PSE CONSULTING ENGINEERS INC.

# STRUCTURAL ENGINEERING CALCULATIONS

PROJECT: Garden Grove Parks –
Westhaven Park Restroom

PROJECT LOCATION: 12252 West St.
Garden Grove, CA 92840

PSE PROJECT NUMBER: Romtec 225-076

DATE: April 30, 2025

BY: Ralph Hall, P.E.


04/30/2025

250-A Main Street
Klamath Falls, OR. 97601

E-Mail: info@structure1.com
Web: www.structure1.com

ph. (541) 850-6300
fax (541) 850-6233

# Table of Contents:



250-A Main Street
Klamath Falls, OR. 97601
E-Mail: info@structure1.com
Web: www.structure1.com
ph. (541) 850-6300
fax (541) 850-6233

# References:

1- Literature:

a. 2022 California Building Code (CBC),
based on the 2021 International Building Code (IBC)

b. Design of Wood Structures, Donald E. Breyer 4th ED.

c. Building Code Requirements for Masonry Structures, TMS 402

d. Building Code Requirements for Concrete, ACI 318

2- Software:

a. Wood Works Design Office,
American Forest & Paper Association

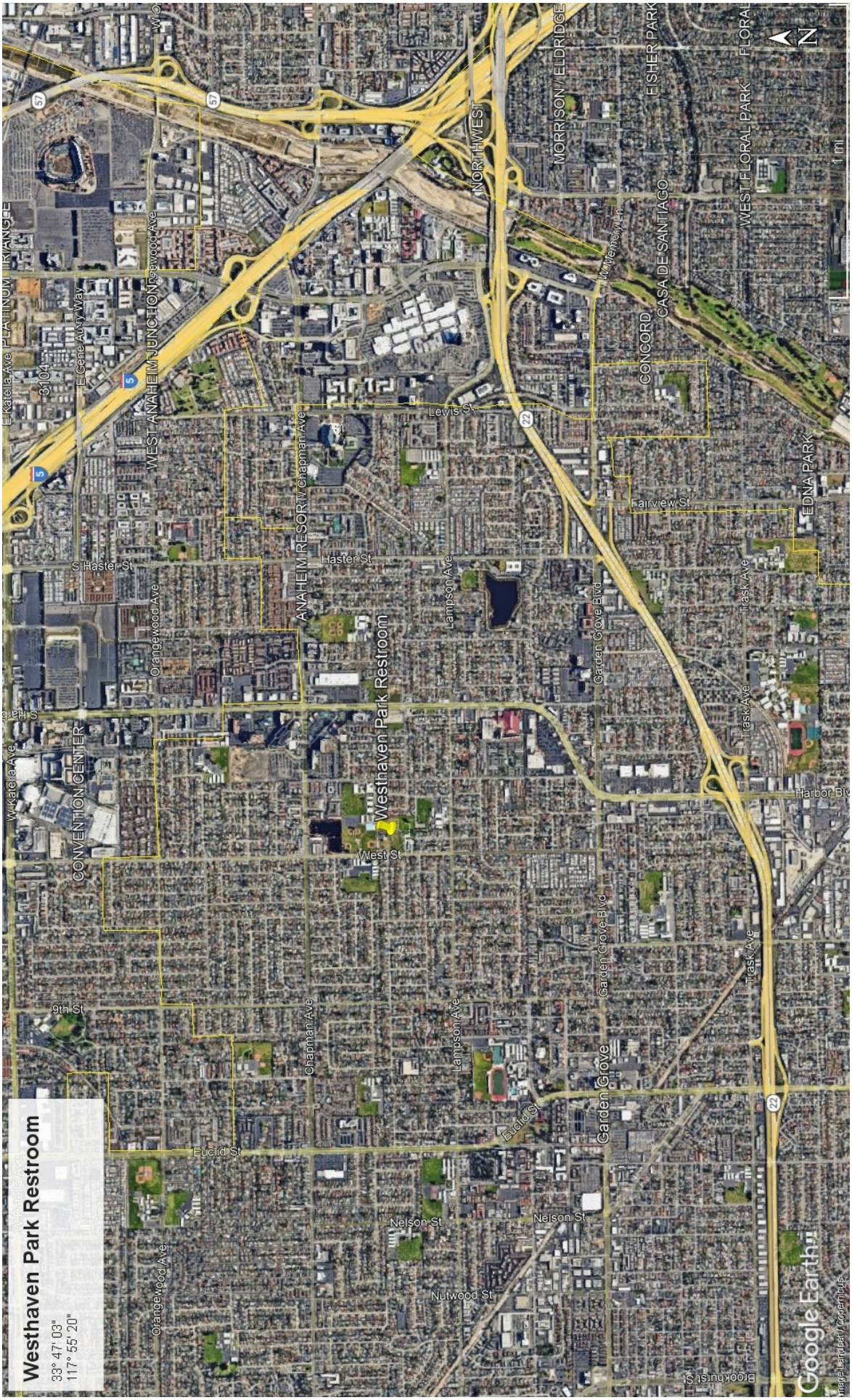
b. Enercalc Structural Engineering Library,
Enercalc Engineering Software

c. Engineering International Spreadsheets
Daniel T. Li

# Design Criteria:

| | | |
|---|---|---|
| 1- Location: | 12252 West St.<br>Garden Grove, CA 92840<br>(Lat. 33° 47' 03" Long. 117° 55' 20") | |
| 2- Seismic: | RC | II |
| | SDC | D |
| | Site Class | D |
| | $S_S$ | 1.377 |
| | $S_1$ | 0.488 |
| | $S_{DS}$ | 1.102 |
| | $S_{D1}$ | 0.884 |
| | $I_E$ | 1.0 |
| | R | 5 |
| 3- Wind: | Ultimate wind speed | 100 mph (3 s. gust) |
| | Exposure | C |
| | RC | II |
| 4- Roof Live: | 20 psf | |
| 5- Soil Bearing Capacity: | 1500 psf (presumptive value from IBC) | |
| 6- Gravity Loads: | DL Floor: | 15 psf |
| | LL Floor: | 40 psf |
| | DL Roof: | 15 psf |
| | CMU Walls: | 81 psf |
| 7- Deflection Criteria: | Floor LL Deflection: | L/480 |
| | Roof TL Deflection: | L/180 |

**Other criteria assumed as stated in design calculations.

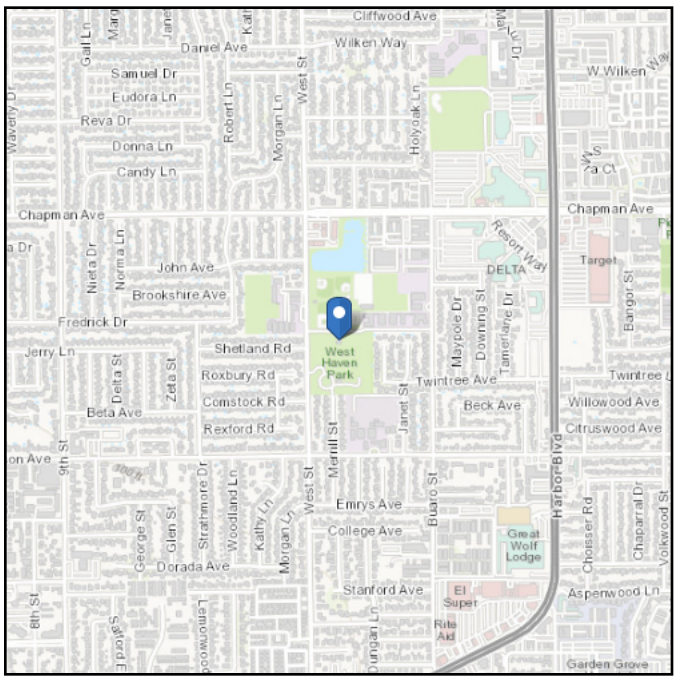

Westhaven Park Restroom
33° 47' 03"
117° 55' 20"
Westhaven Park Restroom
CONVENTION CENTER
ANAHEIM RESORT
WEST ANAHEIM
JUNCTION
NORTH WEST
MORRISON / ELDRIDGE
CONCORD
CASA DE SANTIAGO
ESHER PARK
WEST FLORAL PARK
FLORAL
EDNA PARK
Garden Grove
Katella Ave
E Katella Ave
W Katella Ave
E Gene Autry Way
S Haster St
Haster St
Orangewood Ave
W Orangewood Ave
W Chapman Ave
Chapman Ave
Lewis St
Fairview St
Lampson Ave
Garden Grove Blvd
Trask Ave
Harbor Blvd
West St
9th St
Euclid St
Nelson St
Nutwood St
Bookhurst St
Google Earth
1 mi
N

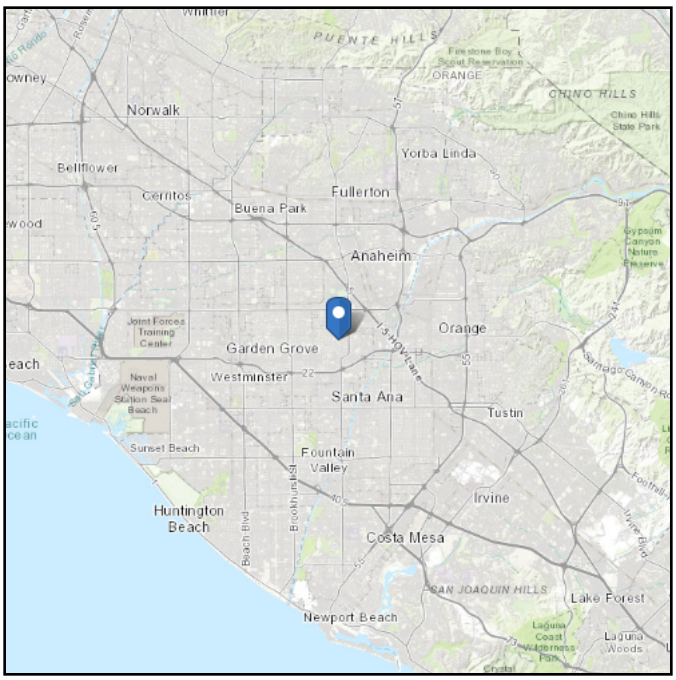
# ASCE Hazards Report

**Address:**
12252 West St
Garden Grove, California
92840

**Standard:** ASCE/SEI 7-16
**Risk Category:** II
**Soil Class:** D - Default (see Section 11.4.3)

**Latitude:** 33.785017
**Longitude:** -117.922551
**Elevation:** 114.48995701341603 ft (NAVD 88)




## Wind

**Results:**

| | |
|---|---|
| Wind Speed | 95 Vmph |
| 10-year MRI | 66 Vmph |
| 25-year MRI | 72 Vmph |
| 50-year MRI | 76 Vmph |
| 100-year MRI | 81 Vmph |

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Mon Apr 28 2025

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

# Seismic

**Site Soil Class:** D - Default (see Section 11.4.3)

**Results:**

| | | | |
|---|---|---|---|
| $S_S$ : | 1.377 | $S_{D1}$ : | N/A |
| $S_1$ : | 0.488 | $T_L$ : | 8 |
| $F_a$ : | 1.2 | PGA : | 0.584 |
| $F_v$ : | N/A | $PGA_M$ : | 0.701 |
| $S_{MS}$ : | 1.652 | $F_{PGA}$ : | 1.2 |
| $S_{M1}$ : | N/A | $I_e$ : | 1 |
| $S_{DS}$ : | 1.102 | $C_v$ : | 1.375 |

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

**Data Accessed:** Mon Apr 28 2025

**Date Source:** USGS Seismic Design Maps

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE Hazard Tool.

# ASCE 7-16 (2018 & 2021 IBC) SEISMIC DESIGN

Last updated April 8, 2025 by Caleb Sale & Ralph Hall

EQUIVALENT LATERAL FORCE PROCEDURE

JOB NUMBER Romtec 225-076

DESIGNER RMH

Design Information

| DATA | VALUE | SOURCE |
|---|---|---|
| Site Class | D-Default | Site conditions, geotech report |
| $S_s$= | 1.377 | Seismic Design Parameters (Software) |
| $S_1$= | 0.488 | Seismic Design Parameters (Software) |
| $S_{MS}$= | 1.652 | Seismic Design Parameters (Calculated) |
| $S_{M1}$= | 1.326 | Seismic Design Parameters (Calculated) |
| $I_E$ | 1.0 | ASCE 7-16 Table 1.5-2 |
| Risk Category | 2 | ASCE 7-16 Table 1.5-1 |
| R | 5 | ASCE 7-16 Table 12.2-1 |
| $h_n$ | 12 | Height per ASCE 7-16 |
| $C_t$ | 0.02 | ASCE 7-16 Table 12.8-2 |
| $T_L$ | 16 | Long-period Transition period (Software) |
| Diaphragm | Flexible | Rigid or Flexible |
| L | 25 | Maximum distance between LFRS Elements |

**$S_{MS}$**: Max considered spectral response acceleration for short periods

**$S_{M1}$**: Max considered spectral response acceleration for 1-second period

**$I_E$** : Seismic importance factor

**R**: Response modification factor

1) Design spectral response acceleration

$S_{DS}$: 5% Damped spectral response acceleration at short periods

$S_{D1}$: 5% Damped spectral response acceleration at 1 second period

$S_{DS}=2/3(S_{ms})$ $S_{DS}=$ 2/3 X 1.6524 $S_{DS}=$ 1.102 [ ASCE 7-16 Eq. 11.4-3 ]

$S_{D1}=2/3(S_{m1})$ $S_{D1}=$ 2/3 X 1.326384 $S_{D1}=$ 0.884 [ ASCE 7-16 Eq. 11.4-4 ]

2) Seismic design category

11.6 EXCEPTIONS:

ALL MUST BE MET TO USE EXCEPTION

1: $T_a < 0.8T_s$ MET

2: T<Ts for Story Drift MET

3: Eq 12.8-2 Used for $C_s$ MET

4: Diaphragm is Rigid or Flexible W/ L<40' MET

From Table 11.6-1 ASCE 7-16 = D

From Table 11.6-2 ASCE 7-16 = D

Governing Design D

Note: S1<0.75 AND all exceptions of ASCE 7-16 11. met, SDC is permitted to be determined from Table 1 alone. IRC table 302.2.1.1 is equivalent to IBC Table 1 for alternate SDC Determination

3) Determine design base shear (V)

**A**. ASCE 7-16, 11.4.8 Exception

Ts= 0.8027015

$T = T_a = C_t ( h_n^x )$ [ ASCE 7-16, 12.8.2.1, Eq. 12.8-7]

$T_a$ : Approximate Fundamental Period

$T= 0.020 \times 12^{0.75}$ T= 0.129

For Site Class D/D-Default: T is < 1.5 Ts

For site class D/-default Cs shall be calculated per Eq. 12.8-2

Equivalent Force Procedure [ ASCE 7-16, 12.8.1]

$V= C_s \times W$

$C_s$ : Seismic Response Coefficient

W : Total dead load and other applicable loads

**B.** [ ASCE 7-16, 12.8.1.1, Eq. 12.8-2 ]

$$C_S = \frac{S_{DS}}{R / I} \qquad C_S = \frac{1.102}{5} 1.0 \qquad C_S = 0.220$$

**C. Nor** greater than

$$C_S = \frac{S_{D1}}{T ( R / I )}$$ [ ASCE 7-16, 12.8.1.1, Eq. 12.8-3] **OR** $$C_S = \frac{S_{D1} * T_L}{T^2 ( R / I )}$$ [ ASCE 7-16, 12.8.1.1, Eq. 12.8-4]

$$C_S = \frac{0.884 \times 1}{0.129 \times 5} \qquad C_S = 1.371$$

$$C_S = \frac{0.884 \times 16 \times 1}{0.017 \times 5} \qquad C_S = 170.18$$

**D. Nor** less than [ ASCE 7-16, 12.8.1.1, Eq. 12.8-5]

$C_S = 0.044 (S_{DS}) ( I )$ $C_S = 0.044 \times 1.102 \times 1$ $C_S = 0.04847$

**OR IF S1>0.6** [ ASCE 7-16, 12.8.1.1, Eq. 12.8-6]

$$C_S = \frac{0.5 * S1}{( R / I )} \qquad C_S = \frac{0.5 \times 0.488}{5} 1.0 \qquad C_S = 0.0488$$

**Governing $C_s$ =** 0.220

V= Cs x W V = 0.22 X W Refer to sheet two for W and Calculated V

# IBC SEISMIC DESIGN

VERTICAL FORCE DISTRIBUTION EQUIVALENT LATERAL FORCE PROCEDURE

JOB NUMBER Romtec 225-076

DESIGNER RMH

1. Determine dead load at each level of building.

| Structural portion | | DL (PSF) | Area (SF) | Length (FT) | Height (FT) | Total Weight (LB) |
|---|---|---|---|---|---|---|
| a) Roof | Diaphram elevation from the base level in ft | | | | 8.7 | |
| | Roof | 15 | 541 | NA | NA | 8115 |
| | Misc. | 0 | 0 | 0 | 0 | 0 |
| | Misc. (LBS) | 0 | NA | NA | NA | 0 |
| c) 5th floor | Diaphram elevation from the base level in ft | | | | 0 | |
| | Ext. Walls | 15 | NA | 0 | 0 | 0 |
| | Int. Walls | 10 | NA | 0 | 0 | 0 |
| | Floor | 15 | 0 | NA | NA | 0 |
| | Misc. | 0 | 0 | 0 | 0 | 0 |
| | Misc. (LBS) | 0 | NA | NA | NA | 0 |
| d) 4th floor | Diaphram elevation from the base level in ft | | | | 0 | |
| | Ext. Walls | 15 | NA | 0 | 0 | 0 |
| | Int. Walls | 10 | NA | 0 | 0 | 0 |
| | Floor | 15 | 0 | NA | NA | 0 |
| | Misc. | 0 | 0 | 0 | 0 | 0 |
| | Misc. (LBS) | 0 | NA | NA | NA | 0 |
| e) 3rd floor | Diaphram elevation from the base level in ft | | | | 0 | |
| | Ext. Walls | 15 | NA | 0 | 0 | 0 |
| | Int. Walls | 10 | NA | 0 | 0 | 0 |
| | Floor | 15 | 0 | NA | NA | 0 |
| | Misc. | 0 | 0 | 0 | 0 | 0 |
| | Misc. (LBS) | 0 | NA | NA | NA | 0 |
| f) 2nd floor | Diaphram elevation from the base level in ft | | | | 0 | |
| | Ext. Walls | 0 | NA | 0 | 0 | 0 |
| | Int. Walls | 0 | NA | 0 | 0 | 0 |
| | Floor | 0 | 0 | NA | NA | 0 |
| | Misc. | 0 | 0 | 0 | 0 | 0 |
| | Misc. (LBS) | 0 | NA | NA | NA | 0 |
| g) 1st floor | Ext. Walls | 81 | NA | 106 | 10.7 | 91870.2 |
| | Int. Walls | 10 | NA | 0 | 10.7 | 0 |
| | Misc. | 0 | 0 | 0 | 0 | 0 |
| | | | | TOTAL DEAD LOAD (LB) = | | 99985.2 |

2) Determine verticle force distribution at each level ASCE 7-16 12.8.3

$F_x = C_{vx} \times V$ ASCE 7-16 Eq. 12.8-11

$$C_{vx} = \frac{w_x h_x^{\,k}}{\sum w_i h_i^{\,k}}$$ ASCE 7-16 Eq. 12.8-12

$F_x$: Lateral seismic force at any level

V: Seismic base shear (Kips)

$w_x$ & $w_i$ : The portion of the total gravity load of the structure (W) located or assigned to level $i$ or $x$

$h_x$ & $h_x$: The height (ft) from the base to level $i$ or $x$ diaphram.

$k$ : An exponent related to the structures period (T) as follows;

T ≤ 0.5 sec $k$ = 1 T ≥ 2.5 sec $k$ = 2 0.5 ≤ T ≤ 2.5 Interpolate between 1 & 2

Refer to sheet one for V

V = 0.22 X W V = 0.22 X 99985.2 V= 22.029 (kips)

T= 0.1289

$k$= 1

| Level (floor) | Wall Height (ft) | Diaphram Height (Ft) | $W_x$ (kips) | $W_x * h_x^{\,k}$ | $C_{vx}$ | $F_x$ (kips) | Allowable $F_x$ (kips) |
|---|---|---|---|---|---|---|---|
| Roof | 10.7 | 8.7 | 54.050 | 470 | 1.000 | 22.03 | 15.42 |
| 5 | 0 | 0 | 0.000 | 0 | 0.000 | 0 | 0.00 |
| 4 | 0 | 0 | 0.000 | 0 | 0.000 | 0 | 0.00 |
| 3 | 0 | 0 | 0.000 | 0 | 0.000 | 0 | 0.00 |
| 2 | 0 | 0 | 0.000 | 0 | 0.000 | 0.00 | 0.00 |
| | | | 54.050 | 470 | 1.000 | 22.03 | 15.4 |

Note: The Total Shear shown in the right hand column is an "allowable" load.

# MecaWind v2525



**Calculations Prepared by:**
Date: Apr 28, 2025
File Location: Current Project Not Saved

**General:**
Reference Abbreviations: T: Table, F: Figure, E: Equation, §: Section

| | | | | | |
|---|---|---|---|---|---|
| Wind Load Standard | = | ASCE 7-16 | Basic Wind Speed | = | 100.0 mph |
| Exposure Classification | = | C | Risk Category | = | II |
| Structure Type | = | Building | Basis for Wind Pressures | = | ASD |
| MWFRS Analysis Method | = | Ch 27 Pt 1 | C&C Analysis Method | = | None |
| Dynamic Type of Structure | = | Rigid | Advanced Options | = | False |

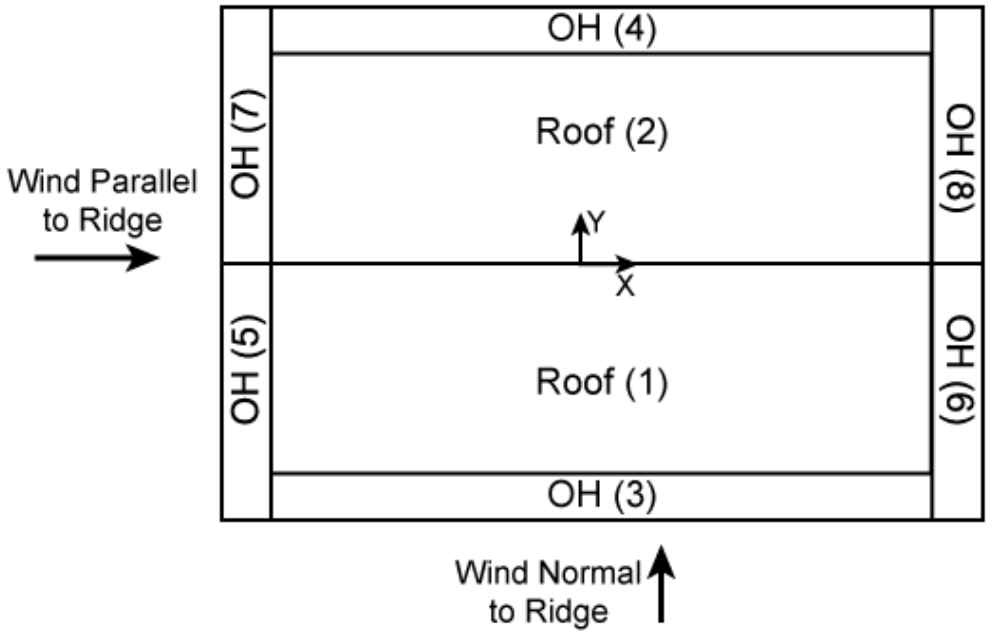
**Building:**

| | | | | | |
|---|---|---|---|---|---|
| Roof = Roof Type | = | Gabled | Encl = Enclosure Classification | = | Enclosed |
| Help = Help on Building Roof Type | = | Help | IsCust = Custom Roof | = | False |
| W = Building Width | = | 25.3000 ft | L = Building Length | = | 14.7000 ft |
| $R_{Ht}$ = Ridge Height | = | 13.971 ft | $E_{Ht}$ = Eave Height | = | 8.700 ft |
| Pitch = Pitch of Roof | = | 5.0 :12 | θ = Slope of Roof | = | 22.62 ° |
| OH = Overhang Configuration | = | All None | Par = Parapet | = | None |
| $z_i$ = Highest Opening Elevation | = | 0.0000 ft | $HT_{over}$ = Override Mean Roof Height | = | False |
| $Ht_{man}$ = Mean Roof Height | = | 11.335 ft | $RA_{over}$ = Override Roof Area | = | False |
| $GC_{pi\_o}$ = Override $GC_{pi}$ value | = | False | | | |

**Exposure Constants [T:26.11-1]:**

| | | | | | |
|---|---|---|---|---|---|
| α = 3-s Gust-speed exponent | = | 9.500 | $Z_g$ = Nominal Ht of Boundary Layer | = | 900.000 ft |
| â = Reciprocal of α | = | 0.105 | b = 3 sec gust speed factor | = | 1.000 |
| $\alpha_m$ = Mean hourly Wind-Speed Exponent | = | 0.154 | $b_m$ = Mean hourly Windspeed Exponent | = | 0.650 |
| c = Turbulence Intensity Factor | = | 0.200 | ε = Integral Length Scale Exponent | = | 0.2000 |

**Main Wind Force Resisting System (MWFRS) Wind Calculations per Ch 27 Pt1**




| | | | | | |
|---|---|---|---|---|---|
| h = Mean structure height | = | 11.335 ft | $K_h = 2.01 \cdot (15/Z_g)^{2/\alpha}$ T:26.10-1 | = | 0.849 |
| $K_{zt}$ = No Topographic Feature | = | 1.000 | $K_d$ = Directionality Factor T:26.6-1 | = | 0.85 |
| $GC_{pi}$ = ± Internal Press Coef T:26.13-1 | = | ±0.18 | LF = ASD Load Factor | = | 0.60 |
| $K_e$ = Ground Elev Factor T:26.9-1 | = | 1.000 | $q_h = .00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ E:26.10-1 | = | 11.08 psf |
| $q_{in}$ = Negative Internal Pressure: $q_h$ | = | 11.08 psf | $q_{ip}$ = For +$GC_{pi}$ use $q_h$ | = | 11.08 psf |
| $A_{roof}$ = Roof Area | = | 402.90 $ft^2$ | | | |

**MWFRS Wind Loads [Normal to Ridge]**

| | | | | | |
|---|---|---|---|---|---|
| h = Mean Roof Height of Building | = | 11.3354 ft | $R_{Ht}$ = Ridge Height Of Roof | = | 13.9708 ft |

B = Building Width Normal To Wind = 14.7000 ft
L/B = Ratio: L/B = 1.721
θ = Slope of Roof = 22.62 °
$Cp_{LW}$ = Leeward Wall Coefficient = -0.356

L = Building Width Parallel To Wind = 25.3000 ft
h/L = Ratio: h/L = 0.448
$Cp_{WW}$ = Windward Wall Coefficient = 0.800
$Cp_{SW}$ = Side Wall Coefficient = -0.700

## Gust Factor Calculation for Wind: [Normal to Ridge]

**Gust Factor Category I Rigid Structures - Simplified Method**

$G_1$ = Simplified: For Rigid Structures can use 0.85 = 0.85

**Gust Factor Category II Rigid Structures - Complete Analysis**

$Z_m$ = Equiv Struc Height: Max(0.6•h, $Z_{min}$) = 15.000 ft
$I_{zm}$ = Turbulence Intensity: c•$(33/Z_m)^{1/6}$ [E:26.11-1] = 0.228
$L_{zm}$ = Turbulence Integral Length Scale: ℓ•$(Z_m/33)^{\varepsilon}$ [E:26.11-9] = 427.057 ft
B = Building Width Width Normal to Wind Direction = 14.700 ft
Q = $[1/(1+0.63•[(B+h)/L_{zm}]^{0.63})]^{0.5}$ [E:26.11-8] = 0.950
$G_2$ = Detailed: $0.925•[(1+1.7•g_q•I_{zm}•Q)/(1+1.7•g_v•I_{zm})]$ [E:26.11-6] = 0.899

**Gust Factor Used in Analysis**

G = Gust Factor: Min($G_1$, $G_2$) = 0.850

**Wall Wind Pressures [Normal to Ridge]**
**All wind pressures include a Load Factor (LF) of 0.6**

| Elev ft | $GC_{pi}$ | $q_i$ psf | $K_z$ | $K_{zt}$ | $q_z$ psf | Windward Press psf | Leeward Press psf | Side Press psf | Total Press psf | Minimum Pressure* psf |
|---|---|---|---|---|---|---|---|---|---|---|
| 8.700 | +0.18 | 11.08 | 0.849 | 1.000 | 11.08 | 5.54 | -5.35 | -8.59 | 10.89 | 9.60 |
| 8.700 | -0.18 | 11.08 | 0.849 | 1.000 | 11.08 | 9.53 | -1.36 | -4.60 | 10.89 | 9.60 |

*$K_z$ = $2.01•(15/Z_g)^{2/\alpha}$ T:26.10-1*
*$GC_{pi}$ = +Internal Coef T:26.13-1*
*$q_{ip}$ = For +$GC_{pi}$ use $q_h$*
*Side = $q_h•G•Cp_{SW}-q_{ip}•(GC_{pi+})$ E:27.3-1*
*Windward = $q_z•G•Cp_{WW}-q_{ip}•(GC_{pi+})$ E:27.3-1*
*+Press = Pressure Acting Toward Surface*
*§27.1.5 = MWFRS Min Wall Pressure = 9.60 psf*

*$K_{zt}$ = No Topographic Feature*
*$q_z$ = $.00256•K_z•K_{zt}•K_d•K_e•V^2*LF$ E:26.10-1*
*$q_{in}$ = Negative Internal Pressure: $q_h$*
*Leeward = $q_h•G•Cp_{LW}-q_{ip}•(GC_{pi+})$ E:27.3-1*
*Total = Windward - Leeward*
*-Press = Pressure Acting Away from Surface*

**Roof Wind Pressures [Normal to Ridge]**
**All wind pressures include a Load Factor (LF) of 0.6**

| Component | Description | Location | Start ft | End ft | θ ° | Basis | $GC_{pi}$ | $C_{pMin}$ | $C_{pMax}$ | $P_{min}$ psf | $P_{max}$ psf | $P_{min}$ psf |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof | Leeward | 2 | All | All | 22.62 | N | +0.18 | -0.6 | -0.6 | -7.65 | -7.65 | 4.80 |
| Roof | Windward | 1 | All | All | 22.62 | N | +0.18 | 0.135 | -0.327 | -0.72 | -5.07 | 4.80 |
| Roof | Leeward | 2 | All | All | 22.62 | N | -0.18 | -0.6 | -0.6 | -3.66 | -3.66 | 4.80 |
| Roof | Windward | 1 | All | All | 22.62 | N | -0.18 | 0.135 | -0.327 | 3.27 | -1.08 | 4.80 |

*Roof Pressures based upon Ch 27 Pt1:*
*Component = The building component for pressures*
*Start = Start Dist from Windward Edge*
*$C_{pMin}$ = Smallest Coefficient Magnitude*
*$P_{min}$ = $q_h•G•C_{pMin}-q_{ip}•GC_{piE:27.3-1}$*
*$GC_{pi}$ = +Internal Coef T:26.13-1*
*$P_{min}$ = Min Press projected on vertical plane §27.1.5*
*§27.1.5 = MWFRS Min Wall Pressure = 9.60 psf*
*-Press = Pressure Acting Away from Surface*

*Location = Reference Graphic in Output for Values*
*End = End Dist from Windward Edge*
*$C_{pMax}$ = Largest Coefficient Magnitude*
*$P_{max}$ = $q_h•G•C_{pMax}-q_{in}•GC_{piE:27.3-1}$*
*Basis = P=Parallel to Ridge: N=Normal to Ridge*
*θ = Roof Slope Relative to Wind*
*+Press = Pressure Acting Toward Surface*

*• The smaller uplift pressures due to $C_{pMin}$ can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7*

## MWFRS Wind Loads [Parallel to Ridge]

h = Mean Roof Height of Building = 11.3354 ft
B = Building Width Normal To Wind = 25.3000 ft
L/B = Ratio: L/B = 0.581
θ = Slope of Roof = 22.62 °
$Cp_{LW}$ = Leeward Wall Coefficient = -0.500

$R_{Ht}$ = Ridge Height Of Roof = 13.9708 ft
L = Building Width Parallel To Wind = 14.7000 ft
h/L = Ratio: h/L = 0.771
$Cp_{WW}$ = Windward Wall Coefficient = 0.800
$Cp_{SW}$ = Side Wall Coefficient = -0.700

## Gust Factor Calculation for Wind: [Parallel to Ridge]

**Gust Factor Category I Rigid Structures - Simplified Method**

$G_1$ = Simplified: For Rigid Structures can use 0.85 = 0.85

**Gust Factor Category II Rigid Structures - Complete Analysis**

$Z_m$ = Equiv Struc Height: Max(0.6•h, $Z_{min}$) = 15.000 ft
$I_{zm}$ = Turbulence Intensity: c•$(33/Z_m)^{1/6}$ [E:26.11-1] = 0.228
$L_{zm}$ = Turbulence Integral Length Scale: ℓ•$(Z_m/33)^{\varepsilon}$ [E:26.11-9] = 427.057 ft

B = Building Width Width Normal to Wind Direction = 25.300 ft
Q = $[1/(1+0.63•[(B+h)/L_{zm}]^{0.63})]^{0.5}$ [E:26.11-8] = 0.939
$G_2$ = Detailed: $0.925•[(1+1.7•g_q•I_{zm}•Q)/(1+1.7•g_v•I_{zm})]$ [E:26.11-6] = 0.893
*Gust Factor Used in Analysis*
G = Gust Factor: Min($G_1$, $G_2$) = 0.850

**Wall Wind Pressures [Parallel to Ridge]**
**All wind pressures include a Load Factor (LF) of 0.6**

| Elev ft | $GC_{pi}$ | $q_i$ psf | $K_z$ | $K_{zt}$ | $q_z$ psf | Windward Press psf | Leeward Press psf | Side Press psf | Total Press psf | Minimum Pressure* psf |
|---|---|---|---|---|---|---|---|---|---|---|
| 13.971 | +0.18 | 11.08 | 0.849 | 1.000 | 11.08 | 5.54 | -6.71 | -8.59 | 12.25 | 9.60 |
| 11.335 | +0.18 | 11.08 | 0.849 | 1.000 | 11.08 | 5.54 | -6.71 | -8.59 | 12.25 | 9.60 |
| 8.700 | +0.18 | 11.08 | 0.849 | 1.000 | 11.08 | 5.54 | -6.71 | -8.59 | 12.25 | 9.60 |
| 13.971 | -0.18 | 11.08 | 0.849 | 1.000 | 11.08 | 9.53 | -2.72 | -4.60 | 12.25 | 9.60 |
| 11.335 | -0.18 | 11.08 | 0.849 | 1.000 | 11.08 | 9.53 | -2.72 | -4.60 | 12.25 | 9.60 |
| 8.700 | -0.18 | 11.08 | 0.849 | 1.000 | 11.08 | 9.53 | -2.72 | -4.60 | 12.25 | 9.60 |

*$K_z$ = $2.01•(15/Z_g)^{2/\alpha}$ T:26.10-1*
*$GC_{pi}$ = +Internal Coef T:26.13-1*
*$q_{ip}$ = For +$GC_{pi}$ use $q_h$*
*Side = $q_h•G•Cp_{SW}-q_{ip}•(GC_{pi+})$ E:27.3-1*
*Windward = $q_z•G•Cp_{WW}-q_{ip}•(GC_{pi+})$ E:27.3-1*
*+Press = Pressure Acting Toward Surface*
*§27.1.5 = MWFRS Min Wall Pressure = 9.60 psf*
*$K_{zt}$ = No Topographic Feature*
*$q_z$ = $.00256•K_z•K_{zt}•K_d•K_e•V^2*LF$ E:26.10-1*
*$q_{in}$ = Negative Internal Pressure: $q_h$*
*Leeward = $q_h•G•Cp_{LW}-q_{ip}•(GC_{pi+})$ E:27.3-1*
*Total = Windward - Leeward*
*-Press = Pressure Acting Away from Surface*

**Roof Wind Pressures [Parallel to Ridge]**
**All wind pressures include a Load Factor (LF) of 0.6**

| Component | Description | Location | Start ft | End ft | θ ° | Basis | $GC_{pi}$ | $C_{pMin}$ | $C_{pMax}$ | $P_{min}$ psf | $P_{max}$ psf | $P_{min}$ psf |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof | Roof 0 to h/2 | 1,2 | 0.000 | 5.668 | 0.0 | P | +0.18 | -1.032 | -0.18 | -11.72 | -3.69 | 4.80 |
| Roof | Roof h/2 to h | 1,2 | 5.668 | 11.335 | 0.0 | P | +0.18 | -0.792 | -0.18 | -9.45 | -3.69 | 4.80 |
| Roof | Roof h to 2•h | 1,2 | 11.335 | 14.700 | 0.0 | P | +0.18 | -0.608 | -0.18 | -7.73 | -3.69 | 4.80 |
| Roof | Roof 0 to h/2 | 1,2 | 0.000 | 5.668 | 0.0 | P | -0.18 | -1.032 | -0.18 | -7.73 | 0.30 | 4.80 |
| Roof | Roof h/2 to h | 1,2 | 5.668 | 11.335 | 0.0 | P | -0.18 | -0.792 | -0.18 | -5.46 | 0.30 | 4.80 |
| Roof | Roof h to 2•h | 1,2 | 11.335 | 14.700 | 0.0 | P | -0.18 | -0.608 | -0.18 | -3.74 | 0.30 | 4.80 |

*Roof Pressures based upon Ch 27 Pt1:*
*Component = The building component for pressures*
*Start = Start Dist from Windward Edge*
*$C_{pMin}$ = Smallest Coefficient Magnitude*
*$P_{min}$ = $q_h•G•C_{pMin}-q_{ip}•GC_{piE:27.3-1}$*
*$GC_{pi}$ = +Internal Coef T:26.13-1*
*$P_{min}$ = Min Press projected on vertical plane §27.1.5*
*§27.1.5 = MWFRS Min Wall Pressure = 9.60 psf*
*+Press = Pressure Acting Toward Surface*
*Location = Reference Graphic in Output for Values*
*End = End Dist from Windward Edge*
*$C_{pMax}$ = Largest Coefficient Magnitude*
*$P_{max}$ = $q_h•G•C_{pMax}-q_{in}•GC_{piE:27.3-1}$*
*Basis = P=Parallel to Ridge: N=Normal to Ridge*
*θ = Roof Slope Relative to Wind*
*Reduction = Reduction Factor (.88) for h≥1 & (0 to h/2)*
*-Press = Pressure Acting Away from Surface*
*• The smaller uplift pressures due to $C_{pMin}$ can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7*

# ANALYSIS & DESIGN:

Pages 15 - 34

250-A Main Street
Klamath Falls, OR. 97601
E-Mail: info@structure1.com
Web: www.structure1.com
ph. (541) 850-6300
fax (541) 850-6233

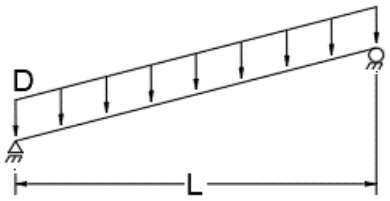
# PSE Consulting Engineers Inc.

| | | | | | |
|---|---|---|---|---|---|
| Project Number | Romtec 225-076 | | | | |
| Project Name | GGP Westhaven Park Restroom | Designed by | RMH | Date | 4/28/2025 |
| Subject | Analysis | Checked by | | Date | |

## Roof Panels

Roof Slope: 5 to 12

L: 6.5 ft




Distributed Load (D):

Dead Load = 10 psf

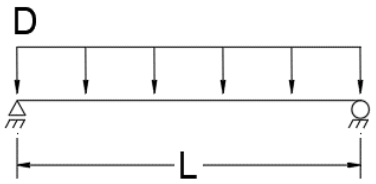
Roof Live Load = 20 psf

**USE** **5.5" Premier SIP Roof Panels**

## Roof Beams

Trib.: 5 ft.

L: 6.75 ft




Distributed Load (D):

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dead Load = | 15 | psf | * | 5.00 | ft | = | 75.00 plf |
| Roof Live Load = | 20 | psf | * | 5.00 | ft | = | 100.00 plf |

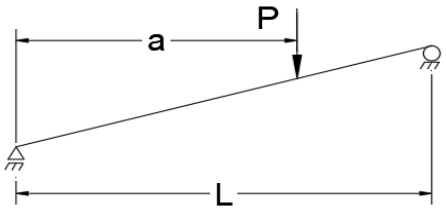
**USE** **5 1/8" x 6" Glu-Lam 24F-1.8E WS**

## Roof Rafters

Roof Slope: 5 to 12

L: 10 ft

a: 6.5 ft




Point Load (P):

| | | |
|---|---|---|
| Dead Load = | 280 x2 = | 560 lb |
| Snow Load = | 342 x2 = | 684 lb |

**USE** **5 1/8" x 6" Glu-Lam 24F-1.8E WS**

**Table 3: Maximum Allowable Uniform Transverse Load (psf) – Type L Panels[1,3]**

| Panel Core Thickness (in) | Deflection Limit[2] | Panel Span (ft) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4[4] | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| 3.5 | L/360 | 103 | 45 | 33 | 24 | 18 | 11 | | | | |
| | L/240 | 225 | 68 | 47 | 34 | 26 | 17 | | | | |
| | L/180 | 297* | 91 | 61 | 45 | 34 | 23 | | | | |
| 5.5 | L/360 | 307* | 129 | 57 | 42 | 34 | 25 | 20 | 15 | | |
| | L/240 | 307* | 182* | 87 | 61 | 49 | 37 | 30 | 22 | | |
| | L/180 | 307* | 182* | 112* | 80 | 65 | 49 | 39 | 29 | | |
| 7.25 | L/360 | 253 | 171 | 82 | 66 | 54 | 41 | 32 | 23 | | |
| | L/240 | 288* | 188* | 128 | 100 | 81 | 61 | 48 | 35 | | |
| | L/180 | 288* | 188* | 133* | 117* | 105 | 80 | 63 | 45 | | |
| 9.25 | L/360 | 286 | 188* | 117 | 101 | 80 | 58 | 47 | 36 | 32 | 27 |
| | L/240 | 326* | 188* | 147* | 134* | 120 | 90 | 71 | 52 | 47 | 41 |
| | L/180 | 326* | 188* | 147* | 134* | 121 | 108* | 93 | 68 | 61 | 53 |
| 11.25 | L/360 | 327* | 188* | 167* | 141 | 116 | 91 | 75 | 58 | 47 | 36 |
| | L/240 | 327* | 188* | 167* | 153* | 132 | 110* | 97 | 83* | 69 | 53 |
| | L/180 | 327* | 188* | 167* | 153* | 132 | 110* | 97 | 83* | 83 | 70 |

[1] Table values assume a simply supported panel with 1.5 in. of continuous bearing on facing at supports. Permanent loads, such as dead load, shall not exceed 0.25 times the tabulated load. Splines consist of #2 or better, Hem-Fir, 1.5 in. wide with a depth equal to the core thickness, spaced to provide not less than two members for every 48 in. of panel width.
[2] Deflection limit shall be selected by building designer based on the serviceability requirements of the structure and the requirements of adopted building code.
[3] Tabulated values for 8 ft walls apply to panels constructed with the OSB strength axis oriented either parallel or perpendicular to supports. Tabulated values for other lengths are based on the strong-axis of the facing material oriented parallel to the span direction.
[4] Panels spanning 4 ft shall be a minimum of 8 ft long spanning a minimum of two 4 ft spans. No single span condition is allowed.
*An asterisk (*) indicates the value shown is governed by the average peak load divided by 3.

| WoodWorks® SOFTWARE FOR WOOD DESIGN | COMPANY | PROJECT |
|---|---|---|
| | Apr. 28, 2025 11:24 | Roof Beam |

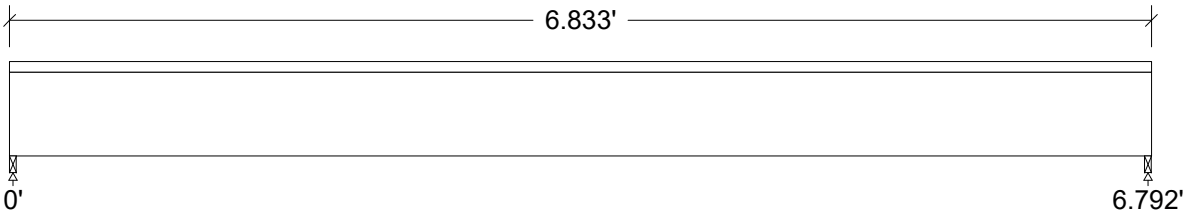
## Design Check Calculation Sheet

WoodWorks Sizer 13.2.1

### Loads:

| Load | Type | Distribution | Pat-tern | Location [ft] Start | End | Magnitude Start | End | Unit |
|---|---|---|---|---|---|---|---|---|
| Load1 | Dead | Full Area | | | | 15.00(5.00') | | psf |
| Load2 | Roof live | Full Area | | | | 20.00(5.00') | | psf |
| Self-weight | Dead | Full UDL | | | | 7.1 | | plf |

### Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :




| | | | |
|---|---|---|---|
| Unfactored: | | | |
| Dead | 280 | | 280 |
| Roof Live | 342 | | 342 |
| Factored: | | | |
| Total | 622 | | 622 |
| Bearing: | | | |
| Capacity | | | |
| Beam | 1666 | | 1666 |
| Support | 1719 | | 1719 |
| Des ratio | | | |
| Beam | 0.37 | | 0.37 |
| Support | 0.36 | | 0.36 |
| Load comb | #2 | | #2 |
| Length | 0.50* | | 0.50* |
| Min req'd | 0.50* | | 0.50* |
| Cb | 1.00 | | 1.00 |
| Cb min | 1.00 | | 1.00 |
| Cb support | 1.07 | | 1.07 |
| Fcp sup | 625 | | 625 |

*Minimum bearing length setting used: 1/2" for end supports

### Glulam-Unbalan., West Species, 24F-1.8E WS, 5-1/8"x6"

Supports: All - Timber-soft Beam, D.Fir-L No.2

Total length: 6.83'; Clear span: 6.75'; Volume = 1.5 cu.ft.; 4 laminations, 5-1/8" maximum width,

Lateral support: top = continuous, bottom = at supports;

**This section PASSES the design code check.**

### Analysis vs. Allowable Stress and Deflection using NDS 2018 :

| Criterion | Analysis Value | Design Value | Unit | Analysis/Design |
|---|---|---|---|---|
| Shear | fv = 26 | Fv' = 265 | psi | fv/Fv' = 0.10 |
| Bending(+) | fb = 410 | Fb' = 2400 | psi | fb/Fb' = 0.17 |
| Live Defl'n | 0.03 = < L/999 | 0.34 = L/240 | in | 0.08 |
| Total Defl'n | 0.06 = < L/999 | 0.45 = L/180 | in | 0.14 |

## Additional Data:

| FACTORS: | F/E(psi) | CD | CM | Ct | CL | CV | Cfu | Cr | Cfrt | Notes | Cvr | LC# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fv' | 265 | 1.00 | 1.00 | 1.00 | - | - | - | - | 1.00 | 1.00 | 1.00 | 2 |
| Fb'+ | 2400 | 1.00 | 1.00 | 1.00 | 1.000 | 1.000 | - | - | 1.00 | 1.00 | - | 2 |
| Fcp' | 650 | - | 1.00 | 1.00 | - | - | - | - | 1.00 | - | - | - |
| E' | 1.8 million | 1.00 | 1.00 | 1.00 | - | - | - | - | 1.00 | - | - | 2 |
| Eminy' | 0.85 million | 1.00 | 1.00 | 1.00 | - | - | - | - | 1.00 | - | - | 2 |

CRITICAL LOAD COMBINATIONS:

```
 Shear     : LC #2  = D + Lr
 Bending(+): LC #2  = D + Lr
 Deflection: LC #2  = D + Lr  (live)
             LC #2  = D + Lr  (total)
 Bearing   : Support 1 - LC #2 = D + Lr
             Support 2 - LC #2 = D + Lr
 Load Types: D=dead Lr=roof live
 Load combinations: ASD Basic from ASCE 7-16 2.4; all LC's listed in the Analysis report
```

CALCULATIONS:

```
 V max = 618, V design = 523 (NDS 3.4.3.1(a)) lbs; M(+) = 1050 lbs-ft
 EI = 166.05e06 lb-in^2
 "Live" deflection is due to all non-dead loads (live, wind, snow…)
 Total deflection = 1.50 permanent + "live"
```

## Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2015 and manufactured in accordance with ANSI A190.1-2012
4. GLULAM: bxd = actual breadth x actual depth.
5. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
6. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).

| WoodWorks® SOFTWARE FOR WOOD DESIGN | COMPANY | PROJECT |
|---|---|---|
| | Apr. 28, 2025 11:25 | Roof Rafter |

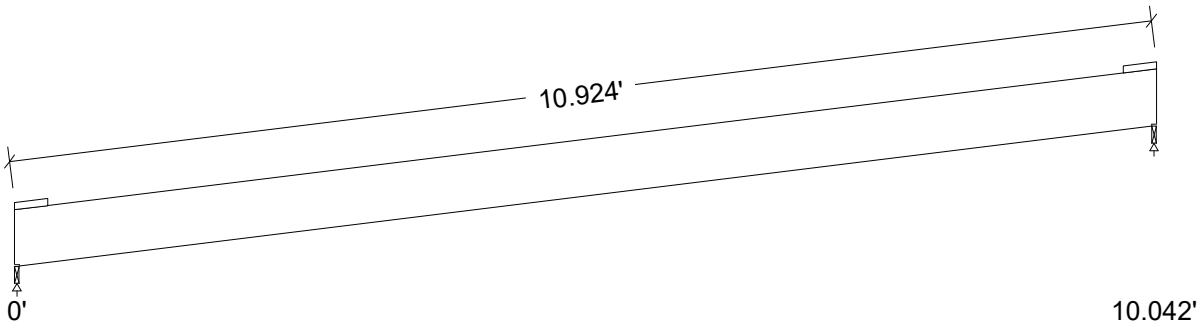
## Design Check Calculation Sheet

WoodWorks Sizer 13.2.1

### Loads:

| Load | Type | Distribution | Pat-tern | Location [ft] Start | End | Magnitude Start | End | Unit |
|---|---|---|---|---|---|---|---|---|
| Load1 | Dead | Point | | 6.54 | | 560 | | lbs |
| Load2 | Roof live | Point | | 6.54 | | 684 | | lbs |
| Self-weight | Dead | Full UDL | | | | 7.1 | | plf |

### Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :




| | | | |
|---|---|---|---|
| Unfactored: | | | |
| Dead | 235 | | 402 |
| Roof Live | 240 | | 444 |
| Factored: | | | |
| Total | 475 | | 846 |
| Bearing: | | | |
| F'theta | 713 | | 713 |
| Capacity | | | |
| Beam | 1826 | | 1826 |
| Support | 1719 | | 1719 |
| Des ratio | | | |
| Beam | 0.26 | | 0.46 |
| Support | 0.28 | | 0.49 |
| Load comb | #2 | | #2 |
| Length | 0.50* | | 0.50* |
| Min req'd | 0.50* | | 0.50* |
| Cb | 1.00 | | 1.00 |
| Cb min | 1.00 | | 1.00 |
| Cb support | 1.07 | | 1.07 |
| Fcp sup | 625 | | 625 |

*Minimum bearing length setting used: 1/2" for end supports

**Glulam-Unbalan., West Species, 24F-1.8E WS, 5-1/8"x6"**

Supports: All - Timber-soft Beam, D.Fir-L No.2

Total length: 11.13'; Clear span(horz): 10'; Volume = 2.4 cu.ft.; Pitch: 5/12; 4 laminations, 5-1/8" maximum width, Notches: 1,2 - bottom (depth = 3/16", length = Lb); Lateral support: top = at supports, bottom = at supports;

**This section PASSES the design code check.**

## Analysis vs. Allowable Stress and Deflection using NDS 2018 :

| Criterion | Analysis Value | Design Value | Unit | Analysis/Design |
|---|---|---|---|---|
| Shear | fv = 38 | Fv' = 172 | psi | fv/Fv' = 0.22 |
| Bending(+) | fb = 1144 | Fb' = 2382 | psi | fb/Fb' = 0.48 |
| Live Defl'n | 0.16 = L/835 | 0.54 = L/240 | in | 0.29 |
| Total Defl'n | 0.37 = L/356 | 0.73 = L/180 | in | 0.51 |

## Additional Data:

| FACTORS: | F/E(psi) | CD | CM | Ct | CL | CV | Cfu | Cr | Cfrt | Notes | Cvr | LC# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fv' | 265 | 1.00 | 1.00 | 1.00 | - | - | - | - | 1.00 | 1.00 | 0.72 | 2 |
| Fb'+ | 2400 | 1.00 | 1.00 | 1.00 | 0.993 | 1.000 | - | - | 1.00 | 1.00 | - | 2 |
| Fcp' | 650 | - | 1.00 | 1.00 | - | - | - | - | 1.00 | - | - | - |
| E' | 1.8 million | 1.00 | 1.00 | - | - | - | - | - | 1.00 | - | - | 2 |
| Eminy' | 0.85 million | 1.00 | 1.00 | - | - | - | - | - | 1.00 | - | - | 2 |

CRITICAL LOAD COMBINATIONS:

```
 Shear     : LC #2  = D + Lr
 Bending(+): LC #2  = D + Lr
 Deflection: LC #2  = D + Lr  (live)
             LC #2  = D + Lr  (total)
 Bearing   : Support 1 - LC #2 = D + Lr
             Support 2 - LC #2 = D + Lr
 Load Types: D=dead Lr=roof live
 Load combinations: ASD Basic from ASCE 7-16 2.4; all LC's listed in the Analysis report
```

CALCULATIONS:

```
 V max = 781, V design = 781 (NDS 3.4.3.1(a)) lbs; M(+) = 2932 lbs-ft
 fv = 3V / 2bd; Fv' includes effect of notch (dn/d)^3 = 0.899 (NDS 3.4-3)
 EI = 166.05e06 lb-in^2
 "Live" deflection is due to all non-dead loads (live, wind, snow…)
 Total deflection = 1.50 permanent + "live"
 Bearing: Allowable bearing at an angle F'theta  calculated for each support
 as per NDS 3.10.3
 Lateral stability(+):  Lu = 10.88'  Le = 20.00'  RB = 7.4
```

## Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2015 and manufactured in accordance with ANSI A190.1-2012
4. GLULAM: bxd = actual breadth x actual depth.
5. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
6. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).
7. SLOPED BEAMS: level bearing is required for all sloped beams.

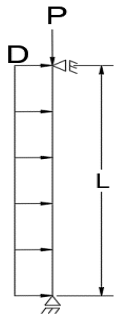
# PSE Consulting Engineers Inc.

| | | | | | |
|---|---|---|---|---|---|
| Project Number | Romtec 225-076 | | | | |
| Project Name | GGP Westhaven Park Restroom | Designed by | RMH | Date | 4/28/2025 |
| Subject | Analysis | Checked by | | Date | |

**Masonry Bearing Wall**

L: 12.7 ft

Trib: 7 ft




Load (P):

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dead Load = | 15 | psf | * | 7.00 | ft | = | 105.00 | plf |
| Roof Live Load = | 20 | psf | * | 7.00 | ft | = | 140.00 | plf |

Distributed Load(D1):

Earthquake Load = 25.7 psf

**USE** **8" CMU W/ #4 Vert Bars @ 24" O.C.**

**Continuous Wall Footing**

Loads from: Roof — Trib: 7 ft

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dead Load = | 15 | psf | * | 7 | = | 105 | plf | |
| Roof Live Load = | 20 | psf | * | 7 | = | 140 | plf | |

Loads from: Wall — Height: 12.7 ft

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dead Load = | 81 | psf | * | 12.7 | = | 1028.7 | plf | |

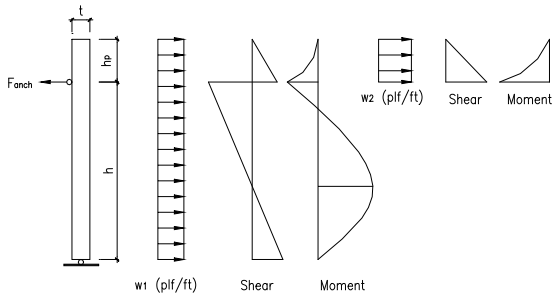
**USE** **Cont. x 24" x 8" Footing W/ 3 - #5 Bars**

PROJECT :
CLIENT :
JOB NO. :
DATE :
PAGE :
DESIGN BY :
REVIEW BY :

# Lateral Force for One-Story Wall Based on ASCE 7-22 & 2021 IBC

## INPUT DATA

| | | | | |
|---|---|---|---|---|
| WALL THICKNESS | t | = | 8 | *in, (203 mm)* |
| PARAPET HEIGHT | $h_p$ | = | 0 | *ft, (0.0 m)* |
| WALL HEIGHT | h | = | 12.7 | *ft, (3.9 m)* |
| TOTAL WALL DENSITY | ρ = | 125 | lbs/ft$^3$ | *( 2001 kg/m$^3$ )* |
| SEISMIC PARAMETER | $S_{DS}$ | = | 1.102 | (ASCE 7 Sec 11.4) |
| SEISMIC DESIGN CATEGOR\` | SDC | = | D | |
| DIAPHRAGM FLEXIBLE ? (0=no, 1=yes) | | | 1 | Yes |
| SEISMIC IMPORTANCE FACTOR | $I_e$ | = | 1 | (ASCE 7 Tab 11.5-1) |
| WIND IMPORTANCE FACTOR | $I_w$ | = | 1.0 | (ASCE 7 Tab 1.5-2) |
| BASIC WIND SPEED | V = | 100 | *mph, (161 kph), (ASCE 7 Sec 26.5.1)* | |
| EXPOSURE CATEGORY (B, C, D) | | = | C | |
| TOPOGRAPHIC FACTOR | $K_{Zt}$ | = | 1 | Flat, (ASCE 7 Tab 26.8-1) |




## DESIGN SUMMARY

Out-of-plane force for wall design $w_1$ = 25.7 psf (Seismic governs) , *( 1231 N/m$^2$ )*
Out-of-plane force for parapet design $w_2$ = 79.2 psf (Seismic governs) , *( 3792 N/m$^2$ )*
Out-of-plane force for anchorage design $F_{anch}$ = 327 plf (Horizontal direction) , *( 4762 N/m )*
(The governing seismic & wind forces have been reduced by 0.7 & 0.6 for ASD)

## WIND ANALYSIS

Out-of-plane wind force for wall design (ASCE 7-22 Eq. 30.3-1)

$$w_{1,wind} = 0.6 q_h K_d \left[(GC_P)-(GC_{Pi})\right] = \left(0.00256 K_h K_{Zt} K_e V^2\right) K_d \left[(GC_P)-(GC_{Pi})\right]$$ = 16.6 psf

Where : $K_h$ = 0.85 , $K_d$ = 0.85 , $GC_p$ = -1.32 , $GC_{pi}$ = 0.18
(mean roof h = 12.7 ft, changeable) $K_e$ = 1.00 (corner ? Yes , TA = 16.93 ft$^2$) (ASCE 7-22 Tab. 26.13-1)
(ASCE 7-22 26.10-1) (ASCE 7-22 30.3.2)

Out-of-plane wind force for parapet design (ASCE 7-22 Eq. 30.8-1)

$$w_{2,wind} = 0.6 q_p K_d \left[(GC_P)-(GC_{Pi})\right] = \left(0.00256 K_h K_{Zt} K_e V^2\right) K_d \left[(GC_P)-(GC_{Pi})\right]$$ = 39.7 psf, (ASCE 7-22 30.8)

Where : $K_h$ = 0.85 , $K_d$ = 0.85 , $GC_p$ = -1.40 , $GC_p$ = -2.40 $GC_{pi}$ = 0.18
(ASCE 7-22 26.10-1) (ASCE 7-22 26.10-1) = 1.00 roof, (ASCE 7-22 30.3.2) ( ASCE 7-22 Tab. 26.13-1)
(TA = 0 ft$^2$)
wall, (ASCE 7-22 30.3.2)

Out-of-plane wind force for anchorage design

$$F_{anch,wind} = \frac{h}{2} w_{1,wind} + h_p \left(1 + \frac{h_p}{2h}\right) w_{2,wind}$$ = 106 plf (Horizontal)

## SEISMIC ANALYSIS

Out-of-plane seismic force for wall design (ASCE 7, Sec.12.11.1)

$$w_{1,seismic} = MAX\left(0.4 I S_{DS} W_p \ , 0.1 W_p\right)$$ = 0.44 $W_p$ = 36.7 psf

Where : $W_p$ = 83.3 psf , $I_e$ = 1.0
(CBC/IBC Tab 1604.5 & ASCE 7 Tab 1.5-2)

Out-of-plane seismic force for parapet design (ASCE 7, Sec. 13.3.1)

$$w_{2,seismic} = MAX\left[0.3 S_{DS} I_p W_p \ , \ MIN\left(\frac{1.4 C_{AR} S_{DS} I_p W_p}{R_{po}} \ , \ 1.6 S_{DS} I_p W_p\right)\right]$$ = 1.36 $W_p$ = 113.1 psf

Where : $C_{AR}$ = 2.2 , $I_p$ = 1.0 , $R_{po}$ = 2.5
(ASCE 7 Tab. 13.5-1) (ASCE 7 Sec. 13.1.3) (ASCE 7 Tab. 13.5-1)

Out-of-plane seismic force for anchorage design

For masonry or concrete under seismic design category A & B, both flexible & rigid diaphragm (ASCE 7 Sec. 12.11.2)

$$F_{anch,seismic} = MAX\left[0.4 S_{DS} I W_p \frac{\left(h+h_p\right)^2}{2h} \ , \ 0.1 W_p \frac{\left(h+h_p\right)^2}{2h} \ , \ 400 S_{DS} I \ , \ F_{min}\right]$$ = 5.29 $W_p$ = 441 plf (Horizontal) (Not applicable)

Where : $F_{min}$ = 280 plf
(ASCE 7 Sec. 12.11.2 & 11.7.3)

For seismic design category C and above, flexible diaphragm (ASCE 7 Sec. 12.11.2.1)

$$F_{anch,seismic} = MAX\left[0.8 S_{DS} I W_p \frac{\left(h+h_p\right)^2}{2h} \ , \ 0.1 W_p \frac{\left(h+h_p\right)^2}{2h} \ , \ 400 S_{DS} I \ , \ F_{min}\right]$$ = 5.60 $W_p$ = 467 plf (Horizontal) (Applicable)

For seismic design category C and above, rigid diaphragm (ASCE 7 Sec. 12.11.2 & Sec. 13.3.1)

$$F_{anch,seismic} = MAX\left\{MAX\left[0.4 S_{DS} I_p \ , \ MIN\left(\frac{1.4 a_p S_{DS} I_p}{R_{po}} \ , \ 1.6 S_{DS} I_p\right)\right] W_p \frac{\left(h+h_p\right)^2}{2h} \ , \ 400 S_{DS} I \ , \ F_{min}\right\}$$

= 11.20 $W_p$ = 933 plf (Horizontal) (Not applicable)

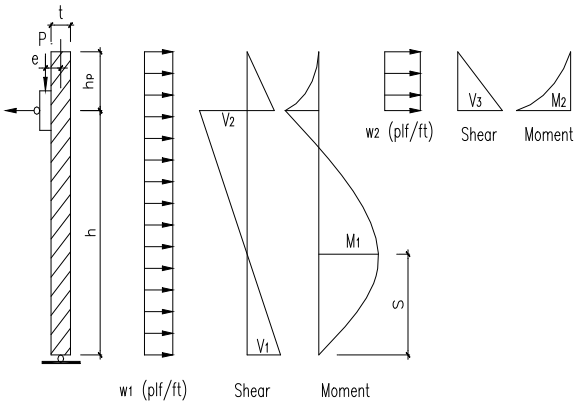
Where : $C_{AR}$ = 2.2 $R_{po}$ = 1.5
(ASCE 7 Tab. 13.5-1) (1.5, ASCE 7 13.4.2 or 2.5, ASCE 7 Tab 13.5-1)

PROJECT : PAGE :
CLIENT : DESIGN BY :
JOB NO. : DATE : REVIEW BY :

## Allowable Stress Design of Masonry Bearing Wall Based on TMS 402-16/13 & 2021 IBC

### INPUT DATA & DESIGN SUMMARY

| | | | | |
|---|---|---|---|---|
| SPECIAL INSPECTION ( 0=NO, 1=YES ) | | | 1 | Yes |
| TYPE OF MASONRY ( 1=CMU, 2=BRICK ) | | | 1 | CMU |
| MASONRY STRENGTH | $f_m'$ | = | 1.5 | ksi |
| REBAR YIELD STRESS | $f_y$ | = | 60 | ksi |
| ALLOWABLE INCREASING ? (IBC/CBC 1605.2) | | | No | |
| SERVICE GRAVITY LOAD | P | = | 245 | lbs / ft |
| SERVICE LATERAL LOAD | $w_1$ | = | 25.7 | plf / ft |
| SERVICE PARAPET LOAD | $w_2$ | = | 0 | plf / ft |
| THICKNESS OF WALL | t | = | 8 | in |
| PARAPET HEIGHT | $h_p$ | = | 0 | ft |
| WALL HEIGHT | h | = | 12.7 | ft |
| ECCENTRICITY | e | = | 0 | in |
| MASONRY SPECIFIC WEIGHT | $\gamma_m$ | = | 125 | pcf |




**[THE WALL DESIGN IS ADEQUATE.]**

| | | | | | | |
|---|---|---|---|---|---|---|
| WALL HORIZ. REINF. | 1 | # | 4 | @ | 24 | in o.c. (at middle) |
| WALL VERT. REINF. | 1 | # | 4 | @ | 24 | in o.c. (at middle) |

### ANALYSIS

| | | | | |
|---|---|---|---|---|
| VERT. REINF. AREA AT EACH SIDE | $A_s$ | = | 0.10 | $in^2$ |
| EFFECTIVE DEPTH (TMS 402 6.1.3.5) | d | = | 3.82 | in |
| WIDTH OF SECTION | $b_w$ | = | 12.00 | in |
| EFFECTIVE THICKNESS | $t_e$ | = | 7.63 | in |
| MASONRY ELASTICITY MODULUS | $E_m$ | = | 1350 | ksi |
| STEEL ELASTICITY MODULUS | $E_s$ | = | 29000 | ksi |

| | | | | |
|---|---|---|---|---|
| MODULAR RATIO | n | = | 21.48 | |
| REINFORCEMENT RATIO | $\rho$ | = | 0.0022 | |
| ALLOWABLE STRESS FACTOR | SF | = | 1.000 | |

THE NEUTRAL AXIS DEPTH FACTOR IS

$$k=\sqrt{2\rho n+(\rho n)^2}-\rho n = 0.26299$$

THE ALLOWABLE STRESS DUE TO FLEXURE IS

$$F_b=(SF)(0.33f_m')= 495 \text{ psi}$$

THE ALLOWABLE REINF. STRESS DUE TO FLEXURE IS

$$F_S=(1.33 \text{ or } 1.0)(20) \text{ or } 32 = 32000 \text{ psi}$$

THE DISTANCE FROM BOTTOM TO $M_1$ IS

$$S=h+h_p-\left[\frac{(h+h_p)^2}{2h}-\frac{Pe}{hw_1}\right] = 6.4 \text{ ft}$$

THE GOVERNING MOMENTS AND AXIAL FORCES ARE

$$M_1=\frac{1.05}{2w_1h^2}\left[Pe+\frac{w_1}{2}(h^2-h_p^2)\right]^2 = 544 \text{ ft-lbs/ft}$$

$$P_1=P+(wall\ \ weight) = 774 \text{ lbs / ft}$$

$$M_2=\frac{w_2h_p^2}{2} = 0 \text{ ft-lbs/ft}$$

$$P_2=P+(wall\ \ weight) = 245 \text{ lbs / ft}$$

THE GOVERNING SHEAR FORCES ARE

$$V_1=(h+h_p)w_1-\frac{(h+h_p)^2w_1}{2h}+\frac{Pe}{h} = 163 \text{ lbs / ft}$$

$$V_2=hw_1-V_1 = 163 \text{ lbs / ft}$$

$$V_3=h_pw_2 = 0 \text{ lbs / ft}$$

THE GOVERNING SHEAR STRESS IN MASONRY IS

$$f_v=\frac{MAX(V_1,\ V_2,\ V_3)}{t_eb_w} = 1.78 \text{ psi}$$

DETERMINE THE REGION FOR FLEXURE AND AXIAL LOAD (MDG-3 Tab 12.2.1, Fig 12.2-12 & 13, page 12-25).

$$\frac{M}{Pd}\le\frac{t_e}{6d} \qquad \frac{M}{Pd}\le\left(\frac{t_e}{2d}-\frac{1}{3}\right) \qquad \frac{M}{Pd}>\left(\frac{t_e}{2d}-\frac{1}{3}\right)$$

1. Wall is in compression and not cracked.
2. Wall is cracked but steel is in compression.
3. Wall is cracked and steel is in tension.

REGION 3 APPLICABLE FOR (M1, P1)

REGION 1 APPLICABLE FOR (M2, P2)

(cont'd)

CHECK REGION 1 CAPACITY

$$M_m = \frac{b_w t_e^2}{6} F_b - P\frac{t_e}{6} = \begin{cases} \text{4721 ft-lbs / ft} > M_1 & \text{[Not applicable]} \\ \text{4777 ft-lbs / ft} > M_2 & \text{[Satisfactory]} \end{cases}$$

CHECK REGION 2 CAPACITY

$$M_m = P\frac{t_e}{2} - \frac{2P^2}{3 b_w F_b} = \begin{cases} \text{241 ft-lbs / ft} < \text{M1} & \text{[Not applicable]} \\ \text{77 ft-lbs / ft} > \text{M2} & \text{[Not applicable]} \end{cases}$$

CHECK REGION 3 CAPACITY (The moment maybe limited by either the masonry compression or steel tension, MDG-3 page 12-25).

$$M_m = MIN\left[\frac{1}{2} b_w kd F_b \left(d - \frac{kd}{3}\right) - P\left(d - \frac{t_e}{2}\right) \;,\; A_s F_s \left(d - \frac{kd}{3}\right) + P\left(\frac{t_e}{2} - \frac{kd}{3}\right)\right]$$

$$= \begin{cases} \text{864 ft-lbs / ft} > M_1 & \text{[Satisfactory]} \\ \text{864 ft-lbs / ft} > M_2 & \text{[Not applicable]} \end{cases}$$

THE ALLOWABLE SHEAR STRESS IS GIVEN BY (TMS 402 8.2.6)

$$F_v = (SF)1.125\left(\sqrt{f'_m}\right) = \text{43.571 psi} > f_v \quad \text{[Satisfactory]}$$

Technical References:

1. "Masonry Designers' Guide, Third Edition" (MDG-3), The Masonry Society, 2001.

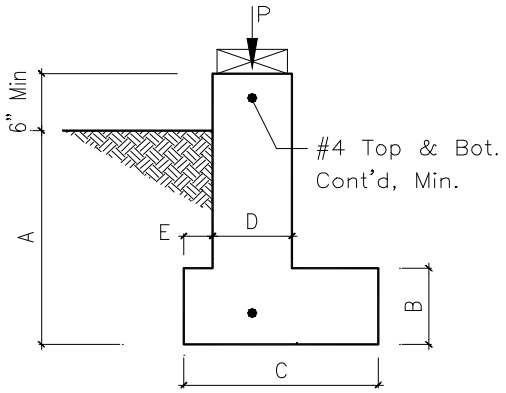
PROJECT :
CLIENT :
JOB NO. :
DATE :
PAGE :
DESIGN BY :
REVIEW BY :

## Footing Design for Bearing Wall Based on 2021 IBC / ACI 318-19

**Wall Footing**

### INPUT DATA & DESIGN SUMMARY

| | | | | |
|---|---|---|---|---|
| FOOTING SIZE | A | = | 24 | in |
| | B | = | 8 | in |
| | C | = | 24 | in |
| | D | = | 8 | in |
| | E | = | 8 | in |
| FOOTING CONCRETE STRENGTH | fc' | = | 2.5 | ksi |
| AXIAL DEAD LOAD (per linear foot) | $P_{DL}$ | = | 1.134 | k / ft |
| AXIAL LIVE LOAD (per linear foot) | $P_{LL}$ | = | 0.14 | k / ft |
| LATERAL LOAD (0=WIND, 1=SEISMIC) | | = | 1 | Seismic,SD |
| LATERAL LOAD (per linear foot) | $P_{LAT}$ | = | 1.5 | k / ft, SD |
| (holdown force converted to load per linear foot) | | | | |
| SURCHARGE | $q_s$ | = | 0.1 | ksf |
| SOIL WEIGHT | $w_s$ | = | 0.11 | kcf |
| ALLOWABLE SOIL PRESSURE | $Q_a$ | = | 1.5 | ksf |




**THE FOOTING DESIGN IS ADEQUATE.**

### ANALYSIS

**DESIGN LOADS** (IBC 1605.2 & ACI 318 5.3)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CASE 1: | DL + LL | P | = | 1.27 | k / ft | 1.2 DL + 1.6 LL | Pu | = | 1.58 k / ft |
| CASE 2: | DL + LL + E / 1.4 | P | = | 2.35 | k / ft | 1.2 DL + 1.0 LL + 1.0 E | Pu | = | 3.00 k / ft |
| CASE 3: | 0.9 DL + E / 1.4 | P | = | 2.09 | k / ft | 0.9 DL + 1.0 E | Pu | = | 2.52 k / ft |

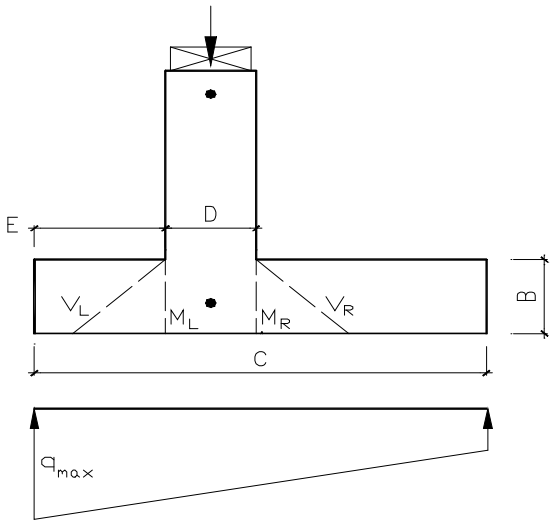
**CHECK SOIL BEARING CAPACITY**(ACI 318 13.3.1.1)

| Service Loads | CASE 1 | CASE 2 | CASE 3 | |
|---|---|---|---|---|
| P | 1.27 | 2.35 | 2.09 | k / ft |
| e | 0.0 | 0.0 | 0.0 | in (from center of footing) |
| $q_s$ C | 0.20 | 0.20 | 0.20 | k / ft, (surcharge load) |
| (0.15-$w_s$) Area | 0.10 | 0.10 | 0.10 | k / ft, (footing increased) |
| Σ P | 1.6 | 2.6 | 2.4 | k / ft |
| e | 0.0 | 0.0 | 0.0 | in |
| $q_{max}$ | 0.79 | 1.32 | 1.20 | ksf |
| $Q_a$ | 1.50 | 1.50 | 1.50 | ksf |

Where

$$q_{max} = \begin{cases} \dfrac{(\Sigma P)\left(1+\dfrac{6e}{C}\right)}{C}, & for \quad e \le \dfrac{C}{6} \\ \dfrac{2(\Sigma P)}{3(0.5C-e)}, & for \quad e > \dfrac{C}{6} \end{cases}$$

[Satisfactory]




**DESIGN FOR FLEXURE** (ACI 318 14.5)

$$\phi M_n = MIN\left(5\lambda\phi\sqrt{f'_c}S,\ 0.85\phi f'_c S\right) = 1.60 \text{ ft-kips / ft}$$

where
λ = 1.0 (ACI 318 19.2.4)
ϕ = 0.6 (ACI 318 21.2)
S = elastic section modulus of section
= 128 $in^3$/ ft

(cont'd)

FACTORED SOIL PRESSURE

| Factored Loads | CASE 1 | CASE 2 | CASE 3 | |
|---|---|---|---|---|
| $P_u$ | 1.6 | 3.0 | 2.5 | k / ft |
| $e_u$ | 0.0 | 0.0 | 0.0 | in (from center of footing) |
| $\gamma q_s C$ | 0.32 | 0.32 | 0.32 | k / ft, (factored surcharge load) |
| $\gamma$[0.15AC - (0.15-Ws) (C-D) (A-B) ] | 0.63 | 0.63 | 0.48 | k / ft, (factored footing & backfill loads) |
| $\Sigma P_u$ | 2.54 | 3.96 | 3.32 | k / ft |
| $e_u$ | 0.0 | 0.0 | 0.0 | in |
| E | 8.0 | 8.0 | 8.0 | in |
| $q_{u, max}$ | 1.27 | 1.98 | 1.66 | ksf |
| $q_{u, VL}$ | 1.27 | 1.98 | 1.66 | ksf |
| $q_{u, ML}$ | 1.27 | 1.98 | 1.66 | ksf |
| $q_{u, MR}$ | 1.27 | 1.98 | 1.66 | ksf |
| $q_{u, VR}$ | 1.27 | 1.98 | 1.66 | ksf |
| $q_{u, min}$ | 1.27 | 1.98 | 1.66 | ksf |
| $M_{u, L}$ | 0.19 | 0.35 | 0.28 | ft-k / ft |
| $M_{u, R}$ | 0.19 | 0.35 | 0.28 | ft-k / ft |
| $V_{u, L}$ | 0.00 | 0.00 | 0.00 | k / ft |
| $V_{u, R}$ | 0.00 | 0.00 | 0.00 | k / ft |

$M_{u, max}$ = 0.35 ft-k / ft < $\phi M_n$ [Satisfactory]

**CHECK FLEXURE SHEAR** (ACI 318 14.5)

$\phi V_n = \frac{4}{3} \lambda \phi \sqrt{f'_c} B$ = 3.84 k / ft

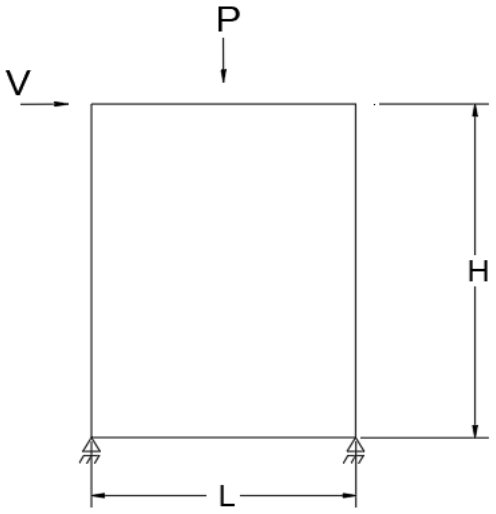
where $\phi$ = 0.6 (ACI 318 21.2)

$V_{u, max}$ = 0.00 k / ft < $\phi V_n$ [Satisfactory]

# PSE Consulting Engineers Inc.

| | | | | | |
|---|---|---|---|---|---|
| Project Number | Romtec 225-076 | | | | |
| Project Name | GGP Westhaven Park Restroom | Designed by | RMH | Date | 4/28/2025 |
| Subject | Analysis | Checked by | | Date | |

## Longitudinal Shearwalls




P: Dead Load = 105 plf
Roof Live Load = 140 plf

H: 8.7 ft.
L: 14.7 ft.

V: Wind

| | | |
|---|---|---|
| Roof Load: | 13 | psf |
| Pitch: | 0 | Degrees |
| Load Area: | 0.00 | Sq.Ft. |
| Wall Load: | 13 | psf |
| Load Area: | 156.00 | Sq.Ft. |

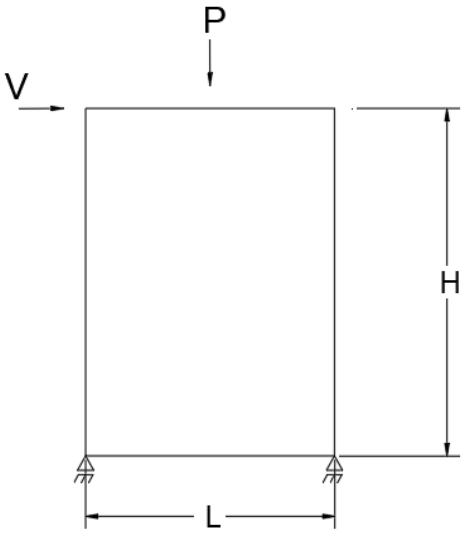
Seismic

| | | |
|---|---|---|
| Total: | 15420 | Lbs |
| Building Length: | 25.3 | |
| Trib. Width | 12.7 | |
| # of Wall Panels: | 1 | |

| | | |
|---|---|---|
| **WL =** | **2028** | Lbs |
| **EL =** | **11565** | Lbs |

**USE** **8" CMU W/ #4 Vert Bars @ 24" O.C. & #5 Horz Bars @ 24" O.C.**

## Transverse Shearwalls




P: Dead Load = 105 plf
Roof Live Load = 140 plf

H: 12.7 ft.
L: 8.7 ft.

V: Wind

| | | |
|---|---|---|
| Roof Load: | 8 | psf |
| Pitch: | 23 | Degrees |
| Load Area: | 104.00 | Sq.Ft. |
| Wall Load: | 13 | psf |
| Load Area: | 102.00 | Sq.Ft. |

Seismic

| | | |
|---|---|---|
| Total: | 15420 | Lbs |
| Building Length: | 14.7 | |
| Trib. Width | 7.4 | |
| # of Wall Panels: | 1 | |

| | | |
|---|---|---|
| **WL =** | **1651** | Lbs |
| **EL =** | **11565** | Lbs |

**USE** **8" CMU W/ #4 Vert Bars @ 24" O.C. & #5 Horz Bars @ 24" O.C.**

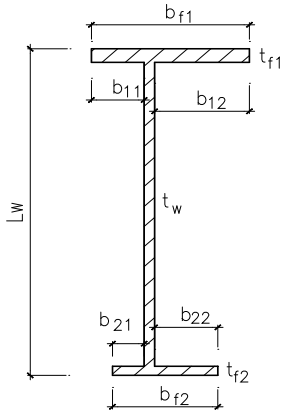
PROJECT :
CLIENT :
JOB NO. :
DATE :
PAGE :
DESIGN BY :
REVIEW BY :

## Masonry Shear Wall Design Based on TMS 402-16/13 & 2021 IBC (both ASD and SD)

**Longitudinal Shearwalls**

**INPUT DATA & DESIGN SUMMARY**

| | | | |
|---|---|---|---|
| SPECIAL INSPECTION ( 0=NO, 1=YES ) | | 1 | Yes |
| (This option only for local jurisdiction amendments to the code, not part of TMS.) | | | |
| TYPE OF MASONRY ( 1=CMU, 2=BRICK ) | | 1 | CMU |
| MASONRY STRENGTH | $f_m'$ = | 1.5 | ksi |
| REBAR YIELD STRESS | $f_y$ = | 60 | ksi |
| ALLOWABLE 30% INCREASING ? (Yes or No, IBC 1605.2) | | No | |
| SEISMIC PERFORMANCE CATEGORY ( C,D,E, 0=WIND, 5=GRAVITY) | | D | Seismic D |
| MASONRY LAID IN RUNNING BOND ? (TMS 402 7.3.2.6) | | No | |
| SERVICE AXIAL LOAD | P = | 2.132 | kips, at middle of $L_w$ |
| SERVICE SHEAR LOAD | $V_x$ = | 11.565 | kips, (in-plane force) |
| SERVICE MOMENT LOAD | $M_x$ = | 67.077 | ft-kips, (top flange, bf1, compression) |
| | $M_y$ = | 0.2 | ft-kips, (out-of-plane, left b11 & b21, compression) |




| | | | |
|---|---|---|---|
| EFFECTIVE HEIGHT OF WALL | $h_w$ = | 8.7 | ft |
| LENGTH OF SHEAR WALL | $L_w$ = | 14.7 | ft, (within vertical control joints) |

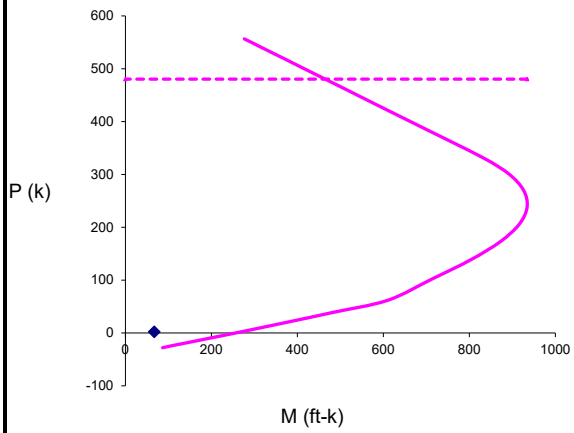
**THE WALL DESIGN IS ADEQUATE.**

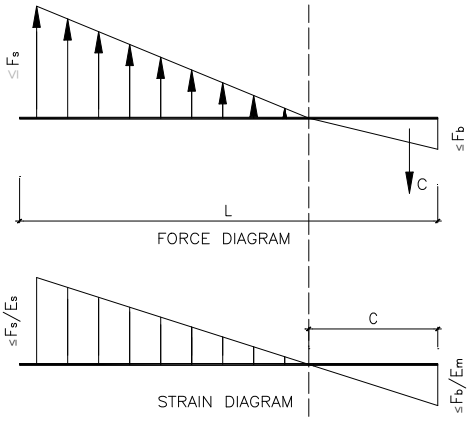
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| THICKNESS OF WALL | $t_w$ = | 8 | in | | | | |
| REINFORCING OF WALL | | 1 | # | 4 | at each ends, with | 4 | in center to edge. |
| $A_{sh}$, Horizontal | 1 | # | 5 | @ | 24 | in o.c. | |
| $A_{sv}$, Vertical | 1 | # | 4 | @ | 24 | in o.c. | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| TOP FLANGE (COMPRESSION) | $b_{11}$ = | 0 | in , | $b_{12}$ = | 0 | in , | $b_{f1}$ = | 8 | in ,(TMS 402 5.1.1.2.3) |
| $t_{f1}$ = | 8 | in , | 1 | # | 4 | @ | 24 | in o.c., Vertical | |
| BOTTOM FLANGE | $b_{21}$ = | 0 | in , | $b_{22}$ = | 0 | in , | $b_{f2}$ = | 8 | in ,(TMS 402 5.1.1.2.3) |
| $t_{f2}$ = | 8 | in , | 1 | # | 4 | @ | 24 | in o.c., Vertical | |

**ANALYSIS**

**CHECK FLEXURAL & AXIAL CAPACITY BY ALLOWABLE STRESS DESIGN (ASD)**

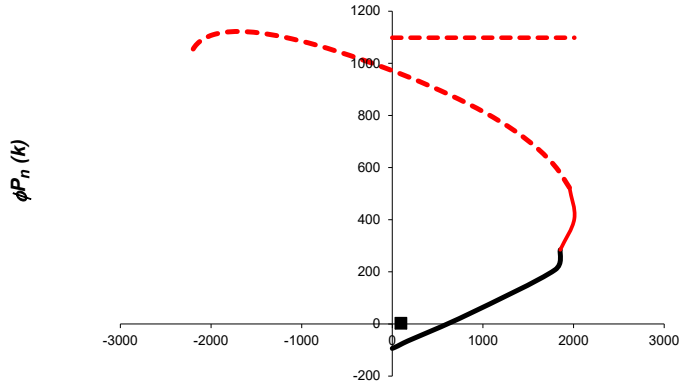


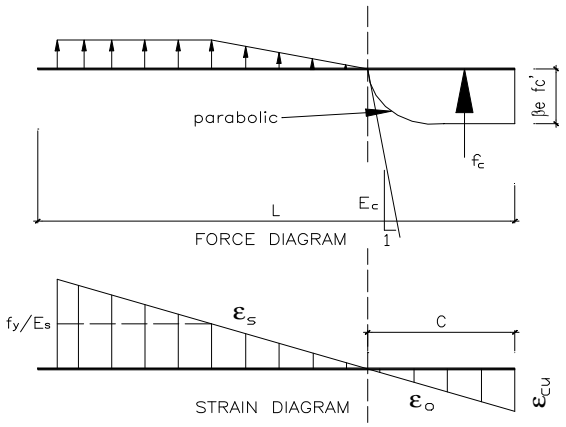




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| P (load) = | 2.132 | kips | < | P (allowable) = $P_a$ = | 480.471 | kips | | |
| M (resultant) = $(M_x^2 + M_y^2)^{0.5}$ = | 67.0773 | ft-kips | < | M (allowable) = | 268.878 | ft-kips | [Satisfactory] | |
| Where $E_m$ = | 1350 | ksi, (TMS 402 4.2.2.2.1) | | $A_n$ = | 1351 | $in^2$ | | |
| $E_s$ = | 29000 | ksi, (TMS 402 4.2.2.1) | | $A_{st}$ = | 1.74 | $in^2$ | | |
| Scale Factor = | 1.000 | , (TMS 402-11 2.1.2) | | $f_s \geq$ | 0 | ksi, (TMS 402 8.3.3.3) | | |
| $F_b$ = | 0.495 | ksi, (TMS 402 8-18) | | h / r = | 47 | , neglected conservatively flanges. | | |
| $F_s$ = | 32.00 | ksi, (TMS 402 8.3.3.1) | | $P_a$ = | 480.471 | kips, (TMS 402 8.3.4.2.1) | | |

(cont'd)

**CHECK FLEXURAL & AXIAL CAPACITY BY STRENGTH DESIGN (SD)**




ϕ$M_n$ (ft-k) Solid Black Line - **Tension Controlled**
Solid Red Line - **Transition**
Dash Line - **Compression Controlled**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $P_u$ = 1.2 P = | 2.5584 | kips | < | ϕ$P_n$ = | 1098.41 | kips, (TMS 402 9.3.4.1.1) | |
| $M_u$ = (1/0.7) ($M_x^2$ + $M_y^2$)$^{0.5}$ = | 95.8247 | ft-kips | < | ϕ$M_n$ = | 661.727 | ft-kips, at $P_u$ level. | |
| | | | [Satisfactory] | | | | |
| Where $\varepsilon_{mu}$ = | 0.0025 | , (TMS 402 9.3.2.c) | | d = | 175 | in | |
| ϕ = | 0.9 | , (TMS 402 9.1.4.1) | | $f_m'$ = | 1.5 | ksi | |

**CHECK SHEAR CAPACITY (ASD)**, (TMS 402 8.3.6)

$$F_v = MAX\left\{(SF)\left[\frac{1}{4}\left(4-1.75MIN\left(1\ ,\ \frac{M_T}{Vd}\right)\right)\sqrt{f_m'}+0.25\frac{P}{A_n}\right]+0.5\frac{A_v F_s d}{A_n s}\ ,\ (SF)\left[\frac{1}{2}\left(4-1.75MIN\left(1\ ,\ \frac{M_T}{Vd}\right)\right)\sqrt{f_m'}+0.25\frac{P}{A_n}\right]\right\}$$

= 64 psi > 1.5 $f_v$ = 13 psi [Satisfactory]
(factor 1.5 from TMS 402 7.3.2.6.1.2)

$$F_{v,\,Maximum} = (SF)\,MIN\left[3\ ,\ MAX\left(2\ ,\ 2+\frac{4}{3}\left(1-\frac{M_T}{Vd}\right)\right)\right]\sqrt{f_m'} = 109 \text{ psi} > 1.5\ f_v$$
[Satisfactory]

**CHECK MINIMUM REINFORCEMENTS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $A_{sh,min}$ = | 0.137 | $in^2$/ft | < | $A_{sh,actual}$ = | 0.155 | $in^2$/ft | [Satisfactory] (TMS 402 7.3.2.6) |
| $S_{sh,max}$ = | 24 | in | > | $S_{sh,actual}$ = | 24 | in | [Satisfactory] (TMS 402 7.3.2.6) |
| $A_{sv,min}$ = | 0.064 | $in^2$/ft | < | $A_{sv,actual}$ = | 0.100 | $in^2$/ft | [Satisfactory] (TMS 402 7.3.2.6) |
| $S_{sv,max}$ = | 24 | in | > | $S_{sv,actual}$ = | 24 | in | [Satisfactory] (TMS 402 7.3.2.6) |
| $A_{total,min}$ = | 0.183 | $in^2$/ft | < | $A_{total,actual}$ = | 0.255 | $in^2$/ft | [Satisfactory] (TMS 402 7.3.2.6) |

**CHECK MAXIMUM REINFORCEMENT PERCENTAGE**

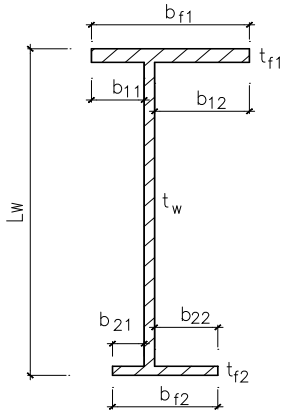
$$\rho_{max} = \frac{n f_m'}{2 f_y\left(n+\frac{f_y}{f_m'}\right)} = 0.0044 > \rho = 0.0001 \text{ [Satisfactory]}$$
(TMS 402 8.3.4.4)

PROJECT :
CLIENT :
JOB NO. : DATE :

PAGE :
DESIGN BY :
REVIEW BY :

## Masonry Shear Wall Design Based on TMS 402-16/13 & 2021 IBC (both ASD and SD) — Transverse Shearwalls

**INPUT DATA & DESIGN SUMMARY**




| | | | |
|---|---|---|---|
| SPECIAL INSPECTION ( 0=NO, 1=YES ) | | 1 | Yes |
| (This option only for local jurisdiction amendments to the code, not part of TMS.) | | | |
| TYPE OF MASONRY ( 1=CMU, 2=BRICK ) | | 1 | CMU |
| MASONRY STRENGTH | $f_m'$ = | 1.5 | ksi |
| REBAR YIELD STRESS | $f_y$ = | 60 | ksi |
| ALLOWABLE 30% INCREASING ? (Yes or No, IBC 1605.2) | | No | |
| SEISMIC PERFORMANCE CATEGORY ( C,D,E, 0=WIND, 5=GRAVITY) | | D | Seismic D |
| MASONRY LAID IN RUNNING BOND ? (TMS 402 7.3.2.6) | | No | |
| SERVICE AXIAL LOAD | P = | 2.132 | kips, at middle of $L_w$ |
| SERVICE SHEAR LOAD | $V_x$ = | 11.565 | kips, (in-plane force) |
| SERVICE MOMENT LOAD | $M_x$ = | 97.917 | ft-kips, (top flange, bf1, compression) |
| | $M_y$ = | 0.2 | ft-kips, (out-of-plane, left b11 & b21, compression) |
| EFFECTIVE HEIGHT OF WALL | $h_w$ = | 12.7 | ft |
| LENGTH OF SHEAR WALL | $L_w$ = | 8.7 | ft, (within vertical control joints) |

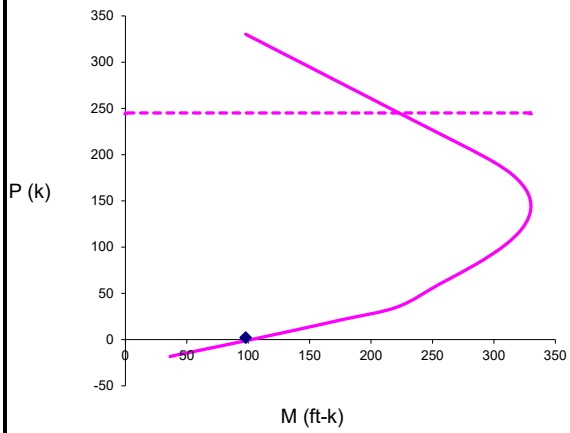
**THE WALL DESIGN IS ADEQUATE.**

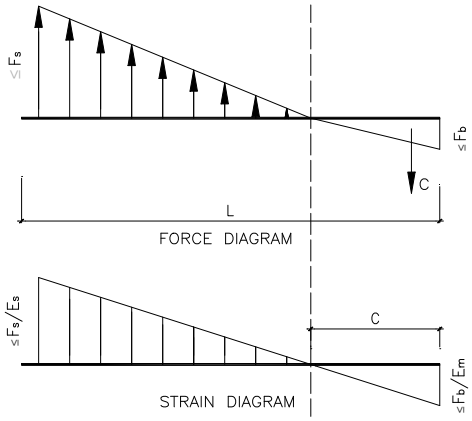
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| THICKNESS OF WALL | $t_w$ = | 8 | in | | | | |
| REINFORCING OF WALL | | 1 | # | 4 | at each ends, with | 4 | in center to edge. |
| $A_{sh}$, Horizontal | 1 | # | 5 | @ | 24 | in o.c. | |
| $A_{sv}$, Vertical | 1 | # | 4 | @ | 24 | in o.c. | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| TOP FLANGE (COMPRESSION) | $b_{11}$ = | 0 | in , | $b_{12}$ = | 0 | in , | $b_{f1}$ = | 8 | in ,(TMS 402 5.1.1.2.3) |
| $t_{f1}$ = | 8 | in , | 1 | # | 4 | @ | 24 | in o.c., Vertical | |
| BOTTOM FLANGE | $b_{21}$ = | 0 | in , | $b_{22}$ = | 0 | in , | $b_{f2}$ = | 8 | in ,(TMS 402 5.1.1.2.3) |
| $t_{f2}$ = | 8 | in , | 1 | # | 4 | @ | 24 | in o.c., Vertical | |

**ANALYSIS**

**CHECK FLEXURAL & AXIAL CAPACITY BY ALLOWABLE STRESS DESIGN (ASD)**

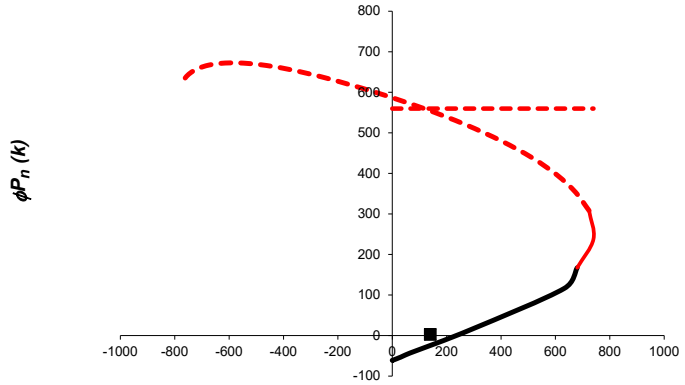


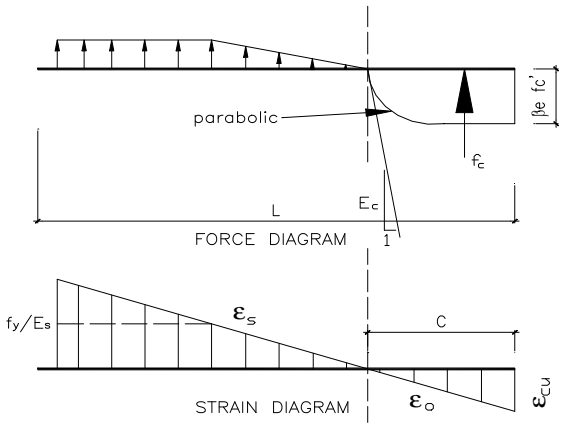




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| P (load) = | 2.132 | kips | < | P (allowable) = $P_a$ = | 245.068 | kips | | |
| M (resultant) = $(M_x^2 + M_y^2)^{0.5}$ = | 97.9172 | ft-kips | < | M (allowable) = | 109.787 | ft-kips | [Satisfactory] | |
| Where $E_m$ = | 1350 | ksi, (TMS 402 4.2.2.2.1) | | $A_n$ = | 802 | $in^2$ | | |
| $E_s$ = | 29000 | ksi, (TMS 402 4.2.2.1) | | $A_{st}$ = | 1.14 | $in^2$ | | |
| Scale Factor = | 1.000 | , (TMS 402-11 2.1.2) | | $f_s \geq$ | 0 | ksi, (TMS 402 8.3.3.3) | | |
| $F_b$ = | 0.495 | ksi, (TMS 402 8-18) | | h / r = | 69 | , neglected conservatively flanges. | | |
| $F_s$ = | 32.00 | ksi, (TMS 402 8.3.3.1) | | $P_a$ = | 245.068 | kips, (TMS 402 8.3.4.2.1) | | |

(cont'd)

**CHECK FLEXURAL & AXIAL CAPACITY BY STRENGTH DESIGN (SD)**




***ϕMn (ft-k)*** Solid Black Line - **Tension Controlled**
Solid Red Line - **Transition**
Dash Line - **Compression Controlled**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $P_u$ = 1.2 P = | 2.5584 | kips | | < | $\phi P_n$ = | 559.839 | kips, (TMS 402 9.3.4.1.1) | |
| $M_u$ = (1/0.7) $(M_x^2 + M_y^2)^{0.5}$ = | 139.882 | ft-kips | | < | $\phi M_n$ = | 260.542 | ft-kips, at $P_u$ level. | |
| | | | [Satisfactory] | | | | | |
| Where $\varepsilon_{mu}$ = | 0.0025 | , (TMS 402 9.3.2.c) | | d = | 103 | in | | |
| $\phi$ = | 0.9 | , (TMS 402 9.1.4.1) | | $f_m'$ = | 1.5 | ksi | | |

**CHECK SHEAR CAPACITY (ASD)**, (TMS 402 8.3.6)

$$F_v = MAX\left\{(SF)\left[\frac{1}{4}\left(4-1.75MIN\left(1\ ,\ \frac{M_T}{Vd}\right)\right)\sqrt{f_m'}+0.25\frac{P}{A_n}\right]+0.5\frac{A_v F_s d}{A_n s}\ ,\ (SF)\left[\frac{1}{2}\left(4-1.75MIN\left(1\ ,\ \frac{M_T}{Vd}\right)\right)\sqrt{f_m'}+0.25\frac{P}{A_n}\right]\right\}$$

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| = | 49 | psi | > | 1.5 $f_v$ | = | 22 | psi [Satisfactory] |

(factor 1.5 from TMS 402 7.3.2.6.1.2)

$$F_{v,\,Maximum} = (SF)\,MIN\left[3\ ,\ MAX\left(2\ ,\ 2+\frac{4}{3}\left(1-\frac{M_T}{Vd}\right)\right)\right]\sqrt{f_m'} =$$ 78 psi > 1.5 $f_v$ [Satisfactory]

**CHECK MINIMUM REINFORCEMENTS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $A_{sh,min}$ = | 0.137 | $in^2$/ft | < | $A_{sh,actual}$ = | 0.155 | $in^2$/ft | [Satisfactory] (TMS 402 7.3.2.6) |
| $S_{sh,max}$ = | 24 | in | > | $S_{sh,actual}$ = | 24 | in | [Satisfactory] (TMS 402 7.3.2.6) |
| $A_{sv,min}$ = | 0.064 | $in^2$/ft | < | $A_{sv,actual}$ = | 0.100 | $in^2$/ft | [Satisfactory] (TMS 402 7.3.2.6) |
| $S_{sv,max}$ = | 24 | in | > | $S_{sv,actual}$ = | 24 | in | [Satisfactory] (TMS 402 7.3.2.6) |
| $A_{total,min}$ = | 0.183 | $in^2$/ft | < | $A_{total,actual}$ = | 0.255 | $in^2$/ft | [Satisfactory] (TMS 402 7.3.2.6) |

**CHECK MAXIMUM REINFORCEMENT PERCENTAGE**

$$\rho_{max} = \frac{n f_m'}{2 f_y\left(n+\frac{f_y}{f_m'}\right)} =$$ 0.0044 > $\rho$ = 0.0003 [Satisfactory]

(TMS 402 8.3.4.4)

# PSE Consulting Engineers Inc.

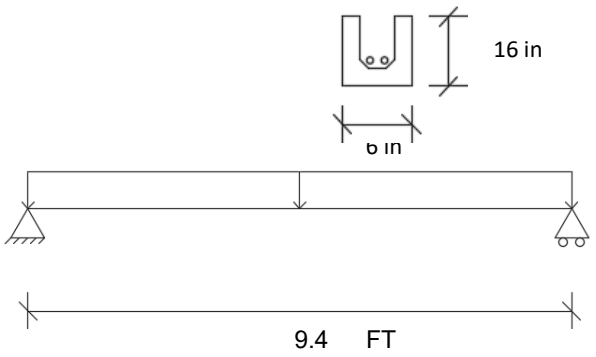
| | | | | | |
|---|---|---|---|---|---|
| Project Number | Romtec 225-076 | | | | |
| Project Name | GGP Westhaven Park Restroom | Designed by | RMH | Date | 4/28/2025 |
| Subject | Analysis | Checked by | | Date | |

**Wall Bond Beam**

F= 327 PLF

V: 1,537 $V = \frac{WL}{2}$

M: 3,612 $M = \frac{WL^2}{8}$




**USE** **8" x 16" CMU W/ 1 - #5 Tension Bar**

**Wall to Rafter Anchorage**

| | | |
|---|---|---|
| P= | 3,074 | LBS |
| SHEAR LOAD= | 327.00 | PLF |
| SPACING= | 112.8 | IN |

**USE** **ROMTEC BEAM BRACKET W/ (2) 1/2" DIA. ANCHOR**

PROJECT :
CLIENT :
JOB NO. :
DATE :
PAGE :
DESIGN BY :
REVIEW BY :

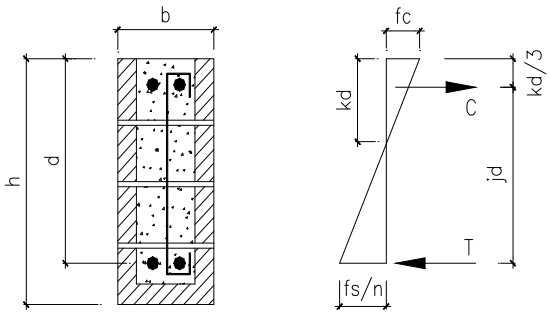
## Masonry Beam Design Based on TMS 402-16/13

Wall Bond Beam

### INPUT DATA & DESIGN SUMMARY

| | | | | |
|---|---|---|---|---|
| SPECIAL INSPECTION ( 0=NO, 1=YES ) | | | 1 | Yes |
| TYPE OF MASONRY ( 1=CMU, 2=BRICK ) | | | 1 | CMU |
| MASONRY STRENGTH | $f_m'$ | = | 1.5 | ksi |
| REBAR YIELD STRESS | $f_y$ | = | 60 | ksi |
| ALLOWABLE INCREASING ? (IBC/CBC 1605.2) | | | Yes | |
| SERVICE SHEAR LOAD | V | = | 1.537 | k |
| SERVICE MOMENT LOAD | M | = | 3.612 | ft-k |
| WIDTH | b | = | 16 | in |
| EFFECTIVE DEPTH | d | = | 6 | in |
| CLEAR SPAN | Lc | = | 9.4 | ft |
| LOAD TYPE (1=SEISMIC, 0=WIND, 5=GRAVITY) | | | 1 | Seismic |

VERTICAL REINF. 0 # 4 @ 32 in o.c.
TENSION REINFORCEMENT 1 # 5




**[THE BEAM DESIGN IS ADEQUATE.]**

### ANALYSIS

| | | | | |
|---|---|---|---|---|
| ALLOWABLE STRESS FACTOR | SF | = | 1.333 | |
| ALLOWABLE REINF. STRESS | (1.33 or 1.0) $F_s$ | = | 32 | ksi |
| ALLOWABLE MASONRY STRESS | $F_b$=(SF)(0.33$f_m'$) | = | 0.66 | ksi |
| MASONRY ELASTICITY MODULUS | $E_m$ | = | 1350 | ksi, (TMS 402 4.2.2) |
| STEEL ELASTICITY MODULUS | $E_s$ | = | 29000 | ksi, (TMS 402 4.2.2) |
| EFFECTIVE WIDTH | $b_w$ | = | 15.63 | in [Satisfactory, Lc < 32 bw] |
| MODULAR RATIO | n | = | 21.48 | |
| TENSION REINFORCEMENT RATIO | ρ | = | 0.003 | |

THE NEUTRAL AXIS DEPTH FACTOR IS

$$k=\sqrt{2\rho n+(\rho n)^2}-\rho n \quad = \quad 0.312$$

THE LEVER-ARM FACTOR IS

$$j=1-\frac{k}{3} \quad = 0.896$$

THE TENSILE STRESS IN REINFORCEMENT DUE TO FLEXURE IS

$$f_s=\frac{M}{A_s jd} \quad = \quad 26 \text{ ksi} \quad < \quad F_s \quad \text{[SATISFACTORY]}$$

THE COMPRESSIVE STRESS IN THE EXTREME FIBER DUE TO FLEXURE IS

$$f_b=\frac{2M}{jkb_w d^2} \quad = \quad 0.55 \text{ ksi} \quad < \quad F_b \quad \text{[SATISFACTORY]}$$

THE SHEAR STRESS IN MASONRY IS

$$f_v=\frac{V}{b_w d} \quad = \quad 16.4 \text{ psi} \quad < \quad F_v=MIN\left[(SF)1.125\sqrt{f_m'}+0.5\left(\frac{A_v F_s d}{A_n S}\right),\ (SF)2\sqrt{f_m'}\right]$$

(TMS 402 8.3.5)

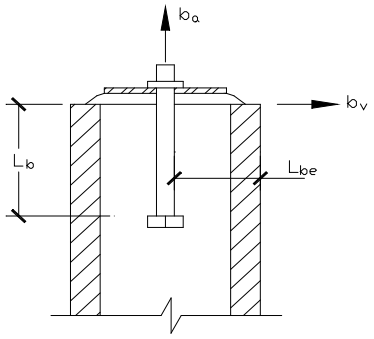
$$= \quad 58.0948 \text{ psi} \quad \text{[SATISFACTORY]}$$

PROJECT :
CLIENT :
JOB NO. :
DATE :
PAGE :
DESIGN BY :
REVIEW BY :

**Double Fastener Anchorage in Tension & Shear Based on TMS 402-16/13** — Wall to Rafter Anchor

## INPUT DATA & DESIGN SUMMARY

| | | | | |
|---|---|---|---|---|
| MASONRY STRENGTH | $f_m'$ | = | 1.9 | ksi |
| FASTENER YIELD STRESS | $f_y$ | = | 60 | ksi |
| SERVICE TENSION LOAD | $b_a$ | = | 0 | kips / 2 fasteners |
| SERVICE SHEAR LOAD | $b_v$ | = | 3.074 | kips / 2 fasteners |
| WALL THICKNESS | b | = | 8 | in |
| FASTENER DIAMETER | $\phi$ | = | 1/2 | in |
| EFFECTIVE EMBEDMENT | $L_b$ | = | 6 | in |
| FASTENER SPACING | S | = | 3 | in |
| ALLOWABLE INCREASING ? (IBC/CBC 1605.2) | | | Yes | |

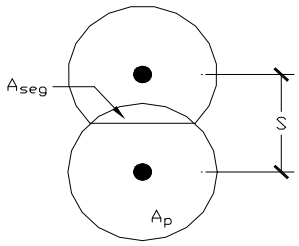



**[THE ANCHORAGE DESIGN IS ADEQUATE.]**

## ANALYSIS

CHECK MIN. EMBEDMENT (TMS 402-16/13 6.3.6/6.2.6)

$L_{b,min}$ = MIN[ 4$\phi$ , 2] = 2.00 in < $L_b$ [SATISFACTORY]




CHECK TENSION CAPACITY (TMS 402 8.1.3.3.1)

$B_a$ = 2 MIN[ 1.25$A_{pt}(f_m')^{0.5}$ , 0.6$A_b f_y$] = 3.31 kips / 2 fasteners

> k $b_a$ [SATISFACTORY]

Where $L_{be}$ = 3.57 in

L = MIN[ $L_b$ , $L_{be}$] = 3.57 in, conservative value

$\theta = COS^{-1}(0.5S / L)$ = 1.14 rad

$A_{seg} = L^2 [ \theta - 0.5 SIN(2\theta)]$ = 9.59 $in^2$

$A_{pt} = \pi L^2 - A_{seg}$ = 30.33 $in^2$ (TMS 402-16/13 6.3.2/6.2.2)

$A_b = \pi \phi^2 / 4$ = 0.20 $in^2$

k = 3/4

CHECK SHEAR CAPACITY (TMS 402 8.1.3.3.2)

$B_v$ = MIN[1.25$A_{pv}(f_m')^{0.5}$ , 350$(A_b f_m')^{1/4}$ , 2.5$A_{pt}(f_m')^{0.5}$ , 0.36$A_b f_y$] = 3.08 kips / 2 fasteners

> k $b_v$ [SATISFACTORY] *(Equation 8-7, 350 in TMS 402-13 increased to 580 in TMS 402-16)*

Where $A_{pv} = A_{pt}$ = 30.33 $in^2$, since L = MIN[ $L_b$ , $L_{be}$] used above, (TMS 402-16/13 6.3.3/6.2.3)

CHECK COMBINED SHEAR AND TENSION CAPACITY (TMS 402 8.1.3.3.3)

$(b_a / B_a)^{(5/3)} + (b_v / B_v)^{(5/3)}$ = 1.00 < 1.33 [SATISFACTORY]

# BUILDING ENERGY ANALYSIS REPORT

## PROJECT:

2504-015 Garden Grove Parks, Westhaven Park
12252 West St
Garden Grove,  CA 92840

## Project Designer:

PSE Consulting Engineers, Inc.
250 Main St. , Ste. A
Klamath Falls, Oregon 97601
541-850-6300

## Report Prepared by:

Matthew Weldon
Regerfour LLC dba 5 Star Energy
1878 Saltu
Redding, Ca 96002
530-275-3350

## Job Number:

2504-015

## Date:

4/17/2025

# TABLE OF CONTENTS

# Indoor Lighting



| **CERTIFICATE OF COMPLIANCE** | **NRCC-LTI-E** |
|---|---|

*This document is used to demonstrate compliance with requirements in 110.9, 110.12(c), 130.0, 130.1, 140.6 and 141.0(b)2 for indoor lighting scopes using the prescriptive path for nonresidential and hotel/motel occupancies. It is also used to document compliance with requirements in 160.5, 170.2(e) and 180.2(b)4 for indoor lighting scopes using the prescriptive path for multifamily occupancies. Multifamily includes dormitory and senior living facilities.*

| | | | |
|---|---|---|---|
| **Project Name:** | 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 1 of 7)** |
| **Project Address:** | 12252 West St | **Date Prepared:** | 4/17/2025 |

## A. GENERAL INFORMATION

| | | | | | |
|---|---|---|---|---|---|
| 01 | Project Location (city) | Garden Grove | 04 | Total Conditioned Floor Area ($ft^2$) | 0 |
| 02 | Climate Zone | 8 | 05 | Total Unconditioned Floor Area ($ft^2$) | 372 |
| 03 | Occupancy Types Within Project (select all that apply): | | 06 | # of Stories (Habitable Above Grade) | 1 |

● Support Areas

## B. PROJECT SCOPE

*This table includes any lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.6 / 170.2(e) or 141.0(b)2 / 180.2(b)4 for alterations.*

| **Scope of Work** | **Conditioned Spaces** | | **Unconditioned Spaces** | |
|---|---|---|---|---|
| 01 | 02 | 03 | 04 | 05 |
| My Project Consists of (check all that apply): | Calculation Method | Area ($ft^2$) | Calculation Method | Area ($ft^2$) |
| ☒ New Lighting System | Area Category Method | 0 | Area Category Method | 372 |
| ☐ New Lighting System - Parking Garage | | | | |
| **Total Area of Work ($ft^2$)** | 0 | | 372 | |

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTI-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 2 of 7)** |
| | **Date Prepared:** | 4/17/2025 |

## C. COMPLIANCE RESULTS

*If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.*

| *Lighting in conditioned and unconditioned spaces must not be combined for compliance per 140.6(b)1 / 170.2(e)* | **Allowed Lighting Power per 140.6(b) / 170.2(e) (Watts)** | | | | | | | **Adjusted Lighting Power per 140.6(a) / 170.2(e) (Watts)** | | | | | **Compliance Results** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 01 | 02 | 03 | 04 | | 05 | | 06 | 07 | | 08 | | 09 |
| | Complete Building 140.6(c)1 | Area Category 140.6(c)2 / 170.2(e)4 | Area Category Additional 140.6(c)2G / 170.2(e)4Av ( +) | Tailored 140.6(c)3 / 170.2(e)4B ( +) | = | **Total Allowed** (Watts) | ≥ | Total Designed (Watts) | Adjustments PAF Lighting Control Credits 140.6(a)2 / 170.2(e)1B (-) | = | **Total Adjusted** (Watts) *Includes Adjustments | | **05 must be >= 08 140.6 / 170.2(e)** |
| | (See Table I) | (See Table I) | (See Table J) | (See Table K) | | | | (See Table F) | (See Table P) | | | | |
| **Conditioned** | | | | | = | | ≥ | | | = | | | |
| **Unconditioned** | | 241.8 | 0 | | = | 242 | ≥ | 176 | 0 | = | 176 | | COMPLIES |
| **Controls Compliance (See Table H for Details)** | | | | | | | | | | | | | COMPLIES |
| **Rated Power Reduction Compliance (See Table Q for Details)** | | | | | | | | | | | | | |

## D. EXCEPTIONAL CONDITIONS

*This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.*

## E. ADDITIONAL REMARKS

*This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.*

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTI-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 3 of 7)** |
| | **Date Prepared:** | 4/17/2025 |

## F. INDOOR LIGHTING FIXTURE SCHEDULE

*This table includes all planned permanent and portable lighting other than dwelling unit/ hotel/ motel room lighting. Multifamily dwelling unit and hotel/motel room lighting is documented in Table T. If using Table T to document lighting in multifamily common use areas providing shared provisions for living, eating, cooking or sanitation, those luminaires are not included here.*

**Designed Wattage: Unconditioned Spaces**

| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Name or Item Tag | Complete Luminaire Description | Modular (Track) Fixture | Small Aperture & Color Change[1] | Watts per luminaire[2] | How is Wattage determined | Total Number of Luminaires | Excluded per 140.6(a)3 / 170.2(e)2C | Design Watts | Field Inspector | |
| | | | | | | | | | Pass | Fail |
| LF-2 | Lithonia CSVT L48 35.3w (LF-2) | No | NA | 35.3 | Mfr. Spec | 5 | No | 176.5 | ☐ | ☐ |
| | | | | | | | **Total Designed Watts: UNCONDITIONED SPACES** | 176 | | |

*[1]FOOTNOTE: Design Watts for small aperture and color changing luminaires which qualify per 140.6(a)4B / 170.2(e)2D is adjusted to be 75% /80% of their rated wattage. Table F automatically makes this adjustment, the permit applicant should enter full rated wattage in column 05.*

*[2]Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per 130.0(c) / 160.5(b). Wattage used must be the maximum rated for the luminaire, not the lamp.*

## G. MODULAR LIGHTING SYSTEMS

*This section does not apply to this project.*

## H. INDOOR LIGHTING CONTROLS (Not including PAFs)

*This table includes lighting controls for conditioned and unconditioned spaces.*

**Building Level Controls**

| 01 | 02 | 03 | |
|---|---|---|---|
| Mandatory Demand Response 110.12(c) | Shut-off controls 130.1(c) / 160.5(b)4C | Field Inspector | |
| | | Pass | Fail |
| NA < 4,000W subject to multilevel | See Area/Space Level Controls | ☐ | ☐ |

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTI-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 4 of 7)** |
| | **Date Prepared:** | 4/17/2025 |

## H. INDOOR LIGHTING CONTROLS (Not including PAFs)

**Area Level Controls**

| 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | |
|---|---|---|---|---|---|---|---|---|---|
| Area Description | Complete Building or Area Category Primary Function Area | Manual Area Controls 130.1(a) / 160.5(b)4A | Multi-Level Controls 130.1(b) / 160.5(b)4B | Shut-Off Controls 130.1(c) // 160.5(b)4C | Primary/Skylit Daylighting 130.1(d) / 160.5(b)4D | Secondary Daylighting 130.1(d) / 160.5(b)4D | Interlocked Systems 140.6(a)1/ 170.2(e)2A | Field Inspector | |
| | | | | | | | | Pass | Fail |
| Restroom Lighting | Restroom | Readily Accessible | Dimmer | See Building Level | Included | Included | No | ☐ | ☐ |

| 13 |
|---|
| Plan Sheet Showing Daylit Zones: |
| |

## I. LIGHTING POWER ALLOWANCE: COMPLETE BUILDING OR AREA CATEGORY METHODS

*Each area complying using the Complete Building or Area Category Methods per 140.6(b) are included in this table. Column 06 indicates if additional lighting power allowances per 140.6(c) or adjustments per 140.6(a) are being used .*

**Unconditioned Spaces**

| 01 | 02 | 03 | 04 | 05 | 06 | |
|---|---|---|---|---|---|---|
| Area Description | Complete Building or Area Category Primary Function Area | Allowed Density ($W/ft^2$) | Area ($ft^2$) | Allowed Wattage (Watts) | Additional Allowance / Adjustment | |
| | | | | | Area Category | PAF |
| Zone 1 - RR/Mech | Restroom | 0.65 | 372 | 241.8 | No | No |
| | | **TOTALS:** | 372 | 241.8 | See Tables J, or P for detail | |

## J. ADDITIONAL ALLOWANCE: AREA CATEGORY METHOD QUALIFYING LIGHTING SYSTEM

*This section does not apply to this project.*

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTI-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 5 of 7)** |
| | **Date Prepared:** | 4/17/2025 |

## K. TAILORED METHOD GENERAL LIGHTING POWER ALLOWANCE

*This section does not apply to this project.*

## L. ADDITIONAL LIGHTING ALLOWANCE: TAILORED WALL DISPLAY

*This section does not apply to this project.*

## M. ADDITIONAL LIGHTING ALLOWANCE: TAILORED FLOOR AND TASK LIGHTING

*This section does not apply to this project.*

## N. ADDITIONAL LIGHTING ALLOWANCE: TAILORED DECORATIVE /SPECIAL EFFECTS

*This section does not apply to this project.*

## O. ADDITIONAL LIGHTING ALLOWANCE: TAILORED VERY VALUABLE MERCHANDISE

*This section does not apply to this project.*

## P. POWER ADJUSTMENT: LIGHTING CONTROL CREDIT (POWER ADJUSTMENT FACTOR (PAF))

*This section does not apply to this project.*

## Q. RATED POWER REDUCTION COMPLIANCE FOR ONE-FOR-ONE ALTERATIONS

*This section does not apply to this project.*

## R. 80% LIGHTING POWER FOR ALL ALTERATIONS - CONTROLS EXCEPTIONS

*This section does not apply to this project.*

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTI-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 6 of 7)** |
| | **Date Prepared:** | 4/17/2025 |

## S. DAYLIGHT DESIGN POWER ADJUSTMENT FACTOR (PAF)

*This section does not apply to this project.*

## T. DWELLING UNIT LIGHTING

*This section does not apply to this project.*

## U. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

*Selections have been made based on information provided in this document. If any selections have been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online*

| Form/Title |
|---|
| NRCI-LTI-E - Must be submitted for all buildings |

## V. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

*Selections have been made based on information provided in this document. If any selections have been changed by the permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and any with "-A" in the form name must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: http://www.energy.ca.gov/title24/attcp/providers.html*

| Form/Title | Systems/Spaces To Be Field Verified |
|---|---|
| NRCA-LTI-03-A - Must be submitted for automatic daylight controls. | Restroom Lighting; |

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTI-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 7 of 7)** |
| **Project Address:** 12252 West St | **Date Prepared:** | 4/17/2025 |

## DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

**I certify that this Certificate of Compliance documentation is accurate and complete.**

| | |
|---|---|
| Documentation Author Name:<br>Matthew Weldon | Documentation Author Signature:<br>Matthew Weldon |
| Company:<br>Regerfour LLC dba 5 Star Energy | Signature Date:<br>2025-04-17 |
| Address:<br>1878 Saltu | CEA/ HERS Certification Identification (if applicable): |
| City/State/Zip:<br>Redding Ca 96002 | Phone:<br>530-275-3350 |

## RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

| | |
|---|---|
| Responsible Designer Name:<br>Ralph Hall | Responsible Designer Signature: |
| Company:<br>PSE Consulting Engineers, Inc. | Date Signed:<br>2025-04-28 |
| Address:<br>250 Main St. | License:<br>C87047 |
| City/State/Zip:<br>Klamath Falls OR 97601 | Phone:<br>541-850-6300 |

STATE OF CALIFORNIA

# Outdoor Lighting

CALIFORNIA ENERGY COMMISSION

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTO-E** |
|---|---|---|
| *This document is used to demonstrate compliance with requirements in 110.9, 130.0, 130.2, 140.7, and 141.0(b)2L for outdoor lighting scopes using the prescriptive path for nonresidential and hotel/motel occupancies. It is also used to document compliance with requirements in 160.5, 170.2(e)6, 180.1(a) and 180.2(b)4Bv for outdoor lighting scopes using the prescriptive path for multifamily and mixed-use occupancies. Multifamily includes dormitory and senior living facilities.* | | |
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 1 of 7)** |
| **Project Address:** 12252 West St | **Date Prepared:** | 4/17/2025 |

## A. GENERAL INFORMATION

| | | | | | |
|---|---|---|---|---|---|
| 01 | Project Location (city) | Garden Grove | 04 | Total Illuminated Hardscape Area ($ft^2$) | 714 |
| 02 | Climate Zone | 8 | | | |
| 03 | Outdoor Lighting Zone per Title 24 Part 1 10.114 or as designated by Authority Having Jurisdiction (AHJ): | | | | |
| ☐ | LZ-0: Very Low - Undeveloped Parkland | ☐ LZ-2: Moderate - Urban Clusters | ☐ | LZ-4: High - Must be reviewed by CA Energy Commission for Approval | |
| ☐ | LZ-1: Low - Rural Areas | ☒ LZ-3: Moderately High - Urban Areas | | | |
| 05 | Occupancy Types within Project | | | | |

● Support Areas

## B. PROJECT SCOPE

*This table includes outdoor lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.7 / 170.2(e)6 or 141.0(b)2L / 180.2(b)4Bv for alterations.*

**My Project Consists of:**

| 01 | 02 |
|---|---|
| ☒ New Lighting System | Must Comply with Allowances from 140.7 / 170.2(e)6 |
| ☐ Altered Lighting System | Is your alteration increasing the connected lighting load (Watts)? ○ Yes ○ No |

| 03 | 04 | 05 |
|---|---|---|
| % of Existing Luminaires Being Altered[1] | Sum Total of Luminaires Being Added or Altered | Calculation Method |
| ☐ < 10% ☐ >= 10% and < 50% ☐ >= 50% | | |

***Please proceed to Table F. Outdoor Lighting Fixture Schedule to define the project's luminaires.***

[1] *FOOTNOTES: % of Existing Luminaires Being Altered = (Sum Total of Luminaires Being Added or Altered / Existing Luminaires within the Scope of the Permit Application) x 100.*

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTO-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 2 of 7)** |
| | **Date Prepared:** | 4/17/2025 |

## C. COMPLIANCE RESULTS

*Results in this table are automatically calculated from data input and calculations in Tables F through N. Note: If any cell on this table says "COMPLIES with Exceptional Conditions" refer to Table D. Exceptional Conditions for guidance or see applicable Table referenced below.*

| **Calculations of Total Allowed Lighting Power (Watts) 140.7 / 170.2(e)6 or 141.0(b)2L / 180.2(b)4Bv** | | | | | | | | | | | **Compliance Results** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 | | 02 | | 03 | | 04 | | 05 | | 06 | | 07 | | 08 | 09 |
| General Hardscape Allowance 140.7(d)1 / 170.2(e)6 (See Table I) | + | Per Application 140.7(d)2 / 170.2(e)6 (See Table J) | + | Sales Frontage 140.7(d)2 (See Table K) | + | Ornamental 140.7(d)2 / 170.2(e)6 (See Table L) | + | Per Specific Area 140.7(d)2 / 170.2(e)6 (See Table M) | OR | Existing Power Allowance 141.0(b)2L / 180.2(b)4Bv (See Table N) | = | **Total Allowed** (Watts) | ≥ | **Total Actual** (Watts) | **07 must be >= 08** |
| 281 | + | --- | + | --- | + | --- | + | --- | OR | --- | = | 281 | ≥ | 27 | COMPLIES |
| **Shielding Compliance (See Table G for Details)** | | | | | | | | | | | | | | | N/A |
| **Controls Compliance (See Table H for Details)** | | | | | | | | | | | | | | | COMPLIES |

## D. EXCEPTIONAL CONDITIONS

*This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.*

## E. ADDITIONAL REMARKS

*This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.*

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTO-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 3 of 7)** |
| | **Date Prepared:** | 4/17/2025 |

## F. OUTDOOR LIGHTING FIXTURE SCHEDULE

*For new or altered lighting systems demonstrating compliance with 140.7 / 170.2(e)6 all new luminaires being installed and any existing luminaires remaining or being moved within the spaces covered by the permit application are included in the Table below. For altered lighting systems using the Existing Power method per 141.0(b)2L only new luminaires being installed and replacement luminaires being installed as part of the project scope are included (ie, existing luminaires remaining or existing luminaires being moved are not included). Outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit are included in Table H. and are not included here. All other multifamily outdoor lighting is included here.*

**Designed Wattage:**

| 01 | 02 | | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Name or Item Tag | Complete Luminaire Description | | Watts per luminaire[1, 2] | How is Wattage determined | Total Number Luminaires [2] | Luminaire Status[3] | Excluded per 140.7(a) / 170.2(e)6A | Design Watts | Cutoff Req. > 6,200 initial lumen output 130.2(b) / 160.5(c)1[4] | Field Inspector | |
| | | | | | | | | | | Pass | Fail |
| LF-1 | Lithonia OLLWD 9w (LF-1) | ☐ Linear | 9 | Mfr. Spec | 3 | New | ☐ | 27 | NA: < 6200 lumens | ☐ | ☐ |
| | | | | | | | **Total Design Watts:** | 27 | | | |

* NOTES: Selections with a * require a note in the space below explaining how compliance is achieved.
*EX: Luminaire is lighting a statue; EXCEPTION 2 to 130.2(b)*

*[1]FOOTNOTES: Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per 130.0(c) / 160.5(b)*

*[2] For linear luminaires, wattage should be indicated as W/lf instead of Watts/luminaire. Total linear feet should be indicated in column 05 instead of number of luminaires.*

*[3] Select "New" for new luminaires in a new outdoor lighting project, or for added luminaires in an alteration. Select "Altered" for replacement luminaires in an alteration. Select "Existing to Remain" for existing luminaires within the project scope that are not being altered and are remaining. Select "Existing Reinstalled" for existing luminaires which are being removed and reinstalled as part of the project scope.*

*[4] Compliance with mandatory shielding requirements is required for luminaires with initial lumen output >= 6,200 unless exempted by 130.2(b)/ 160.5(c)*

## G. SHIELDING REQUIREMENTS (BUG)

*This section does not apply to this project.*

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTO-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 4 of 7)** |
| | **Date Prepared:** | 4/17/2025 |

## H. OUTDOOR LIGHTING CONTROLS

*This table demonstrates compliance with controls requirements for all new or altered luminaires installed as part of the permit application. For alteration projects, luminaires which are existing to remain (ie untouched) and luminaires which are removed and reinstalled (wiring only) do not need to be included in this table even if they are within the spaces covered by the permit application.*
*Outdoor lighting for nonresidential buildings, parking garages and common service areas in multifamily buildings must be documented separately from outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit*

**Mandatory Controls for Nonresidential Occupancies, Parking Garages & Common Areas in Multifamily Buildings**

| 01 | 02 | 03 | 04 | 05 | |
|---|---|---|---|---|---|
| Area Description | Shut-Off<br>130.2(c)1 / 160.5(c) | Auto-Schedule<br>130.2(c)2 / 160.5(c) | Motion Sensor<br>130.2(c)3 / 160.5(c) | Field Inspector | |
| | | | | Pass | Fail |
| Entry Lighting | Photocontrol | Provided | Provided | ☐ | ☐ |

[1]*FOOTNOTE: Text has been abbreviated, please refer to Table 160.5-A to confirm compliance with the specific light source technologies listed.*

[2]*Authority having jurisdiction may ask for cutsheets or other documentation to confirm compliance of light source.*

[3]*Recessed luminaires marked for use in fire-rated installations, and recessed luminaires installed in non-insulated ceilings are excepted from ii and iii.*

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTO-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 5 of 7)** |
| | **Date Prepared:** | 4/17/2025 |

## I. LIGHTING POWER ALLOWANCE (per 140.7 / 170.2(e))

*This table includes areas using allowance calculations per 140.7 / 170.2(e). General Hardscape Allowance is per Table 140.7-A/Table 170.2-R while "Use it or lose it" Allowances are per Table 140.7-B /Table 170.2-S. Indicate which allowances are being used to expand sections for user input. Luminaires that qualify for one of the "Use it or lose it" allowances shall not qualify for another "Use it or lose it" allowance. Outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit are included in Table H. and are not included here. All other multifamily outdoor lighting is included here.*

| 01 | | | | |
|---|---|---|---|---|
| | "Use it or lose it" Allowance (select all that apply) (select all that apply) | | | |
| ☒ General Hardscape Allowance Table I (below) | ☐ Per Application Table J | ☐ Sales Frontage Table K | ☐ Ornamental Table L | ☐ Per Specific Area Table M |

Calculated General Hardscape Lighting Power Allowance per Table 140.7-A for Nonresidential & Hotel/Motel

| 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 |
|---|---|---|---|---|---|---|---|
| Area Description | Area Wattage Allowance (AWA) | | | Linear Wattage Allowance (LWA) | | | Total General AWA + LWA (Watts) |
| | Illuminated Area ($ft^2$) | Allowed Density ($W/ft^2$) | Area Allowance (Watts) | Perimeter Length (lf) | Allowed Density (W/lf) | Linear Allowance (Watts) | |
| Walkway | 714 | 0.021 | 15 | 80 | 0.2 | 16 | 31 |
| | | | | | | **Initial Wattage Allowance for Entire Site (Watts):** | 250 |
| | | | | | | **Instances of Initial Wattage Allowance (LZ 0 only)[1]** | |
| | | | | | | **Total General Hardscape Allowance (Watts):** | 281 |

## J. LIGHTING ALLOWANCE: PER APPLICATION

*This section does not apply to this project.*

## K. LIGHTING ALLOWANCE: SALES FRONTAGE

*This section does not apply to this project.*

## L. LIGHTING ALLOWANCE: ORNAMENTAL

*This section does not apply to this project.*

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTO-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 6 of 7)** |
| | **Date Prepared:** | 4/17/2025 |

## M. LIGHTING ALLOWANCE: PER SPECIFIC AREA

*This section does not apply to this project.*

## N. EXISTING CONDITIONS POWER ALLOWANCE (alterations only)

*This section does not apply to this project.*

## O. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

*Selections have been made based on information provided in this document. If any selection has been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online*

| Form/Title |
|---|
| NRCI-LTO-E - Must be submitted for all buildings |

## P. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

*Selections have been made based on information provided in this document. If any selection has been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: http://www.energy.ca.gov/title24/attcp/providers.html*

| Form/Title | Systems/Spaces To Be Field Verified |
|---|---|
| NRCA-LTO-02-A - Must be submitted for all outdoor lighting controls except for alterations where controls are added to <= 20 luminaires. | Entry Lighting; |

| **CERTIFICATE OF COMPLIANCE** | | **NRCC-LTO-E** |
|---|---|---|
| **Project Name:** 2504-015 Garden Grove Parks, Westhaven Park | **Report Page:** | **(Page 7 of 7)** |
| **Project Address:** 12252 West St | **Date Prepared:** | 4/17/2025 |

## DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

**I certify that this Certificate of Compliance documentation is accurate and complete.**

| | |
|---|---|
| Documentation Author Name:<br>Matthew Weldon | Documentation Author Signature:<br>Matthew Weldon |
| Company:<br>Regerfour LLC dba 5 Star Energy | Signature Date:<br>2025-04-17 |
| Address:<br>1878 Saltu | CEA/ HERS Certification Identification (if applicable): |
| City/State/Zip:<br>Redding Ca 96002 | Phone:<br>530-275-3350 |

## RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

| | |
|---|---|
| Responsible Designer Name:<br>Ralph Hall | Responsible Designer Signature: |
| Company:<br>PSE Consulting Engineers, Inc. | Date Signed:<br>2025-04-28 |
| Address:<br>250 Main St. | License:<br>C87047 |
| City/State/Zip:<br>Klamath Falls OR 97601 | Phone:<br>541-850-6300 |

# AQX ENGINEERING

1520 Brookhollow, Suite #45, Santa Ana, CA 92705
Tel: (714) 662 0510  Fax: (714) 662 0559


## STRUCTURAL CALCULATIONS

for

# THE WESTHAVEN PARK

122252 WEST ST.
GARDEN GROVE, CA 92840

## MK25-039

7/1/2025

# AQX ENGINEERING

**Tel: (949) 261 7740** ***1520 Brookhollow, suite #45, Santa Ana, CA 92705*** **Fax: (949) 261 7760**

| | | | |
|---|---|---|---|
| JOB NAME: | | JOB NO: | SHEET NO: |
| ADDRESS: | | ENGINEER: **Mahdi** | DATE: |

## Residential Roof Design Loads

**Dead Loads:**

| Description | |
|---|---|
| L.W. METAL | 4.0 psf |
| 1/2" plywood sheathing | 1.5 psf |
| Gyp Board Ceiling | 2.5 psf |
| Roof Framing | 1.5 psf |
| Ceiling framing | 1.0 psf |
| Insul. Misc. | 1.0 psf |
| | 11.5 psf |
| | **11.5** psf |

**Slope:** **2** :12
**Adjustment:** 1.014
**USE:** 11.7 psf **Say 12.0 psf**

**Live Load:** (Method 1)

| | | 0 to 200sqt | 201 to 600 sqt | Over 600 sqt | |
|---|---|---|---|---|---|
| **USE** | Flat or rise < =4:12 | **20** | 16 | 12 | psf |
| | Rise = 6:12 | 18 | 16 | 12 | psf |
| | Rise > 12:12 | 16 | 12 | 12 | psf |

**Wall weight breakdown**

| Description | with plaster | | | |
|---|---|---|---|---|
| gypsum board 1/2" | 2.2 psf | | | |
| 2x studs@16"o.c.- 2 walls | 3.4 psf | | | |
| Insulation | 0.5 psf | | | |
| stucco | 8.0 psf | | | |
| Mechanical/Electrical | 0.5 psf | | | |
| Subtotal | 14.6 psf | | | |
| **Use** Ext. with stucco | **15.0** psf | Int. | **9** | psf |

Project Title:
Engineer:
Project ID:
Project Descr:

# Multiple Simple Beam

Project File: MK25-39-Westheaven park.ec6



## Description :

## Wood Beam Design : BM1

**Calculations per NDS 2018, IBC 2021, ASCE 7-16**

BEAM Size : **2x12, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2021 Load Combinations, Major Axis Bending

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Fb - Tension | 900 psi | Fc - Prll | 1350 psi | Fv | 180 psi | Ebend- xx | 1600 ksi | Density | 31.21 pcf |
| Fb - Compr | 900 psi | Fc - Perp | 625 psi | Ft | 575 psi | Eminbend - xx | 580 ksi | | |

*Applied Loads*

Unif Load: D = 0.0120, Lr = 0.020 k/ft, Trib= 3.0 ft

**Design Summary**

Max fb/Fb Ratio = **0.505** : 1
fb : Actual : 328.82 psi at 4.250 ft in Span # 1
Fb : Allowable : 651.21 psi
Load Comb : +D+Lr

Max fv/FvRatio = **0.126** : 1
fv : Actual : 28.29 psi at 7.565 ft in Span # 1
Fv : Allowable : 225.00 psi
Load Comb : +D+Lr

| Max Reactions (k) | D | Lr | L | S | W | E | H |
|---|---|---|---|---|---|---|---|
| Left Support | 0.15 | 0.26 | | | | | |
| Right Support | 0.15 | 0.26 | | | | | |


Max Deflections

| | | | |
|---|---|---|---|
| Transient Downward | 0.025 in | Total Downward | 0.040 in |
| Ratio | 4099 | Ratio | 2562 |
| | LC: Lr Only | | LC: +D+Lr |
| Transient Upward | 0.000 in | Total Upward | 0.000 in |
| Ratio | 9999 | Ratio | 9999 |
| | LC: | | LC: |