

Structural Calculations for Vertical and Lateral Design of Trash Enclosure Structure

PRCNC20260048

Project & Location:

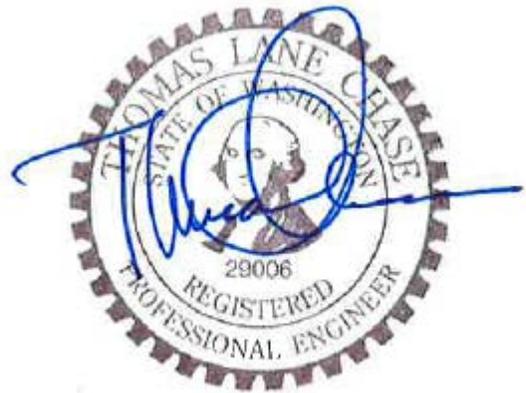
Structural Calculations
Bradley Heights Apartments
 (Lat 47.1652, Long -122.2921)
 202 27th Avenue SE, Puyallup, WA

Client:

Timberlane Partners
 Attn: Dave Enslow
dave@timberlanepartners.com

Professional Engineer:

Solutions 4 Structures, Inc
 11605 135th St Ct E
 Puyallup, WA 98374
 Attn: Tom Chase, PE
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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
 $I_E = 1.0, S_s = 1.263, S_1 = 0.435$
 $SDS = 1.010, SD_1 = 0.435$

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

City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE

SKinnear
 02/11/2026
 9:07:42 AM

City of Puyallup Development & Permitting Services ISSUED PERMIT	
Building	Planning
Engineering	Public Works
Fire	Traffic

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** = 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

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

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

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

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

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

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

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

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