

Structural Calculations for Vertical and Lateral Design of Trash Enclosure Structure

PRCNC20260043

Project & Location:

Structural Calculations

Bradley Heights Apartments

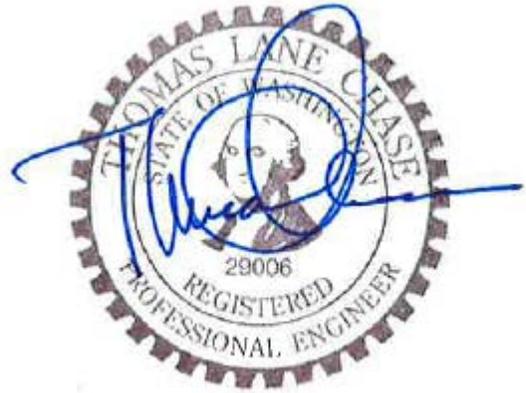
(Lat 47.1652, Long -122.2921)
 202 27th Avenue SE, Puyallup, WA

Client:

Timberlane Partners
 Attn: Dave Enslow
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Professional Engineer:

Solutions 4 Structures, Inc
 11605 135th St Ct E
 Puyallup, WA 98374
 Attn: Tom Chase, PE
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Project Number:

23.007

Code / Location:

2021 IBC

Loads:

1. Vertical Loads	Dead	Live
Roof	22 PSF	25 PSF (Snow)

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
 $I_E = 1.0$, $S_s = 1.263$, $S_1 = 0.435$
 $SDS = 1.010$, $SD1 = 0.435$

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

City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE

SKInear
 02/10/2026
 11:25:24 AM

Calculations required to be provided by
 the Permittee on site for all Inspections

CMU ENCLOSURE WALLS

Project Bradley Heights
 S4S Job# 23.007
 Date 8/14/2024

SOIL PROPERTIES

Wind Pressure (ASD) $W = 10.0$ psf
 Seismic Pressure (ASD) $E = 23.8$ psf
 Allowable Bearing $ASBP = 2,000$ psf
 Allowable 1/3 Increase **yes**
 Seismic Sds **1.010**

WALL DESIGN

Base Design Shear $V_u = 0.32$ k
 Shear Strength $\phi V_m = 3.19$ k OK!
 Base Design Moment $M_u = 1.48$ kft
 Bending Strength $\phi M_n = 1.78$ kft **OK!**
 Bar A # **5**
 Spacing A $s = 32$ in o.c.

WALL & FOOTING DIMENSIONS

Concrete Strength $f'_c = 2,500$ psi
 Wall thickness $t = 7.625$ in
 Wall Height $H = 9.33$ ft
 Footing Width $W_{ftg} = 2.83$ ft
 Footing thickness $T_{ftg} = 1.00$ ft

FOOTING REINF

Longitudinal Bars **(3) #5** = 0.93 in²
 Min Reinforcing = 0.73 in²

STABILITY CHECKS

Wall wt	$W_w = 784$ lbs
Footing wt	$W_f = 425$ lbs
Total wt	$W = 1209$ lbs

Overturning M	$OTM = 1,256$ kft
Resisting M	$RM = 1,713$ lbft
	$X = 0.38$ ft
	$e = 1.04$ ft > L/6
Soil Pressure	$SP = 2,135$ psf OK!

CMU ENCLOSURE WALLS

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SOIL PROPERTIES

Wind Pressure (ASD) $W = 10.0$ psf
 Seismic Pressure (ASD) $E = 23.8$ psf
 Allowable Bearing $ASBP = 2,000$ psf
 Allowable 1/3 Increase **yes**
 Seismic Sds **1.010**

WALL DESIGN

Base Design Shear $V_u = 0.25$ k
 Shear Strength $\phi V_m = 3.19$ k OK!
 Base Design Moment $M_u = 0.91$ kft
 Bending Strength $\phi M_n = 1.44$ kft **OK!**
 Bar A # **5**
 Spacing A $s = 40$ in o.c.

WALL & FOOTING DIMENSIONS

Concrete Strength $f'_c = 2,500$ psi
 Wall thickness $t = 7.625$ in
 Wall Height $H = 7.33$ ft
 Footing Width $W_{ftg} = 2.33$ ft
 Footing thickness $T_{ftg} = 0.83$ ft

FOOTING REINF

Longitudinal Bars **(3) #4** = $As = 0.60$ in²
 Min Reinforcing = 0.50 in²

STABILITY CHECKS

Wall wt	$W_w = 616$ lbs
Footing wt	$W_f = 292$ lbs
Total wt	$W = 908$ lbs

Overturning M	$OTM = 784$ kft
Resisting M	$RM = 1,059$ lbft
	$X = 0.30$ ft
	$e = 0.86$ ft $> L/6$
Soil Pressure	$SP = 1,998$ psf OK!

CMU ENCLOSURE WALLS

Project Bradley Heights
 S4S Job# 23.007
 Date 8/14/2024

SOIL PROPERTIES

Wind Pressure (ASD) $W = 10.0$ psf
 Seismic Pressure (ASD) $E = 23.8$ psf
 Allowable Bearing $ASBP = 2,000$ psf
 Allowable 1/3 Increase **yes**
 Seismic Sds **1.010**

WALL DESIGN

Base Design Shear $V_u = 0.18$ k
 Shear Strength $\phi V_m = 3.19$ k OK!
 Base Design Moment $M_u = 0.48$ kft
 Bending Strength $\phi M_n = 1.18$ kft **OK!**
 Bar A # **4**
 Spacing A $s = 32$ in o.c.

WALL & FOOTING DIMENSIONS

Concrete Strength $f'_c = 2,500$ psi
 Wall thickness $t = 7.625$ in
 Wall Height $H = 5.33$ ft
 Footing Width $W_{ftg} = 1.83$ ft
 Footing thickness $T_{ftg} = 0.83$ ft

FOOTING REINF

Longitudinal Bars **(2) #4** = 0.40 in²
 Min Reinforcing = 0.40 in²

STABILITY CHECKS

Wall wt	$W_w = 448$ lbs
Footing wt	$W_f = 229$ lbs
Total wt	$W = 677$ lbs

Overturning M	$OTM = 443$ kft
Resisting M	$RM = 621$ lbft
	$X = 0.26$ ft
	$e = 0.65$ ft > L/6
Soil Pressure	$SP = 1,724$ psf OK!

JOB# 23.007DESIGNED MRO DATE 8-15-24PROJECT: BRADLEY HEIGHTS APTS

CMU ENCLOSURE WALLS

EXAMPLE HT = 7'-4"

$$w_o = 0.4505 W$$

$$= 0.4 (1.010) (84)$$

$$= 33.9 \text{ PSF}$$

$$w_{ABD} = 0.7 w_o$$

$$= 0.7 (33.9)$$

$$= 23.8 \text{ PSF}$$

$$V_u = 0.0339 (7.33) = 0.25 \text{ K}$$

$$M_u = 0.25 (7.33) / 2 = 0.91 \text{ Kft}$$

$$\phi V_c = 0.80 (2.25) \sqrt{1500} (12) (3.81) = 3.19 \text{ K} \checkmark$$

$$A_{s \text{ dowels}} = V_u / \phi F_y = 0.25 / 0.9 \times 60 = 0.0046 \text{ in}^2 / \text{ft}$$

$$A_{s \text{ self}} = \#5 @ 40" - A_{s \text{ dowels}} = 0.0884 \text{ in}^2 / \text{ft}$$

$$a = \frac{0.0884 (60)}{0.8 (1.5) (12)} = 0.368 \text{ in}$$

$$\phi M_n = 0.9 (0.0884) (60) (3.81 - \frac{0.368}{2}) / 12 = 1.44 \text{ Kft} \checkmark$$

JOB# 23.007DESIGNED MRO DATE 8-15-24PROJECT: BRADLEY HEIGHTS APTS

$$HT = 7'-4'' \text{ cont.}$$

$$OTM = 23.8 (7.33) (7.33/2 + 0.833) = 785 \text{ lbft}$$

$$W_{\text{wall}} = 84 (7.33) = 616$$

$$W_{\text{FTG}} = 150 (2.33 \times 0.83) = \frac{292}{908 \text{ lbs}}$$

$$RM = 908 (2.33) / 2 = 1,059 \text{ lbft}$$

$$\bar{x} = \frac{RM - OTM}{\Sigma W} = \frac{1059 - 785}{908} = 0.30 \text{ ft}$$

$$e = 2.33/2 - 0.30 = 0.87 \text{ ft } (> l/6)$$

$$SP = \frac{2}{3} \frac{\Sigma W}{\bar{x}} = \frac{2}{3} \frac{908}{0.30} = 1,998 \text{ psf}$$