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STRUCTURAL CALCULATIONS

PATIO COVER AT 3113 SUNNYDALE DR

2024 IBC 2025 CBC
ASCE 7 -22
WIND EXPOSURE B
110 MPH
SDC - D
SITE CLASS D

8/5/2026

CHRIS OLIVEIRA AND ASSOCIATES	project	Sunnydale patio cover	
	by	CO	no.
	date	8/4/26	1

GAZEBO

PATIO COVERS

CANVAS FABRIC…….…….……..	2.0		
Framing…… ……..…….……..	2.0		
Miscellaneous…… ……..…….……..	2.0		
(DL has been factored for roof slope)			
DL	**6.0**	psf	
LL	**5.0**	psf	(1:12)

FABRIC SUPPORTED BY A FRAME

SECTION 13.3.1 PAGE 88 ASCE 7 - 10

Fp = .4*Ap * Sds * Wp (1 + 2*z/h)

Rp / Ip

Ap = 2.5 APPENDAGES

SEE TBL 13.5-1

PAGE 91

Sds =

Sds = 1.3 ASCE HAZARD MAP

Wp = 3432 LBS

Rp = 2.5 TABLE 13.5-1 APPENDAGES

I= 1 Rp / I = 2.5

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z = 0 FT
HEIGHT OF POINT OF ATTACHMENT

h = 8 FT *2* z/H = 0*
AVERAGE HEIGHT *1+ 2* Z/H = 1*

*.4*Ap * Sds* (1+(2*z/h)= 0.5*
Rp / Ip
Fp = 1798.4

MULT BY 0.7 FOR ASD ADJUSTMENT
Fp ADJUSTED = 1258.9 LBS

*MAX VALUE = 1.6 * Sds * Wp * I p = 7193.5 LBS*

*MIN VALUE = .3 * Sds * Ip * Wp 1348.8 LBS*
2 COLMNS= 674 LBS PER COLUMN

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STEPS FOR CALCULATION PER 27.2 — BASIC WIND SPEED = 95 FIG 26.5-1

RISK CATEGORY = 11 PER TBL 1.5-1

WIND ON OPEN STRUCTURES - ASCE7-16

OPEN BLDG PER 26.12

p = qh G Cn **EQ 27.3-2**

q = .00256 * Kz * K zt * K d * V squared

Kd = wind directionality - 26.6 - table 26.6-1 — USE 0.85

Kz - vel press coeff - 6.5.6.6 -table 6-3 page 79 — USE 0.57

	B	C
0-15	0.57	0.85

Ke = 1 PER 26.9

K zt= 1 — no topo effects — FIG 26.8-1

WIND LOAD FROM ASCE 7-16 =

V = velocity = **95** — V squared = 9025

FGI 26.5-1

qz = 11.194 psf

G = GUST EFFECT FACTOR SECT 26.11 = 0.85

Cn = NET PRESSURE COEFF- 27.3-4 = 1.3

CLEAR FLOW 15 DEGREES

Cnw= 1.6

Cnl= 0.3

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MULT BY 0.6 TO CONVERT TO ASD

p = 7.4215 psf

N-S LENGTH 26

WEIGHT = 3432 LBS

E-W LENGTH 22

North / South

W(1): Wind = (7.4)(1')= 7 plf

Seismic = 0.96[6(26')] = 150 plf

NORTH SOUTH Vw = (7plf)(11') = **77** lb

Vs = (150plf)(11') = **1349** lb

GOVERNS

NUMBER OF COLUMNS 2

Vw / COL 38.5

Vs / COL 674.39

HEIGHT = **8** MOMENT = 5395.1 LB-FT

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RB1 PLUS RB2:

COLUMN

Check HSS4x4x0.125

P = **0.17** kips
M_X = **5.40** ft-kips
M_Y = **0.00** ft-kips

L_X = 8.0 ft
L_X = 8.0 ft
F_y = 36 ksi
A = 1.90 in^2
S_X = 2.35 in^3
S_Y = 2.35 in^3
r_X = 1.57 in
r_Y = 1.57 in

K_X = 1.00
K_Y = 1.00
E = 29000 ksi
f_a = 0.1 ksi
f_{bx} = 27.5 ksi
f_{by} = 0.0 ksi
$K_X L_X / r_X$ = 61.1
$K_Y L_Y / r_Y$ = 61.1
KL / r (Max) = 61.1

Allowable Axial Stress:

$$C_C = \sqrt{\frac{2\pi^2 E}{F_y}} = 126.1$$

(E2-1)
$$F_a = \frac{\left(1 - \frac{(KL/r)^2}{2C_C^2}\right) F_y}{\frac{5}{3} + \frac{3(KL/r)}{8C_C} - \frac{(KL/r)^3}{8C_C^3}} = 17.3 \text{ ksi}$$

(E2-2)
$$F_a = \frac{12\pi^2 E}{23(KL/r)^2} = \text{NA ksi}$$

Combined Axial + Bending Stress: F_a = 17.3 ksi f_a / F_a = 0.01

$$F'_{eX} = \frac{12\pi^2 E}{23(K_X L_X / r_X)^2} = 40.0 \text{ ksi}$$ C_{mX} = 0.85 F_{bX} = 23.8 ksi

$$F'_{eY} = \frac{12\pi^2 E}{23(K_Y L_Y / r_Y)^2} = 40.0 \text{ ksi}$$ C_{mY} = 0.85 F_{bY} = 23.8 ksi

(H1-1)
$$\frac{f_a}{F_a} + \frac{C_{mX} f_{bX}}{(1 - f_a / F'_{ex}) F_{bx}} + \frac{C_{mY} f_{bY}}{(1 - f_a / F'_{eY}) F_{bY}} = \text{NA}$$

(H1-2)
$$\frac{f_a}{0.60 F_y} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} = \text{NA}$$

(H1-3)
$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} + \frac{f_{by}}{F_{by}} = 1.16 < 1.33$$ **O.K.**

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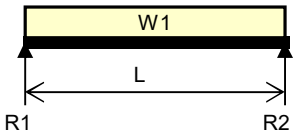
	date	8/4/26	

GAZEBO

RB1 $L =$ 23.0 ft

(0'-23') $w_1 = (6D + 5L)(8') + 38 =$ **126** plf

R(L) = 1449 lb
R(R) = 1449 lb
M(Max) = 8332 ft-lb



Support Conditions: (Pinned - Pinned)

Check: $V =$ 1449 lb $M =$ 8332 ft-lb $w_{eq} =$ 126 plf

$S_{req} = \frac{M(12"/')}{F_b} =$ 4.2 in^3 $F_v =$ 0.40 (36) = 14.4 ksi

$F_b =$ 0.66 (36) = 23.8 ksi

$I_{req} = \frac{5\ wL^4}{384\ E\Delta} =$ 24.0 in^4 $E =$ 29000 ksi Δ: L / 240

HSS12x4x0.375
S = 29.6, I = 178

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GAZEBO

RB2 $L =$ 22.0 ft

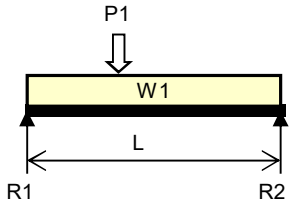
(0'-22') $w_1 =$ + 38 = **38** plf

(@ 8') $P_1 =$ R2 **170** lb

R(L) = 526 lb

R(R) = 480 lb

M(Max) = 3029 ft-lb



Support Conditions: (Pinned - Pinned)

Check: $V =$ 526 lb $M =$ 3029 ft-lb $w_{eq} =$ 50 plf

$$S_{req} = \frac{M(12"/')}{F_b} = 1.5 \text{ in}^3$$

$$I_{req} = \frac{5\ wL^4}{384\ E\Delta} = 8.0 \text{ in}^4$$

$F_v =$ 0.40 (36) = 14.4 ksi

$F_b =$ 0.66 (36) = 23.8 ksi

$E =$ 29000 ksi Δ: L / 240

HSS12x4x0.375
S = 29.6, I = 178

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GAZEBO

2 TUBE STEEL BEAMS

R2

L = 13.0 ft

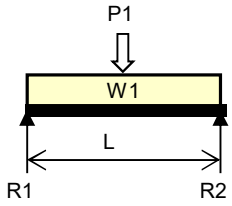
(0'-13') w_1 = (6D + 5L)(1') + 4 = **8** plf

(@ 6.5') P_1 = [(6D + 5L)(4')](11') = **242** lb

R(L) = 170 lb

R(R) = 170 lb

M(Max) = 945 ft-lb



Support Conditions: (Pinned - Pinned)

Check: V = 170 lb M = 945 ft-lb w_{eq} = 45 plf

$$S_{req} = \frac{M(12"/')}{F_b} = 0.5 \text{ in}^3$$

F_v = 0.40 (36) = 14.4 ksi

F_b = 0.66 (36) = 23.8 ksi

E = 29000 ksi Δ: L / 100

HSS2x2x0.125
S = 0.5, I = 0.5

Spread Footing

P = [](') = RB1 AND 2 1975 lb

$$A_{REQ} = \frac{1975 \text{ lb}}{1500 \text{ psf}} = 1.32 \text{ ft}^2$$

2'-0" square x 18" deep
w / 3 - #4 Bars Each Way