A * F_c * C_bP_{c,allow} = A * F_cL/(I * E / 15 * L * M_{applied})

(1.0) * W

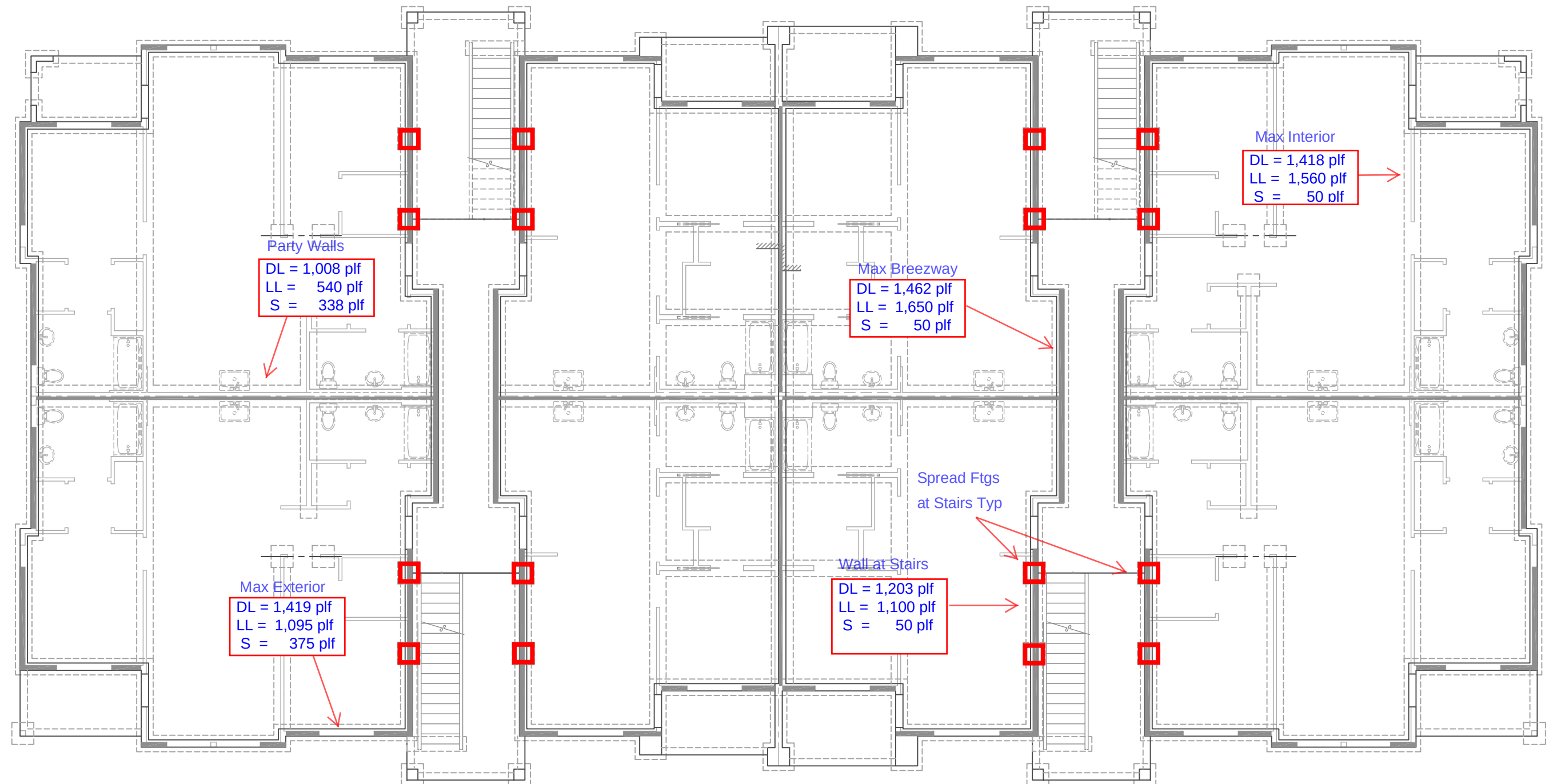
Table 1604.3(f)

Actual Δ

Axial + Ber

Bearing on

Bearing on

FOUNDATIONS - KEY PLAN

Bradley Heights Apartments
S4S Job# 23.007
Foundation Load Summary

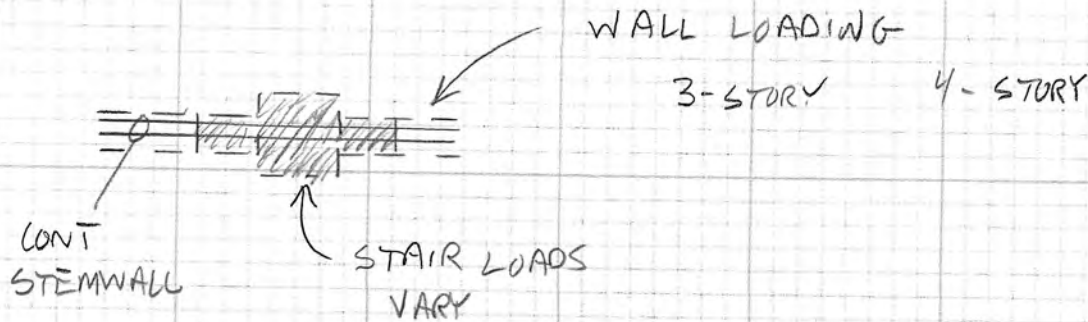
Spread Ftgs	Beams	Σ DL	Σ LL	Σ S	D+L	D + 0.75(L+S)
Breezway (3 story)	(2) FB19	3.2	6.8		9.9 k	8.3 k
Breezway (3 story)	RB6 + (2) FB19	4.8	6.8	1.83	11.6 k	11.2 k
Breezway (4 story)	(3) FB19	4.8	10.1		14.9 k	12.4 k
Breezway (4 story)	RB6 + (3) FB19	6.4	10.1	1.83	16.5 k	15.4 k

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 # 23.007DESIGNED MRO DATE 5-31-23PROJECT: BRADLEY HEIGHTS - APTS

COMBINED FOOTINGS AT STAIRS



EXAMPLE (3) STORY @ RB1/6

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

$$\text{LANDING LOAD} = 11,600$$

$$\hline 21,935 \text{ lbs}$$

$$\text{COMBINED AREA} = 2(2 \times 1.5) = 6.0$$

$$+ (2.5 \times 2.5)$$

$$\hline 12.25 \text{ ft}^2$$

Soil Pressure =

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

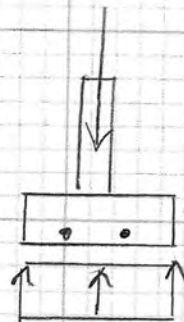
	POINT LD	WALL LD	FTG	SP
3-STORY	9,900	9,540	F2.0	1,944 PSF
3-STORY @ RB1/6	11,600	10,335	F2.5	1,791 PSF
4-STORY	14,900	16,121	F3.0	2,068 PSF (WITHIN 3%)
4-STORY @ RB1/6	16,500	17,273	F3.5	1,851 PSF

TYPICAL WALL FOOTING

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

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

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



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

DESIGN TOE USING STRUCTURAL PLAIN CONCRETE

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

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

$$\phi V_c = 0.75(2) \sqrt{2500} (12)(4.75) = 4.28 \text{ K} \checkmark$$

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

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

$$\phi M_n = 0.75(5) \sqrt{2500} (128/12) = 2.00 \text{ Kft} \checkmark$$

PROJECT NAME:Bradley Heights Apts

PROJECT NUMBER:23.007

SOLUTIONS 4 STRUCTURES

STRUCTURAL ENGINEERING CONSULTANTS

SHEETOF

DATE:4/15/2022

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

					FOOTING SIZE	
LOADS	D	L	Hs			
	4 k	4 k	0 k			
Ftg Self	0.5 k			LENGTH: 2.00 FT		
LOAD COMBINATIONS				WIDTH: 2.00 FT		
	D	L	Hs	DEPTH: 10 IN		
ASD	1	1	1	8 k	Service	AREA: 4.00 SF
ULT	1.2	1.6	1	11 k	Factored	COLUMN DATA
φ (shear)	0.75			LENGTH: 4 IN		
φ (flexure)	0.9			WIDTH: 4 IN		
include ftg self weight	no		SW = 0.5 k			

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

SHEET OF

DATE: 4/15/2022

DESIGN BY: **MRO**

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

					FOOTING SIZE	
LOADS	D	L	Hs			
	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		
					COLUMN DATA	
					LENGTH:	4 IN
					WIDTH:	4 IN

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

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

Vu2l:	4	KIPS
Vu2w:	4	IN
Vu2(max):	4	IN ²
φVc2:	15	KIPS
SR ₂ = Vu ₂ (max) / Vc ₂ =	0.259	
		OK

Vu1:	15	KIPS
bo:	42	IN
bo * d	273	IN ²
ϕVc1:	41	KIPS
SR ₁ = Vu ₁ / Vc ₁ =	0.375	OK

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

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

PROJECT NUMBER:23.007

SOLUTIONS 4 STRUCTURES

STRUCTURAL ENGINEERING CONSULTANTS

SHEETOF

DATE:4/15/2022

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

					FOOTING SIZE	
LOADS	D	L	Hs			
	9 k	9 k	0 k			
Ftg Self	1.4 k			LENGTH: 3.00 FT		
LOAD COMBINATIONS					WIDTH: 3.00 FT	
	D	L	Hs	DEPTH: 12 IN		
ASD	1	1	1	18 k	Service	AREA: 9.00 SF
ULT	1.2	1.6	1	25 k	Factored	COLUMN DATA
φ (shear)	0.75			LENGTH: 4 IN		
φ (flexure)	0.9			WIDTH: 4 IN		
include ftg self weight	no		SW =	1.4 k		

CONCRETE SPECS

F'c:2,500 PSI

Fy:60,000 PSI

d: (DEPTH-3.5"):8.50 IN

Conc Density150 PCF

Conc Ftg Weight1.35 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 IN²

φVc2:23 KIPS

SR₂ = Vu₂(max) / Vc₂ = 0.229

OK

CONCRETE PUNCHING SHEAR

Vu1:22 KIPS

bo:50 IN

bo * d425 IN²

φVc1:64 KIPS

SR₁ = Vu₁ / Vc₁ = 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

Mcr27.00 K-FT

Ms5.33 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

Mcr27.00 K-FT

Ms5.33 K-FT

number of bars3

bar size4

As0.60 in^2

d8.5 inches

φMn22 K-FT @ d=8.50 "

φMn / Mu12.99

Mcr/Ms = 5.06

φMn/Mcr = 0.83

PROJECT NAME:Bradley Heights Apts

PROJECT NUMBER:23.007

SOLUTIONS 4 STRUCTURES

STRUCTURAL ENGINEERING CONSULTANTS

SHEETOF

DATE:4/15/2022

DESIGN BY:MRO

SINGLE FOOTING DESIGN TABLE

3.50 ft x 3.50 ft x 12 inches thick

(4)-#4 BOT EA. WAY

3.5'x3.5'x12 " .2ksf

					FOOTING SIZE	
LOADS	D	L	Hs			
	12 k	12 k	0 k			
Ftg Self	1.8 k			LENGTH: 3.50 FT		
LOAD COMBINATIONS					WIDTH: 3.50 FT	
	D	L	Hs	DEPTH: 12 IN		
ASD	1	1	1	AREA: 12.25 SF		
ULT	1.2	1.6	1	COLUMN DATA		
φ (shear)	0.75			LENGTH: 4 IN		
φ (flexure)	0.9			WIDTH: 4 IN		
include ftg self weight	no		SW = 1.8 k			
				AXIAL 25 k	Service	
				34 k	Factored	

CONCRETE SPECS

F'c:2,500 PSI

Fy:60,000 PSI

d: (DEPTH-3.5"):8.50 IN

Conc Density150 PCF

Conc Ftg Weight1.8375 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 IN²

φVc2:27 KIPS

SR₂ = Vu₂(max) / Vc₂ = 0.320

OK

CONCRETE PUNCHING SHEAR

Vu1:31 KIPS

bo:50 IN

bo * d425 IN²

φVc1:64 KIPS

SR₁ = Vu₁ / Vc₁ = 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

Mcr31.50 K-FT

Ms8.77 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

Mcr31.50 K-FT

Ms8.77 K-FT

number of bars4

bar size4

As0.80 in^2

d8.5 inches

φMn30 K-FT @ d=8.50 "

φMn / Mu12.41

Mcr/Ms = 3.59

φMn/Mcr = 0.94

SOLUTIONS 4 STRUCTURES Inc.

JOB #

23.001

DESIGNED

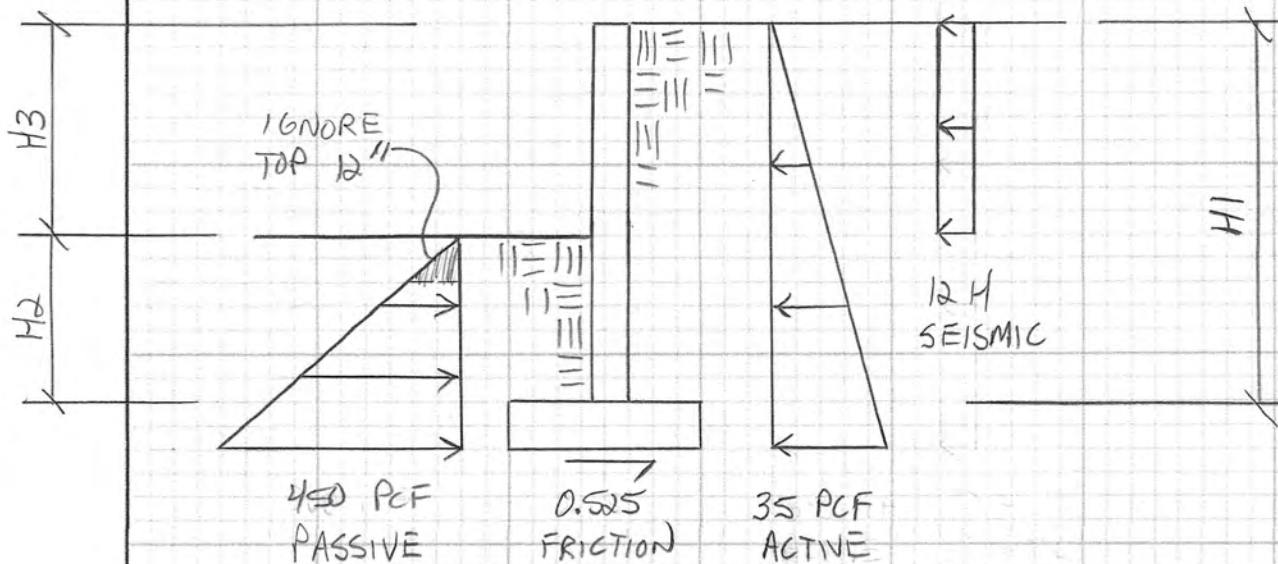
MRO

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	$\mu =$	0.525
Soil Weight	$\gamma =$	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	$V_u =$	1.7 k	
Shear Strength	$\phi V_c =$	5.6 k	OK!
Base Design Moment	$M_u =$	7.9 kft	
Bending Strength	$\phi M_n =$	8.9 kft	OK!
Cracking Moment	$M_{cr} =$	4.38 kft	Ductile
Bar A	#	5	
Spacing A	s =	10 in o.c.	
As provided	$A_s =$	0.37 in ²	OK!
As min	$A_{s \min} =$	0.23 in ²	
Development	Ldh =	10 in	OK!

WALL & FOOTING DIMENSIONS

Concrete Strength	$f_c =$	3,000 psi
Wall thickness	t =	8 in
Footing thickness	t _f =	14 in
Wall Height	H =	10.0 ft
Toe Length	b _t =	2.67 ft
Heel Length	b _h =	1.67 ft
Footing Length	b _f =	5.00 ft

1/3 height Moment	$M_u =$	2.02 kft	
Bending Strength	$\phi M_n =$	4.07 kft	OK!
Cracking Moment	$M_{cr} =$	4.38 kft	>> M_u
Bar B	#	4	
Spacing B	s =	10 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	$V_u =$	1.2 k	
Heel Shear Strength	$\phi V_c =$	11.6 k	OK!
Heel Design Moment	$M_u =$	2.3 kft	
Heel Bending Strength	$\phi M_n =$	12.4 kft	OK!
Bar C	#	4	
Spacing C	s =	10 in o.c.	
As provided	$A_s =$	0.24 in ²	OK!
As min	$A_{s \min} =$	0.24 in ²	

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!

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 $\mu = 0.525$
Soil Weight $\gamma = 120$ 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 $V_u = 1.0$ k
Shear Strength $\phi V_c = 5.6$ k OK!
Base Design Moment $M_u = 3.6$ kft
Bending Strength $\phi M_n = 7.5$ kft OK!
Cracking Moment $M_{cr} = 4.38$ kft Ductile
Bar A # **5**
Spacing A $s = 12$ in o.c.
As provided $A_s = 0.31$ in² OK!
As min $A_{s \min} = 0.21$ in²
Development $L_{dh} = 6$ in OK!

WALL & FOOTING DIMENSIONS

Concrete Strength $f_c = 3,000$ psi
Wall thickness $t = 8$ in
Footing thickness $t_f = 12$ 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 $M_u = 1.03$ kft
Bending Strength $\phi M_n = 3.42$ kft OK!
Cracking Moment $M_{cr} = 4.38$ kft >> M_u
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 $V_u = 0.7$ k
Heel Shear Strength $\phi V_c = 9.6$ k OK!
Heel Design Moment $M_u = 1.2$ kft
Heel Bending Strength $\phi M_n = 8.6$ kft OK!
Bar C # **4**
Spacing C $s = 12$ in o.c.
As provided $A_s = 0.20$ in² OK!
As min $A_{s \min} = 0.20$ 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 $\mu = 0.525$
Soil Weight $\gamma = 120$ 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 $V_u = 0.6$ k
Shear Strength $\phi V_c = 3.9$ k OK!
Base Design Moment $M_u = 1.9$ kft
Bending Strength $\phi M_n = 3.4$ kft OK!
Cracking Moment $M_{cr} = 4.38$ kft >> M_u
Bar A # 4
Spacing A $s = 12$ in o.c.
As provided $A_s = 0.20$ in² OK!
As min $A_{s \min} = 0.17$ in²
Development $L_{dh} = 6$ in OK!

WALL & FOOTING DIMENSIONS

Concrete Strength $f_c = 3,000$ psi
Wall thickness $t = 8$ in
Footing thickness $t_f = 12$ 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

1/3 height Moment $M_u = 0.44$ kft
Bending Strength $\phi M_n = 3.42$ kft OK!
Cracking Moment $M_{cr} = 4.38$ kft >> M_u
Bar B # 4
Spacing B $s = 12$ in o.c.
Full ht bai

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

FOOTING DESIGN

Heel Shear $V_u = 0.2$ k
Heel Shear Strength $\phi V_c = 9.6$ k OK!
Heel Design Moment $M_u = 0.5$ kft
Heel Bending Strength $\phi M_n = 8.6$ kft OK!
Bar C # 4
Spacing C $s = 12$ in o.c.
As provided $A_s = 0.20$ in² OK!
As min $A_{s \min} = 0.20$ in²

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!

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	$\mu =$	0.525
Soil Weight	$\gamma =$	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	$V_u =$	0.4 k	
Shear Strength	$\phi V_c =$	3.9 k	OK!
Base Design Moment	$M_u =$	0.8 kft	
Bending Strength	$\phi M_n =$	2.6 kft	OK!
Cracking Moment	$M_{cr} =$	4.38 kft	>> M_u
Bar A	#	4	
Spacing A	s =	16 in o.c.	
As provided	$A_s =$	0.15 in ²	OK!
As min	$A_{s \min} =$	0.17 in ²	
Development	L _{dh} =	6 in	OK!

WALL & FOOTING DIMENSIONS

Concrete Strength	$f_c =$	3,000 psi
Wall thickness	t =	8 in
Footing thickness	t _f =	10 in
Wall Height	H =	4.0 ft
Toe Length	b _t =	0.67 ft
Heel Length	b _h =	0.67 ft
Footing Length	b _f =	2.00 ft

1/3 height Moment	$M_u =$	0.13 kft	
Bending Strength	$\phi M_n =$	2.60 kft	OK!
Cracking Moment	$M_{cr} =$	4.38 kft	>> M_u
Bar B	#	4	
Spacing B	s =	16 in o.c.	
			Full ht bal

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

FOOTING DESIGN

Heel Shear	$V_u =$	0.0 k	
Heel Shear Strength	$\phi V_c =$	7.6 k	OK!
Heel Design Moment	$M_u =$	0.2 kft	
Heel Bending Strength	$\phi M_n =$	5.1 kft	OK!
Bar C	#	4	
Spacing C	s =	16 in o.c.	
As provided	$A_s =$	0.15 in ²	OK!
As min	$A_{s \min} =$	0.17 in ²	

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!

JOB #

DESIGNED MRO DATE 5-29-23

PROJECT: BRADLEY HEIGHTS APTS

SOLUTIONS 4

STRUCTURES Inc.

WALL DESIGN

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

DEPTH TO ZERO SHEAR (ie MAX MOMENT)

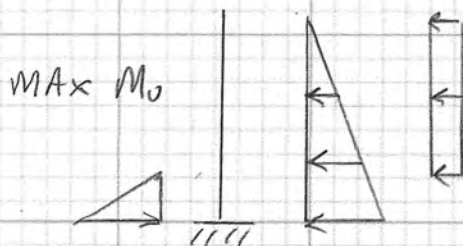
$$(1.6) \frac{450x^2}{2} = (1.6) \frac{35(x+6.5)^2}{2} + 12(6.5)^2$$

$$x = 2.87 \text{ ft}$$

$$\therefore \text{DESIGN } H = 6.5 + 2.87 = 9.37 \text{ ft}$$

$$\text{MAX } V_u = 1.6(35)(6.5)^2/2 + 12(6.5)^2 = 1.69 \text{ K}$$

$$\phi V_c = 0.75(2) \sqrt{3000}(12)(4.0) = 3.94 \text{ K} \checkmark$$



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

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

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

$$7.94 \text{ K ft}$$

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

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

$$\phi M_n = 0.9(.372)(60)(5.69 - \frac{.729}{2})/12 = 8.91 \text{ K ft}$$

JOB #

SOLUTIONS 4

STRUCTURES Inc.

DESIGNED MRO DATE 5-29-23PROJECT: BRADLEY HEIGHTS APTSSLIDING 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

$$\text{ACTIVE} = 35(10 + 14/12)^2 / 2 = 2,182$$

$$\text{SEISMIC} = 12(6.5)(6.5) \times 0.7 = 355$$

$$\underline{2,537 \text{ lbs}}$$

$$\Sigma W = 5(175) + 10(100) + 3.5(2.67 \times 120) + 10(1.67 \times 120) = 4,995 \text{ lbs}$$

$$\text{FRICTION} = 0.525(4,995) = 2,623 \text{ lbs} = 2,623$$

$$\text{PASSIVE} = 450(4.83)^2 / 2 - 450(1)^2 / 2 = 4,675$$

$$\underline{7,298 \text{ lbs}}$$

$$\text{SF} = 7,298 / 2,537 = 2.88$$

SOLUTIONS 4 STRUCTURES Inc.

JOB #

23.007

DESIGNED

MRO

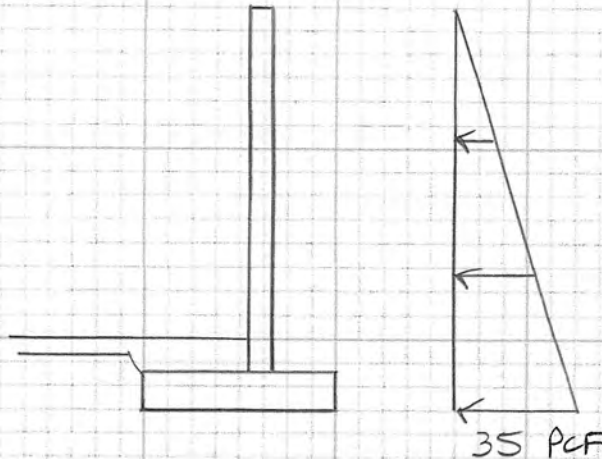
DATE

5-29-23

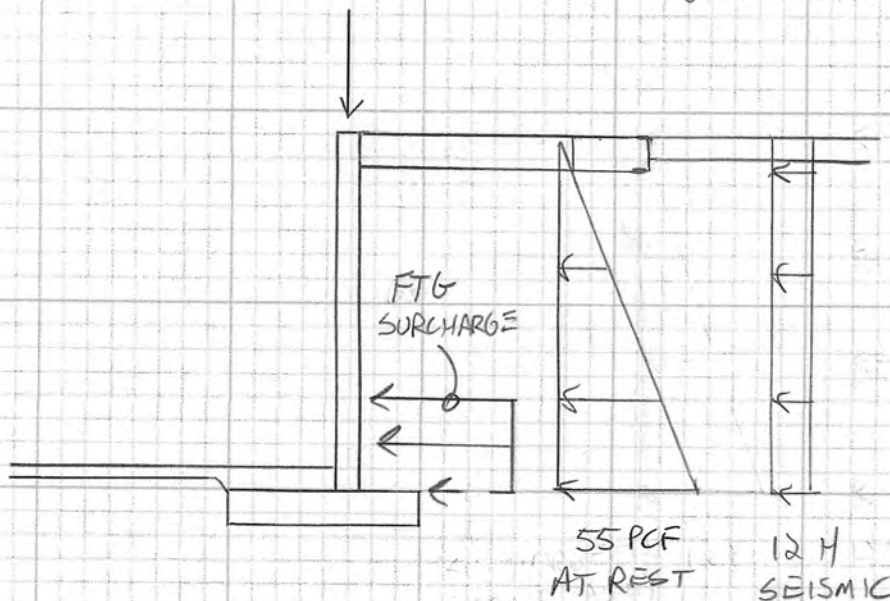
PROJECT:

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 $\mu = 0.525$
Soil Weight $\gamma = 120$ 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 $V_u = 2.8$ k
Shear Strength $\phi V_c = 5.6$ k OK!
Base Design Moment $M_u = 9.3$ kft
Bending Strength $\phi M_n = 9.9$ kft OK!
Cracking Moment $M_{cr} = 4.38$ kft Ductile
Bar A # **5**
Spacing A $s = 8$ in o.c.
As provided $A_s = 0.47$ in² OK!
As min $A_{s \min} = 0.23$ in²
Development $L_{dh} = 10$ in OK!

WALL & FOOTING DIMENSIONS

Concrete Strength $f_c = 3,000$ psi
Wall thickness $t = 8$ in
Footing thickness $t_f = 14$ 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 $M_u = 2.02$ kft
Bending Strength $\phi M_n = 5.00$ kft OK!
Cracking Moment $M_{cr} = 4.38$ kft >> M_u
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 $V_u = 1.2$ k
Heel Shear Strength $\phi V_c = 11.6$ k OK!
Heel Design Moment $M_u = 2.3$ kft
Heel Bending Strength $\phi M_n = 15.5$ kft OK!
Bar C # **4**
Spacing C $s = 8$ in o.c.
As provided $A_s = 0.30$ in² OK!
As min $A_{s \min} = 0.24$ 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 Inc.

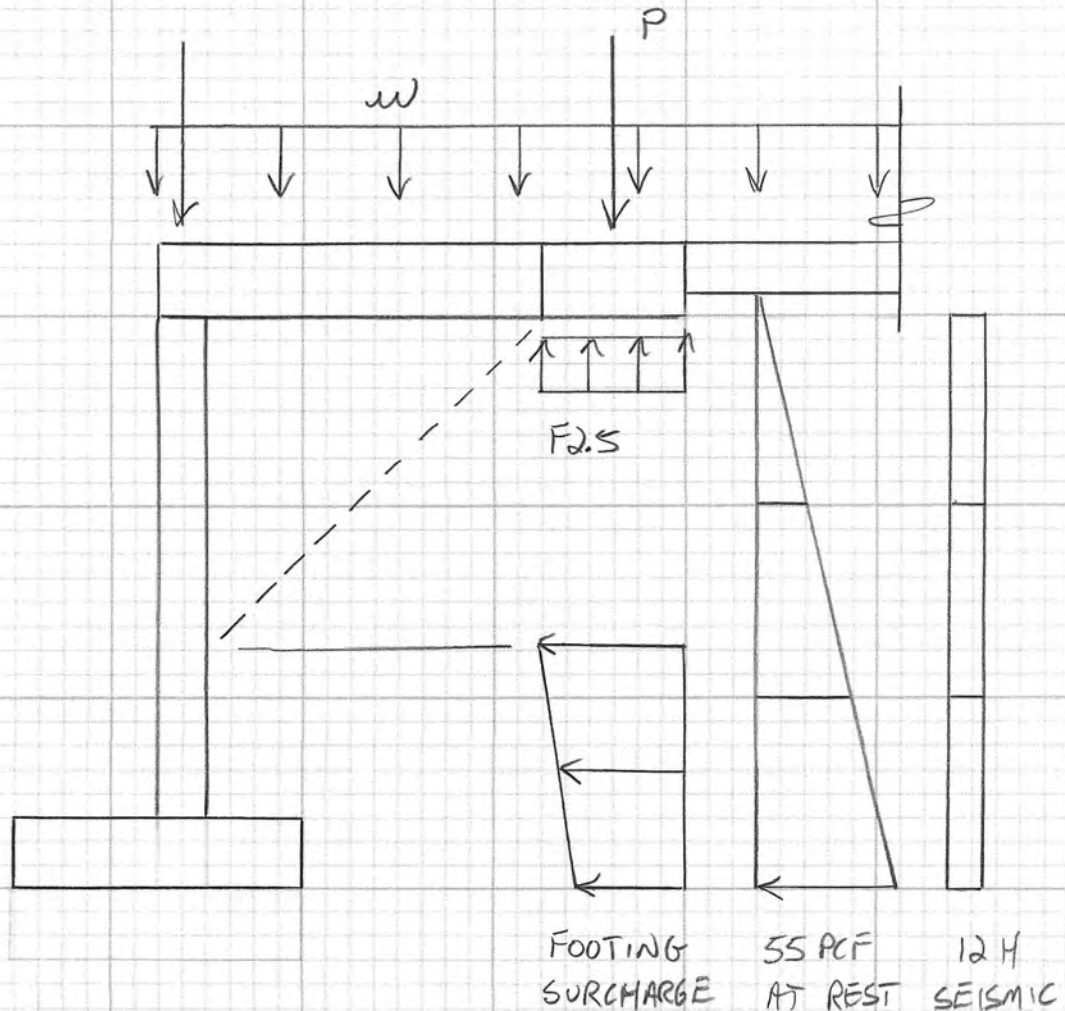
JOB # _____

DESIGNED _____ DATE _____

PROJECT: _____

3-4 STORY SPLIT LEVEL BASEMENT WALL

DESIGN GRADE BEAM TO SPAN BEARING WALL AT BACKFILL



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

$$P_u = 3,066 (8/2) = 12.2 \text{ K}$$

SURCHARGE VARIES w/ DEPTH

$$d = 8 \text{ ft} \quad w_u = 12.2 (55/120) / (2(8) + 2.5) = 302 \text{ PSF}$$

$$d = 10 \text{ ft} \quad w_u = 12.2 (55/120) / (2(10) + 2.5) = 249 \text{ PSF}$$

Description:

Bradley Heights Apts
S4S Job# 23.007

Split Level Basement Wall

Units: English

Properties - X = feet, E = ksi, I = in⁴
X = 0; E = 3122; I = 512;

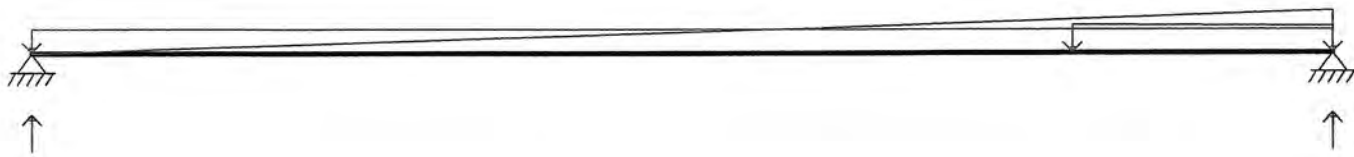
Moment Releases - X = feet

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

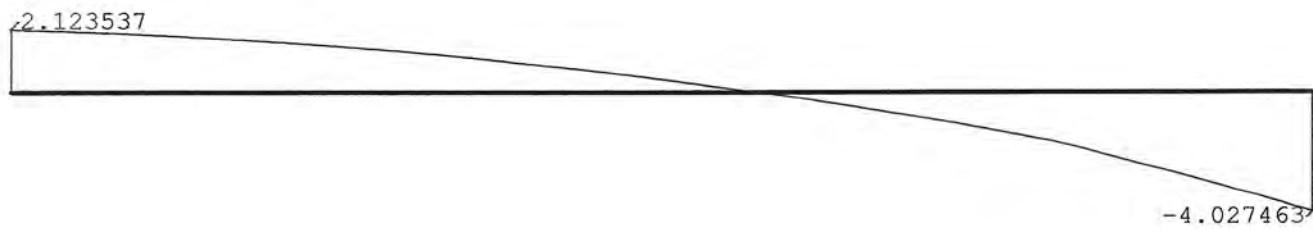
Springs - X = feet, VSpring = kip/inch, RSpring = kip in/rad

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



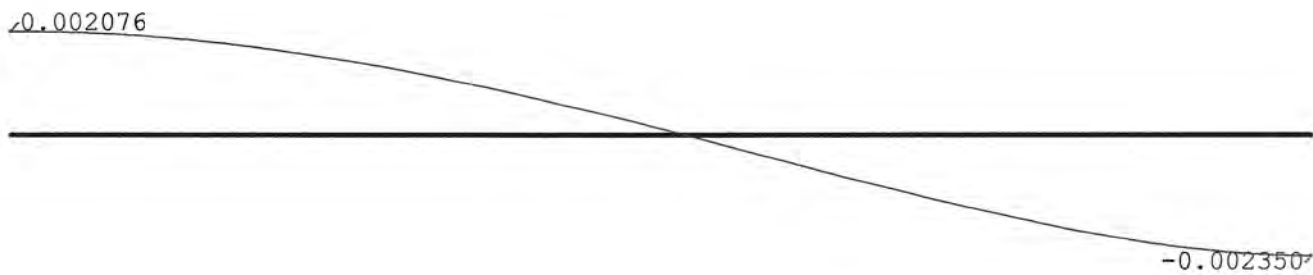
Shear - kips



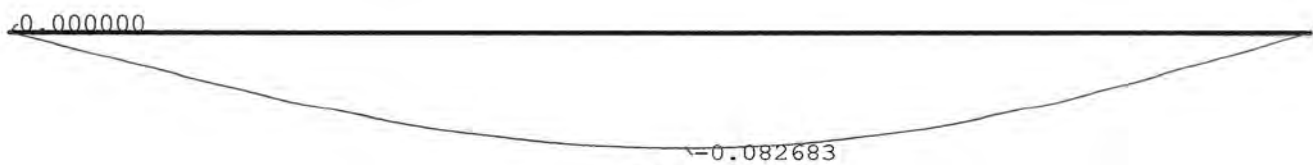
Moment - kip ft



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 5-29-23PROJECT: BRADLEY HEIGHTS APTS

FINAL BASEMENT WALL DESIGN

$$\left. \begin{array}{l} V_{u\max} = 4.03 \text{ K} \\ M_{u\max} = 7.43 \text{ Kft} \end{array} \right\} \text{SEE OUTPUT}$$

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

$$\begin{aligned} A_s &= \#5 @ 8" \text{ (mid-Ht)} \\ &= 0.465 \text{ in}^2 \end{aligned}$$

$$a = \frac{0.465(60)}{0.85(3)(12)} = 0.912 \text{ in}$$

$$\phi M_n = 0.9(0.465)(60)\left(4.0 - \frac{0.912}{2}\right)/12 = 7.42 \text{ Kft} \checkmark$$

SOLUTIONS 4

STRUCTURES Inc.

JOB #

23.007

DESIGNED

MRO

DATE

5-29-23

PROJECT:

BRADLEY HEIGHTS APTS

GRADE BEAM DESIGN

(18" x 14")

$$\text{SELF WT} = 1.5(1.17)(150) = 263$$

$$\text{SDL} = \frac{825}{1,088} \quad (\text{MAX PERP BRG WALL})$$

$$\text{LL} = 1,100$$

$$w = 1088 + 1100 = 2,188 \text{ plf}$$

F25 R

$$= 2,188 (8/2)$$

$$w_o = 1.2(1088) + 1.6(1100) = 3,066 \text{ plf}$$

$$= 8,752 \text{ lbs (1400 PSF)}$$

$$V_u = 3.066 (8/2) = 12.2 \text{ K (9.6 K @ dist d)}$$

$$\phi V_c = 0.75(2) \sqrt{2500} (18)(10.25) = 13.9 \text{ K} < 2 V_u \quad \left(\begin{array}{l} \text{PROVIDE} \\ \text{MIN REINF} \\ @ d/2 \end{array} \right)$$

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

$$M_u = 3.066 (8)^2 / 8 = 24.5 \text{ Kft}$$

$$A_s = (2) \#5 = 0.62 \text{ in}^2$$

$$a = \frac{0.62(60)}{0.85(2.5)(18)} = 0.972 \text{ in}$$

$$\phi M_n = 0.9(0.62)(60)(10.25 - \frac{0.972}{2}) / 12 = 27.2 \text{ Kft} \checkmark$$

Lateral

Building A



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** (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)
 $C_u = 1.4$ (ASCE Table 12.8-1)
 $T_{(MAX)} = C_u * T_a = 0.5344$ (ASCE 12.8.2)

All other structural system

Seismic Use Group:

Risk Category: 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 Eq 12.8-2)
 $R = 6.5$ (ASCE 7 Table 12.2-1) wood shear wall
 $I_E = 1.00$ (ASCE Table 1.5-2)
 $CS(Max) = 0.175$
 $S_{D1} / ((R / I_E) * T_a) = 0.175$ (ASCE Eq 12.8-3) for $T \leq T_L$ OK $T_L = 4$
 $S_{D1} * T_L / ((R / I_E) * T_a^2) = 1.837$ (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)
 $0.044 S_{DS} I \geq 0.01 = 0.044$ (ASCE Eq 12.8-5)
Not Required $S_1 \leq 0.6g$ (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.](#)

ATC Hazards by Location

Search Information

Coordinates: 47.16516801120486, -122.2920663220895

Elevation: 386 ft

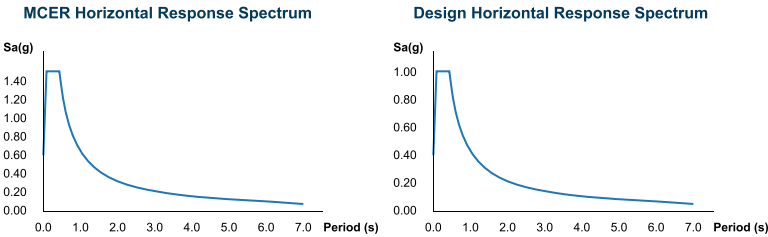
Timestamp: 2023-05-11T15:08:01.436Z

Hazard Type: Seismic

Reference Document: ASCE7-16

Risk Category: II

Site Class: C



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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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

$GC_{pi} = +/- 0.18$ 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: $P = qGC_p - q_i(GC_{pi})$ (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 feet	Sec. 27.3.1 K_z	Sec. 27.3.2 q_z (psf)	External $q_z GC_p$	Internal $- q_i(GC_{pi})$	Total $q GC_p + q_i(GC_{pi})$	Total $q GC_p - q_i(GC_{pi})$
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

Figure 27.3-1

$C_p = -0.5$ (Leeward along L)

$C_p = -0.27$ (Leeward along B)

Leeward: $P = qGC_p - q_i(GC_{pi})$ (ASCE 7-16) (Eq. 27.3-1)

	External $q_h GC_p$	Internal $- q_i(GC_{pi})$	Total $q GC_p - q_i(GC_{pi})$	Total $q GC_p + q_i(GC_{pi})$
q_h (psf)				
14.82	-6.30	2.67	-3.63	-8.97
14.82	-3.38	2.67	-0.71	-6.05

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

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

Section 27.3.4

$GC_{pn} = 1.5$ (Windward Parapet)

$GC_{pn} = -1.0$ (Leeward Parapet)

Walls: $P = q_h [(GC_p) - (GC_{pi})]$ (ASCE 7-16) (Eq. 30.3-1)

$h \leq 60$ ft

Table 26.13-1

Area (ft ²)	$GC_p(4\&5)$	Windward	$GC_p(4)$	Leeward	$GC_p(5)$	Leeward	GC_{pi}	
10	1.00	17.5 (10.5)	-1.10	-19.0 (-11.4)	-1.40	-23.4 (-14.0)	0.18	(Windward)
25	0.93	16.4 (9.9)	-1.03	-17.9 (-10.8)	-1.26	-21.3 (-12.8)	-0.18	(Leeward)
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)	q_h (psf) = 14.82	



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

 $GC_{pi} = +/- 0.18$ 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: $P = qGC_p - q_i(GC_{pi})$ (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)	$q_z GC_p$	$- q_i(GC_{pi})$	$q_z GC_p + q_i(GC_{pi})$	$q_z GC_p - q_i(GC_{pi})$
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

Figure 27.3-1

 $C_p = -0.5$ (Leeward along L)

 $C_p = -0.27$ (Leeward along B)

Leeward: $P = qGC_p - q_i(GC_{pi})$ (ASCE 7-16) (Eq. 27.3-1)

	External	Internal	Total	Total	
q_h (psf)	$q_h GC_p$	$- q_i(GC_{pi})$	$q_z GC_p - q_i(GC_{pi})$	$q_z GC_p + q_i(GC_{pi})$	
15.83	-6.73	2.85	-3.88	-9.58	Along L
15.83	-3.61	2.85	-0.76	-6.46	Along B

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

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

Section 27.3.4

 $GC_{pn} = 1.5$ (Windward Parapet)

 $GC_{pn} = -1.0$ (Leeward Parapet)

Walls: $P = q_h [(GC_p) - (GC_{pi})]$ (ASCE 7-16) (Eq. 30.3-1)

 $h \leq 60$ ft

Table 26.13-1

Area (ft ²)	$GC_p(4\&5)$	Windward	$GC_p(4)$	Leeward	$GC_p(5)$	Leeward	GC_{pi}	
10	1.00	18.7 (11.2)	-1.10	-20.3 (-12.2)	-1.40	-25.0 (-15.0)	0.18	(Windward)
25	0.93	17.6 (10.5)	-1.03	-19.2 (-11.5)	-1.26	-22.8 (-13.7)	-0.18	(Leeward)
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)	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.](#)

ATC

Hazards by Location

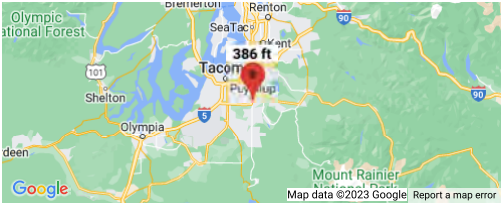
Search Information

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

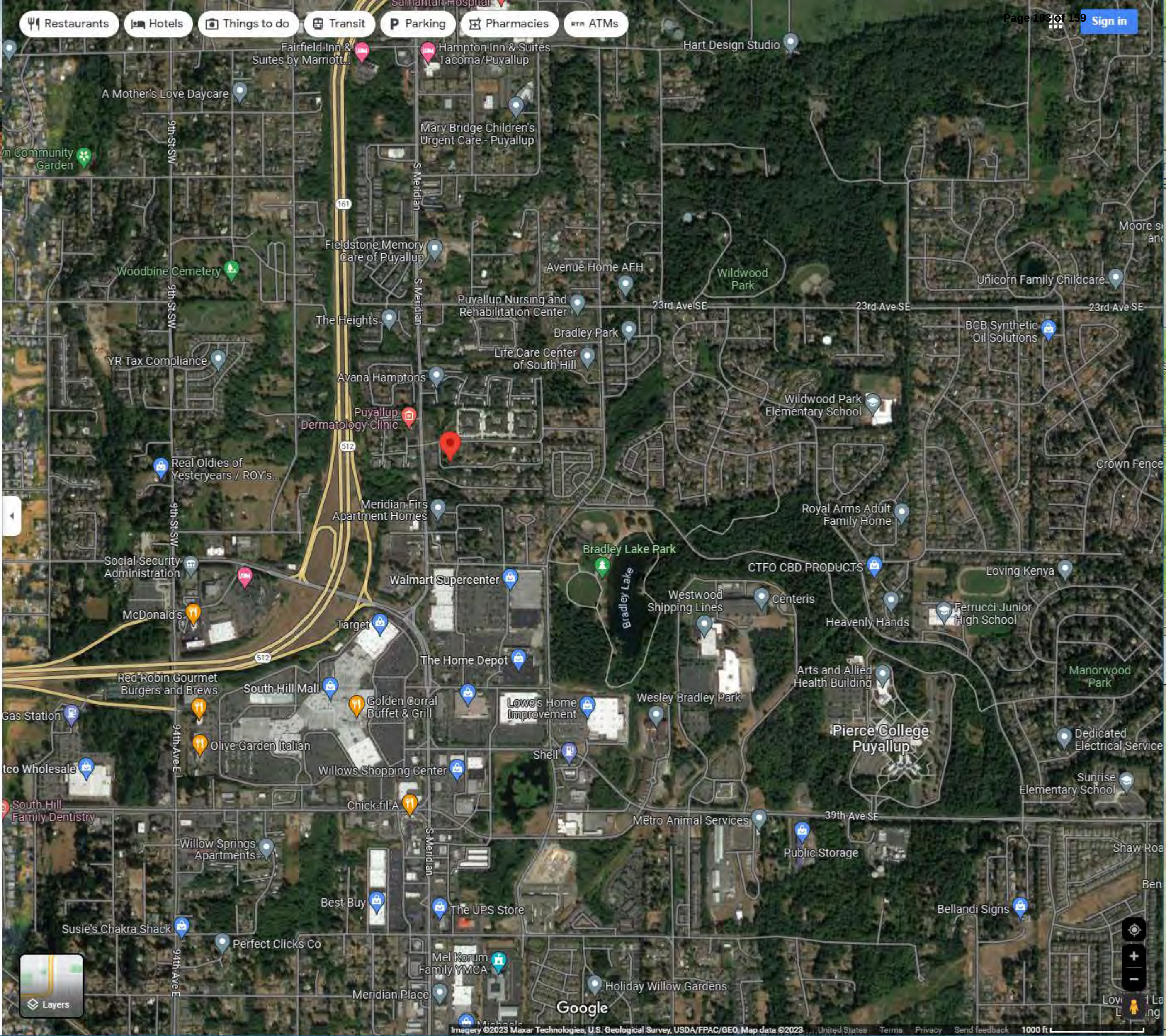
PRMU20240286

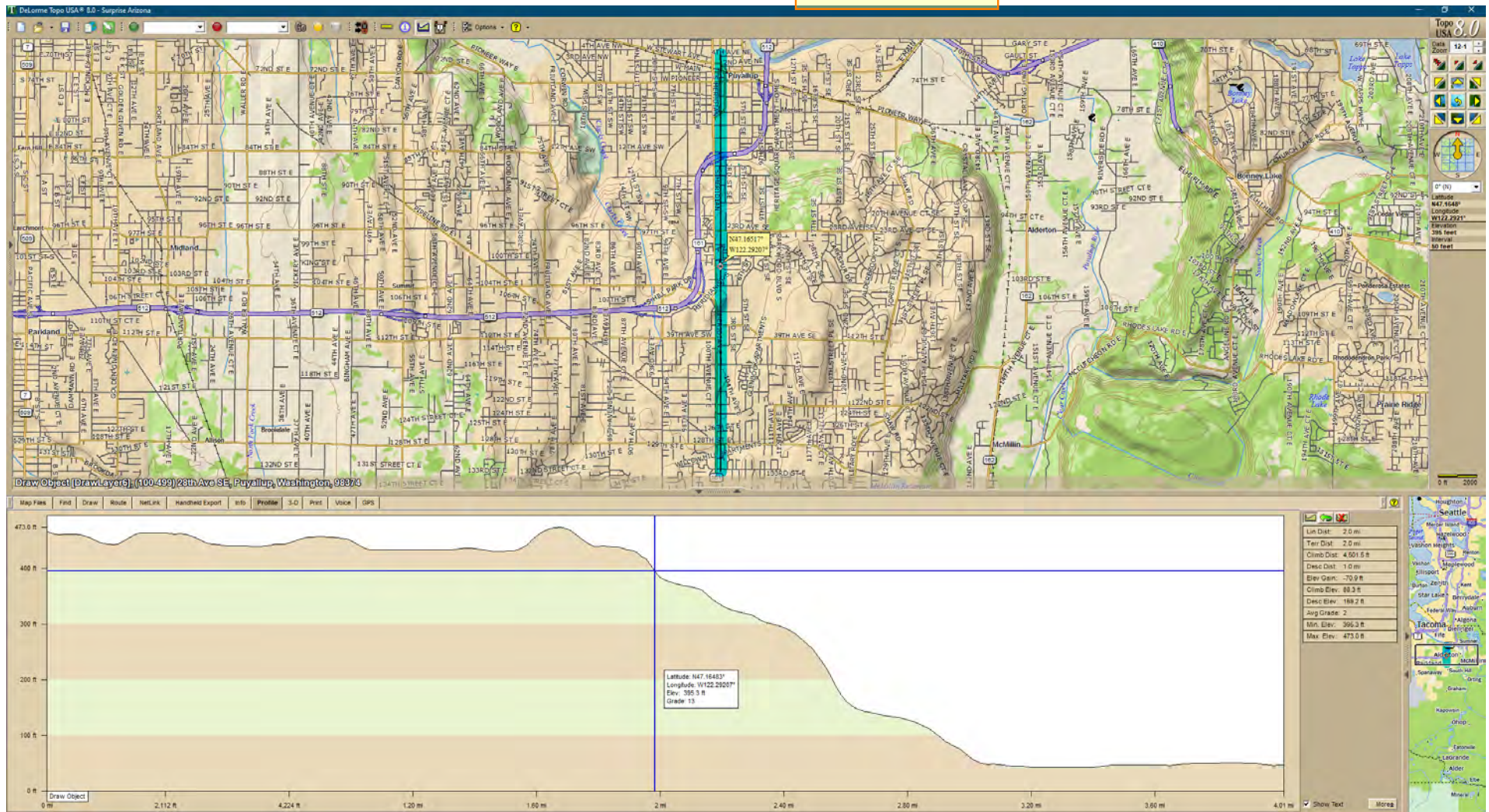
Building

- 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





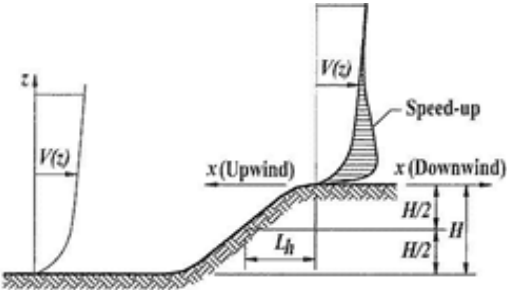
Kzt = 1.0

26.8 TOPOGRAPHIC EFFECTS

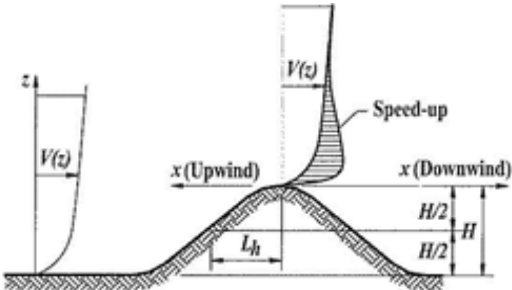
K_{ZT}1

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

$$K_1 = 0.75H/L_h = 0.070086$$
$$K_1/(H/L_h) = 0.75$$

(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

(Figure 26.8-1)

$$\mu = 1.5$$
$$L_h = 3541 \text{ ft}$$

(Figure 26.8-1)

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

z = 15 ft

height above ground surface at site

$$\gamma = 2.5$$

(Figure 26.8-1)

$$L_h = 3541 \text{ ft}$$

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

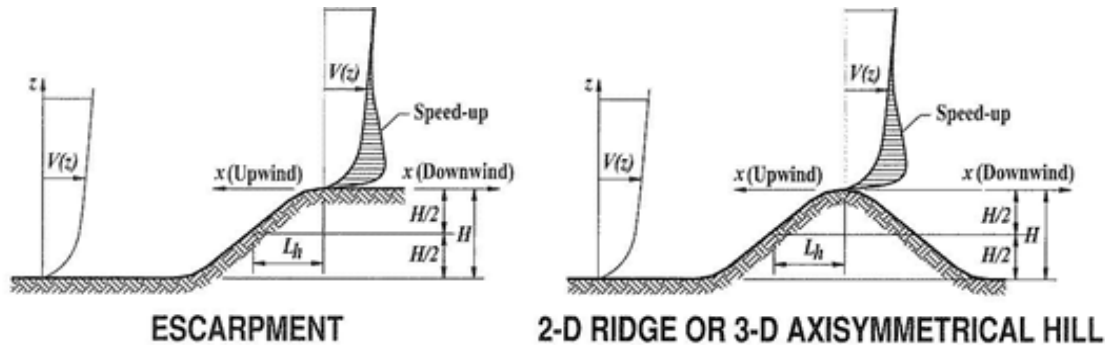
(Eq. 26.8-1)

26.8 TOPOGRAPHIC EFFECTS

K_{ZT}2

Exposure Category: B

Hill Shape: 2D Escarpment



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

$$K_1 = 0.75H/L_h = 0.126782$$
$$K_1/(H/L_h) = 0.75$$

(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

$$\mu = 4$$
$$L_h = 940 \text{ ft}$$

(Figure 26.8-1)

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

z = 15 ft

height above ground surface at site

$$\gamma = 2.5$$

(Figure 26.8-1)

$$L_h = 940 \text{ ft}$$

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

(Eq. 26.8-1)

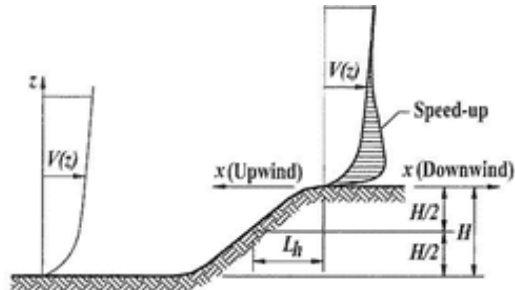
26.8 TOPOGRAPHIC EFFECTS

K_{ZT}

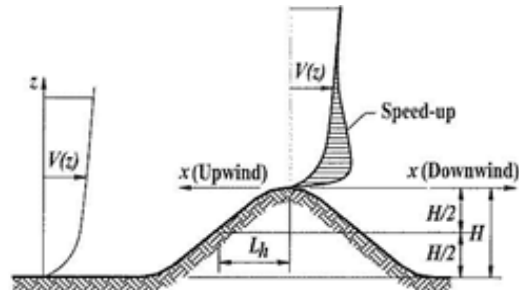
3

Exposure Category: B

Hill Shape: 2D Escarpment



ESCARPMENT



2-D RIDGE OR 3-D AXISYMMETRICAL HILL

$$EL_{top} = 177.4 \text{ ft}$$

Elevation at crest of 2D Escarpment

$$EL_{Bot} = 0 \text{ ft}$$

Elevation at base of 2D Escarpment

$$H = 177.4 \text{ ft}$$

$$H/2 = 88.7 \text{ ft}$$

$$L_h = 1144 \text{ ft}$$

$$H/L_h = 0.1551$$

Kzt Calc Not Required

$$K_1 = 0.75H/L_h = 0.116302$$

$$K_1/(H/L_h) = 0.75$$

(Figure 26.8-1)

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

$$x = 6598 \text{ ft}$$

4576 distance KZT no long affects wind speed

downwind

$$\mu = 4$$

(Figure 26.8-1)

$$L_h = 1144 \text{ ft}$$

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

$$z = 15 \text{ ft}$$

height above ground surface at site

$$\gamma = 2.5$$

(Figure 26.8-1)

$$L_h = 1144 \text{ ft}$$

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

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} :

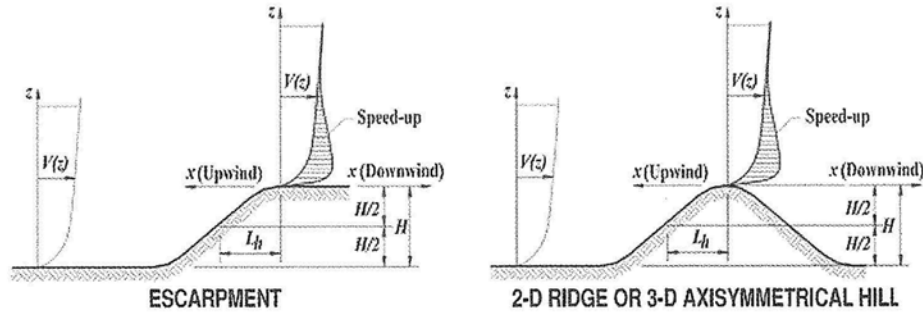
$$K_{zt} = (1 + K_1 K_2 K_3)^2 \qquad (26.8-1)$$

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 $K_{zt} = 1.0$.

$$K_{zt} = 1.0$$

Diagrams



Topographic Multipliers for Exposure $C^{a,b,c}$

H/L_h	K_1 Multiplier			x/L_h	K_2 Multiplier		z/L_h	K_2 Multiplier		
	2D Ridge	2D Escarpment	3D Axisym-metrical Hill		2D Escarpment	All Other Cases		2D Ridge	2D Escarpment	3D Axisym-metrical 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	

^aFor values of H/L_h , x/L_h , and z/L_h other than those shown, linear interpolation is permitted.

^bFor $H/L_h > 0.5$, assume that $H/L_h = 0.5$ for evaluating K_1 and substitute $2H$ for L_h for evaluating K_2 and K_3 .

^cMultipliers 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

$$K_2 = (1 - |x|/\mu L_h)$$

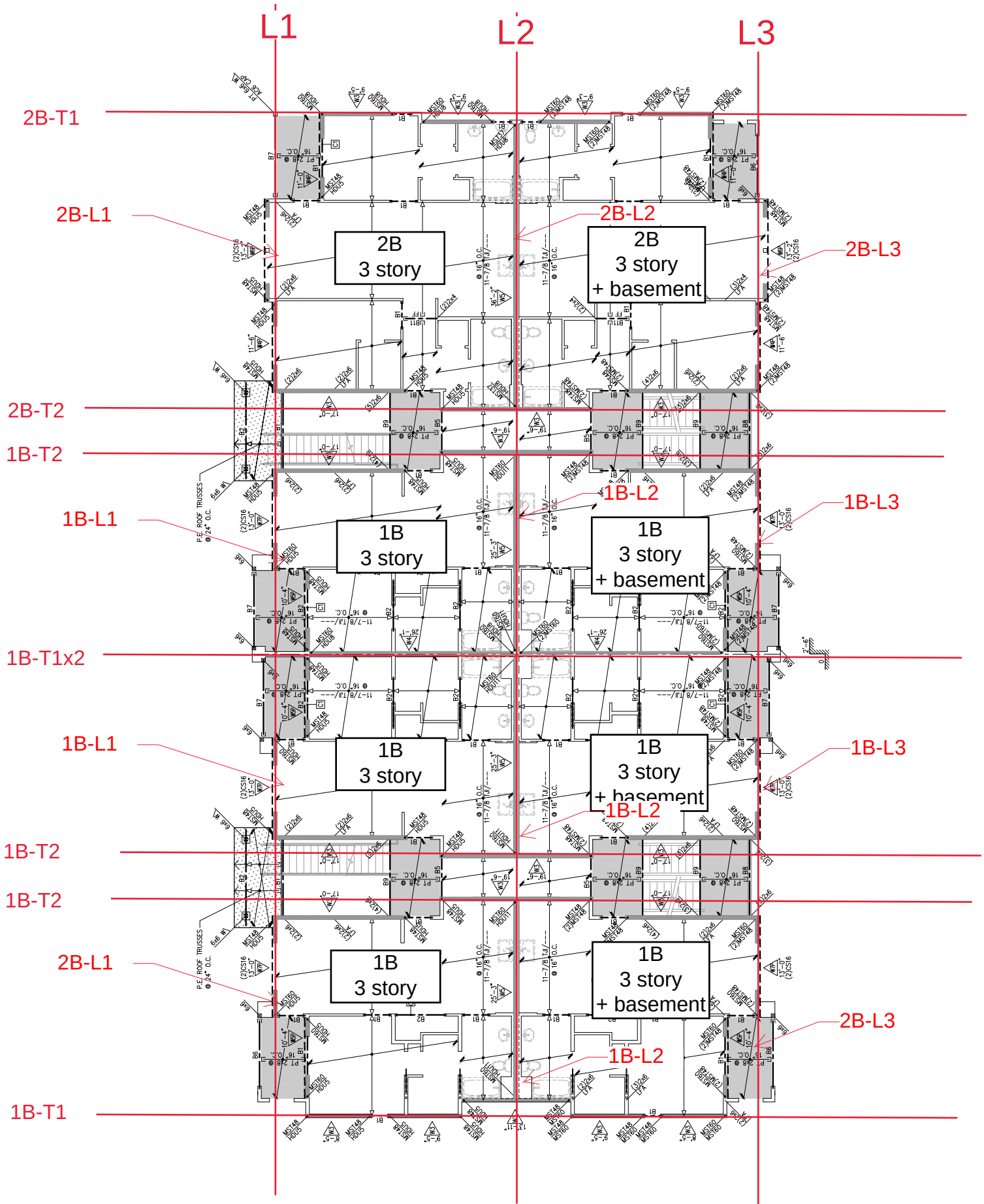
$$K_3 = e^{-\gamma z/L_h}$$

Parameters for Speed-Up over Hills and Escarpments

Hill Shape	$K_1/(H/L_h)$			γ	μ	
	Exposure				Upwind of Crest	Downwind of Crest
	B	C	D			
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

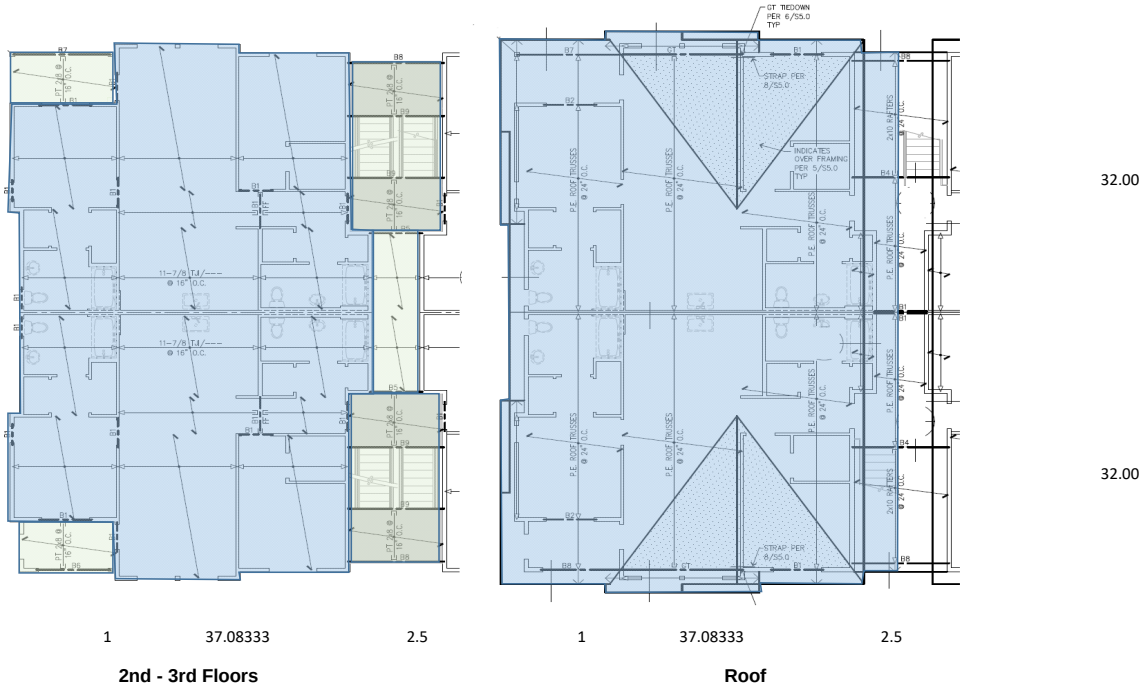
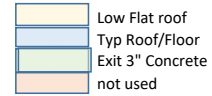


Building A



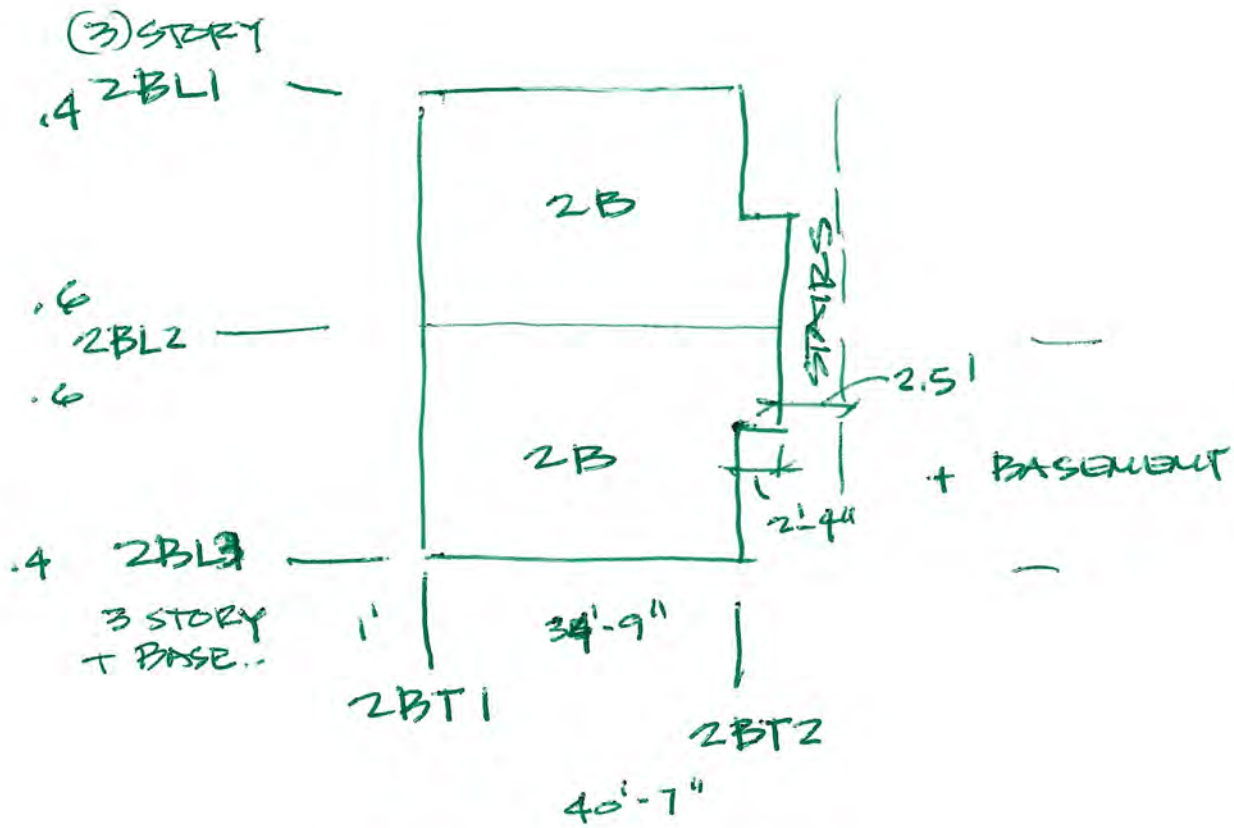
Project: Bradley Heights - 3 Story & basement Story
Seismic Design: 2 Bedroom units

Job # 23.002 Sheet:
Designed: TLC Date: 5/29/23
Checked: Date:



$C_s/1.4 = 0.111$		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 3 story	Roof	L (ft)	W or h(ft)	psf	W (#)	0.1110W		With		156 plf	
	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
d1, d2	3rd Floor	L (ft)	W or h(ft)	psf	W (#)	0.1110W				102 plf	
	Typ Floor	1118	1	26	29068	46834	5199				
	Other Floor	378	1	47	17766						
	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
d1, d2	2nd Floor	L (ft)	W or h(ft)	psf	W (#)	0.1110W				101 plf	
	Typ Floor	1118	1	26	29068	46834	5199				
	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 3 story + B	Roof	L (ft)	W or h(ft)	psf	W (#)	0.1110W	With		156 plf						
	Typ Roof	1381	1	22	30382	30382	3372	Vertical Distribution		L(ft) windward leeward					
	Low Roof	0	1	22	0										
	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		40.58	3906	2442	3906	
		Ext	38.17	4.5415	10	1733.491	3466.981	385		3757	6286				
		Int	38.17	4.5415	10	1733.491				154.8861					
e	3rd Floor	L (ft)	W or h(ft)	psf	W (#)	0.1110W			102 plf						
	Typ Floor	1118	1	26	29068	46834	5199			L(ft) windward leeward					
	Other Floor	378	1	47	17766										
	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		40.58	2552	1595	2552	
		Ext	38.17	9.083	10	3466.981	6933.962	770		5968	7688				
		Int	38.17	9.083	10	3466.981				189.4395					
e	2nd Floor	L (ft)	W or h(ft)	psf	W (#)	0.1110W			101 plf						
	Typ Floor	1118	1	26	29068	46834	5199			L(ft) windward leeward					
	Other Floor	378	1	47	17766										
	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		40.58	2531	1582	2531	
		Ext	38.17	9.083	10	3466.981	6933.962	770		5968	5125				
		Int	38.17	9.083	10	3466.981				126.293					
b1, b2	1st Floor	L (ft)	W or h(ft)	psf	W (#)	0.1110W			101 plf						
	Typ Floor	1118	1	26	29068	46834	5199			L(ft) windward leeward					
	Other Floor	378	1	47	17766										
	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		40.58	2531	1582	2531	
		Ext	38.17	9.083	10	3466.981	6933.962	770		5968	2563				
		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

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

$$F_x = C_{vx} V \quad (12.8-11)$$

$$F_{dx} = \frac{\sum_{i=x}^n F_i}{\sum_{i=x}^n w_i} w_{px} \quad (12.10-1)$$

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

$$I_e = 1$$

$$S_{DS} = 0.8787$$

$$\text{Minimum: } F_{px} = 0.2S_{DS}I_e w_{px}$$

$$\text{Maximum: } F_{px} = 0.4S_{DS}I_e w_{px}$$

3- story	D								use	
	→	F_i	$\sum_{i=x}^n F_i$	w_{xp}	$\sum_{i=x}^n w_i$	F_{px}	Min	Max	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								use	
	↑	F_i	$\sum_{i=x}^n F_i$	w_i	$\sum_{i=x}^n w_i$	F_{px}	Min	Max	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								use	
	→	F_i	$\sum_{i=x}^n F_i$	w_{xp}	$\sum_{i=x}^n w_i$	F_{px}	Min	Max	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									use	
	↑	F_i	$\sum_{i=x}^n F_i$	w_i	$\sum_{i=x}^n w_i$	F_{px}	Min	Max	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	Line	Line	Line
Unit B2	Unit B2	B2+B2 combined	2B-T1	2B-T2	B2-I1	B2-I2
Roof	Roof	Roof	0.45	0.55	0.4	0.6
Wind	Wind	Wind	3080	3080	3491	3491
Seismic	Seismic	Seismic	6095	6457	7322	7322
3rd Floor	3rd Floor	3rd Floor	2012	2012	2438	2438
Wind	Wind	Wind	6730	7950	805	805
Seismic	Seismic	Seismic	1996	1996	2692	2692
2nd Floor	2nd Floor	2nd Floor	3365	5300	798	798
Wind	Wind	Wind	1996	1996	2395	2395
Seismic	Seismic	Seismic	3365	5300	5199	5199
1st Floor	1st Floor	1st Floor	1996	1996	0	1198
Wind	Wind	Wind	1996	1996	0	1198
Seismic	Seismic	Seismic	2650	2650	0	1590
						to concrete retaining wall

Job # 23.007 Sheet:

Designer TLC **Date:** 5/26

Checked: _____ Date: _____

Project: Bradley Height Apartments

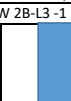
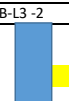
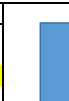
2B-L1

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): Seismic (ASD):		1.232 kips 2.583 kips	72 #/ft 150 #/ft		76 #/ft 160 #/ft		
	use W1P	SW 2B-L3 -1		use W2P	SW 2B-L3 -2			use W1P	SW 2B-L3 -3
									
	3.333 ft	2.667 ft	0 ft	2.333 ft	2.333 ft	0 ft	0 ft	3 ft	3.5 ft
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
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
PLF	W E 76 160	W E 76 160	W E 0 0	W E 59 125	W E 59 125	W E 0 0	W E 0 0	W E 76 160	W E 76 160
M _{tot} (#-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 NG	No Holdown NG	No Holdown NG	No Holdown NG	No Holdown NG	No Holdown NG	No Holdown NG
(see calc next pp OK)		(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)

3rd Floor: W2		Wind (ASD): Seismic (ASD):		0.805 kips 3.18 kips	119 #/ft 336 #/ft		126 #/ft 357 #/ft		
	use W3P	SW 2B-L3 -1		use W4P	SW 2B-L3 -2			use W3P	SW 2B-L3 -3
									
	3.333 ft	2.667 ft	0 ft	2.333 ft	2.333 ft	0 ft	0 ft	3 ft	3.5 ft
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
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
PLF	W E 126 357	W E 126 357	W E 0 0	W E 98 278	W E 98 278	W E 0 0	W E 0 0	W E 126 357	W E 126 357
M _{tot} (#-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)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)

2nd Floor W4		Wind (ASD): Seismic (ASD):		0.798 kips 2.12 kips	165 #/ft 459 #/ft		176 #/ft 489 #/ft		
	use W4P	SW 2B-L3 -1		use W6P	SW 2B-L3 -2			use W4P	SW 2B-L3 -3
									
	3.333 ft	2.667 ft	0 ft	2.333 ft	2.333 ft	0 ft	0 ft	3 ft	3.5 ft
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
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
PLF	W E 176 489	W E 176 489	W E 0 0	W E 137 380	W E 137 380	W E 0 0	W E 0 0	W E 176 489	W E 176 489
M _{tot} (#-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 HDUS NG		1.05 HDUS NG	No Holdown OK	1.05 HDUS NG	1.05 HDUS NG	No Holdown OK	No Holdown OK	1.05 HDUS NG	1.05 HDUS NG
(see calc next pp OK)		(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)	(see calc next pp OK)



Job # 23.007 Sheet:

Designer: TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

2B-L2

0.5 (ft) holdown dist from end

Roof: W1	Wind (ASD): 3.696 kips Seismic (ASD): 7.531 kips				102 #/ft 208 #/ft					102 #/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	0 ft	36.17
Distribution L	0 ft	0 ft	0 ft	0 ft	36.17 ft	0 ft	0 ft	0 ft	0 ft	36.17
h/b _s =					0.251 W1					
DL w (plf) =					363.1					
0.6M _R (#-ft) =					142477					
	W	E	W	E	W	E	W	E	W	E
PLF	0	0	0	0	102	208	0	0	0	0
M _{ot} (#-ft) =	0	0	0	0	33575	68404	0	0	0	0
F (#) =	0	0	0	0	-3053	-2077	0	0	0	0
Holdown	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: W3	Wind (ASD): 2.415 kips Seismic (ASD): 8.808 kips				169 #/ft 452 #/ft					169 #/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	0 ft	36.17
Distribution L	0 ft	0 ft	0 ft	0 ft	36.17 ft	0 ft	0 ft	0 ft	0 ft	36.17
h/b _s =					0.251 W3					
DL w (plf) =					108.2					
0.6M _R (#-ft) =					42446					
	W	E	W	E	W	E	W	E	W	E
PLF	0	0	0	0	169	452	0	0	0	0
M _{ot} (#-ft) =	0	0	0	0	55510	148406	0	0	0	0
F (#) =	0	0	0	0	-2687	894	0	0	0	0
Holdown	2335	S2	1000	-	1000	-	1000	-	1000	-
	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 W4	Wind (ASD): 2.395 kips Seismic (ASD): 5.199 kips				235 #/ft 595 #/ft					235 #/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	0 ft	36.17
Distribution L	0 ft	0 ft	0 ft	0 ft	36.17 ft	0 ft	0 ft	0 ft	0 ft	36.17
h/b _s =					0.251 W4					
DL w (plf) =					108.2					
0.6M _R (#-ft) =					42446					
	W	E	W	E	W	E	W	E	W	E
PLF	0	0	0	0	235	595	0	0	0	0
M _{ot} (#-ft) =	0	0	0	0	77265	195628	0	0	0	0
F (#) =	0	0	0	0	-1711	5189	0	0	0	0
Holdown	4065	H3	6970	H4	1000	-	1000	-	6970	H4
	1.05	HDU5 OK	HDU8 OK	No Holdown OK	No Holdown OK	HDU5 NG	No Holdown OK	No Holdown OK	HDU8 OK	HDU11 OK

Job # 23.007 Sheet:

Designec 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				
		5		5		6		6		0 ft	
	3.333 ft		2.667 ft		2.333 ft		2.333 ft		0 ft		
Distribution L	3.333 ft		2.667 ft		1.815 ft		1.815 ft		0 ft		
	$h/b_s = 1.5$ W1		1.875 W1		2.571 W1		2.571 W1		1.667 W1		
DL w (plf) =	427.2		427.2		178.8		178.8		0		
0.6M _R (#-ft) =	1424		911		292		292		0		
	W	E	W	E	W	E	W	E	W	E	
PLF	76	160	76	160	59	125	59	125	76	160	
M _{tot} (#-ft) =	2313 4848		1850 3878		1259 2639		1259 2639		2082 4363		
F (#) =	314 1208		433 1369		528 1280		528 1280		369 1282		
Holdown	1000 -		1000 -		1000 -		1000 -		1000 -		
	No Holdown NG		No Holdown NG		No Holdown OK		No Holdown NG		No Holdown NG		
	(see calc next pp OK)				(see calc next pp OK)				(see calc next pp OK)		

9.083 ft

17.17

16.13

Actual Distribu

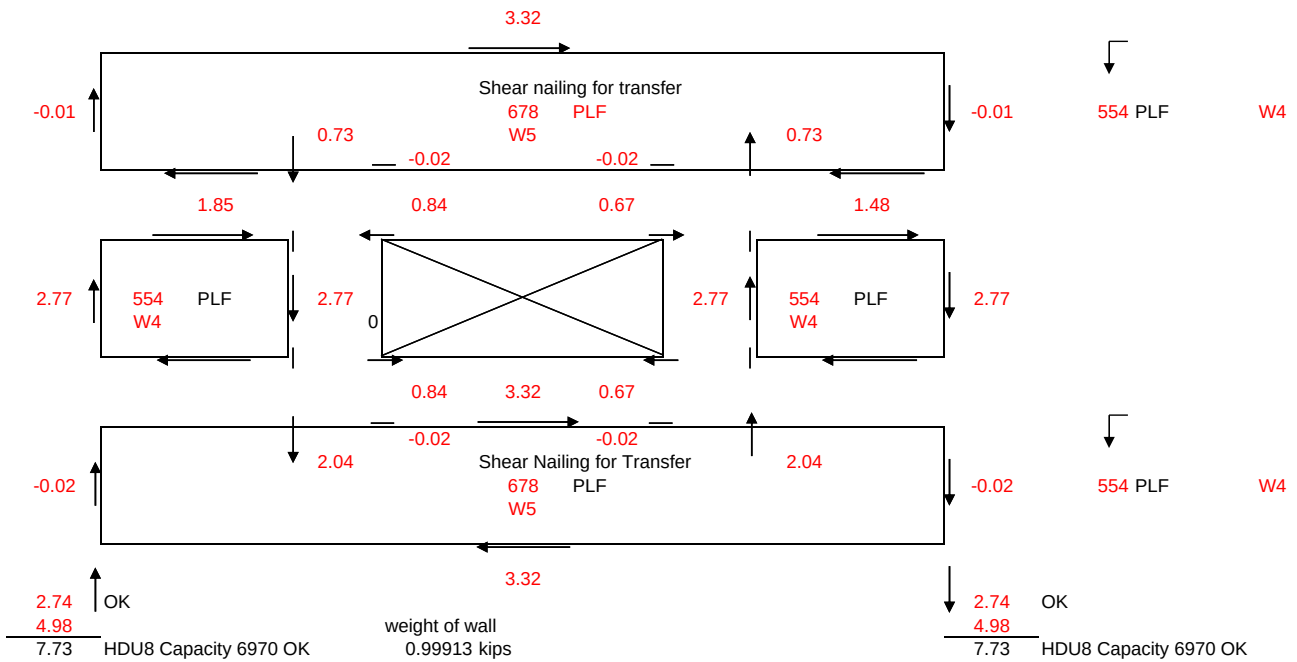
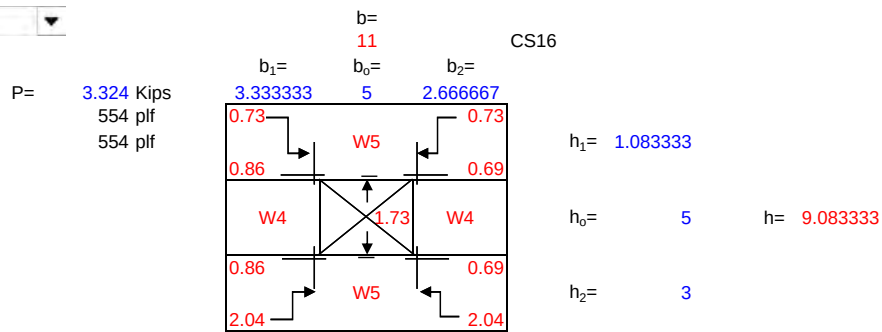
[illegible]

2nd Floor W4		Wind (ASD): 0.798 kips Seismic (ASD): 2.12 kips		165 #/ft 459 #/ft		176 #/ft 489 #/ft			
	use W4P	SW 2B-L3 -1		use W6P	SW 2B-L3 -2		use W4P	SW 2B-L3 -3	
									
	3.333 ft	2.667 ft	0 ft	2.333 ft	2.333 ft	0 ft	3 ft	3.5 ft	
Distribution L	3.333 ft	2.667 ft	0 ft	1.815 ft	1.815 ft	0 ft	3 ft	3.5 ft	
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	108.2	108.2	
0.6M _R (#-ft) =	361	231	0	177	177	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	176 489	176 489	
M _{ot} (#-ft) =	5323 14796	4258 11837	0 0	2898 8056	2898 8056	0 0	4790 13317	5589 15536	
F (#) =	3287 9994	3597 10614	0 0	3051 8694	3051 8694	0 0	3428 10269	3220 9871	
Holdown	4670 S4	4670 S4	1000 -	4670 S4	4670 S4	1000 -	4670 S4	4670 S4	
(2) MST48 NG		(2) MST48 NG		(2) MST48 NG		(2) MST48 NG		(2) MST48 NG	
(see calc next pp OK)		(see calc next pp OK)		(see calc next pp OK)		(see calc next pp OK)		(see calc next pp OK)	

1st Floor W4	Wind (ASD): 0.798 kips		212 #/ft		225 #/ft					
	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			
								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
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
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 _{int} (#-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	
Holddown	6970 H4	6970 H4	1000 -	6970 H4	6970 H4	1000 -	1000 -	6970 H4	6970 H4	
	1.05	HDU8 NG	HDU8 NG	No Holddown OK	HDU8 NG	HDU8 NG	No Holddown OK	No Holddown OK	HDU8 NG	HDU8 NG
	(see calc next pp OK)			(see calc next pp OK)			(see calc next pp OK)			

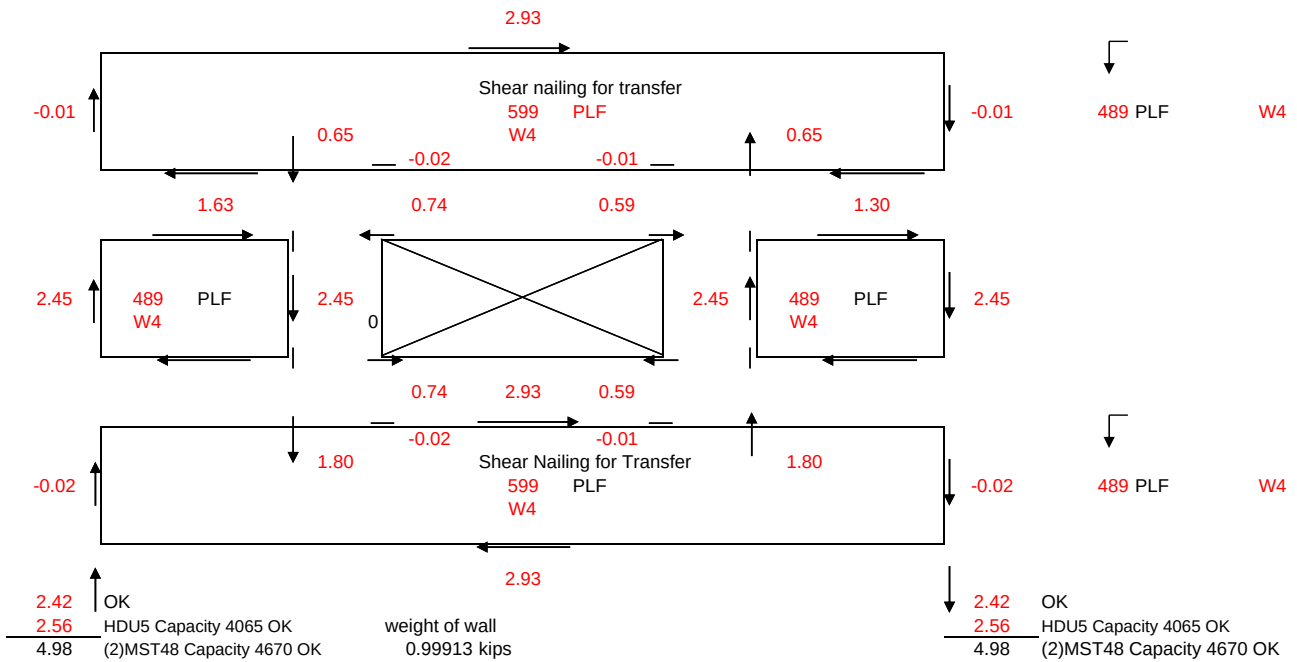
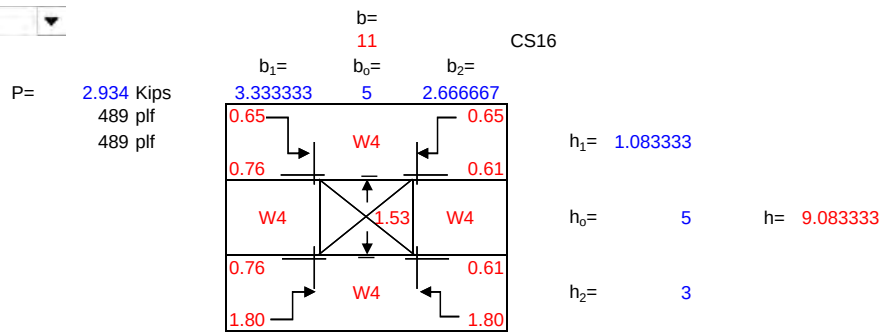
Shear Wall Line 2B-L3-1 1st

W Designation



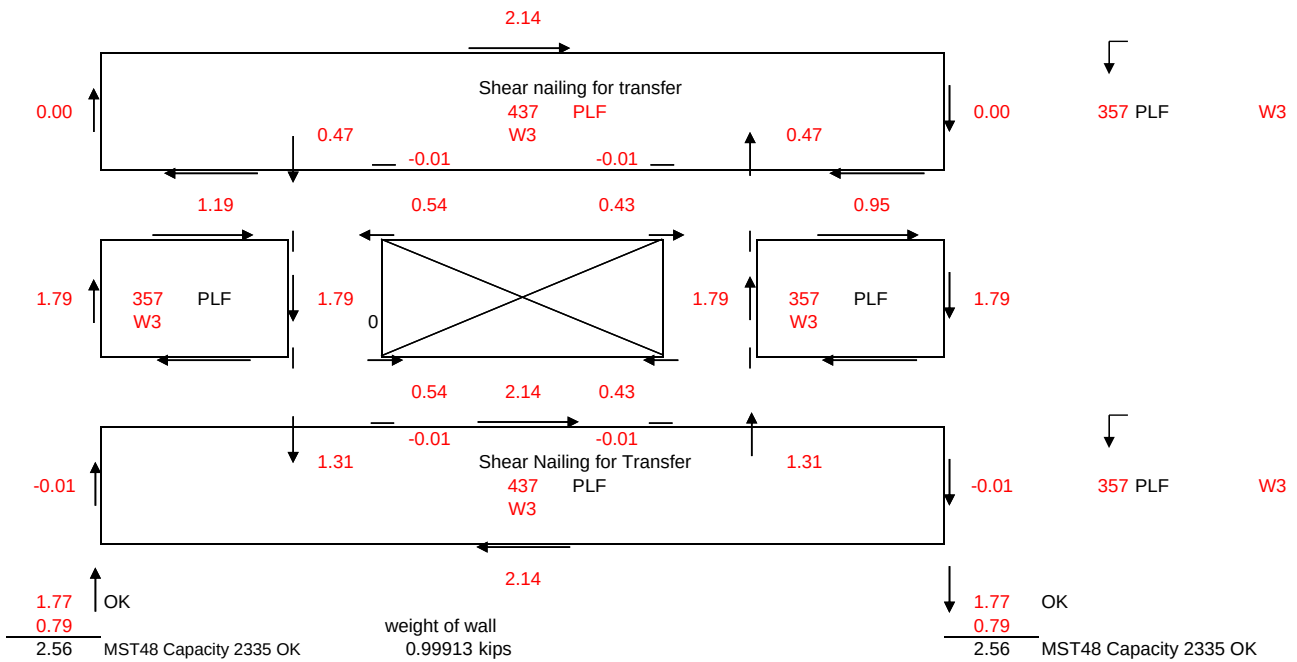
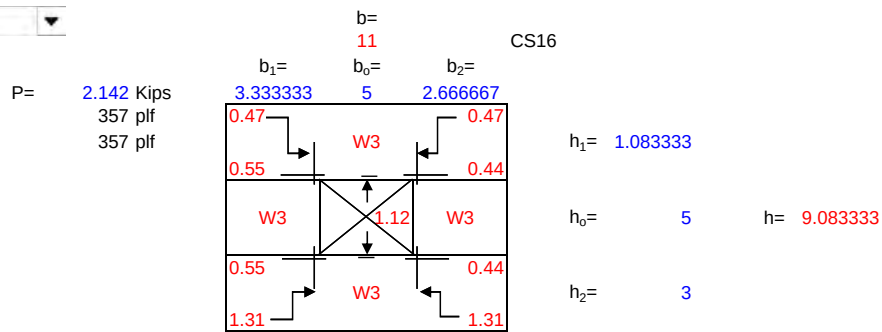
Shear Wall Line 2B-L3-1 2nd

W Designation



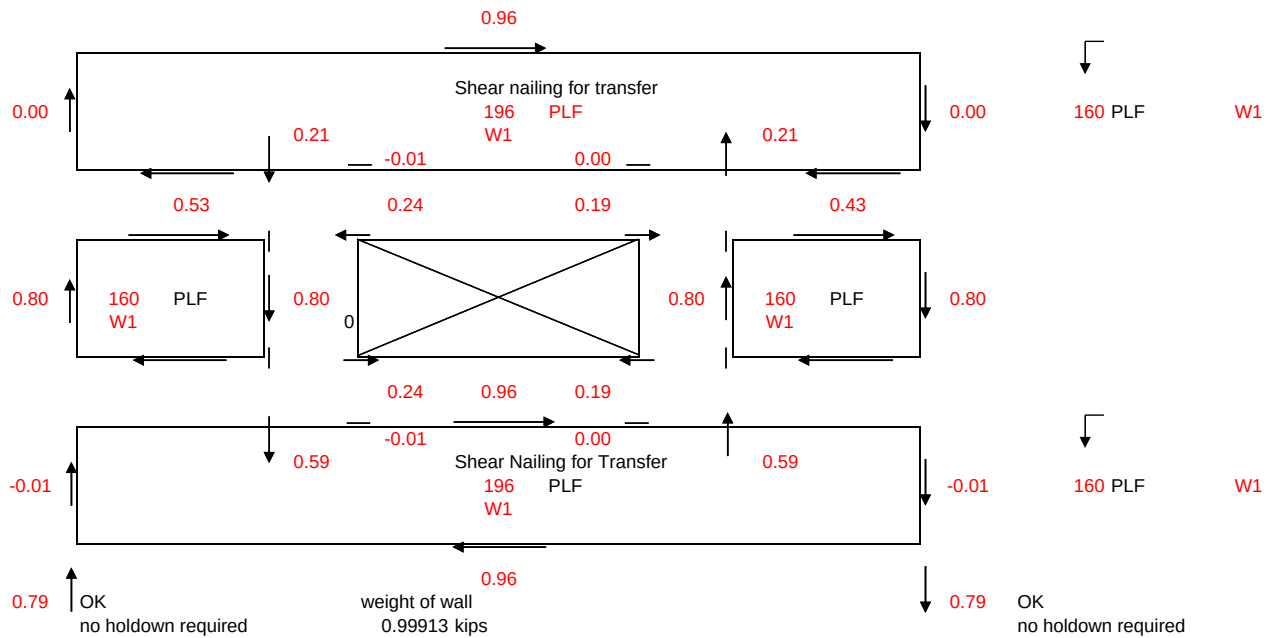
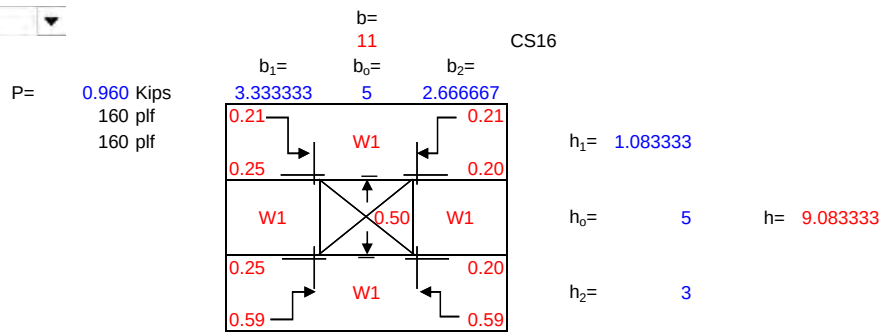
Shear Wall Line 2B-L3-1 3rd

W Designation



Shear Wall Line 2B-L3-1 roof

W Designation

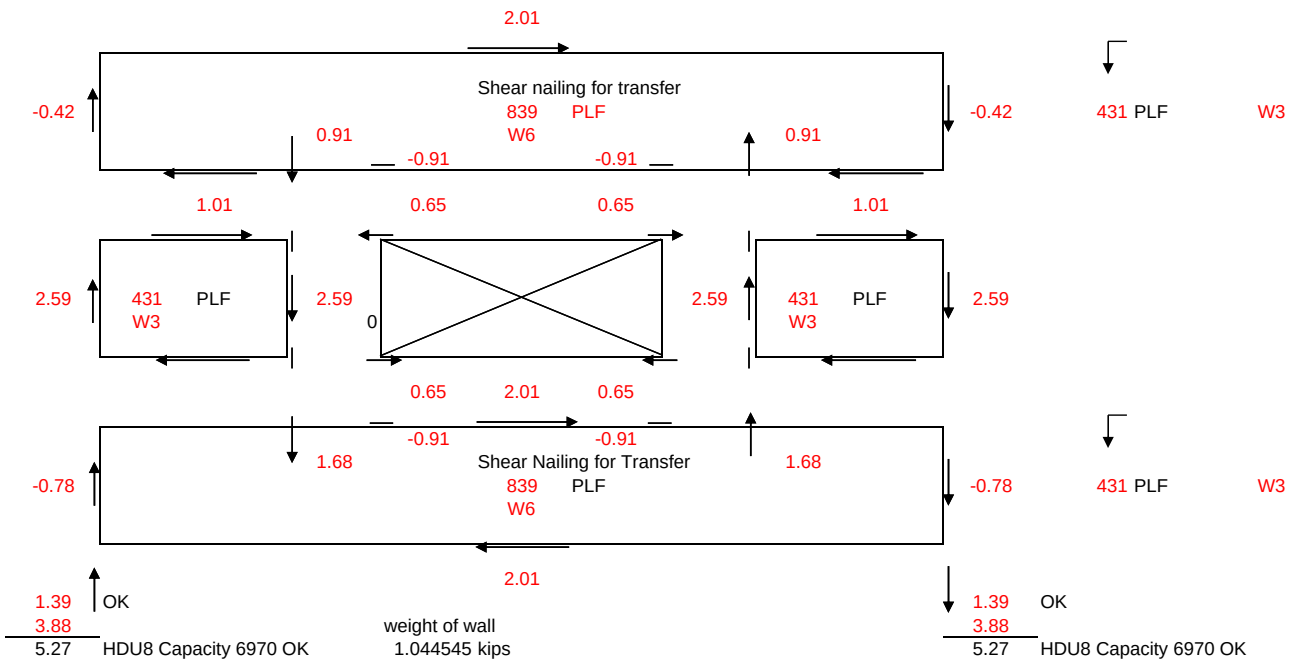


Shear Wall Line 2B-L3-2 1st

W Designation

P= 2.011 Kips
431 plf
431 plf

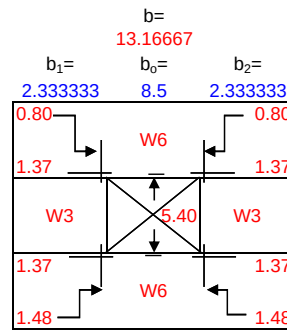
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$$h_1 = 1.083333$$
$$h_0 = 6 \quad h = 9.083333$$
$$h_2 = 2$$


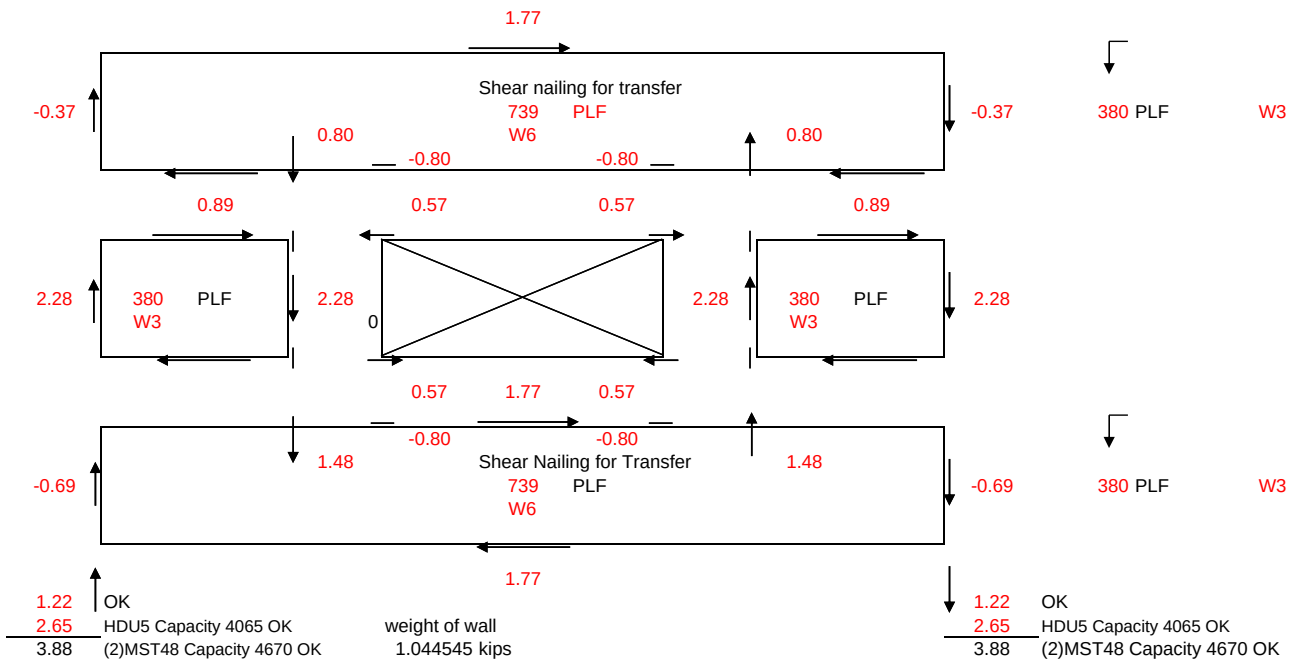
Shear Wall Line 2B-L3-2 2nd

W Designation

P= 1.773 Kips
380 plf
380 plf



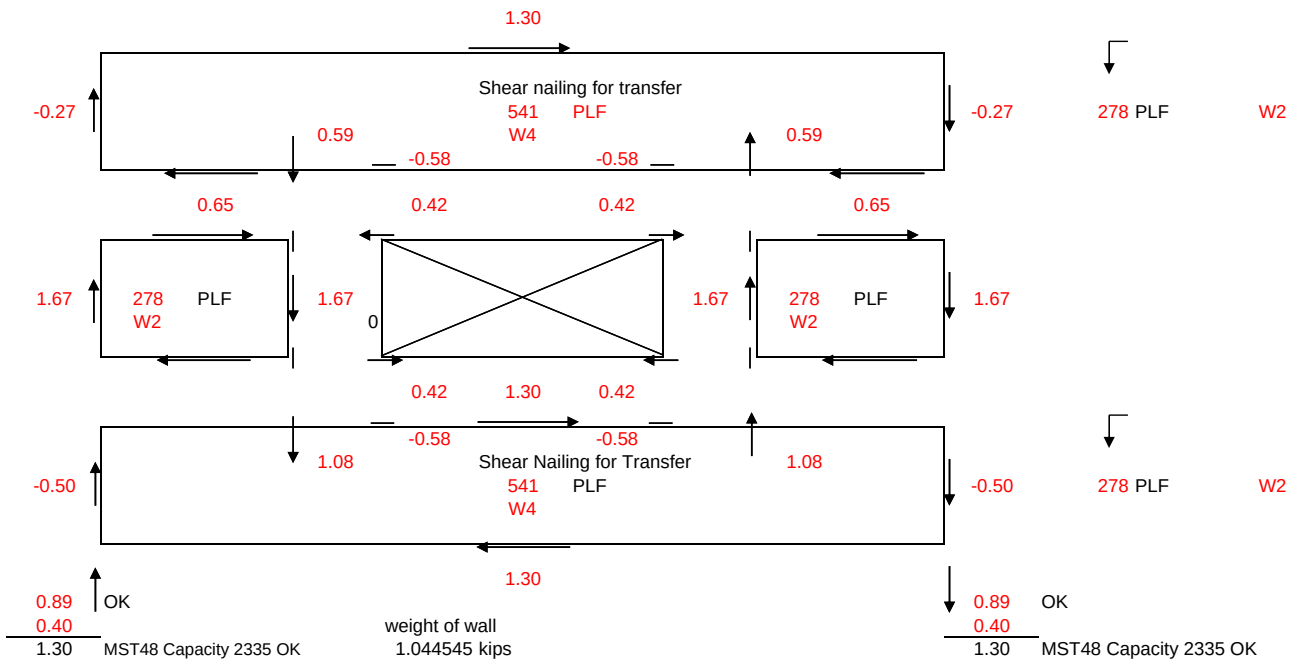
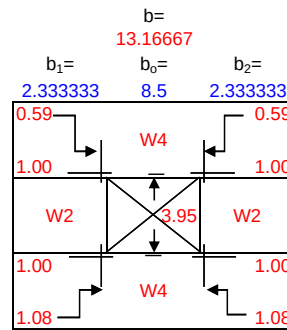
(2) CS16 each sheathing layer



Shear Wall Line 2B-L3-2 3rd

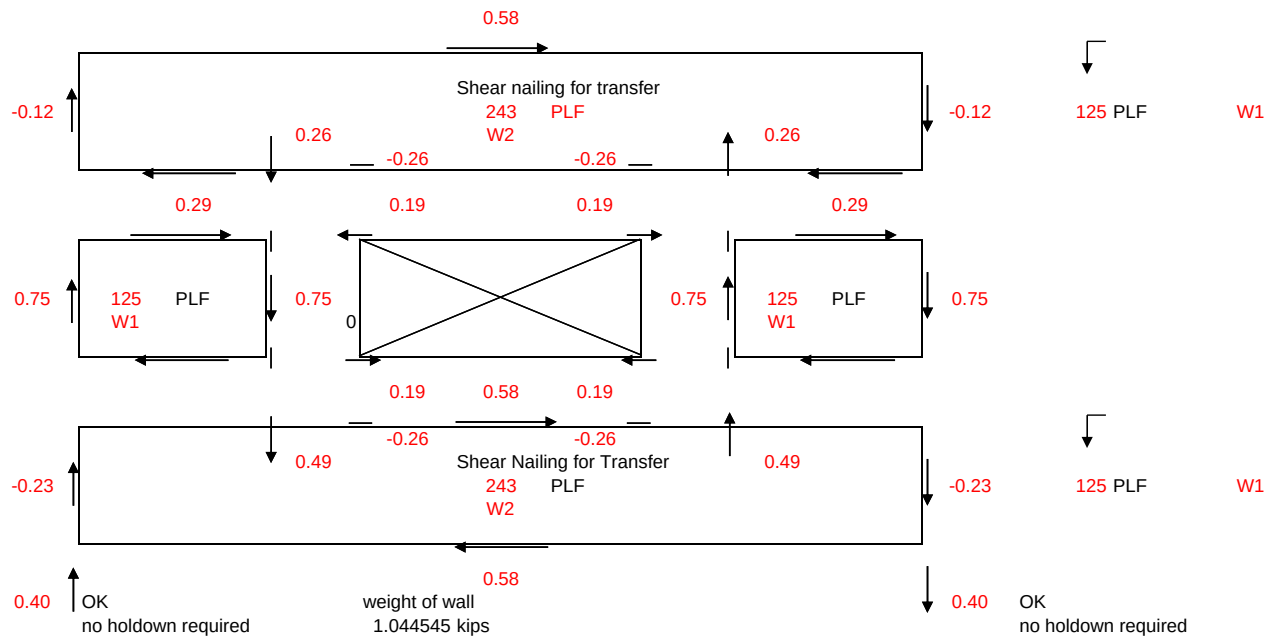
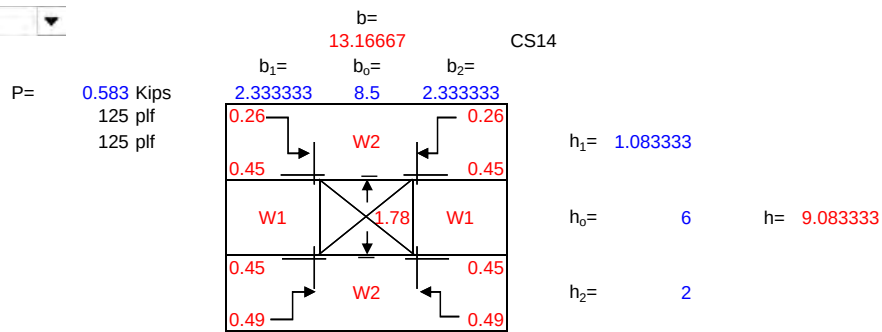
W Designation

P= 1.297 Kips
278 plf
278 plf



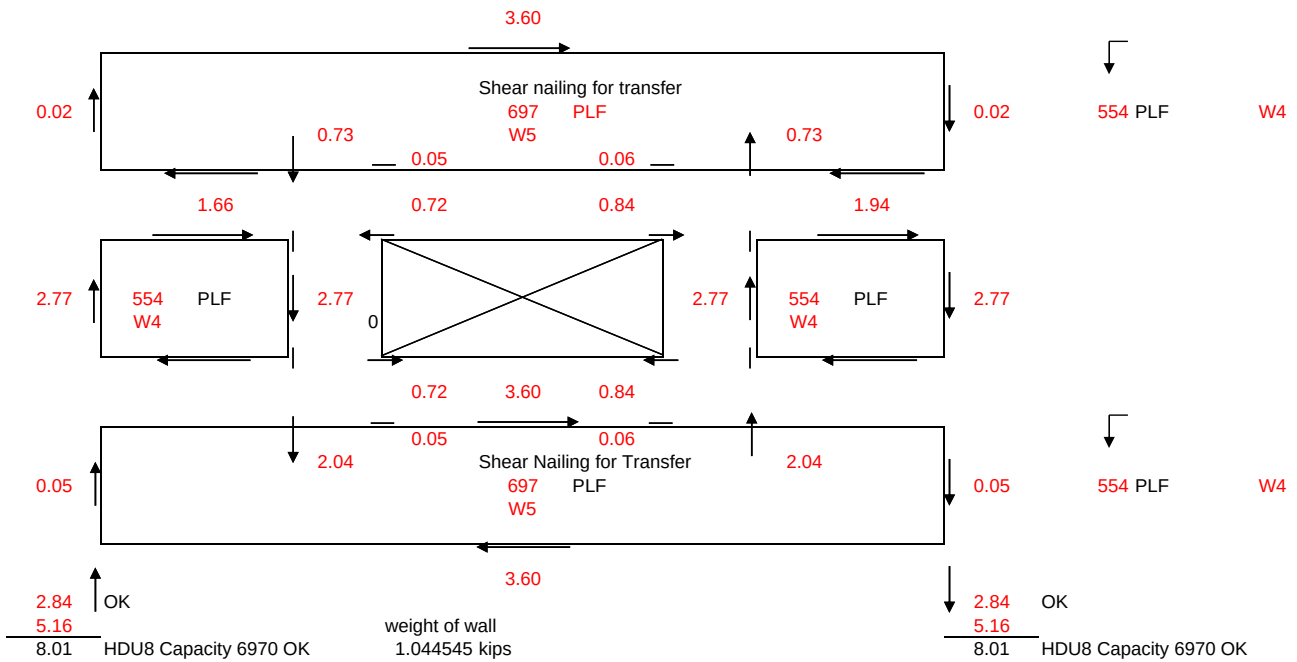
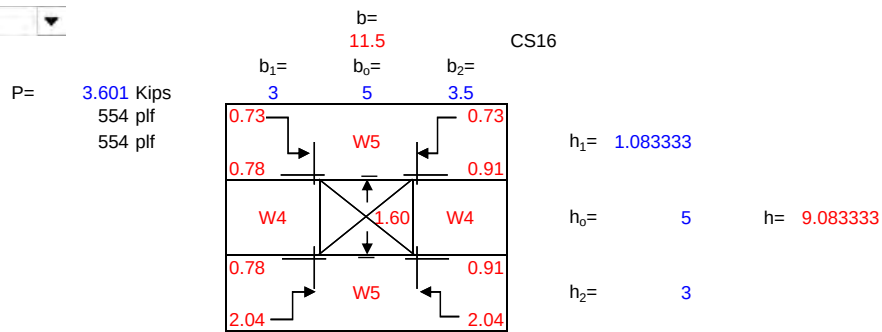
Shear Wall Line 2B-L3-2 roof

W Designation



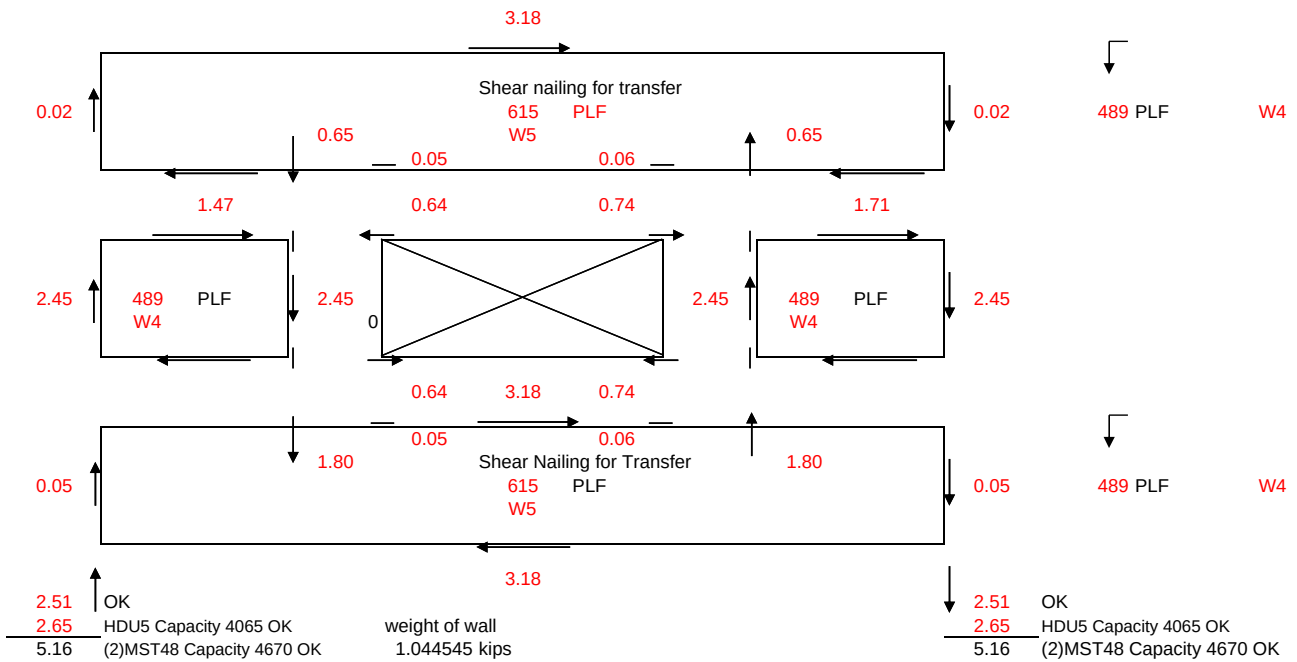
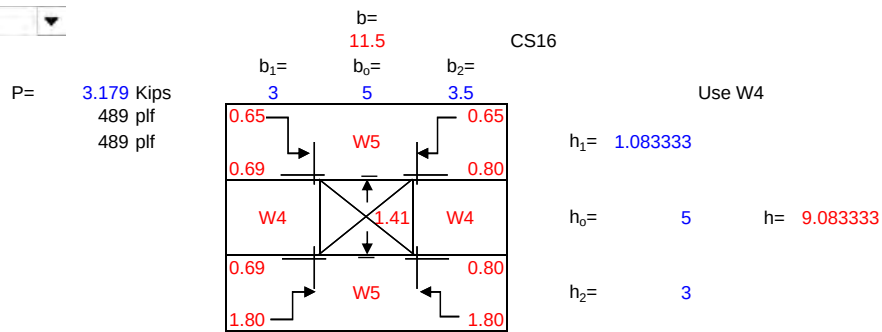
Shear Wall Line 2B-L3-3 1st

W Designation



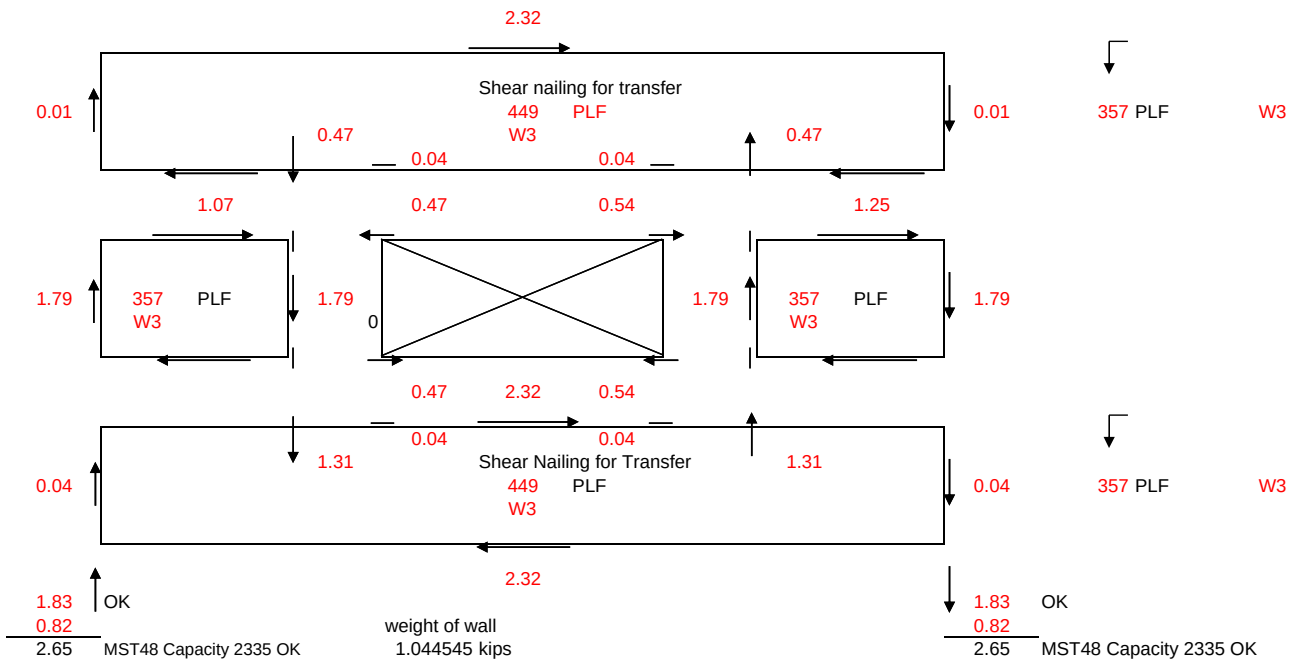
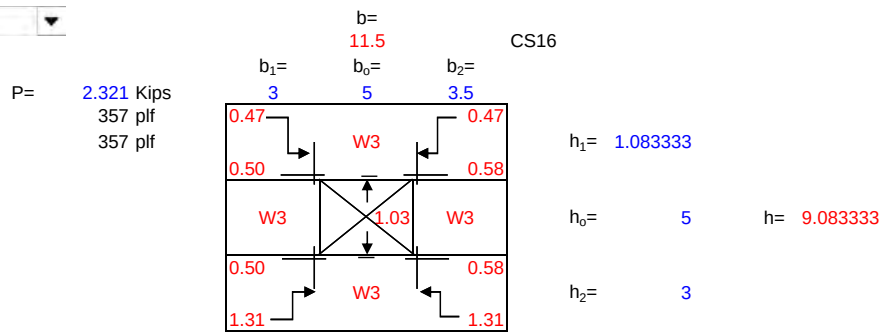
Shear Wall Line 2B-L3-3 2nd

W Designation



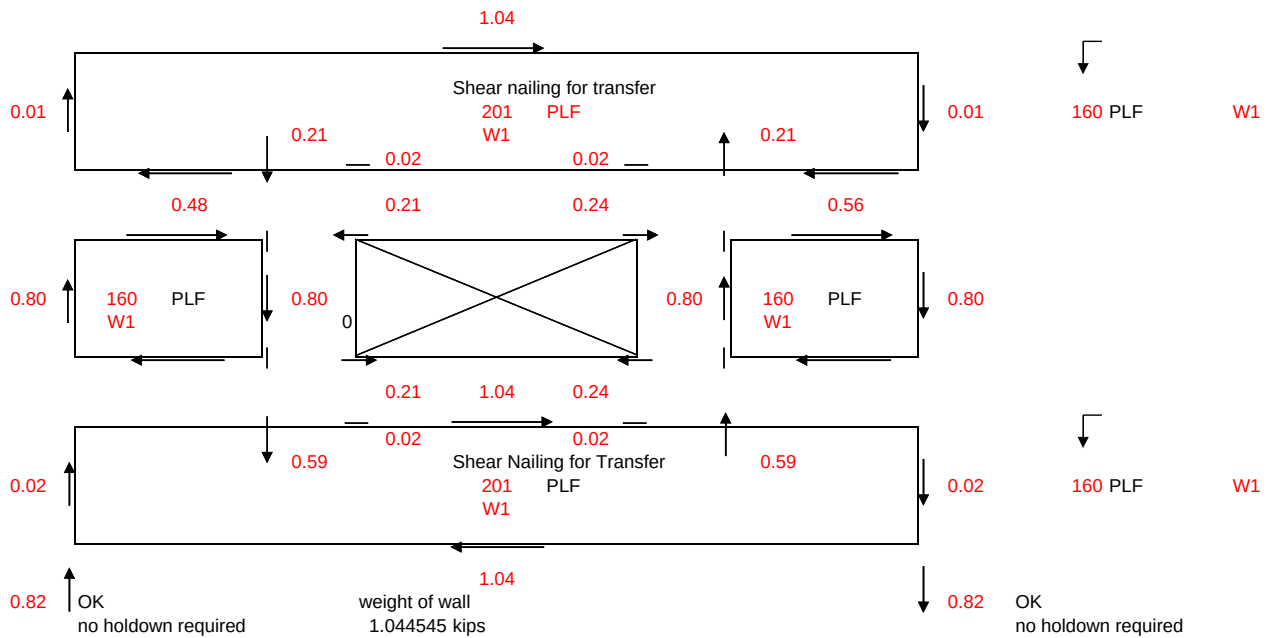
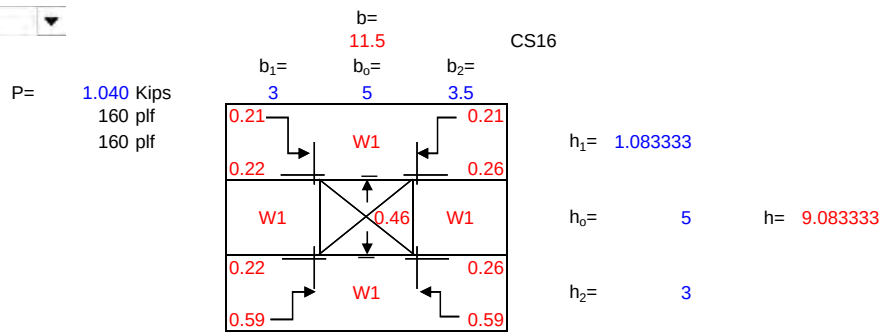
Shear Wall Line 2B-L3-3 3rd

W Designation



Shear Wall Line 2B-L3-3 roof

W Designation





Job # 23.007 Sheet:

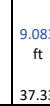
Design: TLC Date: 5/26

Checked: Date:

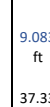
Project: Bradley Height Apartments

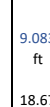
B-T1 end (3 story + Basement)

0.5 (ft) holdown dist from end

Roof: W1	Wind (ASD): 2.857 kips		77 #/ft		77 #/ft		77 #/ft		77 #/ft		77 #/ft	
	Seismic (ASD): 5.498 kips		147 #/ft		147 #/ft		147 #/ft		147 #/ft		147 #/ft	
											9.083 ft	
	9.417 ft	9.25 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	9.25 ft	9.417 ft	37.33	Actual
Distribution L	9.417 ft	9.25 ft	0 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	0	178.8	178.8		
$0.6M_R$ (#-ft) =	4757	4590	0	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	W E		
PLF	77 147	77 147	0 0	0 0	0 0	0 0	0 0	0 0	77 147	77 147		
M_{tot} (#-ft) =	6545 12597	6429 12374	0 0	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	0 0	210 890	200 879		
Holdown	1000 -	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	No Holdown OK		

3rd Floor: W2	Wind (ASD): 1.866 kips		127 #/ft		127 #/ft		127 #/ft		127 #/ft		127 #/ft	
	Seismic (ASD): 6.388 kips		318 #/ft		318 #/ft		318 #/ft		318 #/ft		318 #/ft	
											9.083 ft	
	9.417 ft	9.25 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	9.25 ft	9.417 ft	37.33	Actual
Distribution L	9.417 ft	9.25 ft	0 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	0	221.9	234.9		
$0.6M_R$ (#-ft) =	6249	5696	0	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	W E		
PLF	127 318	127 318	0 0	0 0	0 0	0 0	0 0	0 0	127 318	127 318		
M_{tot} (#-ft) =	10821 27233	10629 26751	0 0	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	0 0	774 3296	713 3233		
Holdown	3356 S3	3356 S3	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	3356 S3	3356 S3		
	MST60 OK	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 W3	Wind (ASD): 1.851 kips		176 #/ft		176 #/ft		176 #/ft		176 #/ft		176 #/ft	
	Seismic (ASD): 3.771 kips		419 #/ft		419 #/ft		419 #/ft		419 #/ft		419 #/ft	
											9.083 ft	
	9.417 ft	9.25 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	9.25 ft	9.417 ft	37.33	Actual
Distribution L	9.417 ft	9.25 ft	0 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	0	221.9	234.9		
$0.6M_R$ (#-ft) =	6249	5696	0	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	W E		
PLF	176 419	176 419	0 0	0 0	0 0	0 0	0 0	0 0	176 419	176 419		
M_{tot} (#-ft) =	15061 35872	14795 35237	0 0	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	0 0	1814 6672	1701 6555		
Holdown	6970 H4	6970 H4	1000 -	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	No Holdown OK	(2) MST60 OK	(2) MST60 OK		
	Load above to foundation											

1st Floor W4	Wind (ASD): -2.148 kips		237 #/ft		237 #/ft		237 #/ft		237 #/ft		237 #/ft	
	Seismic (ASD): -6.675 kips		481 #/ft		481 #/ft		481 #/ft		481 #/ft		481 #/ft	
											9.083 ft	
	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	9.25 ft	9.417 ft	18.67	Actual
Distribution L	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	9.25 ft	9.417 ft	18.67	Distribu
$h/b_s =$									0.982 W4	0.965 W4		
DL w (plf) =	0	0	0	0	0	0	0	0	221.9	234.9		
$0.6M_R$ (#-ft) =	0	0	0	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	W E		
PLF	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	237 481	237 481		
M_{tot} (#-ft) =	0 0	0 0	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	0 0	0 0	3440 10641	3275 10469		
Holdown	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	9535 H5	9535 H5		
	1.05	No Holdown NG	No Holdown NG	No Holdown NG	No Holdown NG	No Holdown NG	No Holdown NG	No Holdown NG	HDU11 NG	HDU11 NG		
	concrete foundation OK											
	OK By Inspection OK By Inspection											
	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

2B-T1 end (3 story)

0.5 (ft) holddown dist from end

Roof: W1	Wind (ASD): 2.857 kips		77 #/ft		77 #/ft		77 #/ft		77 #/ft	
	Seismic (ASD): 5.498 kips		147 #/ft		147 #/ft		147 #/ft		147 #/ft	
										9.083 ft
	9.417 ft	9.25 ft	0 ft	0 ft	0 ft	0 ft	0 ft	9.25 ft	9.417 ft	37.33
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
h/b _s = 0.965 W1	0.982 W1							0.982 W1	0.965 W1	
DL w (plf) = 178.8	178.8							178.8	178.8	
0.6M _R (#-ft) = 4757	4590							4590	4757	
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	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	0 0	6429 12374	6545 12597	
F (#) = 200 879	210 890	0 0	0 0	0 0	0 0	0 0	0 0	210 890	200 879	
Holddown	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	
	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	

3rd Floor: W2	Wind (ASD): 1.866 kips		127 #/ft		127 #/ft		127 #/ft		127 #/ft	
	Seismic (ASD): 6.388 kips		318 #/ft		318 #/ft		318 #/ft		318 #/ft	
										9.083 ft
	9.417 ft	9.25 ft	0 ft	0 ft	0 ft	0 ft	0 ft	9.25 ft	9.417 ft	37.33
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
h/b _s = 0.965 W2	0.982 W2							0.982 W2	0.965 W2	
DL w (plf) = 234.9	221.9							221.9	234.9	
0.6M _R (#-ft) = 6249	5696							5696	6249	
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	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	0 0	10629 26751	10821 27233	
F (#) = 713 3233	774 3296	0 0	0 0	0 0	0 0	0 0	0 0	774 3296	713 3233	
Holddown	3356 S3	3356 S3	1000 -	1000 -	2335 S2	1000 -	1000 -	3356 S3	3356 S3	
	MST60 OK	MST60 OK	No Holddown OK	No Holddown OK	MST48 OK	No Holddown OK	No Holddown OK	MST60 OK	MST60 OK	

2nd Floor W3	Wind (ASD): 1.851 kips		176 #/ft		176 #/ft		176 #/ft		176 #/ft	
	Seismic (ASD): 3.771 kips		419 #/ft		419 #/ft		419 #/ft		419 #/ft	
										9.083 ft
	9.417 ft	9.25 ft	0 ft	0 ft	0 ft	0 ft	0 ft	9.25 ft	9.417 ft	37.33
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
h/b _s = 0.965 W3	0.982 W3							0.982 W3	0.965 W3	
DL w (plf) = 234.9	221.9							221.9	234.9	
0.6M _R (#-ft) = 6249	5696							5696	6249	
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	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	0 0	14795 35237	15061 35872	
F (#) = 1701 6555	1814 6672	0 0	0 0	0 0	0 0	0 0	0 0	1814 6672	1701 6555	
Holddown	6970 H4	6970 H4	1000 -	1000 -	1000 -	1000 -	1000 -	6970 H4	6970 H4	
	1.05 HDU8 OK	HDU8 OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	HDU8 OK	HDU8 OK	



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 Seismic (ASD): 6.720 kips				65 #/ft 126 #/ft				65 #/ft 126 #/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
h/b _s = DL w (plf) = 0.6M _R (#-ft) =	0.534 W1 178.8 15505	0 0 0	0 0 0	0 0 0	0.466 W1 178.8 20400	0 0 0	0 0 0	0 0 0	0.534 W1 178.8 15505	
PLF	W E 65 126	W E 0 0	W E 0 0	W E 0 0	W E 65 126	W E 0 0	W E 0 0	W E 0 0	W E 65 126	
M _{tot} (#-ft) = F (#) =	10077 19396 -329 236	0 0 0 0	0 0 0 0	0 0 0 0	11559 22248 -465 97	0 0 0 0	0 0 0 0	0 0 0 0	10077 19396 -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	

Actual
Distribu

3rd Floor: W2	Wind (ASD): 2.281 kips Seismic (ASD): 7.808 kips				108 #/ft 272 #/ft				108 #/ft 272 #/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
h/b _s = DL w (plf) = 0.6M _R (#-ft) =	0.534 W2 241.4 20931	0 0 0	0 0 0	0 0 0	0.466 W2 242.5 27668	0 0 0	0 0 0	0 0 0	0.534 W2 241.4 20931	
PLF	W E 108 272	W E 0 0	W E 0 0	W E 0 0	W E 108 272	W E 0 0	W E 0 0	W E 0 0	W E 108 272	
M _{tot} (#-ft) = F (#) =	16661 41931 -588 1509	0 0 0 0	0 0 0 0	0 0 0 0	19111 48097 -916 1172	0 0 0 0	0 0 0 0	0 0 0 0	16661 41931 -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	

Actual
Distribu

with point load ok by inspection

2nd Floor W2	Wind (ASD): 2.262 kips Seismic (ASD): 4.609 kips				150 #/ft 358 #/ft				150 #/ft 358 #/ft	
	use W3 				use W3 				use W3 	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
h/b _s = DL w (plf) = 0.6M _R (#-ft) =	0.534 W2 241.4 20931	0 0 0	0 0 0	0 0 0	0.466 W2 242.5 27668	0 0 0	0 0 0	0 0 0	0.534 W2 241.4 20931	
PLF	W E 150 358	W E 0 0	W E 0 0	W E 0 0	W E 150 358	W E 0 0	W E 0 0	W E 0 0	W E 150 358	
M _{tot} (#-ft) = F (#) =	23191 55233 -451 3587	0 0 0 0	0 0 0 0	0 0 0 0	26601 63355 -972 3051	0 0 0 0	0 0 0 0	0 0 0 0	23191 55233 -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	

Actual
Distribu

Load above to foundation

HDU5 above

1st Floor W3	Wind (ASD): -2.625 kips Seismic (ASD): -8.159 kips				202 #/ft 410 #/ft				202 #/ft 410 #/ft	
					use W4 				use W4 	9.083 ft
Distribution L	0 ft	0 ft	0 ft	0 ft	9.75 ft	0 ft	0 ft	0 ft	17 ft	26.75
h/b _s = DL w (plf) = 0.6M _R (#-ft) =	0 0 0	0 0 0	0 0 0	0 0 0	0.932 W3 242.5 6917	0 0 0	0 0 0	0 0 0	0.534 W3 241.4 20931	
PLF	W E 0 0	W E 0 0	W E 0 0	W E 0 0	W E 202 410	W E 0 0	W E 0 0	W E 0 0	W E 202 410	
M _{tot} (#-ft) = F (#) =	0 0 -451 3587	0 0 0 0	0 0 0 0	0 0 0 0	17910 36344 217 6232	0 0 0 0	0 0 0 0	0 0 0 0	31227 63369 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	

Actual
Distribu

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

2B-T2 stairs (3 story)

0.5 (ft) holddown dist from end

Roof: W1	Wind (ASD): 3.491 kips		65 #/ft		65 #/ft		65 #/ft		65 #/ft		65 #/ft	
	Seismic (ASD): 6.720 kips		126 #/ft		126 #/ft		126 #/ft		126 #/ft		126 #/ft	
										9.083 ft		
	17 ft	0 ft	0 ft	0 ft	19.5 ft	0 ft	0 ft	0 ft	0 ft	17 ft	53.5	
Distribution L	17 ft	0 ft	0 ft	0 ft	19.5 ft	0 ft	0 ft	0 ft	0 ft	17 ft	53.5	
h/b _s = 0.534 W1					0.466 W1				0.534 W1			
DL w (plf) = 178.8	0		0		178.8		0		178.8			
0.6M _R (#-ft) = 15505	0		0		20400		0		15505			
PLF	W	E	W	E	W	E	W	E	W	E	W	E
	65	126	0	0	0	0	65	126	0	0	65	126
M _{ot} (#-ft) = 10077 19396	0		0		11559 22248		0		0		10077 19396	
F (#) = -329 236	0		0		-465 97		0		0		-329 236	
Holddown	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -		
	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK		

Actual
Distribu

3rd Floor: W2	Wind (ASD): 2.281 kips		108 #/ft		108 #/ft		108 #/ft		108 #/ft		108 #/ft	
	Seismic (ASD): 7.808 kips		272 #/ft		272 #/ft		272 #/ft		272 #/ft		272 #/ft	
										9.083 ft		
	17 ft	0 ft	0 ft	0 ft	19.5 ft	0 ft	0 ft	0 ft	0 ft	17 ft	53.5	
Distribution L	17 ft	0 ft	0 ft	0 ft	19.5 ft	0 ft	0 ft	0 ft	0 ft	17 ft	53.5	
h/b _s = 0.534 W2					0.466 W2				0.534 W2			
DL w (plf) = 241.4	0		0		242.5		0		241.4			
0.6M _R (#-ft) = 20931	0		0		27668		0		20931			
PLF	W	E	W	E	W	E	W	E	W	E	W	E
	108	272	0	0	0	0	108	272	0	0	108	272
M _{ot} (#-ft) = 16661 41931	0		0		19111 48097		0		0		16661 41931	
F (#) = -588 1509	0		0		-916 1172		0		0		-588 1509	
Holddown	2335 S2	1000 -	1000 -	1000 -	2335 S2	1000 -	1000 -	1000 -	1000 -	2335 S2		
	MST48 OK	No Holddown OK	No Holddown OK	No Holddown OK	MST48 OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	MST48 OK		

Actual
Distribu

2nd Floor W2	Wind (ASD): 2.262 kips		150 #/ft		150 #/ft		150 #/ft		150 #/ft		150 #/ft	
	Seismic (ASD): 4.609 kips		358 #/ft		358 #/ft		358 #/ft		358 #/ft		358 #/ft	
										9.083 ft		
	17 ft	0 ft	0 ft	0 ft	19.5 ft	0 ft	0 ft	0 ft	0 ft	17 ft	53.5	
Distribution L	17 ft	0 ft	0 ft	0 ft	19.5 ft	0 ft	0 ft	0 ft	0 ft	17 ft	53.5	
h/b _s = 0.534 W2					0.466 W2				0.534 W2			
DL w (plf) = 241.4	0		0		242.5		0		241.4			
0.6M _R (#-ft) = 20931	0		0		27668		0		20931			
PLF	W	E	W	E	W	E	W	E	W	E	W	E
	150	358	0	0	0	0	150	358	0	0	150	358
M _{ot} (#-ft) = 23191 55233	0		0		26601 63355		0		0		23191 55233	
F (#) = -451 3587	0		0		-972 3051		0		0		-451 3587	
Holddown	4065 H3	6970 H4	1000 -	1000 -	9535 H5	1000 -	1000 -	6970 H4	9535 H5			
	1.05	HDU5 OK	HDU8 OK	No Holddown OK	No Holddown OK	HDU11 OK	No Holddown OK	No Holddown OK	HDU8 OK	HDU11 OK		

Actual
Distribu

Job # 23.002

Sheet:



Designed: TLC

Date: 5/29/23

Checked:

Date:

Project: Bradley Heights - 3 Story & basement Story

Vertical Distribution 2 Bedroom units

$$F_x = C_{vx} V \quad (12.8-11)$$

$$C_{vx} = \frac{w_x h_x^k}{\sum w_i h_i^k}$$

$$T_a = C_t h_n^x = 0.3240544 \quad (12.8-7)$$

$$C_t = 0.02 \quad \text{Table 12.8-2}$$

$$x = 0.75 \quad \text{Table 12.8-2}$$

$$H_n = 41 \text{ ft} \quad \text{Structural Height defined in 11.2}$$

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

Job # 23.002 Sheet:

Designed: TLC Date: 5/29/23

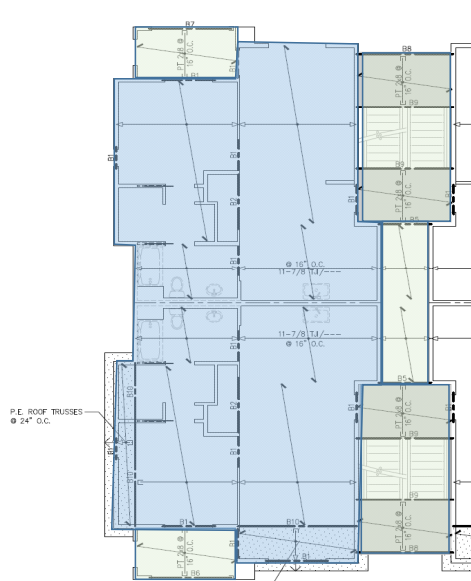
Checked: Date:

SOLUTIONS 4 STRUCTURES Inc.

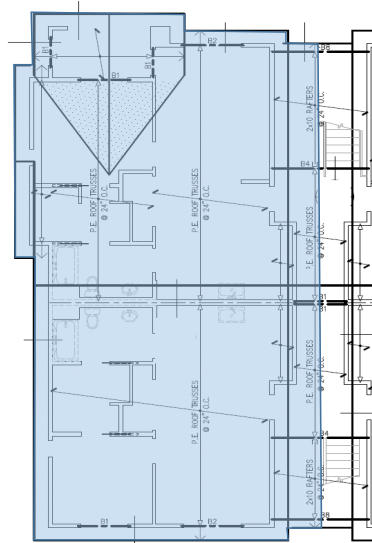
Project: Bradley Heights - 3 Story & basement Story

Seismic Design: 1 Bedroom units

	Low Flat roof
	Typ Roof/Floor
	Exit 3" Concrete
	not used



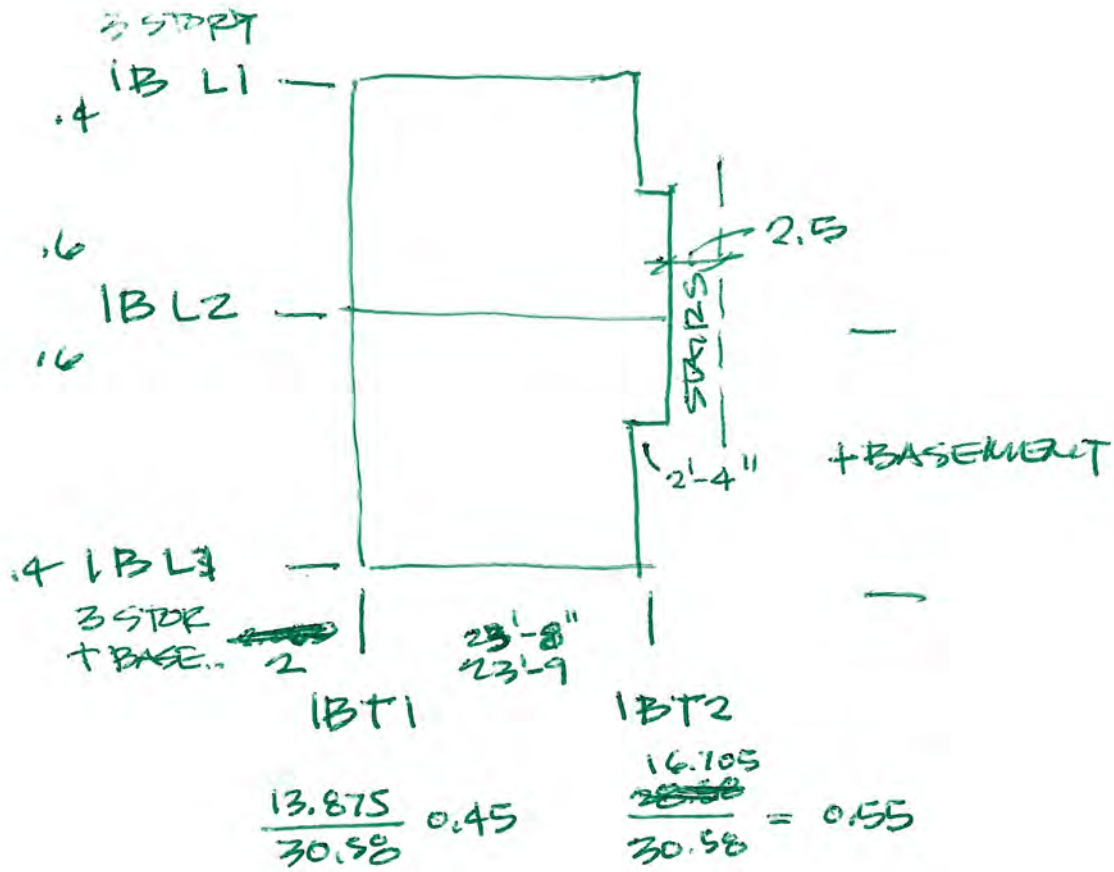
2.083 26 2.5
2nd - 3rd Floors



2.083 26 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:	
18x1		Roof				0.1110W		With		156 plf	
3 story		Typ Roof				20878		Vertical Distribution		0.615385 0.384615	
		Low Roof				0				L(ft) windward leeward	
		Ext		64		2906.56		2801		31.00 2984 1865 2984	
		Int		32		1453.28		145.5968			
		Ext		38.17		1733.491		2702		30.58 2944 1840 2944	
		Int		38.17		1733.491		142.304			
		3rd Floor				0.1110W				102 plf	
		Typ Floor				19630					
		Other Floor				18236				L(ft) windward leeward	
		Ext		64		5813.12		5171		31.00 1950 1218 1950	
		Int		32		2906.56		185.5897			
		Ext		38.17		3466.981		4973		30.58 1923 1202 1923	
		Int		38.17		3466.981		180.8369			
		2nd Floor				0.1110W				101 plf	
		Typ Floor				19630					
		Other Floor				18236				L(ft) windward leeward	
		Ext		64		5813.12		5171		31.00 1934 1208 1934	
		Int		32		2906.56		1.797587 92.79485			
		Ext		38.17		3466.981		4973		30.58 1908 1192 1908	
		Int		38.17		3466.981		1.798306 90.41845			
								2hr		Wind:	

1 BEDROOM



1Bx1 3 story + B	Roof		L (ft)	W or h(ft)	psf	W (#)		0.1110W		With		156 plf				
	Typ Roof		949	1	22	20878		20878	2317	Vertical Distribution		L(ft) windward leeward				
	Low Roof		0	1	22	0										
		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				
	e	3rd Floor		L (ft)	W or h(ft)	psf	W (#)		0.1110W		With		102 plf			
		Typ Floor		755	1	26	19630		37866	4203			L(ft) windward leeward			
		Other Floor		388	1	47	18236									
		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				
e		2nd Floor		L (ft)	W or h(ft)	psf	W (#)		0.1110W		With		101 plf			
		Typ Floor		755	1	26	19630		37866	4203			L(ft) windward leeward			
		Other Floor		388	1	47	18236									
		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				
	b1, b2	1st Floor		L (ft)	W or h(ft)	psf	W (#)		0.1110W		With		101 plf			
		Typ Floor		755	1	26	19630		37866	4203			L(ft) windward leeward			
		Other Floor		388	1	47	18236									
		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

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

$$F_x = C_{vx} V \quad (12.8-11)$$

$$F_{dx} = \frac{\sum_{i=x}^n F_i}{\sum_{i=x}^n w_i} w_{px} \quad (12.10-1)$$

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

$$I_e = 1$$

$$S_{DS} = 0.8787$$

$$\text{Minimum: } F_{px} = 0.2S_{DS}I_e w_{px}$$

$$\text{Maximum: } F_{px} = 0.4S_{DS}I_e w_{px}$$

3- story	B1								use	
	→	F_i	$\sum_{i=x}^n F_i$	w_{xp}	$\sum_{i=x}^n w_i$	F_{px}	Min	Max	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								use	
	↑	F_i	$\sum_{i=x}^n F_i$	w_i	$\sum_{i=x}^n w_i$	F_{px}	Min	Max	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 + EB1									use	
	→	F_i	$\sum_{i=x}^n F_i$	w_{xp}	$\sum_{i=x}^n w_i$	F_{px}	Min	Max	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 + EB1									use	
	↑	F_i	$\sum_{i=x}^n F_i$	w_i	$\sum_{i=x}^n w_i$	F_{px}	Min	Max	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

[illegible]



Job # 23.007 Sheet:

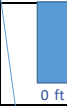
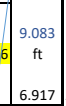
Designer: TLC Date: 5/26

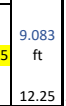
Checked: Date:

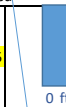
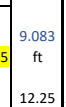
Project: Bradley Height Apartments

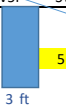
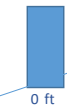
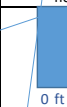
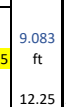
1B-11

0.5 (ft) holdown dist from end

Roof: W2	Wind (ASD): 1.194 kips		173 #/ft		173 #/ft		173 #/ft		173 #/ft		173 #/ft	
	Seismic (ASD): 1.906 kips		276 #/ft		276 #/ft		276 #/ft		276 #/ft		276 #/ft	
	use W1P	SW 1B-L3 -1			use W2P	SW 1B-L3 -2			not used			
												
	0 ft	0 ft	0 ft	0 ft	3.417 ft	3.5 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft
Distribution L	0 ft	0 ft	0 ft	0 ft	3.417 ft	3.5 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft
h/b _s =					1.756 W2	1.714 W2						
DL w (plf) =	427.2	427.2	0	0	382.3	382.3	0	0	429.1	429.1	0	0
0.6M _R (#-ft) =	0	0	0	0	1339	1405	0	0	0	0	0	0
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E
M _{br} (#-ft) =	0	0	0	0	173	276	173	276	0	0	0	0
F (#) =	0	0	0	0	5356	8554	5486	8763	0	0	0	0
Holdown	1000	-	1000	-	1256	S1	1256	S1	1000	-	1000	-
	No Holdown OK	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	No Holdown OK	No Holdown OK
	(see calc next pp OK)											

3rd Floor: W3	Wind (ASD): 0.780 kips		161 #/ft		163 #/ft		163 #/ft		163 #/ft		163 #/ft	
	Seismic (ASD): 2.71 kips		377 #/ft		377 #/ft		377 #/ft		377 #/ft		377 #/ft	
	use W3P	SW 2B-L3 -1			use W4P	SW 2B-L3 -2			not used			
												
	3 ft	2.333 ft	0 ft	0 ft	3.417 ft	3.5 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft
Distribution L	3 ft	2.178 ft	0 ft	0 ft	3.417 ft	3.5 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft
h/b _s =	1.667 W3	2.143 W3			1.756 W3	1.714 W3						
DL w (plf) =	108.2	108.2	0	0	108.2	108.2	0	0	108.2	108.2	0	0
0.6M _R (#-ft) =	292	177	0	0	379	398	0	0	0	0	0	0
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E
M _{br} (#-ft) =	163	382	152	356	163	382	163	382	0	0	0	0
F (#) =	4446	10401	3228	7550	5064	11845	5187	12134	0	0	0	0
Holdown	2335	S2	2335	S2	1000	-	2335	S2	2335	S2	1000	-
	MST48 NG	MST48 NG	No Holdown OK	No Holdown OK	MST48 NG	MST48 NG	No Holdown OK	No Holdown OK	No Holdown OK	No Holdown OK	No Holdown OK	No Holdown OK
	(see calc next pp OK)											

2nd Floor: W4	Wind (ASD): 0.773 kips		224 #/ft		227 #/ft		227 #/ft		227 #/ft		227 #/ft	
	Seismic (ASD): 1.806 kips		524 #/ft		524 #/ft		524 #/ft		524 #/ft		524 #/ft	
	use W4P	SW 2B-L3 -1			use W6P	SW 2B-L3 -2			not used			
												
	3 ft	2.333 ft	0 ft	0 ft	3.417 ft	3.5 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft
Distribution L	3 ft	2.178 ft	0 ft	0 ft	3.417 ft	3.5 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft
h/b _s =	1.667 W4	2.143 W4			1.756 W4	1.714 W4						
DL w (plf) =	108.2	108.2	0	0	108.2	108.2	0	0	108.2	108.2	0	0
0.6M _R (#-ft) =	292	177	0	0	379	398	0	0	0	0	0	0
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E
M _{br} (#-ft) =	227	531	212	496	227	531	227	531	0	0	0	0
F (#) =	6189	14471	4493	10505	7048	16480	7220	16882	0	0	0	0
Holdown	4020	9715	4018	9655	5270	11926	5231	11860	0	0	0	0
	4065	H3	4065	H3	1000	-	4065	H3	4065	H3	1000	-
	HDU5 NG	HDU5 NG	No Holdown OK	No Holdown OK	HDU5 NG	HDU5 NG	No Holdown OK	No Holdown OK	No Holdown OK	No Holdown OK	No Holdown OK	No Holdown OK
	(see calc next pp OK)											

1st Floor: W4	Wind (ASD): 0.773 kips		287 #/ft		291 #/ft		291 #/ft		291 #/ft		291 #/ft	
	Seismic (ASD): 0.903 kips		598 #/ft		598 #/ft		598 #/ft		598 #/ft		598 #/ft	
	use W5P	SW 2B-L3 -1			use W6P	SW 2B-L3 -2			not used			
												
	3 ft	2.333 ft	0 ft	0 ft	3.417 ft	3.5 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft
Distribution L	3 ft	2.178 ft	0 ft	0 ft	3.417 ft	3.5 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft
h/b _s =	1.667 W4	2.143 W4			1.756 W4	1.714 W4						
DL w (plf) =	108.2	108.2	0	0	108.2	108.2	0	0	108.2	108.2	0	0
0.6M _R (#-ft) =	292	177	0	0	379	398	0	0	0	0	0	0
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E	W E
M _{br} (#-ft) =	291	606	272	565	291	606	291	606	0	0	0	0
F (#) =	7931	16506	5758	11982	9033	18798	9253	19257	0	0	0	0
Holdown	7076	16200	7062	16095	8237	18241	8183	18146	0	0	0	0
	6970	H4	6970	H4	1000	-	6970	H4	6970	H4	1000	-
	HDU8 NG	HDU8 NG	No Holdown OK	No Holdown OK	HDU8 NG	HDU8 NG	No Holdown OK	No Holdown OK	No Holdown OK	No Holdown OK	No Holdown OK	No Holdown OK
	(see calc next pp OK)											

1.05



Job # 23.007 Sheet:

Designer: TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

1B-L2

0.5 (ft) holdown dist from end

Roof: W1	Wind (ASD): 3.581 kips 142 #/ft				142 #/ft				221 #/ft	
	Seismic (ASD): 5.568 kips									
					Use W2 					9.083 ft
	0 ft	0 ft	0 ft	0 ft	25.17 ft	0 ft	0 ft	0 ft	0 ft	25.17
Distribution L	0 ft	0 ft	0 ft	0 ft	25.17 ft	0 ft	0 ft	0 ft	0 ft	25.17
h/b _s =					0.361 W1					
DL w (plf) =					384.2					
0.6M _R (#-ft) =					73002					
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	0 0	0 0	0 0	0 0	142 221	0 0	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	0 0	
F (#) =	0 0	0 0	0 0	0 0	-1641 -909	0 0	0 0	0 0	0 0	
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: W4	Wind (ASD): 2.339 kips 235 #/ft				235 #/ft				520 #/ft	
	Seismic (ASD): 7.516 kips									
										9.083 ft
	0 ft	0 ft	0 ft	0 ft	25.17 ft	0 ft	0 ft	0 ft	0 ft	25.17
Distribution L	0 ft	0 ft	0 ft	0 ft	25.17 ft	0 ft	0 ft	0 ft	0 ft	25.17
h/b _s =					0.361 W4					
DL w (plf) =					108.2	184				
0.6M _R (#-ft) =					23269					
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	0 0	0 0	0 0	0 0	235 520	0 0	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	0 0	
F (#) =	0 0	0 0	0 0	0 0	-404 2966	0 0	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 W5	Wind (ASD): 2.320 kips 327 #/ft				327 #/ft				696 #/ft	
	Seismic (ASD): 4.436 kips									
										9.083 ft
	0 ft	0 ft	0 ft	0 ft	25.17 ft	0 ft	0 ft	0 ft	0 ft	25.17
Distribution L	0 ft	0 ft	0 ft	0 ft	25.17 ft	0 ft	0 ft	0 ft	0 ft	25.17
h/b _s =					0.361 W5					
DL w (plf) =					108.2					
0.6M _R (#-ft) =					23269					
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	0 0	0 0	0 0	0 0	327 696	0 0	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	0 0	
F (#) =	0 0	0 0	0 0	0 0	1687 8474	0 0	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	

Job # 23.007 Sheet:

Designed TLC **Date:** 5/26

Checked: _____ Date: _____

Project: Bradley Height Apartments

1B-L3

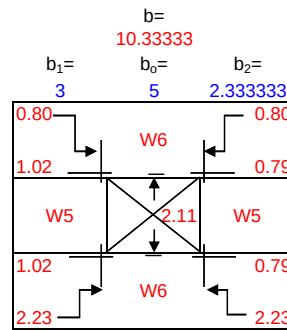
0.5 (ft) holdown dist from end

[illegible]

Shear Wall Line 2B-L3-1 1st

W Designation

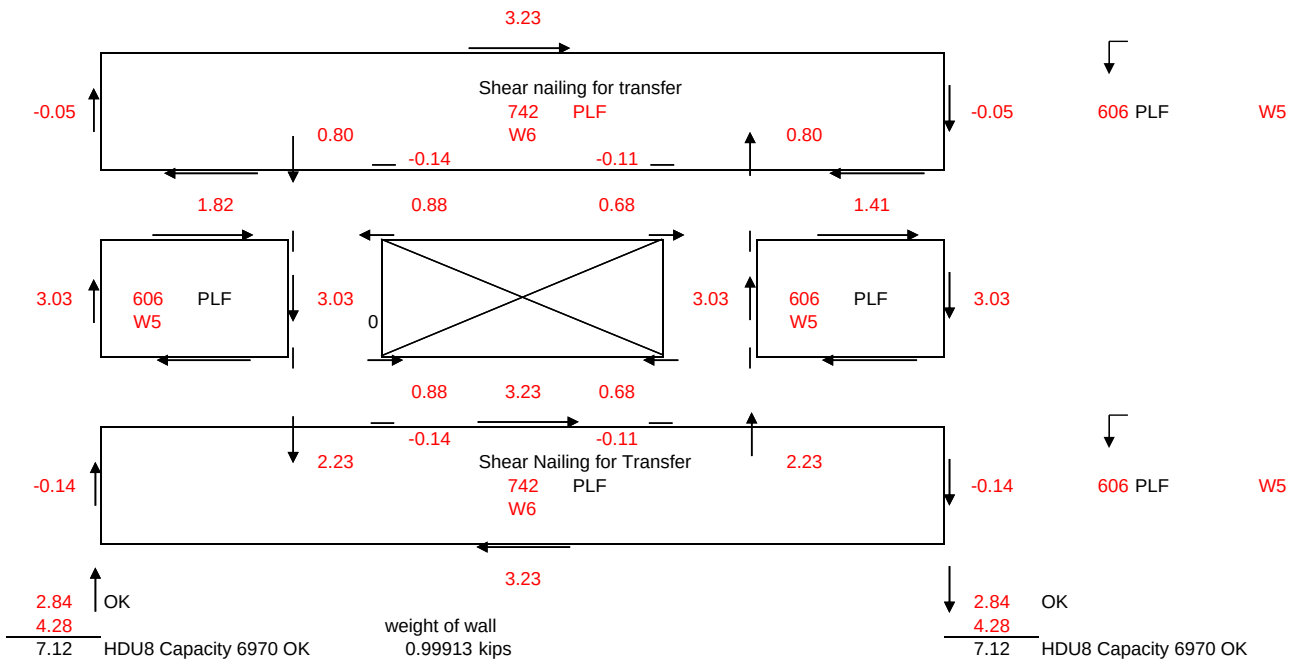
P= 3.232 Kips
606 plf
606 plf



h₁= 1.083333

h₀= 5 h= 9.083333

h₂= 3



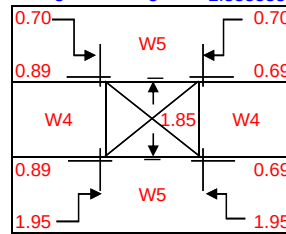
Shear Wall Line 2B-L3-1 2nd

W Designation

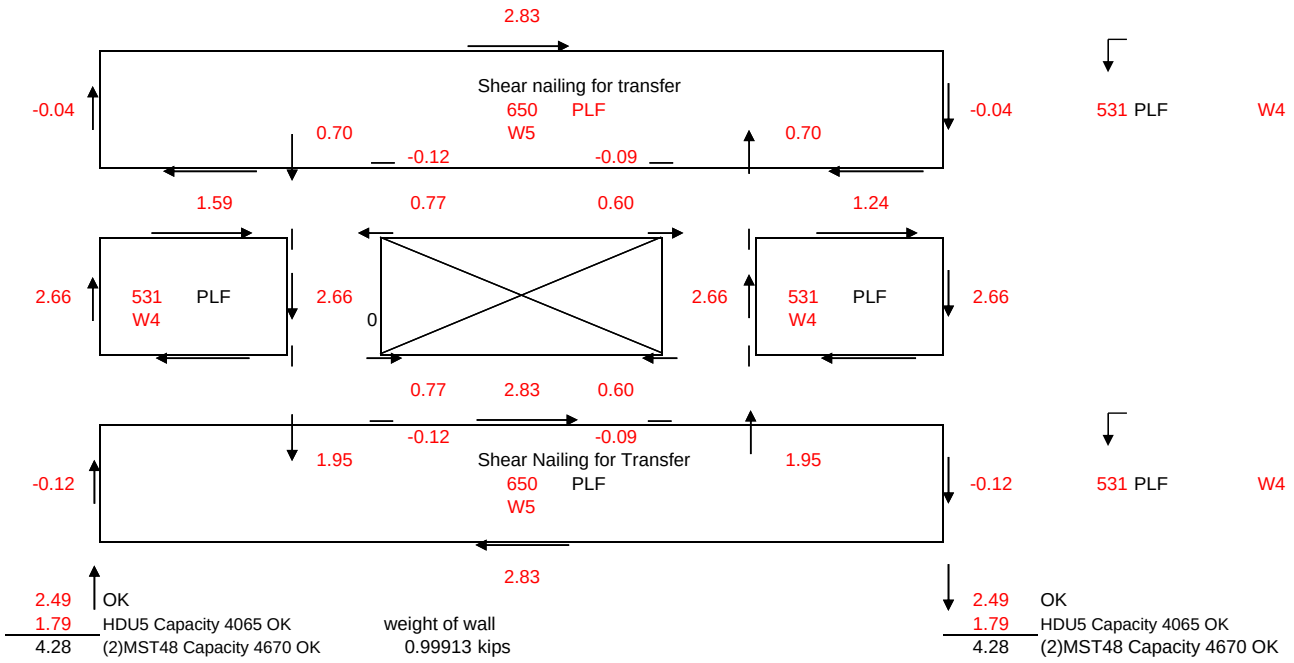
P= 2.832 Kips
531 plf
531 plf

b=0.33333 CS16x2

$b_1 =$	$b_0 =$	$b_2 =$
3	5	2.333333


$$h_1 = 1.083333$$

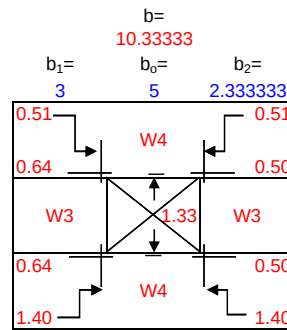
$h_0 = 5$ $h = 9.083333$

$$h_2 = 3$$


Shear Wall Line 1B-L3-1 3rd

W Designation

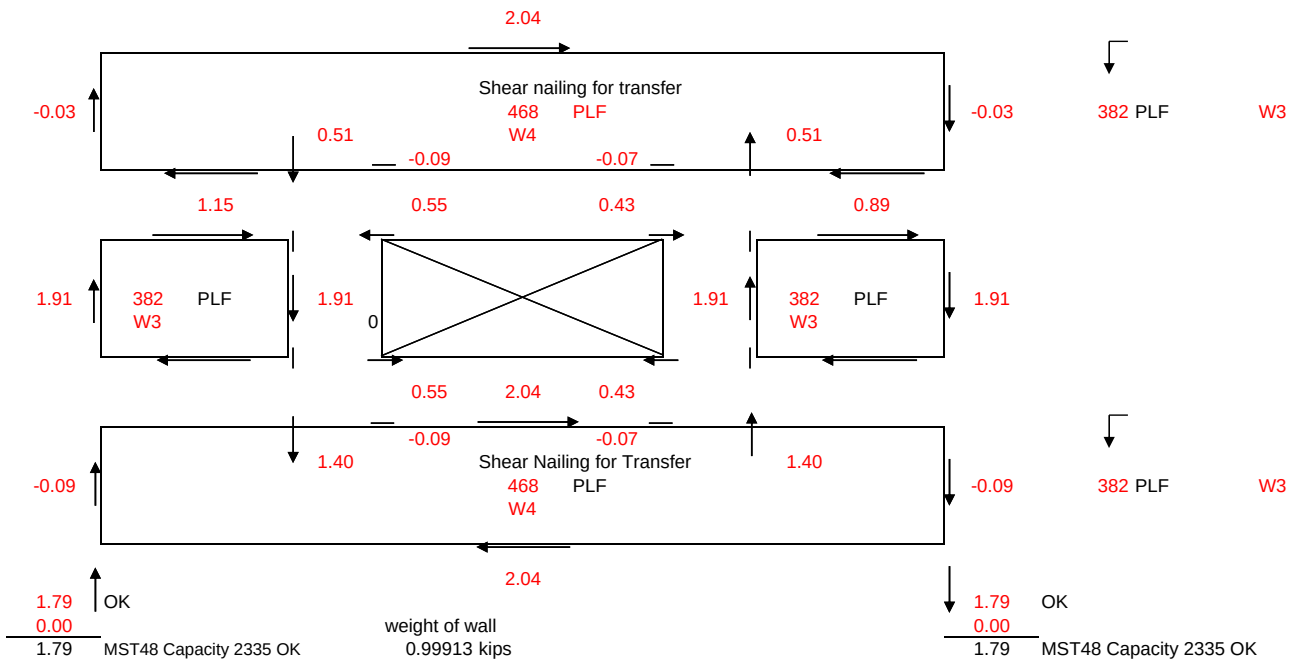
P= 2.037 Kips
382 plf
382 plf



h₁= 1.083333

h₀= 5 h= 9.083333

h₂= 3



Shear Wall Line 1B-L3-1 roof not used

W Designation

CS16

$b = 10.33333$

$b_1 = 3$ $b_0 = 5$ $b_2 = 2.33333$

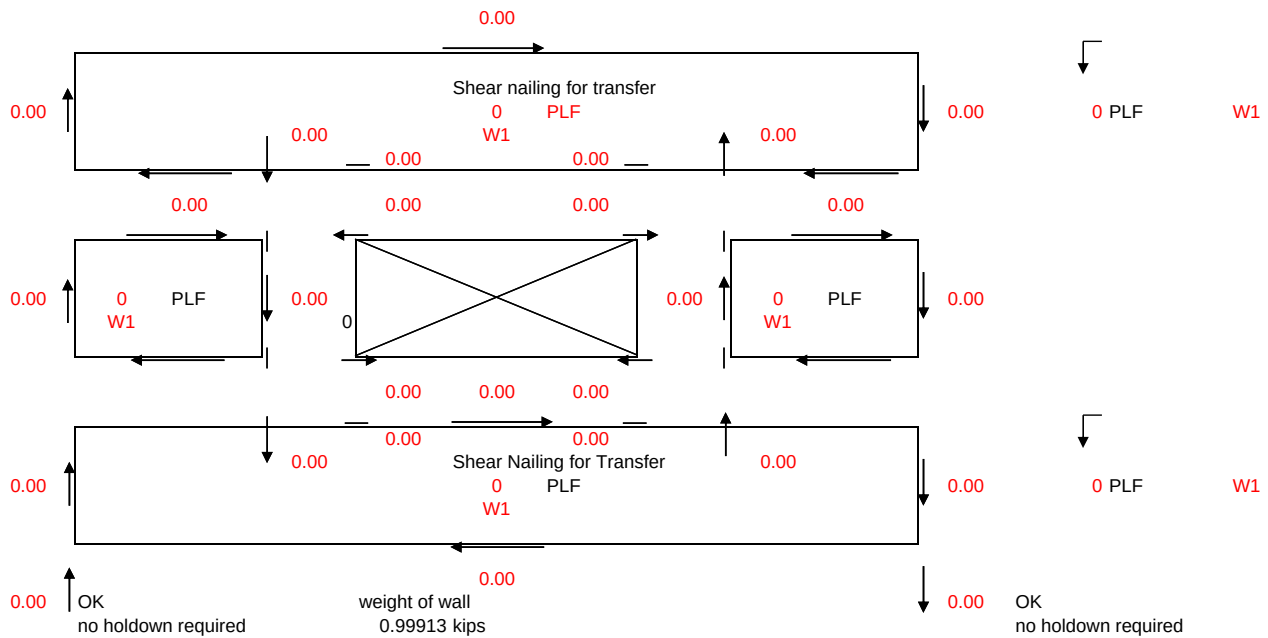
$P = 0.000$ Kips
0 plf
0 plf

$h_1 = 1.08333$

$h_0 = 5$

$h_2 = 3$

$h_1 = 1.083333$
 $h_0 = 5$ $h = 9.083333$
 $h_2 = 3$



Shear Wall Line 1B-L3-2 1st

W Designation

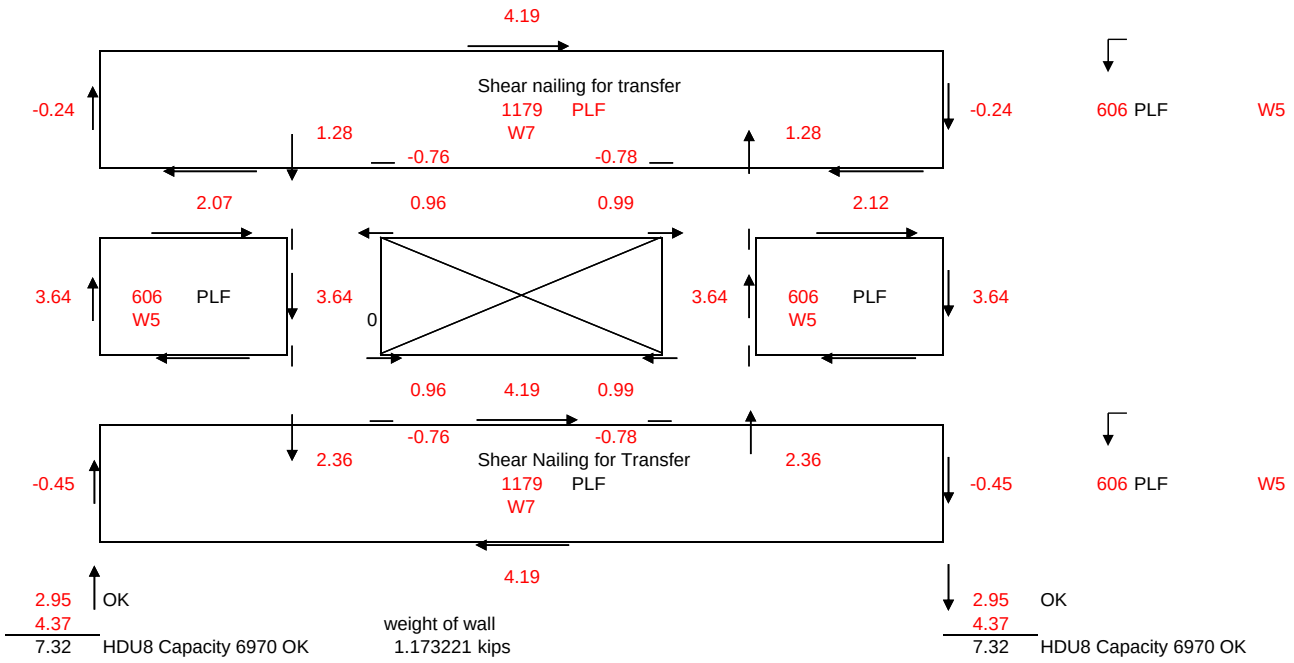
P= 4.192 Kips
606 plf
606 plf

Diagram of a 3x3 crossbar switch with 3 inputs and 3 outputs. The inputs are labeled $b_1 = 3.416667$, $b_0 = 6$, and $b_2 = 3.5$. The outputs are labeled 1.28, 1.72, and 2.36. The switch is controlled by a 3x3 weight matrix W . The weights are: $W_{11} = 1.28$, $W_{12} = 1.72$, $W_{13} = 2.36$, $W_{21} = 1.72$, $W_{22} = 4.99$, $W_{23} = 1.72$, $W_{31} = 1.28$, $W_{32} = 1.72$, $W_{33} = 2.36$. The diagram shows the internal connections and the resulting output values.

CS14x2

$$h_1 = 1.083333$$

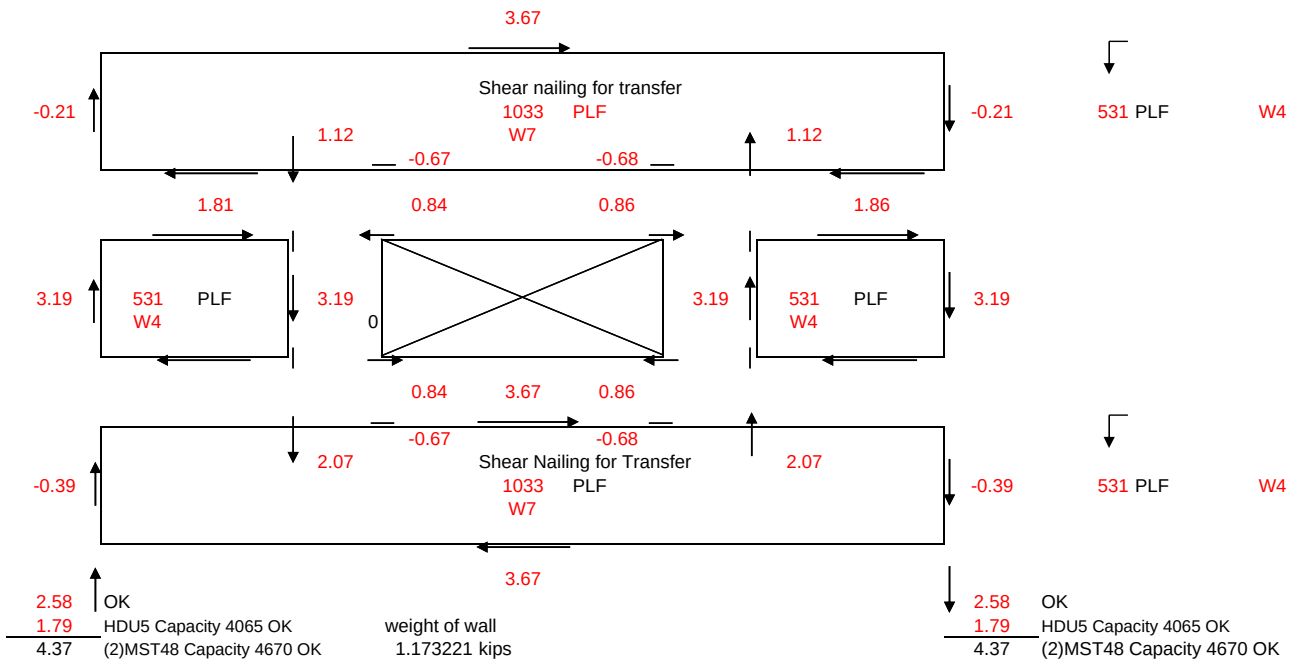
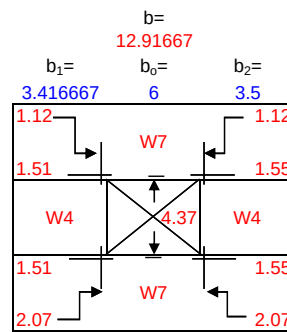
$h_0 = 6$ $h = 9.083333$

$$h_2 = 2$$


Shear Wall Line 1B-L3-2 2nd

W Designation

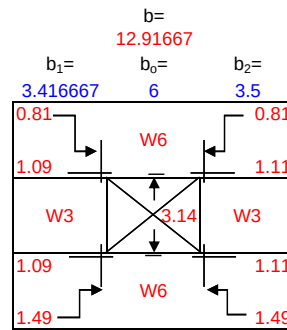
P= 3.673 Kips
531 plf
531 plf



Shear Wall Line 1B-L3-2 3rd

W Designation

P= 2.642 Kips
382 plf
382 plf

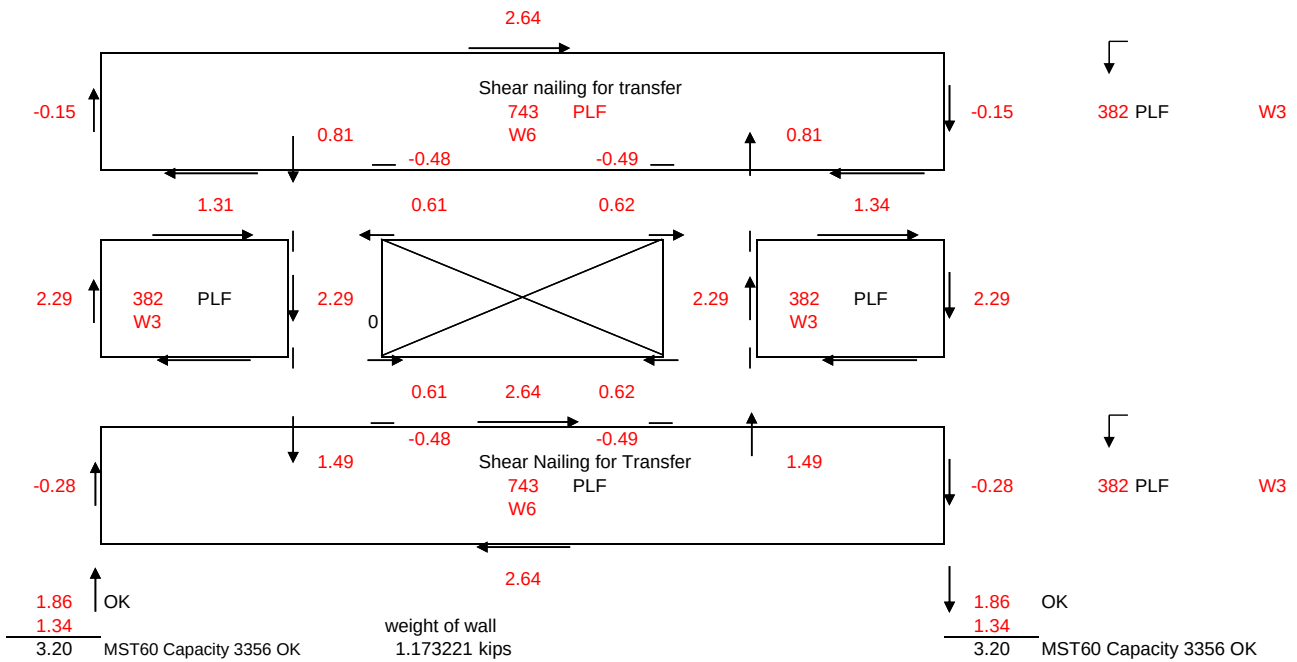


h₁= 1.083333

h₀= 6

h= 9.083333

h₂= 2



Shear Wall Line 1B-L3-2 roof

W Designation

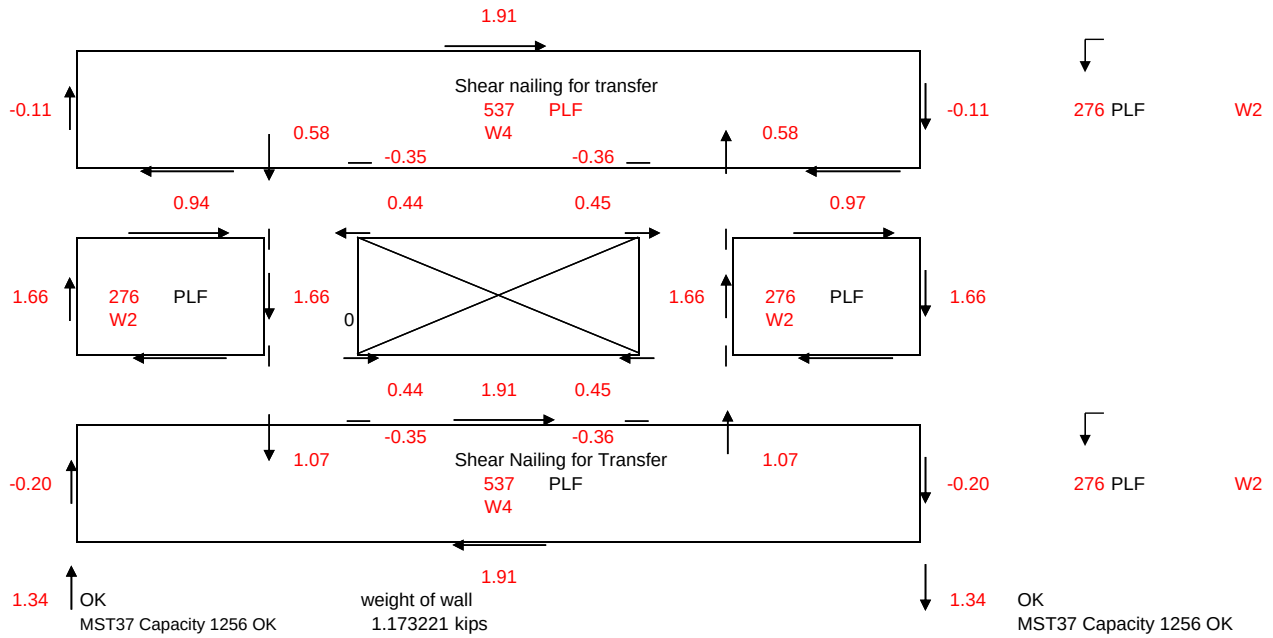
P= 1.909 Kips
276 plf
276 plf

Diagram illustrating a 3x3 grid structure with 12 nodes and 12 edges. The nodes are labeled with values: top row (0.58, 0.79, 0.58), middle row (0.79, 2.27, 0.80), bottom row (1.07, 0.80, 1.07). The edges are labeled with weights: W2 for horizontal edges, W4 for vertical edges, and W4 for diagonal edges. The grid is part of a larger system with parameters $b_1=3.416667$, $b_0=6$, $b_2=3.5$, and $b=12.91667$.

CS14

$$h_1 = 1.083333$$
$$h_o = 6$$

h= 9.083333

$$h_2 = 2$$




Job # 23.007 Sheet:

Design: 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		43 #/ft		43 #/ft		43 #/ft	
W1	Seismic (ASD): 4.027 kips		81 #/ft		81 #/ft		81 #/ft		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			
PLF	43 81	43 81	0 0	0 0	43 81	0 0	0 0	43 81	43 81			
M _{tot} (#-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		72 #/ft		72 #/ft		72 #/ft	
W1	Seismic (ASD): 5.419 kips		191 #/ft		191 #/ft		191 #/ft		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			
PLF	72 191	72 191	0 0	0 0	72 191	0 0	0 0	72 191	72 191			
M _{tot} (#-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		100 #/ft		100 #/ft		100 #/ft	
W2	Seismic (ASD): 3.198 kips		255 #/ft		255 #/ft		255 #/ft		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			
PLF	100 255	100 255	0 0	0 0	100 255	0 0	0 0	100 255	100 255			
M _{tot} (#-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			
	HDUS OK	HDUS OK	No Holdown OK	No Holdown OK	No Holdown NG	No Holdown OK	No Holdown OK	MST60 OK	MST60 OK			
	Load above to foundation above											

1st Floor	Wind (ASD): -1.619 kips		135 #/ft		135 #/ft		135 #/ft		135 #/ft		135 #/ft	
W2	Seismic (ASD): -5.345 kips		294 #/ft		294 #/ft		294 #/ft		294 #/ft		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			
PLF	0 0	0 0	0 0	0 0	135 294	0 0	0 0	135 294	135 294			
M _{tot} (#-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 NG	HDUS OK	No Holdown OK	No Holdown OK	HDUS OK	HDUS OK			
	concrete foundation OK											
	OK By Inspection OK By Inspection											
	2 Bedroom Unit 3 story						2 Bedroom Unit 3 story + Basement					

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

[illegible]

3rd Floor: W2	Wind (ASD): 2.813 kips Seismic (ASD): 10.839 kips								136 #/ft 362 #/ft	
									9.083 ft	
Distribution L	26.08 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	26.08 ft	52.17
h/b _s = 0.348 W2 DL w (plf) = 108.2 0.6M _R (#-ft) = 22077	0 0 W E 22077	0 0 W E 22077	0 0 W E 22077	0 0 W E 22077	0 0 W E 22077	0 0 W E 22077	0 0 W E 22077	0 0 W E 22077	0.348 W2 108.2 22077	
PLF	136 362	0 0	0 0	0 0	0 0	0 0	0 0	0 0	136 362	
M _{tot} (#-ft) = 32328 85801 F (#) = 265 3020	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	32328 85801 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	No Holdown OK	MST60 OK	MST60 OK	

with point load ok by inspection

2nd Floor W4		Wind (ASD): 2.790 kips Seismic (ASD): 6.396 kips								190 #/ft 485 #/ft	
										9.083 ft	
	26.08 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	26.08 ft	52.17	
Distribution L	26.08 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	26.08 ft	52.17	
h/b _s = 0.348 W4									0.348 W4		
DL w (plf) = 108.2	0	0	0	0	0	0	0	0	108.2	Actual Distribu	
0.6M _n (#-ft) = 22077	0	0	0	0	0	0	0	0	22077		
PLF	W E 190 485	W E 0 0	W E 0 0	W E 0 0	W E 0 0	W E 0 0	W E 0 0	W E 0 0	W E 190 485		
M _{or} (#-ft) = 44999 114850	0 0	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	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 foundation					above						

1st Floor W4	Wind (ASD): -3.237 kips		256 #/ft		9.908		256 #/ft		
	Seismic (ASD): -10.690 kips		560 #/ft		25.288		560 #/ft		
									9.083 ft
Distribution L	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	26.08 ft	26.08
h/b _s =								0.348 W4	
DL w (plf) =								108.2	
0.6M _R (#-ft) =								22077	
PLF	W E	W E	W E	W E	W E	W E	W E	W E	
	0 0	0 0	0 0	0 0	0 0	0 0	0 0	256 560	
M _{tot} (#-ft) =								60593 132596	
F (#) =	1161 6647	0 0	0 0	0 0	0 0	0 0	0 0	2666 10967	
Holdown	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			



Job # 23.007 Sheet:

Designer: TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

T1 x 2 backs (3 story)

0.5 (ft) holddown dist from end

Roof: W1	Wind (ASD): 4.305 kips		83 #/ft		83 #/ft		83 #/ft		83 #/ft	
	Seismic (ASD): 8.053 kips		154 #/ft		154 #/ft		154 #/ft		154 #/ft	
										9.083 ft
Distribution L	26.08 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	26.08 ft	52.17
h/b _s = 0.348 W1										
DL w (plf) = 112.8										
0.6M _R (#-ft) = 23030										
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	83 154	0 0	0 0	0 0	0 0	0 0	0 0	0 0	83 154	
M _{ot} (#-ft) = 19554 36576										
F (#) = -136 529										
Holddown	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	
	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	

Actual
Distribu

3rd Floor: W2	Wind (ASD): 2.813 kips		136 #/ft		136 #/ft		136 #/ft		136 #/ft	
	Seismic (ASD): 10.839 kips		362 #/ft		362 #/ft		362 #/ft		362 #/ft	
	use W2				use W2				use W2	9.083 ft
Distribution L	26.08 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	26.08 ft	52.17
h/b _s = 0.348 W2										
DL w (plf) = 108.2										
0.6M _R (#-ft) = 22077										
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	136 362	0 0	0 0	0 0	0 0	0 0	0 0	0 0	136 362	
M _{ot} (#-ft) = 32328 85801										
F (#) = 265 3020										
Holddown	3356 S3	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	3356 S3	
	MST60 OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	MST60 OK	

Actual
Distribu

2nd Floor W4	Wind (ASD): 2.790 kips		190 #/ft		190 #/ft		190 #/ft		190 #/ft	
	Seismic (ASD): 6.396 kips		485 #/ft		485 #/ft		485 #/ft		485 #/ft	
	use W3				use W3				use W3	9.083 ft
Distribution L	26.08 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	26.08 ft	52.17
h/b _s = 0.348 W4										
DL w (plf) = 108.2										
0.6M _R (#-ft) = 22077										
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	190 485	0 0	0 0	0 0	0 0	0 0	0 0	0 0	190 485	
M _{ot} (#-ft) = 44999 114850										
F (#) = 1161 6647										
Holddown	6970 H4	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	6970 H4	
	1.05 HDU8 OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	HDU8 OK	

Actual
Distribu



Job # 23.007 Sheet:

Designer TLC Date: 5/26

Checked: Date:

Project: Bradley Height Apartments

1B-T2 stairs (3 story + Base)

0.5 (ft) holdown dist from end

Roof: W1	Wind (ASD): 2.631 kips Seismic (ASD): 4.921 kips				49 #/ft 92 #/ft				49 #/ft 92 #/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
h/b _s = 0.534 W1 DL w (plf) = 178.8 0.6M _R (#-ft) = 15505					0.466 W1 178.8 20400				0.534 W1 178.8 15505	
PLF	W E 49 92	W E 0 0	W E 0 0	W E 0 0	W E 49 92	W E 0 0	W E 0 0	W E 0 0	W E 49 92	
M _{tot} (#-ft) = 7594 14205 F (#) = -479 -79					8711 16294 -615 -216				7594 14205 -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: W1	Wind (ASD): 1.719 kips Seismic (ASD): 6.624 kips				81 #/ft 216 #/ft				81 #/ft 216 #/ft	
	use W2 				use W2 				use W2 	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
h/b _s = 0.534 W1 DL w (plf) = 252.3 0.6M _R (#-ft) = 21870					0.466 W1 282.6 32236				0.534 W1 252.3 21870	
PLF	W E 81 216	W E 0 0	W E 0 0	W E 0 0	W E 81 216	W E 0 0	W E 0 0	W E 0 0	W E 81 216	
M _{tot} (#-ft) = 12555 33322 F (#) = -1044 615					14402 38223 -1554 99				12555 33322 -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 W2	Wind (ASD): 1.705 kips Seismic (ASD): 3.909 kips				113 #/ft 289 #/ft				113 #/ft 289 #/ft	
	use W3 				use W3 				use W3 	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
h/b _s = 0.534 W2 DL w (plf) = 252.3 0.6M _R (#-ft) = 21870					0.466 W2 282.6 32236				0.534 W2 252.3 21870	
PLF	W E 113 289	W E 0 0	W E 0 0	W E 0 0	W E 113 289	W E 0 0	W E 0 0	W E 0 0	W E 113 289	
M _{tot} (#-ft) = 17476 44604 F (#) = -1310 1993					20046 51164 -2195 1095				17476 44604 -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 foundation

1st Floor W2	Wind (ASD): -1.978 kips Seismic (ASD): -6.533 kips				152 #/ft 333 #/ft				152 #/ft 333 #/ft	
					use W4 				use W4 	9.083 ft
Distribution L	0 ft	0 ft	0 ft	0 ft	9.75 ft	0 ft	0 ft	0 ft	17 ft	26.75
h/b _s = 0.932 W2 DL w (plf) = 282.6 0.6M _R (#-ft) = 8059					0.932 W2 282.6 8059				0.534 W2 252.3 21870	
PLF	W E 0 0	W E 0 0	W E 0 0	W E 0 0	W E 152 333	W E 0 0	W E 0 0	W E 0 0	W E 152 333	
M _{tot} (#-ft) = 13496 29535 F (#) = -1310 1993					1608 3417				23532 51496 -1210 3789	
Holdown	14445 H6	1000 -	1000 -	1000 -	6970 H4	1000 -	1000 -	1000 -	6970 H4	
	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) holddown dist from end

Roof: W1	Wind (ASD): 2.631 kips		49 #/ft		49 #/ft		49 #/ft		49 #/ft	
	Seismic (ASD): 4.921 kips		92 #/ft		92 #/ft		92 #/ft		92 #/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
h/b _s = 0.534 W1					0.466 W1				0.534 W1	
DL w (plf) = 178.8					178.8				178.8	
0.6M _R (#-ft) = 15505					20400				15505	
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	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	
Holddown	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	1000 -	
	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	No Holddown OK	

Actual
Distribu

3rd Floor: W1	Wind (ASD): 1.719 kips		81 #/ft		81 #/ft		81 #/ft		81 #/ft	
	Seismic (ASD): 6.624 kips		216 #/ft		216 #/ft		216 #/ft		216 #/ft	
	use W2 				use W2 				use W2 	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
h/b _s = 0.534 W1					0.466 W1				0.534 W1	
DL w (plf) = 252.3					282.6				252.3	
0.6M _R (#-ft) = 21870					32236				21870	
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	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	
Holddown	2335 S2	1000 -	1000 -	1000 -	2335 S2	1000 -	1000 -	1000 -	2335 S2	
	MST48 OK	No Holddown OK	No Holddown OK	No Holddown OK	MST48 OK	No Holddown OK	No Holddown OK	No Holddown OK	MST48 OK	

Actual
Distribu

2nd Floor W2	Wind (ASD): 1.705 kips		113 #/ft		113 #/ft		113 #/ft		113 #/ft	
	Seismic (ASD): 3.909 kips		289 #/ft		289 #/ft		289 #/ft		289 #/ft	
	use W3 				use W3 				use W3 	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
h/b _s = 0.534 W2					0.466 W2				0.534 W2	
DL w (plf) = 252.3					282.6				252.3	
0.6M _R (#-ft) = 21870					32236				21870	
PLF	W E	W E	W E	W E	W E	W E	W E	W E	W E	
	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	
Holddown	4065 H3	6970 H4	1000 -	1000 -	4065 H3	1000 -	1000 -	6970 H4	4065 H3	
	1.05 HDU5 OK	HDU8 OK	No Holddown OK	No Holddown OK	HDU5 OK	No Holddown OK	No Holddown OK	HDU8 OK	HDU5 OK	

Actual
Distribu

Job # 23.002

Sheet:



Designed: TLC

Date: 5/29/23

Checked:

Date:

Project: Bradley Heights - 3 Story & basement Story

Vertical Distribution 1 Bedroom units

$$F_x = C_{vx} V \quad (12.8-11)$$

$$C_{vx} = \frac{w_x h_x^k}{\sum w_i h_i^k}$$

$$T_a = C_t h_n^x = 0.3240544 \quad (12.8-7)$$

$$C_t = 0.02 \quad \text{Table 12.8-2}$$

$$x = 0.75 \quad \text{Table 12.8-2}$$

$$H_n = 41 \text{ ft} \quad \text{Structural Height defined in 11.2}$$

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	-
H DU2	2215	H1
H DU4	3285	H2
H DU5	4065	H3
H DU8	6970	H4
H DU11	9535	H5
H DU14	14445	H6
(2) H DU11	19070	H7
(2) H DU14	28890	H8