

Structural Calculations for Vertical and Lateral Design of Trash Enclosure Structure

PRCNC20260042

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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(253) 314 - 9822



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
02/10/2026
11:41:09 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	Vu =	0.32	k	
Shear Strength	ϕV_m =	3.19	k	OK!
Base Design Moment	Mu =	1.48	kft	
Bending Strength	ϕM_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	FOOTING REINF			As
Wall thickness	t =	7.625	in	Longitudinal Bars	(3)	#5	= 0.93 in2
Wall Height	H =	9.33	ft	Min Reinforcing			= 0.73 in2
Footing Width	W _{ftg} =	2.83	ft				
Footing thickness	T _{ftg} =	1.00	ft				

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	Vu =	0.25	k	
Shear Strength	ϕV_m =	3.19	k	OK!
Base Design Moment	Mu =	0.91	kft	
Bending Strength	ϕM_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	
Min Reinforcing			=	0.60	in2
				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
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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	Vu =	0.18	k	
Shear Strength	ϕV_m =	3.19	k	OK!
Base Design Moment	Mu =	0.48	kft	
Bending Strength	ϕM_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	=	As	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 APTSCMU ENCLOSURE WALLS

EXAMPLE HT = 7'-4"

$$w_o = 0.4505 W$$

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

$$= 33.9 \text{ PSF}$$

$$w_{ABD} = 0.7 w_o$$

$$= 0.7 (33.9)$$

$$= 23.8 \text{ PSF}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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