

CITY OF ONTARIO

SITE STRUCTURAL CALCULATIONS (APPENDIX F)

VOLUME 8 of 8

**FOR CONSTRUCTION OF THE
ONTARIO SPORTS EMPIRE
IN THE CITY OF ONTARIO, CALIFORNIA**

April 2, 2025

PREPARED BY:

**RJM Design Group, Inc.
31591 Camino Capistrano
San Juan Capistrano, California 92675
(949) 493-2600**

ANCILLARY STRUCTURES

Ontario Sports Park, California

STRUCTURAL CALCULATIONS

Date: February 27, 2025

Calculations Prepared by:



Matthew Farrington, M.Sc. PE, 90349

Structural Engineering Group Manager

GMU Engineers and Geologists

1. Project Soils Report Design Parameters
2. Concrete
3. Wind Loading Calculations
4. Cheek Wall and Handrail (Landscape Detail 1-3/L-2.03)
5. 100' Flagpole, (Landscape Detail 1/L-2.05)
6. Water Mister (Landscape Detail 2/L-2.05)
7. Retaining Wall/Seat Wall, (Landscape Detail 1/L-2.06), Scorer Table and Scorer Bench, (Landscape Detail 1/L-2.16, 1/L-2.20)
8. Light pole on Seat Wall (Landscape Detail 1E/L-2.06)
9. Retaining wall at Vineyard (Landscape Detail 1/L-2.07), & Retaining Wall w/ Fence at Soccer Play Area, (Landscape Detail 2/L-2.07)
10. Retaining wall at South Home Run Way, (Landscape Detail 1/L-2.08), Retaining Wall at Soccer Fields, (Landscape Detail, 1/L-2.09)
11. CMU Block Wall at Shipping Containers, (Landscape Detail 4/ L-2.30)
12. Scoreboard, (Landscape Detail 1-4/L-2.10)
13. 8' Ht. Backstop Fencing, (Landscape Detail 1/L-2.11)
14. 20' Ht. Backstop Fencing/Soccer Containment Netting, (Landscape Detail 1/L-2.11)
15. 30' Ht. Backstop Fencing, (Landscape Detail 1/L-2.11)
16. 40' Ht. Backstop Fencing, (Landscape Detail 1/L-2.11)
17. 9' Ht. Dugout Fencing & Wall, (Landscape Detail 1/L-2.12)
18. Guardrail (Landscape Detail 1/L-2.13)
19. Bullpen Fence CIDH Caisson (Landscape Detail 1/L-2.14)
20. Batting Cage Fence CIDH Caisson (Landscape Detail 2/L-2.14)
21. Baseball field Terraced Seating, Stairs, and Scorer Table (Landscape Detail 1 / L-2.16)
22. Chain Link Fence at Ballfields (Landscape Detail 1-2/L-2.17)
23. Sliding Ball Field Maintenance Access Gate (Landscape Detail 3/L-2.17)
24. Double Swing Chain-link Baseball Gate (Landscape Detail 1/L-2.18), 12'-0" Swinging Entry Gate, (Landscape Detail 2/L-2.23), Double Swinging Gate with Pilasters, (Landscape Detail 1/L-2.45)
25. Soccer Concourse Details (Seating Details) (Landscape Detail 1/L-2.19)
26. Seating at Soccer Concourse (Landscape Detail 1/L-2.20)
27. Soccer Containment Netting (Landscape Detail 1/L-2.21)
28. 8'-2" Ht. Omega Fencing, (Landscape Detail 12&4/L-2.22)
29. 6'-0" Ht. Tubular Fencing, (Landscape Detail 1&3/L-2.22)
30. Maintenance Yard Perimeter Wall (Landscape Detail 1/L-2.24)
31. Maintenance Pilaster, (Landscape Detail 1/L-2.25) & Pilaster with Light Standard, (Landscape Detail 1/L-2.25)
32. Maintenance Yard Swinging Gate (Landscape Detail 1/L-2.26)
33. Maintenance Yard Rolling Gate (Landscape Detail 1/L-2.27)
34. Main Entry Swinging Gate, (Landscape Detail 1/L-2.29)
35. Main Entry Gate Pilaster, (Landscape Detail 1/L-2.29)
36. Stage Canopy, (Landscape Detail 2/L-2.34)
37. Soccer Canopy, (Landscape Detail 3/L-2.32)
38. Small Baseball Canopy, (Landscape Detail 2/L-2.33)
39. Family Canopy, (Landscape Detail 4/L-2.32)
40. Large Baseball Canopy, (Landscape Detail 3/L-2.33)
41. NA
42. NA

43. M01 Monument Sign Identity 1, (W-02)
44. M02 Monument Identity 2, (W-02)
45. A01 Gateway Entry Arch, (W-03)
46. A11 Field Identity Pylon, (W-04)
47. B01 Vehicle Direction Pylon, (W-06)
48. B03 Pedestrian Direction Pylon, (W-06)
49. B04 Pedestrian Direction Pole, (W-07)
50. C01 Pedestrian Information Pylon, (W-07)
51. D20 Parking Regulations Pylon, (W-08)
52. E02 Fence Topper Art, (W-09)
53. E03-W-Whistle, (W-10)
54. E03-B-Baseball, (W-11)
55. E03-S-Soccer, (W-12)
56. E04 Column, (W-09)
57. E05 Graphic Wall – Long, (W-13)
58. E06 Graphic Wall – Short, (W-13)
59. E07 Display Wall – Long, (W-13)
60. E08 Display Wall - Short, (W-14)
61. Main Display (50' x 150')

1. Project Soils Report Design Parameters

Project Soils Report

"Geotechnical Investigation For Ontario Sports Park, SE Corner Of East Riverside Dr And Ontario Ave, Ontario, Ca" By RMA Group, Dated April 16, 2024,

Conventional Footings

Bearing Material: Engineered Fill

Allowable Bearing Value: 2,000 psf with a minimum embedment of 18".

- May be increased 200 psf for each additional foot of width or by 200 psf for each additional foot of depth.
- Maximum of 3,500 psf.
- One-third increase for wind or seismic loading.

Allowable Coefficient of Friction:..... 0.38

- One-third increase for wind or seismic loading.

Passive Resistance:..... 500 psf/ft of depth (level ground),

- Maximum of 3,200 psf
- Disregard upper 6 inches (level ground)
- One-third increase for wind or seismic loading.

Static Lateral Earth Pressures: 30 Pcf (EFP) - Level Backfill.

..... 41 Pcf (EFP) - 2:1 Sloping Backfill.

..... 21 Pcf (EFP) - Seismic Increment

Unit Weight of Backfill..... 125 pcf

Minimum Footing Design Recommendations (Conventional Footings)

Minimum Footing Width:..... 12 inches

Minimum Footing Depth:..... 12 inches below lowest adjacent grade; however, deepen as necessary to maintain a horizontal distance of 5 feet between the outside bottom edge of the footing and the face of the adjacent slope.

Construction Joints:..... Construction joints should be implemented and designed by a structural engineer. As a minimum, construction joints should be provided at a maximum interval of 20 feet and at all angle points and other locations where differential movement is likely to occur. Joints consist of a clear vertical break of all masonry materials.

Pole Foundations

End Bearing Value: 500 psf

- May be increased by 120psf for each additional for of diameter and by 545 psf for each additions for of depth
- Maximum of 5,500 psf.

Skin Friction: 500 psf

- One-third increase for wind or seismic loading.

Passive Resistance:..... 150 psf/ft of depth (level ground),

2. Concrete

CONCRETE

Structural Elements (i.e., foundations, grade beams, caissons, etc.)

- Cement Type: Type II/V
- Maximum Water Cement Ratio: 0.50
- Minimum Strength: 4,000 psi (geotechnical perspective only)

LOADING

Wind and Seismic

Wind loading is applied on fences above grade level. Effective wind loading on chain link fences is per "The Chain Link Fence Manufacturing Institute's, Wind Load Guide WLG2445". For most chain link fences on this project, the effective wind loading is < 10% of gross loading or loading over full area. 25% will be used conservatively for foundations, and 12% will be used for post design.

For other (non-porous) structural elements, full loading will be used.

Typical wind loading: 30 psf

Typical wind loading on chain link fences: 15 psf

3. Wind Loading Calculations

Wind Load (ASCE 7-22) - Chapter 29, Solid Free-Standing Wall

Improvement: General Wind Loading

Velocity Pressure $q_z = 0.00256 K_z K_{zt} K_d K_e V^2$ (lb/ft²); V in mi/h (26.10-1)

Risk Category	II	(table 1.5-1)
Basic Wind Speed (V)	110	(figure 26.5-1B)

Wind Load Parameters

K_d	0.85	(table 26.6-1)
Exposure Category	C	(section 26.7)
K_{zt}	1	(section 26.8) - Assume no speed-up
K_z	0.85	(table 26.10-1)
K_e	1	(section 26.9)
G	0.85	(section 26.11.1) - Rigid Structure
q_z	22.38016	(equation 26.10-1)

Wind Load on Wall Face $F = q_h G C_f A_s$ (Eqn. 29.3-1)

A_s	1	Unit Area of Loading, ft ²
C_f	1.55	(Force Coefficient, Figure 29.3-1)
Total Wind Load	29.5	psf

Use Wind Load:	30.0	psf
----------------	-------------	-----

4. Cheek Wall and Handrail (Landscape Detail 1-2/L-2.03)

Cheek Wall and Handrail (Landscape Detail 1-3/L-2.03)

Standard slab on grade / minimal reinforcement. Handrails 50 plf or 200lbs point load

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 4. Cheek Wall

Code Reference:

Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	2.00 ft
Wall height above soil	=	3.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	18.00 in
Water table above bottom of footing	=	0.0 ft

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

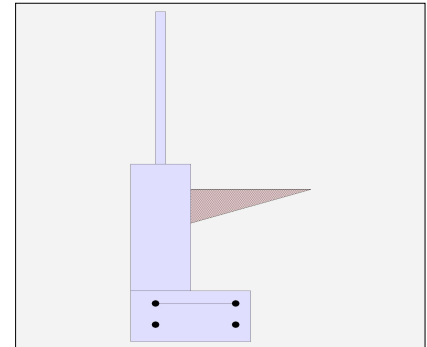
Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
	=	
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.480
Soil height to ignore for passive pressure	=	6.00 in

Lateral Load Applied to Stem

Lateral Load	=	50.0 #/ft
...Height to Top	=	4.50 ft
...Height to Bottom	=	3.50 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 4. Cheek Wall

Design Summary

Wall Stability Ratios

Overturing	=	2.62	OK
Sliding	=	10.70	OK
Global Stability	=	7.73	

Total Bearing Load	=	999 lbs	
...resultant ecc.	=	4.49 in	

Eccentricity outside middle third

Soil Pressure @ Toe	=	1,064 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	2,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,380 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	0.0 psi	OK
Footing Shear @ Heel	=	3.1 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	185.0 lbs	
less 100% Passive Force	=	1,500.0 lbs	
less 100% Friction Force	=	479.4 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	2.50	Stem OK	
Wall Material Above "Ht"	=	Fence	Concrete
Design Method	=		SD ASD
Thickness	=		12.00
Rebar Size	=		# 4
Rebar Spacing	=		8.00
Rebar Placed at	=		Center

Design Data

fb/FB + fa/Fa	=	0.049
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	176.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	384.0

Moment.....Allowable

ft-# =	7,701.8
--------	---------

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	2.4

Shear.....Allowable

=	52.9	91.50
---	------	-------

Anet (Masonry)

in2 =	
-------	--

Wall Weight

psf =	150.0
-------	-------

Rebar Depth 'd'

in =	6.00
------	------

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0
Fy	psi =	60,000.0

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 4. Cheek Wall

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.015 in ² /ft	
0.0018bh : 0.0018(12)(12) :	0.2592 in ² /ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.2592 in ² /ft	#4@ 9.26 in #4@ 18.52 in
Provided Area :	0.3 in ² /ft	#5@ 14.35 in #5@ 28.70 in
Maximum Area :	0.9754 in ² /ft	#6@ 20.37 in #6@ 40.74 in

Footing Data

Toe Width	=	0.00 ft
Heel Width	=	2.00
Total Footing Width	=	2.00
Footing Thickness	=	12.00 in

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm = 3.00 in

Footing Design Results

	Toe	Heel	
Factored Pressure	= 1,380	0	psf
Mu' : Upward	= 0	83	ft-#
Mu' : Downward	= 0	358	ft-#
Mu: Design	= 0	275	ft-#
φ Mn	= OK - Flush	11,415	
Actual 1-Way Shear	= 0.00	3.09	psi
Allow 1-Way Shear	= 46.63	46.63	psi
Toe Reinforcing	= Flush toe condition. No reinforcing required.		
Heel Reinforcing	= # 4 @ 8.00 in		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=	0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=	0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: Flush toe condition. No reinforcing required.

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area 0.52 in²
Min footing T&S reinf Area per foot 0.26 in² /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 4. Cheek Wall

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	135.0	1.00	135.0	Soil Over HL (ab. water tbl)	250.0	1.50	375.0
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		1.50	375.0
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	50.0	5.00	250.0	* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=			Soil Over Toe	=		
	=			Surcharge Over Toe	=		
				Stem Weight(s)	375.0	0.50	187.5
				Earth @ Stem Transitions	=		
Total	= 185.0	O.T.M.	= 385.0	Footing Weight	300.0	1.00	300.0
				Key Weight	=		
Resisting/Overturning Ratio		=	2.62	Vert. Component	73.7	2.00	147.4
Vertical Loads used for Soil Pressure =		998.7 lbs		Total =	998.7 lbs	R.M.=	1,009.9

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.081 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 4. Cheek Wall

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) = 17.09 in

Development length for #4 bar specified in this stem design segment = 13.15 in

Hooked embedment length into footing for #4 bar specified in this stem design segment = 6.00 in

As Provided = 0.3000 in²/ft

As Required = 0.0200 in²/ft

Cantilevered Retaining Wall

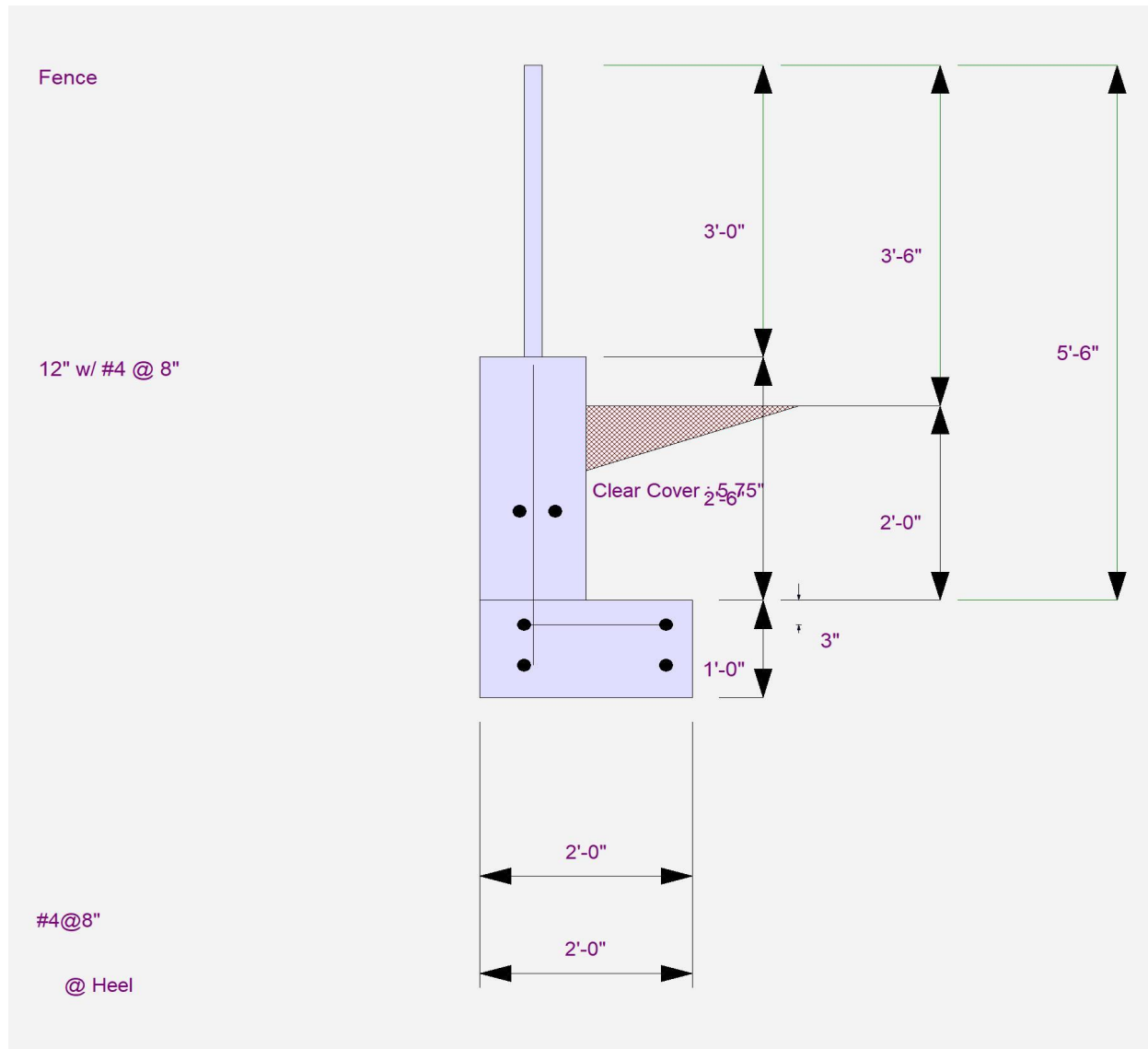
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 4. Cheek Wall



Cantilevered Retaining Wall

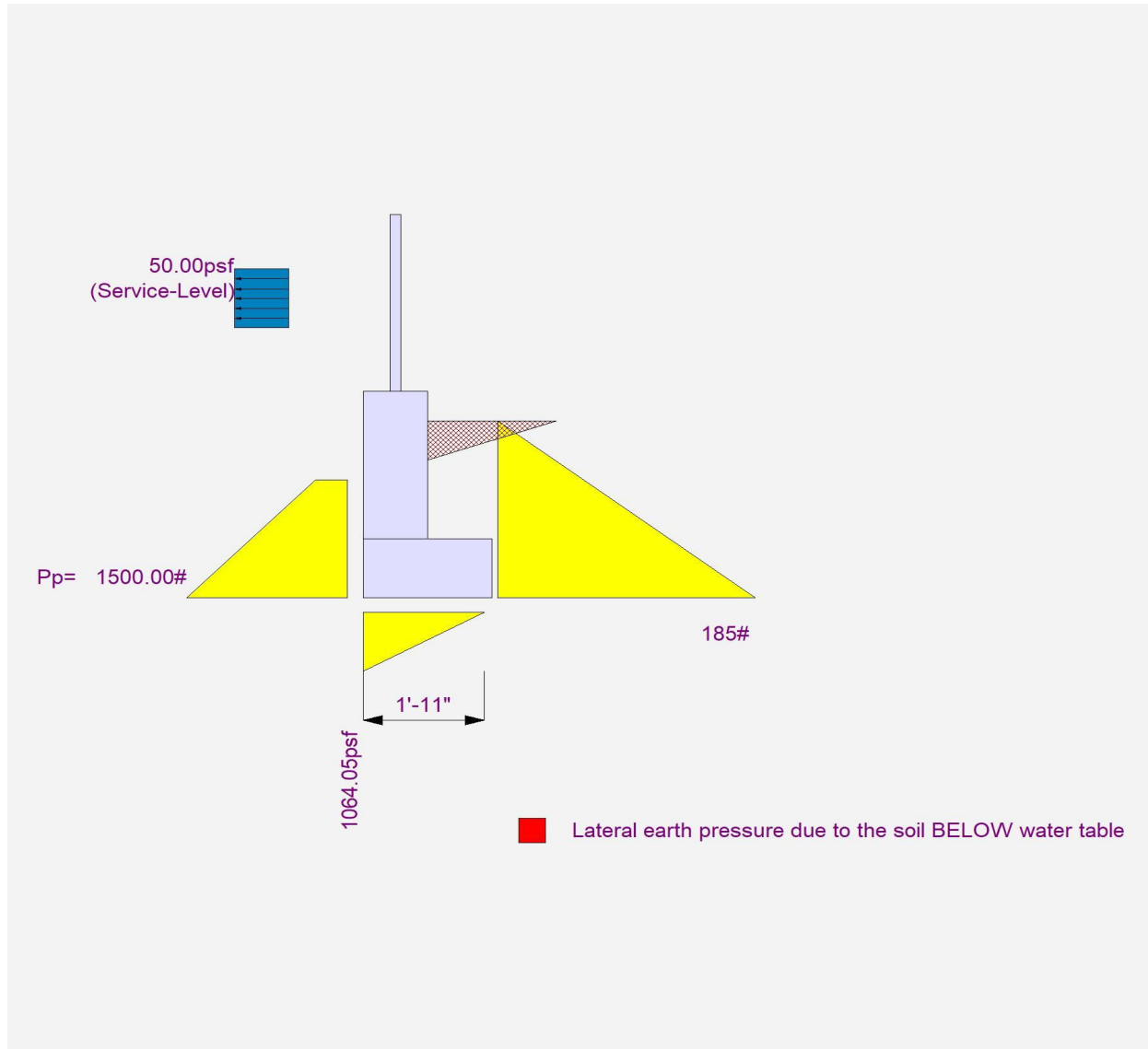
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 4. Cheek Wall



Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 4. Handrail Embedment @ Cheek Wall

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape	Rectangular
Pole Footing Width	12.0 in
Calculate Min. Depth for Allowable Pressures	
Lateral Restraint at Ground Surface	
Allow Passive	500.0 pcf
Max Passive	5,000.0 psf

Controlling Values

Governing Load Combination	L Only
Lateral Load	0.20 k
Moment	0.60 k-ft

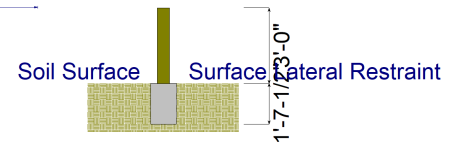
Restraint @ Ground Surface

Pressure at Depth	
Actual	684.88 psf
Allowable	812.50 psf
Surface Retraint Force	984.62 lbs

Minimum Required Depth 1.625 ft

Footing Base Area	1.0 ft^2
Maximum Soil Pressure	0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Applied Moment (kft)	Vertical Load (k)
D : Dead Load	k		k/ft	k-ft	k
Lr : Roof Live	k		k/ft	k-ft	k
L : Live	0.20 k		k/ft	k-ft	k
S : Snow	k		k/ft	k-ft	k
W : Wind	k		k/ft	k-ft	k
E : Earthquake	k		k/ft	k-ft	k
H : Lateral Earth	k		k/ft	k-ft	k
Load distance above ground surface	3.0 ft	TOP of Load above ground surface	ft		
		BOTTOM of Load above ground surface	ft		

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	62.5	1.000
L Only	0.200	0.600	1.63	684.9	812.5	1.000
+0.750L	0.150	0.450	1.50	602.8	750.0	1.000

5. 80'/100' Flagpole, (Landscape Detail 1/L-2.05)

80' Flagpole, (Landscape Detail 1/L-2.05)

- 80'-0" Tall
- 12" wide flagpole + 20'x30' flag

$M_u = 89.3 \text{ k} - \text{ft}$, (See *Wind Load Spreadsheet*)

$V_u = 1.656 \text{ kips}$, (See *Wind Load Spreadsheet*)

Enercalc: $89.3 \text{ k-ft}/40' = 2,233 \text{ lbs@40'}$ (for moment calculation)

30"Ø x 9.667' (min) embedment CIDH Caisson w/ (10) #6 rebar

Flag and Pole Calculation - ANSI/NAAMM FP 1001-07

Improvement: Flag Pole Structures

Pole Velocity Pressure : $P = 0.00256 \times V^2 \times C_d \times C_h \times G$

Flag Force : $P = 0.0014 \times V^2 \times \sqrt{A_F} \times C_h \times G$

Risk Category :	II	
Basic Wind Speed (V) :	110	
Wind Gust :	1.15	
Flag Size :	20' x 30'	600 sq ft

Pole Ht (ft)	Pole Dia (in)	Ch	Cd	P (psf)	w (plf)
4	12.0000	0.86	0.450	13.79	13.79
10	10.9474	0.86	0.450	13.79	12.58
20	9.8947	0.90	0.450	14.46	11.92
30	8.8421	0.98	0.450	15.75	11.60
40	7.7895	1.04	0.502	18.66	12.12
50	6.7368	1.09	0.606	23.63	13.26
60	5.6842	1.14	0.756	30.62	14.50
70	4.6316	1.17	0.987	41.27	15.93
80	4.0000	1.21	1.100	47.32	15.77

24.36 13.50

Flag Load: 576 lbs

Total Shear: 1,656 lbs

Moment @ Base: 89.3 k-ft

$C_h = 2.01 (z/900)^{2/9.5}$	for 16.4 ft < z <= 900 ft	Equation 2
$C_h = 2.01 (z/274)^{2/9.5}$	for 5 m < z <= 274m	Equation 2M
For z <= 16.4 (5m)	$C_h = 0.86$	

Wind Speed x Diameter	Drag Coefficient, C_d
V d ≤ 39 (5.33)	1.10
39 (5.33) < V d < 78 (10.66)	$129 / [V d]^{1.3} (9.69 / [V d]^{1.3})$
V d ≥ 78 (10.66)	0.45
V = wind speed in mph (m/s)	
d = diameter of cylindrical pole or segment or average diameter of tapered pole or segment in feet (meters)	

FLAG LOAD
4.1 Wind. The load acting on the pole as a result of the wind acting on the flag shall be computed by the following formulas:

for nylon and cotton flags,

$$W_F = 0.0010 \times V^2 \times \sqrt{A_F} \times C_h \times G$$

$$W_F = 0.0730 \times V^2 \times \sqrt{A_F} \times C_h \times G$$

Equation 4

Equation 4M

for polyester flags,

$$W_F = 0.0014 \times V^2 \times \sqrt{A_F} \times C_h \times G$$

$$W_F = 0.1022 \times V^2 \times \sqrt{A_F} \times C_h \times G$$

Equation 5

Equation 5M

Where

- W_F = flag load on pole in pounds (Newtons), including height correction
- V = 3-second gust wind speed in miles per hour (meters per second) Figure 3.2.2
- A_F = area of flag in square feet (square meters)
- C_h = coefficient of height for wind pressure from Table 3.2.3A, calculated at top of flag.
- G = Gust effect factor, use minimum value of 1.14

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 5. 80' Flagpole Post Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

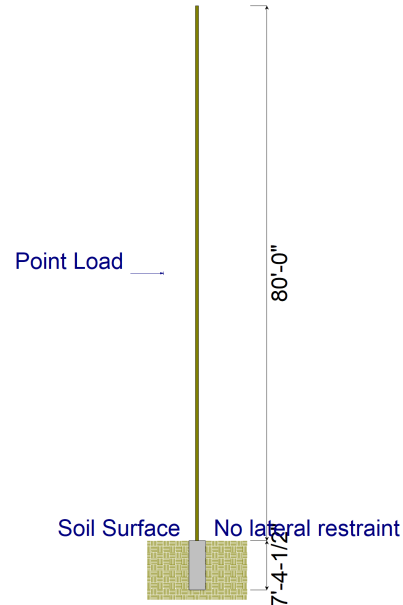
Pole Footing Shape Circular
Pole Footing Diameter 30.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination D+0.60W
Lateral Load 1.340 k
Moment 53.592 k-ft
NO Ground Surface Restraint
Pressures at 1/3 Depth
Actual **1,208.75** psf
Allowable **1,210.72** psf

Minimum Required Depth 7.375 ft

Footing Base Area 4.909 ft²
Maximum Soil Pressure 6.927 ksf



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	k		k/ft	11.301 k
Lr : Roof Live	k		k/ft	22.701 k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	2.233 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	40.0 ft	TOP of Load above ground surface	80.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.000	0.000	0.13	0.0	0.0	1.000
+D+Lr	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.750Lr	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.60W	1.340	53.592	7.38	1,208.8	1,210.7	1.000
+D+0.750Lr+0.450W	1.005	40.194	6.63	1,093.2	1,095.0	1.000
+D+0.450W	1.005	40.194	6.63	1,093.2	1,095.0	1.000
+0.60D+0.60W	1.340	53.592	7.38	1,208.8	1,210.7	1.000
+0.60D	0.000	0.000	0.13	0.0	0.0	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 5. 80' Flagpole Pole CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

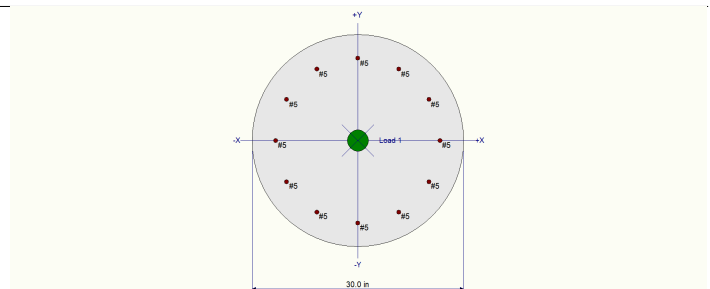
f'_c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	9.670 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 30.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 12 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 7,120.13 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 9.670 ft above base, D = 0.50 k

BENDING LOADS . . .

Moment X: Moment acting about X-X axis at 9.670 ft, W = 89.30 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+W		
Location of max.above base	9.605 ft		
Maximum Stress Ratio	0.398 : 1		
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5			
Pu =	9.144 k	φ * Pn =	19.40 k
Mu-x =	89.30 k-ft	φ * Mn-x =	228.777 k-ft
Mu-y =	1.143 k-ft	φ* Mn-y =	3.645 k-ft
Mu Angle =	1.0 deg	φ =	0.90
Mu at Angle =	89.307 k-ft	φMn at Angle =	224.126 k-ft

P_n & M_n values located at P_u - M_u vector intersection with capacity curve

Column Capacities . .

P_{nmax} : Nominal Max. Compressive Axial Capacit	2,613.87 k
P_{nmin} : Nominal Min. Tension Axial Capacity	k
ΦP_n , max : Usable Compressive Axial Capacity	1,359.21 k
ΦP_n , min : Usable Tension Axial Capacity	k

Maximum SERVICE Load Reactions .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Deflections . .

Along Y-Y	-0.05773 in	at	9.670 ft	above base
for load combination : W Only				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :				

General Section Information

ρ : % Reinforcing	0.5263 %	Rebar % Ok	β = 0.850	θ = 0.80
Reinforcing Area	3.720 in ²			
Concrete Area	706.86 in ²			

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 5. 80' Flagpole Pole CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k				Bending Analysis k-ft					Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δMu	ϕMn	Ratio
+1.40D	Actual	M2,min	9.61	10.67	1,359.21	1.000		1.000	1.33	90.000	1.33	171.32	0.008	
+1.40D	M2,min	Actual	9.61	10.67	1,359.21	1.000	1.33	1.000		0.000	1.33	171.32	0.008	
+1.20D	Actual	M2,min	9.61	9.14	1,359.21	1.000		1.000	1.14	90.000	1.14	171.32	0.007	
+1.20D	M2,min	Actual	9.61	9.14	1,359.21	1.000	1.14	1.000		0.000	1.14	171.32	0.007	
+1.20D+0.50W	Actual	M2,min	9.61	9.14	50.44	1.000	44.65	1.000	1.14	1.000	44.66	252.08	0.177	
+1.20D+W	Actual	M2,min	9.61	9.14	19.40	1.000	89.30	1.000	1.14	1.000	89.31	224.13	0.398	
+0.90D+W	Actual	M2,min	9.61	6.86	19.40	1.000	89.30	1.000	0.86	1.000	89.30	224.13	0.398	
+0.90D	Actual	M2,min	9.61	6.86	1,359.21	1.000		1.000	0.86	90.000	0.86	171.32	0.005	
+0.90D	M2,min	Actual	9.61	6.86	1,359.21	1.000	0.86	1.000		0.000	0.86	171.32	0.005	

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		My - End Moments
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	
D Only						7.620			
+D+0.60W						7.620	-53.580		
+D+0.450W						7.620	-40.185		
+0.60D+0.60W						4.572	-53.580		
+0.60D						4.572			
W Only								-89.300	

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		k-ft	Moment About Y-Y Axis		k-ft
	@ Base	@ Top		@ Base	@ Top	
D Only						
+D+0.60W	-53.580		k-ft			k-ft
+D+0.450W	-40.185		k-ft			k-ft
+0.60D+0.60W	-53.580		k-ft			k-ft
+0.60D			k-ft			k-ft
W Only	-89.300		k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.035	in	9.670 ft
+D+0.450W	0.0000	in	0.000 ft	-0.026	in	9.670 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.035	in	9.670 ft
+0.60D	0.0000	in	0.000 ft	0.000	in	0.000 ft
W Only	0.0000	in	0.000 ft	-0.057	in	9.605 ft

100' Flagpole, (Landscape Detail 1/L-2.05)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 100'-0" Tall
- 12" wide flagpole + 44" (eagle) + 25' x 40' flag

$M_u = 147.8 \text{ k} - \text{ft}$, (See *Wind Load Spreadsheet*)

$V_u = 2,177 \text{ kips}$, (See *Wind Load Spreadsheet*)

Enercalc: $147.8 \text{ k-ft}/50' = 2,956 \text{ lbs}@50'$ (for moment calculation)

30"Ø x 10.5' (min) embedment CIDH Caisson w/ (10) #6 rebar

Flag and Pole Calculation - ANSI/NAAMM FP 1001-07

Improvement: Flag Pole Structures

Pole Velocity Pressure : $P = 0.00256 \times V^2 \times C_d \times C_h \times G$

Flag Force : $P = 0.0014 \times V^2 \times \sqrt{A_F} \times C_h \times G$

Risk Category :	II	
Basic Wind Speed (V) :	110	
Wind Gust :	1.15	
Flag Size :	25' x 40'	1000 sq ft

Pole Ht (ft)	Pole Dia (in)	Ch	Cd	P (psf)	w (plf)
4	12.0000	0.86	0.450	13.79	13.79
10	11.1667	0.86	0.450	13.79	12.83
20	10.3333	0.90	0.450	14.46	12.45
30	9.5000	0.98	0.450	15.75	12.47
40	8.6667	1.04	0.450	16.73	12.08
50	7.8333	1.09	0.498	19.42	12.68
60	7.0000	1.14	0.577	23.36	13.62
70	6.1667	1.17	0.680	28.45	14.62
80	5.3333	1.21	0.822	35.34	15.71
90	4.5000	1.24	1.025	45.18	16.94
100	4.0000	1.27	1.100	49.59	16.53
				25.08	13.97

Flag Load: 780 lbs

Total Shear: 2,177 lbs

Moment @ Base: 147.8 k-ft

$C_h = 2.01 (z/900)^{.5}$	for 16.4 ft < z <= 900 ft	Equation 2
$C_h = 2.01 (z/274)^{.5}$	for 5 m < z <= 274m	Equation 2M
For z <= 16.4 (5m)	$C_h = 0.86$	

Wind Speed x Diameter	Drag Coefficient, C_d
V d ≤ 39 (5.33)	1.10
39 (5.33) < V d < 78 (10.66)	$129 / [V d]^{1.3} (9.69 / [V d]^{1.3})$
V d ≥ 78 (10.66)	0.45
V = wind speed in mph (m/s)	
d = diameter of cylindrical pole or segment or average diameter of tapered pole or segment in feet (meters)	

FLAG LOAD

4.1 Wind. The load acting on the pole as a result of the wind acting on the flag shall be computed by the following formulas:

for nylon and cotton flags,

$$W_F = 0.0010 \times V^2 \times \sqrt{A_F} \times C_h \times G$$

Equation 4

$$W_F = 0.0730 \times V^2 \times \sqrt{A_F} \times C_h \times G$$

Equation 4M

for polyester flags,

$$W_F = 0.0014 \times V^2 \times \sqrt{A_F} \times C_h \times G$$

Equation 5

$$W_F = 0.1022 \times V^2 \times \sqrt{A_F} \times C_h \times G$$

Equation 5M

Where

- W_F = flag load on pole in pounds (Newtons), including height correction
- V = 3-second gust wind speed in miles per hour (meters per second) Figure 3.2.2
- A_F = area of flag in square feet (square meters)
- C_h = coefficient of height for wind pressure from Table 3.2.3A, calculated at top of flag.
- G = Gust effect factor, use minimum value of 1.14

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 5. 100' Flagpole Post Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

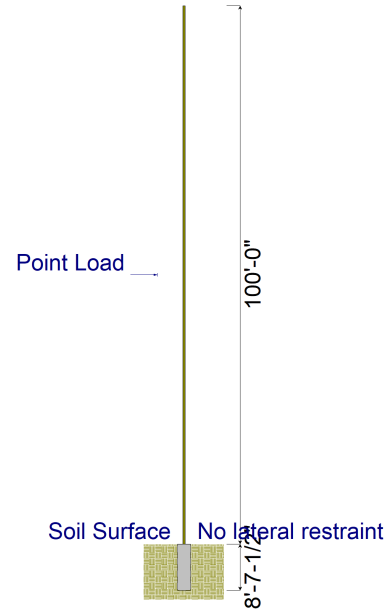
Pole Footing Shape Circular
Pole Footing Diameter 30.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination D+0.60W
Lateral Load 1.774 k
Moment 88.680 k-ft
NO Ground Surface Restraint
Pressures at 1/3 Depth
Actual **1,426.75** psf
Allowable **1,427.71** psf

Minimum Required Depth 8.625 ft

Footing Base Area 4.909 ft²
Maximum Soil Pressure 6.927 ksf



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	k		k/ft	11.301 k
Lr : Roof Live	k		k/ft	22.701 k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	2.956 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	50.0 ft	TOP of Load above ground surface	100.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.000	0.000	0.13	0.0	0.0	1.000
+D+Lr	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.750Lr	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.60W	1.774	88.680	8.63	1,426.7	1,427.7	1.000
+D+0.750Lr+0.450W	1.330	66.510	7.88	1,288.5	1,292.7	1.000
+D+0.450W	1.330	66.510	7.88	1,288.5	1,292.7	1.000
+0.60D+0.60W	1.774	88.680	8.63	1,426.7	1,427.7	1.000
+0.60D	0.000	0.000	0.13	0.0	0.0	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 5. 100' Flagpole Pose CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

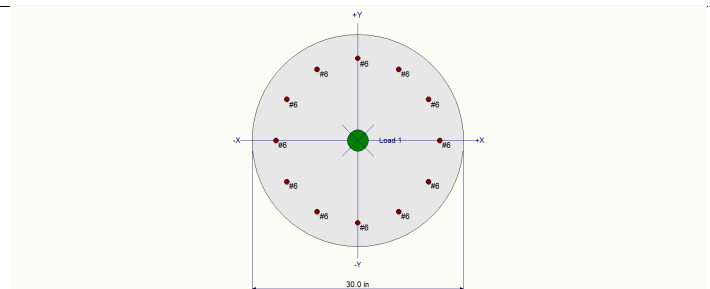
f'_c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	11.50 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 30.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 12 - #6 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 8,467.57 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 11.50 ft above base, D = 0.50 k

BENDING LOADS . . .

Moment X: Moment acting about X-X axis at 11.50 ft, W = 147.80 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W			Maximum SERVICE Load Reactions .			
Location of max.above base	11.423 ft			Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.502 : 1			Top along X-X	0.0 k	Bottom along X-X	0.0 k
				Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5			
Pu =	8.071 k	φ * Pn =	14.918 k	Maximum SERVICE Load Deflections . .			
Mu-x =	147.80 k-ft	φ * Mn-x =	299.112 k-ft				
Mu-y =	1.009 k-ft	φ* Mn-y =	0.0 k-ft	Along Y-Y	-0.1351 in	at	11.50 ft above base
		φ =	0.90	for load combination : W Only			
Mu Angle =	0.0 deg			Along X-X	0.0in	at	0.0 ft above base
Mu at Angle =	147.803 k-ft	φMn at Angle =	294.716 k-ft	for load combination :			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>							
Column Capacities . .				General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacit	2,702.17 k			ρ : % Reinforcing	0.7470 %	Rebar	% Ok
Pnmin : Nominal Min. Tension Axial Capacity	k			Reinforcing Area	5.280 in^2		
φ Pn, max : Usable Compressive Axial Capacity	1,405.13 k			Concrete Area	706.86 in^2		
φ Pn, min : Usable Tension Axial Capacity	k						
						β = 0.850	θ = 0.80

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 5. 100' Flagpole Pose CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δMu	ϕMn	Ratio
+1.40D	Actual	M2,min	11.42	12.55	1,405.13	1.000			1.000	1.57	90.000	1.57	177.03	0.009
+1.40D	M2,min	Actual	11.42	12.55	1,405.13	1.000	1.57	1.000			0.000	1.57	177.03	0.009
+1.20D	Actual	M2,min	11.42	10.76	1,405.13	1.000			1.000	1.35	90.000	1.35	177.03	0.008
+1.20D	M2,min	Actual	11.42	10.76	1,405.13	1.000	1.35	1.000			0.000	1.35	177.03	0.008
+1.20D+0.50W	Actual	M2,min	11.42	10.76	47.89	1.000	73.90	1.000			1.000	73.91	320.56	0.231
+1.20D+W	Actual	M2,min	11.42	10.76	25.90	1.000	147.80	1.000			1.000	147.81	303.47	0.487
+0.90D+W	Actual	M2,min	11.42	8.07	14.92	1.000	147.80	1.000			1.01	0.000	147.80	0.502
+0.90D	Actual	M2,min	11.42	8.07	1,405.13	1.000			1.000	1.01	90.000	1.01	177.03	0.006
+0.90D	M2,min	Actual	11.42	8.07	1,405.13	1.000	1.01	1.000			0.000	1.01	177.03	0.006

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		k-ft	My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
D Only						8.968					
+D+0.60W						8.968		-88.680			
+D+0.450W						8.968		-66.510			
+0.60D+0.60W						5.381		-88.680			
+0.60D						5.381					
W Only								-147.800			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		k-ft	Moment About Y-Y Axis		k-ft
	@ Base	@ Top		@ Base	@ Top	
D Only						
+D+0.60W	-88.680		k-ft			k-ft
+D+0.450W	-66.510		k-ft			k-ft
+0.60D+0.60W	-88.680		k-ft			k-ft
+0.60D			k-ft			k-ft
W Only	-147.800		k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.081	in	11.500 ft
+D+0.450W	0.0000	in	0.000 ft	-0.061	in	11.500 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.081	in	11.500 ft
+0.60D	0.0000	in	0.000 ft	0.000	in	0.000 ft
W Only	0.0000	in	0.000 ft	-0.133	in	11.423 ft

6. Water Mister (Landscape Detail 2/L-2.05)

Water Mister (Landscape Detail 2/L-2,05)

- 10' Tall
- 5" wide

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Total Wind Load per Post = $30 \text{ psf} \times 10' \times 0.5' = 150 \text{ lbs}$

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 6. Water Mister Post Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination +0.60W
Lateral Load 0.090 k
Moment 0.540 k-ft

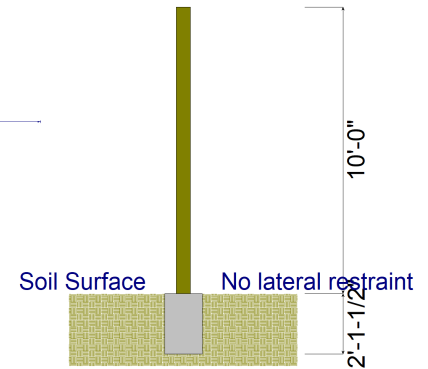
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 333.207 psf
Allowable 335.604 psf

Minimum Required Depth 2.125 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.150 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	6.0 ft	TOP of Load above ground surface	10.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.090	0.540	2.13	333.2	335.6	1.000
+0.450W	0.068	0.405	1.88	301.2	302.1	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 6. Water mister CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

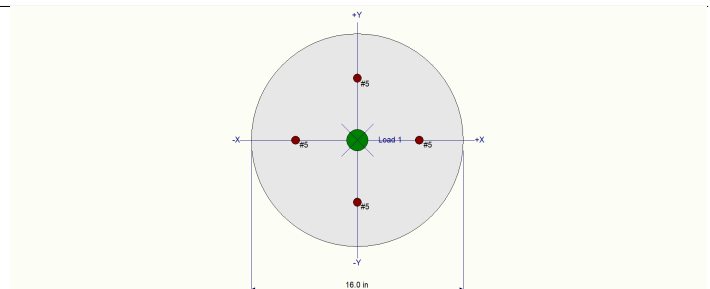
f'_c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	3.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 4 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 628.32 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 3.0 ft above base, D = 0.50 k

BENDING LOADS . . .

Wind: Moment acting about X-X axis at 2.750 ft, W = 0.750 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W		Maximum SERVICE Load Reactions .			
Location of max.above base	2.980 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.011 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	1.015 k	φ * Pn =	89.160 k			
Mu-x =	0.750 k-ft	φ * Mn-x =	66.045 k-ft			
Mu-y =	0.09139 k-ft	φ * Mn-y =	8.904 k-ft			
Mu Angle =	7.0 deg	φ =	0.8602			
Mu at Angle =	0.7555 k-ft	φMn at Angle =	66.576 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .			General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacit	753.79 k		ρ : % Reinforcing		0.6167 %	Rebar % Ok
Pnmin : Nominal Min. Tension Axial Capacity	k		Reinforcing Area		1.240 in^2	
φ Pn, max : Usable Compressive Axial Capacity	391.973 k		Concrete Area		201.062 in^2	
φ Pn, min : Usable Tension Axial Capacity	k					
					β =	0.850
					θ =	0.80

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 6. Water mister CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	$\delta x * Mux$	δy	$\delta y * Muy$	Alpha (deg)	δMu	ϕMn	Ratio
+1.40D	Actual	M2,min	2.98	1.58	391.97	1.000			1.000	0.14	90.000	0.14	35.46	0.004
+1.40D	M2,min	Actual	2.98	1.58	391.97	1.000	0.14	1.000			0.000	0.14	35.46	0.004
+1.20D	Actual	M2,min	2.98	1.35	391.97	1.000			1.000	0.12	90.000	0.12	35.46	0.003
+1.20D	M2,min	Actual	2.98	1.35	391.97	1.000	0.12	1.000			0.000	0.12	35.46	0.003
+1.20D+0.50W	Actual	M2,min	2.98	1.35	238.12	1.000	0.38	1.000	0.12	18.000		0.39	69.25	0.006
+1.20D+W	Actual	M2,min	2.98	1.35	121.13	1.000	0.75	1.000	0.12	9.000		0.76	67.95	0.011
+0.90D+W	Actual	M2,min	2.98	1.02	89.16	1.000	0.75	1.000	0.09	7.000		0.76	66.58	0.011
+0.90D	Actual	M2,min	2.98	1.02	391.97	1.000			1.000	0.09	90.000	0.09	35.46	0.003
+0.90D	M2,min	Actual	2.98	1.02	391.97	1.000	0.09	1.000			0.000	0.09	35.46	0.003

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k		Y-Y Axis Reaction k		Axial Reaction @ Base	Mx - End Moments k-ft		My - End Moments k-ft	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					1.128				
+D+0.60W					1.128	-0.450			
+D+0.450W					1.128	-0.338			
+0.60D+0.60W					0.677	-0.450			
+0.60D					0.677				
W Only						-0.750			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top
D Only			k-ft		k-ft
+D+0.60W	-0.450		k-ft		k-ft
+D+0.450W	-0.338		k-ft		k-ft
+0.60D+0.60W	-0.450		k-ft		k-ft
+0.60D			k-ft		k-ft
W Only	-0.750		k-ft		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.000	in	3.000 ft
+D+0.450W	0.0000	in	0.000 ft	-0.000	in	3.000 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.000	in	3.000 ft
+0.60D	0.0000	in	0.000 ft	0.000	in	0.000 ft
W Only	0.0000	in	0.000 ft	-0.001	in	2.980 ft

7. Retaining Wall / Seat Wall, (Landscape Detail 1/L-2.06) &
Scorer Bench & Table, (Landscape Details 1/L-2.16, & L-2.20)

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Low Retaining Walls - up to 3' retained

Code Reference

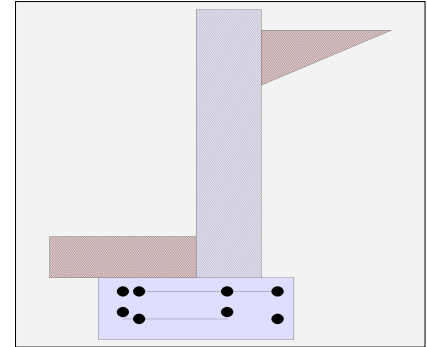
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	3.00 ft
Wall height above soil	=	0.25 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	50.0 lbs
Axial Live Load	=	50.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	20.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Low Retaining Walls - up to 3' retained

Design Summary

Wall Stability Ratios

Overturing	=	2.84	OK
Sliding	=	1.74	OK
Global Stability	=	3.23	

Total Bearing Load	=	578 lbs
...resultant ecc.	=	1.03 in

Eccentricity within middle third

Soil Pressure @ Toe	=	395 psf	OK
Soil Pressure @ Heel	=	233 psf	OK
Allowable	=	2,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	451 psf	
ACI Factored @ Heel	=	266 psf	
Footing Shear @ Toe	=	2.6 psi	OK
Footing Shear @ Heel	=	3.7 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	213.9 lbs	
less 100% Passive Force	-	140.6 lbs	
less 100% Friction Force	= -	231.1 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht"	=	Masonry
Design Method	=	ASD
Thickness	=	8.00
Rebar Size	=	# 4
Rebar Spacing	=	16.00
Rebar Placed at	=	Center

Design Data

fb/FB + fa/Fa	=	0.173
---------------	---	-------

Total Force @ Section

Service Level	lbs =	138.0
Strength Level	lbs =	

Moment....Actual

Service Level	ft-# =	144.4
Strength Level	ft-# =	

Moment.....Allowable

	=	854.2
--	---	-------

Shear.....Actual

Service Level	psi =	1.5
Strength Level	psi =	

Shear.....Allowable

	psi =	44.0
--	-------	------

Anet (Masonry)

	in2 =	91.50
--	-------	-------

Wall Weight

	psf =	0.0
--	-------	-----

Rebar Depth 'd'

	in =	3.81
--	------	------

Masonry Data

f'm	psi =	1,500
Fs	psi =	20,000
Solid Grouting	=	Yes
Modular Ratio 'n'	=	21.48
Equiv. Solid Thick.	in =	7.63
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	
Fy	psi =	



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Low Retaining Walls - up to 3' retained

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.00
Total Footing Width	=	2.00
Footing Thickness	=	9.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	451	266	psf
Mu' : Upward	=	210	15	ft-#
Mu' : Downward	=	140	126	ft-#
Mu: Design	=	70	111	ft-#
ϕ Mn	=	7,365	8,715	ft-#
Actual 1-Way Shear	=	2.57	3.66	psi
Allow 1-Way Shear	=	53.64	50.85	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, ϕ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 12.34 in, #5@ 18 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 12.34 in, #5@ 18 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.39	in ²
Min footing T&S reinf Area per foot	0.19	in ² /ft

If one layer of horizontal bars:

#4@ 12.35 in
#5@ 19.14 in
#6@ 27.16 in

If two layers of horizontal bars:

#4@ 24.69 in
#5@ 38.27 in
#6@ 54.32 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Low Retaining Walls - up to 3' retained

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	210.9	1.25	263.7	Soil Over HL (ab. water tbl)	125.0	1.83	229.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		1.83	229.2
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =	50.0	1.33	66.7
Added Lateral Load =				* Axial Live Load on Stem =	50.0	1.33	66.7
Load @ Stem Above Soil =	3.0	3.88	11.6	Soil Over Toe =	62.5	0.50	31.3
=				Surcharge Over Toe =			
				Stem Weight(s) =			
				Earth @ Stem Transitions =			
Total =	213.9	O.T.M. =	275.3	Footing Weight =	225.0	1.00	225.0
				Key Weight =			
Resisting/Overturning Ratio =			2.84	Vert. Component =	115.2	2.00	230.4
Vertical Loads used for Soil Pressure =		577.7 lbs		Total =	577.7 lbs	R.M.=	782.4
				* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
------------------------------	-------	-----

Horizontal Defl @ Top of Wall (approximate only) 0.018 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

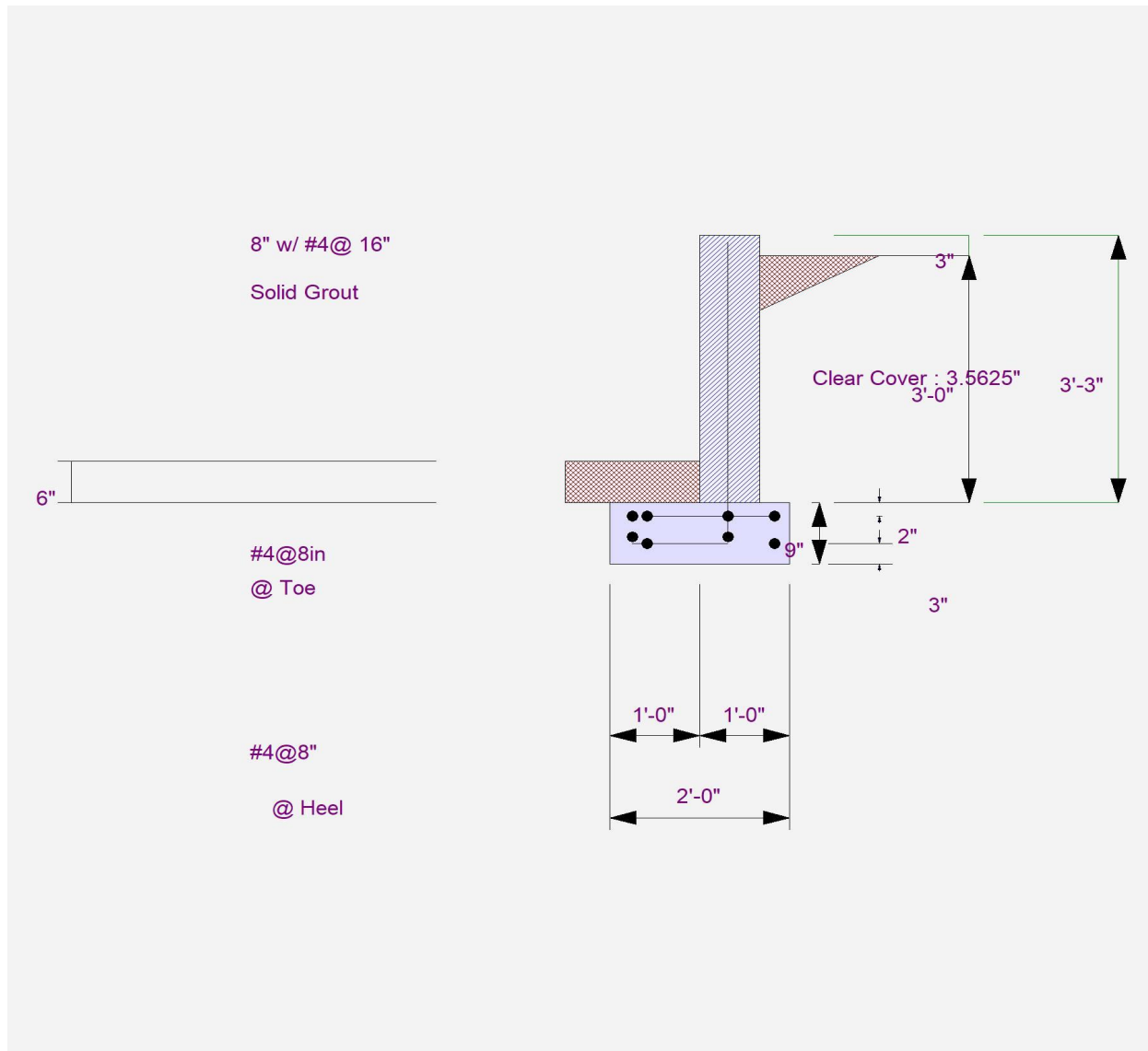
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Low Retaining Walls - up to 3' retained



Cantilevered Retaining Wall

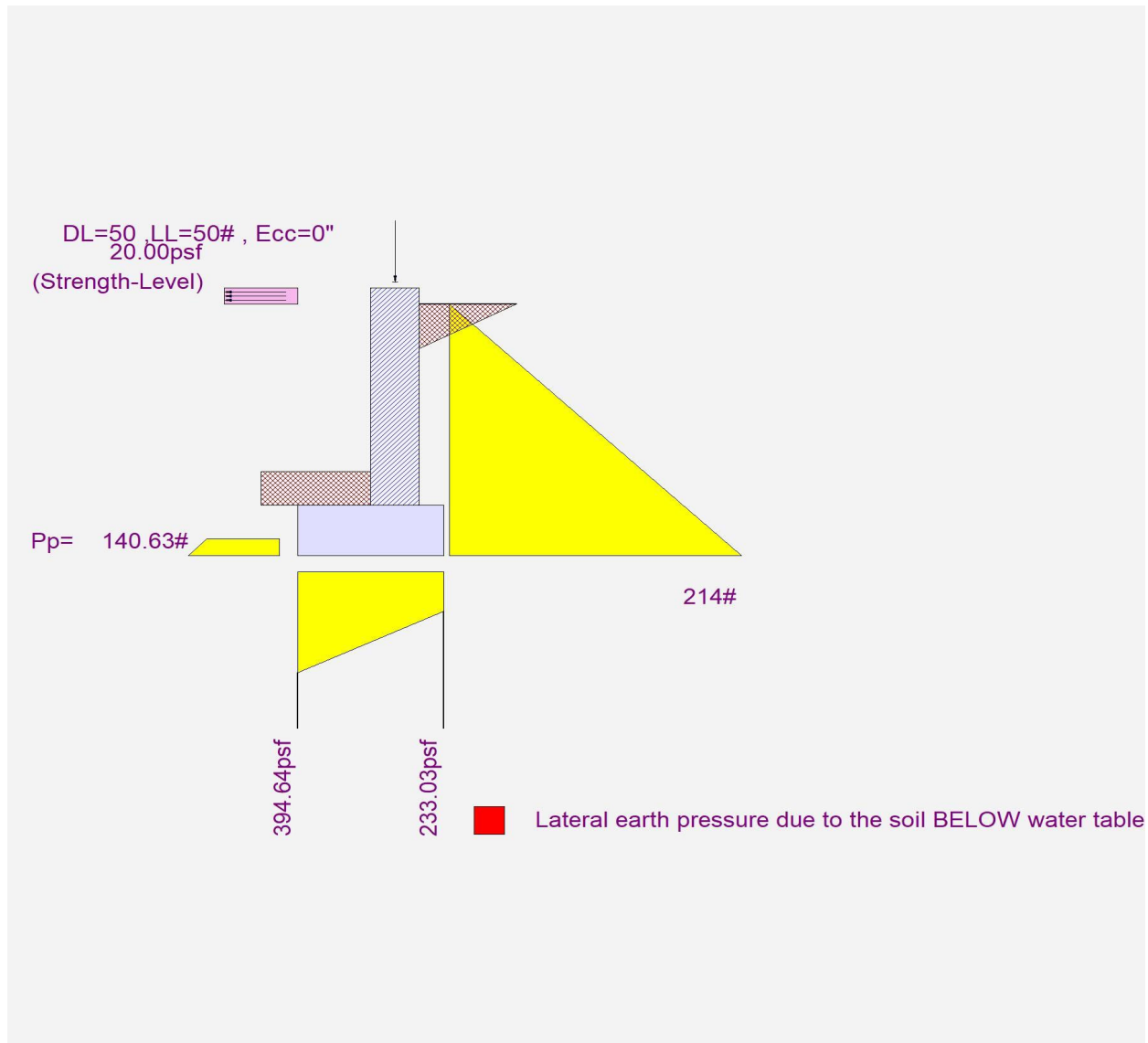
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Low Retaining Walls - up to 3' retained



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench Table

Code Reference

Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	2.00 ft
Wall height above soil	=	3.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	24.00 in
Water table above bottom of footing	=	0.0 ft

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

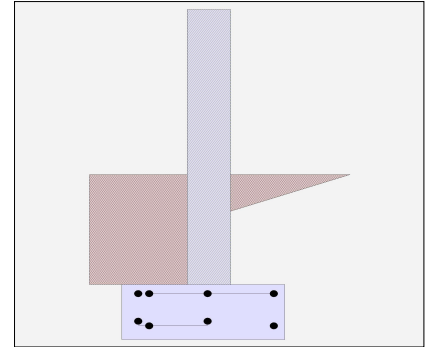
Axial Dead Load	=	50.0 lbs
Axial Live Load	=	50.0 lbs
Axial Load Eccentricity	=	12.0 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.480
Soil height to ignore for passive pressure	=	6.00 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	20.0 psf (Strength Level)



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench Table

Design Summary

Wall Stability Ratios

Overturing	=	4.14	OK
Sliding	=	15.48	OK
Global Stability	=	10.61	

Total Bearing Load	=	957 lbs	
...resultant ecc.	=	3.70 in	

Eccentricity within middle third

Soil Pressure @ Toe	=	701 psf	OK
Soil Pressure @ Heel	=	105 psf	OK
Allowable	=	2,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	909 psf	
ACI Factored @ Heel	=	136 psf	
Footing Shear @ Toe	=	1.7 psi	OK
Footing Shear @ Heel	=	2.6 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	171.0 lbs	
less 100% Passive Force	=	2,187.5 lbs	
less 100% Friction Force	=	459.4 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	0.00
Wall Material Above "Ht"	= Masonry
Design Method	= ASD
Thickness	= 8.00
Rebar Size	= # 4
Rebar Spacing	= 16.00
Rebar Placed at	= Center

Design Data

fb/FB + fa/Fa	=	0.318
---------------	---	-------

Total Force @ Section

Service Level	lbs =	96.0
Strength Level	lbs =	

Moment....Actual

Service Level	ft-# =	266.0
Strength Level	ft-# =	

Moment.....Allowable

=	854.2
---	-------

Shear.....Actual

Service Level	psi =	1.0
Strength Level	psi =	

Shear.....Allowable

psi =	44.0
-------	------

Anet (Masonry)

in2 =	91.50
-------	-------

Wall Weight

psf =	0.0
-------	-----

Rebar Depth 'd'

in =	3.81
------	------

Masonry Data

f'm	psi =	1,500
Fs	psi =	20,000
Solid Grouting	=	Yes
Modular Ratio 'n'	=	21.48
Equiv. Solid Thick.	in =	7.63
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	
Fy	psi =	

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench Table

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.50
Total Footing Width	=	2.50
Footing Thickness	=	12.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	909	136	psf
Mu' : Upward	=	403	77	ft-#
Mu' : Downward	=	320	332	ft-#
Mu: Design	=	83	255	ft-#
ϕ Mn	=	11,415	12,765	ft-#
Actual 1-Way Shear	=	1.71	2.61	psi
Allow 1-Way Shear	=	46.63	44.98	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, ϕ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.65	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench Table

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	135.0	1.00	135.0	Soil Over HL (ab. water tbl)	208.3	2.08	434.0
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.08	434.0
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =	50.0	0.33	16.7
Added Lateral Load =				* Axial Live Load on Stem =	50.0	0.33	16.7
Load @ Stem Above Soil =	36.0	4.50	162.0	Soil Over Toe =	250.0	0.50	125.0
=				Surcharge Over Toe =			
				Stem Weight(s) =			
				Earth @ Stem Transitions =			
Total =	171.0	O.T.M. =	297.0	Footing Weight =	375.0	1.25	468.8
				Key Weight =		0.83	
Resisting/Overturning Ratio		=	4.14	Vert. Component =	73.7	2.50	184.3
Vertical Loads used for Soil Pressure =		957.0	lbs	Total =	957.0	lbs	R.M.= 1,228.7
				* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.039 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

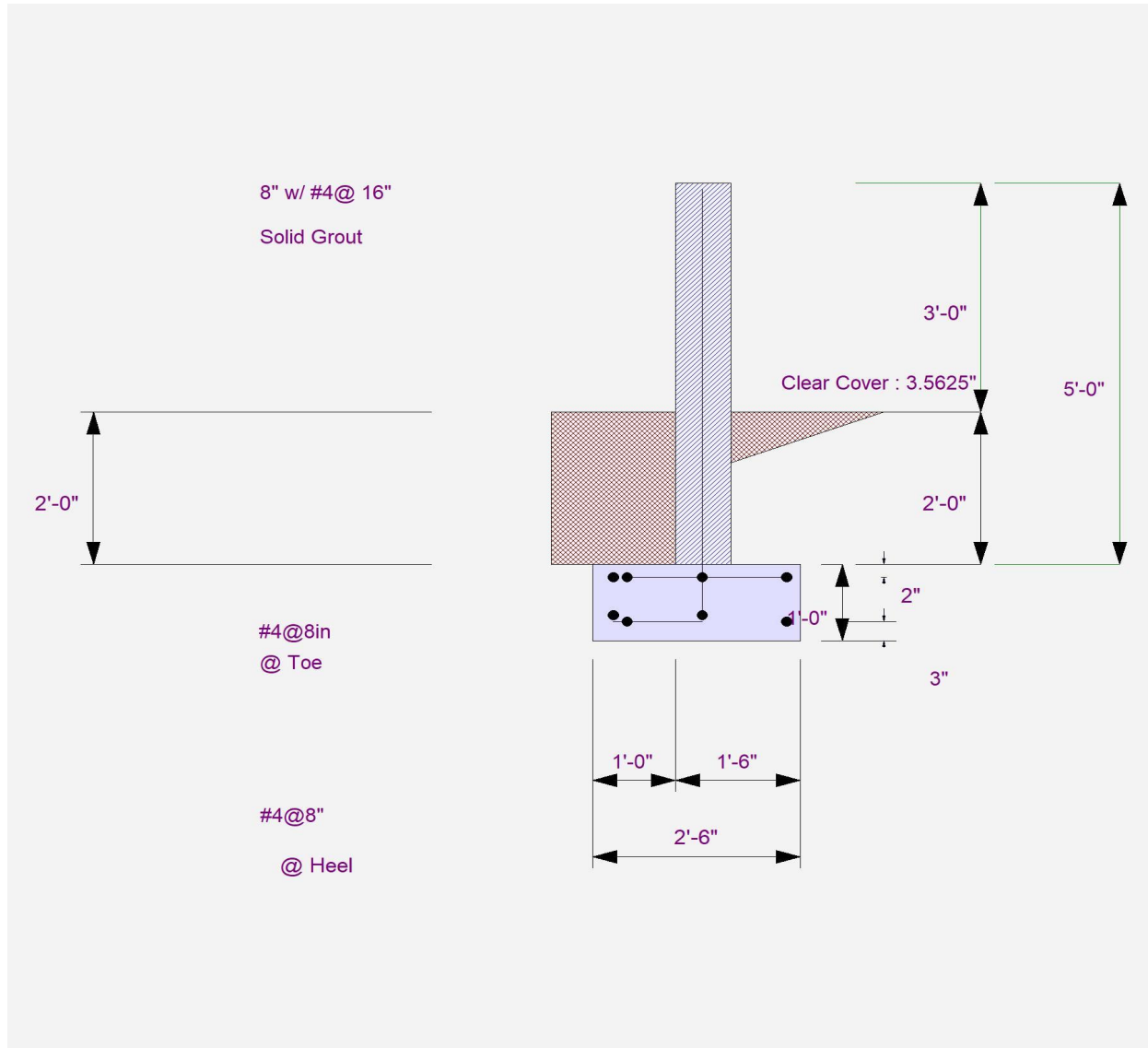
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench Table



Cantilevered Retaining Wall

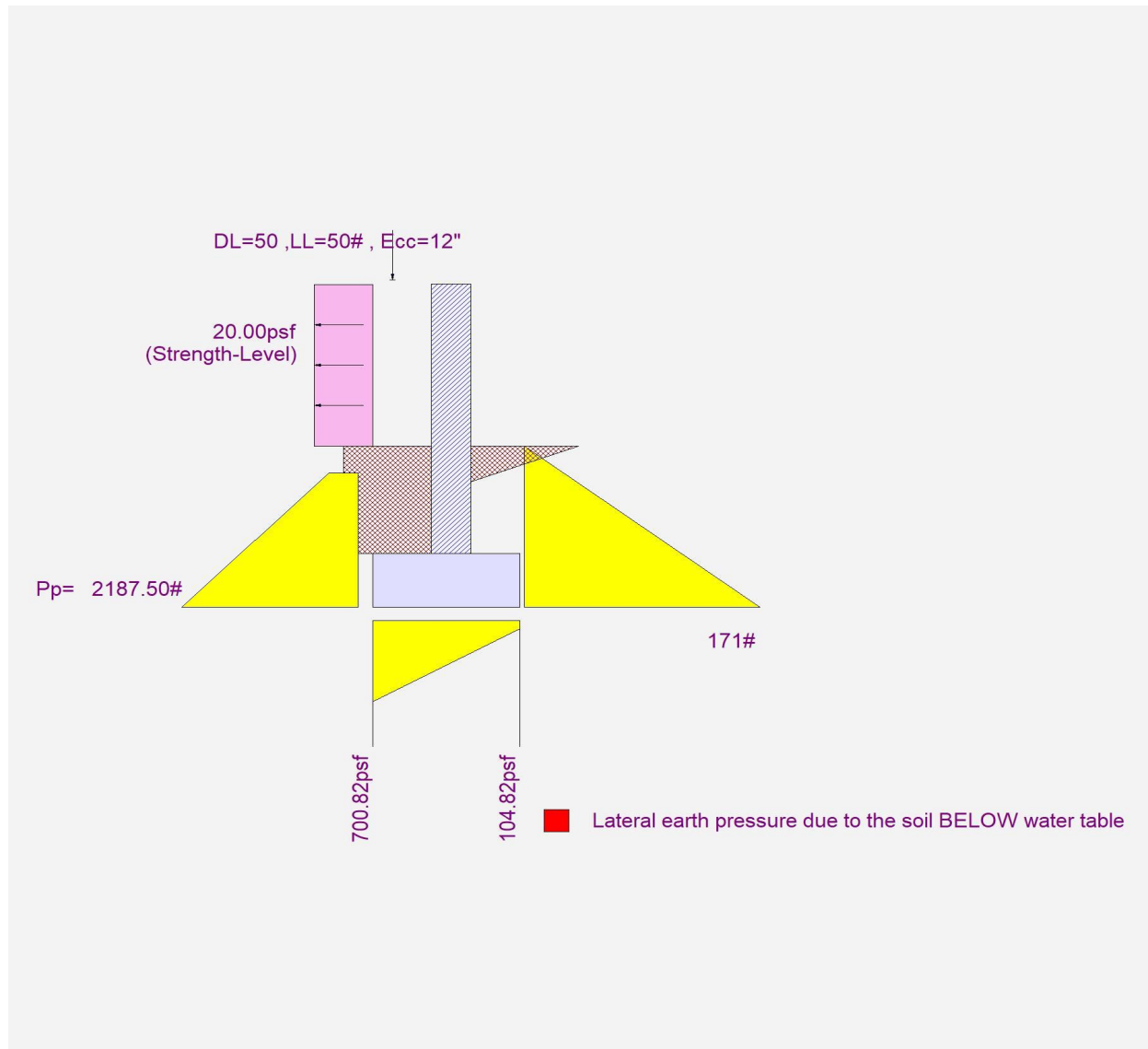
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench Table



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench

Code Reference

Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	0.50 ft
Wall height above soil	=	1.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water table above bottom of footing	=	0.0 ft

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

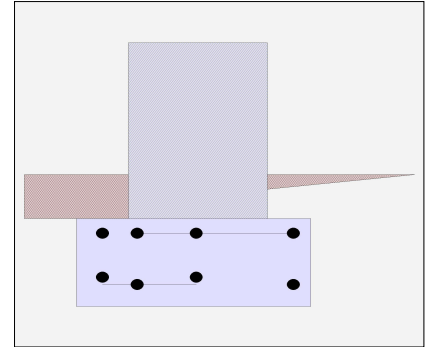
Axial Dead Load	=	150.0 lbs
Axial Live Load	=	50.0 lbs
Axial Load Eccentricity	=	4.0 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
	=	
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.480
Soil height to ignore for passive pressure	=	6.00 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	20.0 psf (Strength Level)



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench

Design Summary

Wall Stability Ratios

Overtuning	=	10.58	OK
Sliding	=	14.89	OK
Global Stability	=	8.98	

Total Bearing Load	=	563	lbs
...resultant ecc.	=	1.93	in

Eccentricity within middle third

Soil Pressure @ Toe	=	389	psf	OK
Soil Pressure @ Heel	=	156	psf	OK
Allowable	=	2,000	psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	529	psf
ACI Factored @ Heel	=	212	psf
Footing Shear @ Toe	=	1.0	psi OK
Footing Shear @ Heel	=	0.3	psi OK
Allowable	=	94.9	psi

Sliding Calcs

Lateral Sliding Force	=	51.8 lbs	
less 100% Passive Force	-	500.0 lbs	
less 100% Friction Force	= -	270.3 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	0.00	
Wall Material Above "Ht"	=	Masonry
Design Method	=	ASD
Thickness	=	16.00
Rebar Size	=	# 4
Rebar Spacing	=	16.00
Rebar Placed at	=	Center

Design Data

fb/FB + fa/Fa	=	0.053
---------------	---	-------

Total Force @ Section

Service Level	lbs =	21.8
Strength Level	lbs =	

Moment....Actual

Service Level	ft-# =	89.8
Strength Level	ft-# =	

Moment.....Allowable	=	1,803.3
----------------------	---	---------

Shear.....Actual

Service Level	psi =	0.1
Strength Level	psi =	

Shear.....Allowable	psi =	43.9
---------------------	-------	------

Anet (Masonry)	in2 =	187.50
----------------	-------	--------

Wall Weight	psf =	0.0
-------------	-------	-----

Rebar Depth 'd'	in =	7.81
-----------------	------	------

Masonry Data

f'm	psi =	1,500
Fs	psi =	20,000
Solid Grouting	=	Yes
Modular Ratio 'n'	=	21.48
Equiv. Solid Thick.	in =	15.63
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	
Fy	psi =	

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench

Footing Data

Toe Width	=	0.50 ft
Heel Width	=	1.75
Total Footing Width	=	2.25
Footing Thickness	=	12.00 in

f'c =	4,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	529	212	psf
Mu' : Upward	=	63	20	ft-#
Mu' : Downward	=	74	70	ft-#
Mu: Design	=	-11	50	ft-#
ϕ Mn	=	11,515	12,865	ft-#
Actual 1-Way Shear	=	1.05	0.31	psi
Allow 1-Way Shear	=	53.85	51.94	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, ϕ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.58	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	33.8	0.50	16.9	Soil Over HL (ab. water tbl)	26.0	2.04	53.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.04	53.2
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=	150.0	0.83
Added Lateral Load	=			* Axial Live Load on Stem	=	50.0	0.83
Load @ Stem Above Soil	=	18.0	2.25	Soil Over Toe	=	31.3	0.25
	=		40.5	Surcharge Over Toe	=		
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
				Footing Weight	=	337.5	1.13
				Key Weight	=		0.83
				Vert. Component	=	18.4	2.25
Total	=	51.8	O.T.M.				
			=				
			57.4				
Resisting/Overturning Ratio			=				
			10.58				
Vertical Loads used for Soil Pressure =		563.2	lbs				
						</	

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.010 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

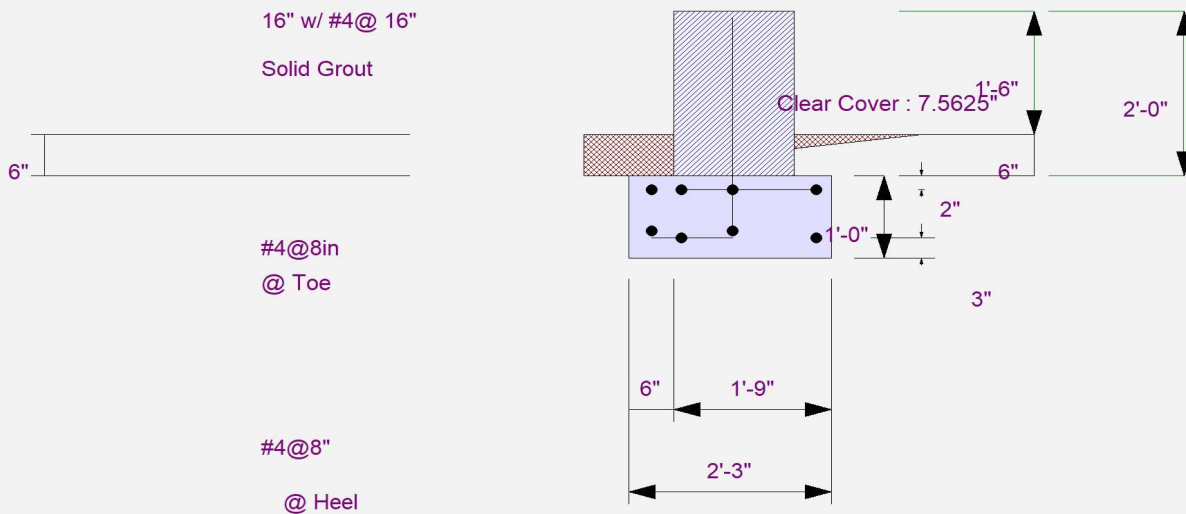
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench



Cantilevered Retaining Wall

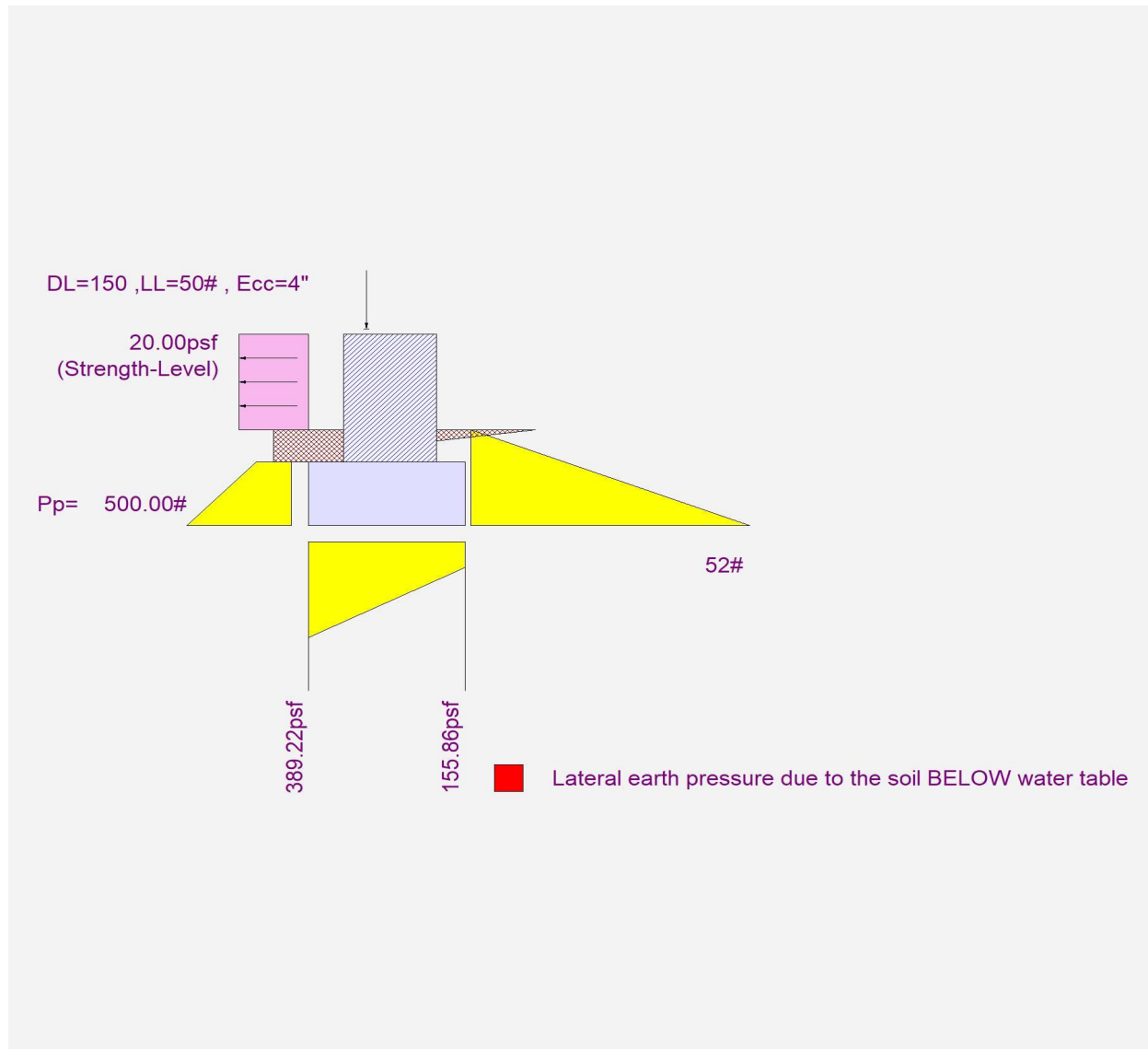
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 7. Scorer Bench



8. Light pole on Seat Wall (Landscape Detail 1E/L-2.06)

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 8. Seat Wall Adj. Light Pole

Code Reference:

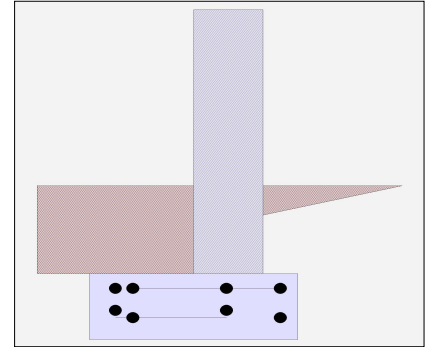
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	1.00 ft
Wall height above soil	=	2.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
	=	
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	50.0 lbs
Axial Live Load	=	50.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	20.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 8. Seat Wall Adj. Light Pole

Design Summary

Wall Stability Ratios

Overturing	=	5.18	OK
Sliding	=	10.04	OK
Global Stability	=	6.54	

Total Bearing Load	=	467 lbs	
...resultant ecc.	=	1.44 in	

Eccentricity within middle third

Soil Pressure @ Toe	=	352 psf	OK
Soil Pressure @ Heel	=	165 psf	OK
Allowable	=	2,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	468 psf	
ACI Factored @ Heel	=	220 psf	
Footing Shear @ Toe	=	1.1 psi	OK
Footing Shear @ Heel	=	0.7 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	69.9 lbs	
less 100% Passive Force	=	515.6 lbs	
less 100% Friction Force	=	186.7 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	0.00
Wall Material Above "Ht"	= Masonry
Design Method	= ASD
Thickness	= 8.00
Rebar Size	= # 4
Rebar Spacing	= 16.00
Rebar Placed at	= Center

Design Data

fb/FB + fa/Fa	=	0.066
---------------	---	-------

Total Force @ Section

Service Level	lbs =	39.0
Strength Level	lbs =	

Moment....Actual

Service Level	ft-# =	53.0
Strength Level	ft-# =	

Moment.....Allowable

=	854.2
---	-------

Shear.....Actual

Service Level	psi =	0.4
Strength Level	psi =	

Shear.....Allowable

psi =	44.0
-------	------

Anet (Masonry)

in2 =	91.50
-------	-------

Wall Weight

psf =	0.0
-------	-----

Rebar Depth 'd'

in =	3.81
------	------

Masonry Data

f'm	psi =	1,500
Fs	psi =	20,000
Solid Grouting	=	Yes
Modular Ratio 'n'	=	21.48
Equiv. Solid Thick.	in =	7.63
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	
Fy	psi =	

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 8. Seat Wall Adj. Light Pole

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.00
Total Footing Width	=	2.00
Footing Thickness	=	9.00 in

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm = 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	468	220	psf
Mu' : Upward	=	213	13	ft-#
Mu' : Downward	=	190	45	ft-#
Mu: Design	=	23	32	ft-#
φ Mn	=	7,365	8,715	ft-#
Actual 1-Way Shear	=	1.08	0.70	psi
Allow 1-Way Shear	=	53.64	50.85	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=	0.00 ft-lbs		
Footing Allow. Torsion, φ Tn	=	0.00 ft-lbs		

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 12.34 in, #5@ 18 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 12.34 in, #5@ 18 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area 0.39 in²
Min footing T&S reinf Area per foot 0.19 in² /ft

If one layer of horizontal bars:

#4@ 12.35 in
#5@ 19.14 in
#6@ 27.16 in

If two layers of horizontal bars:

#4@ 24.69 in
#5@ 38.27 in
#6@ 54.32 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 8. Seat Wall Adj. Light Pole

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	45.9	0.58	26.8	Soil Over HL (ab. water tbl)	41.7	1.83	76.4
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		1.83	76.4
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=	50.0	1.33
Added Lateral Load	=			* Axial Live Load on Stem	=	50.0	1.33
Load @ Stem Above Soil	=	24.0	2.75	Soil Over Toe	=	125.0	0.50
	=		66.0	Surcharge Over Toe	=		
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
				Footing Weight	=	225.0	1.00
				Key Weight	=		
				Vert. Component	=	25.1	2.00

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.015 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 8. Seat Wall Adj. Light Pole

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Calculated Rebar Stress, f_s = 1240.96 psi

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) =

20.00 in

Development length for #4 bar specified in this stem design segment =

12.00 in

Hooked embedment length into footing for #4 bar specified in this stem design segment =

6.00 in

As Provided =

0.1500 in²/ft

As Required =

0.0093 in²/ft

Cantilevered Retaining Wall

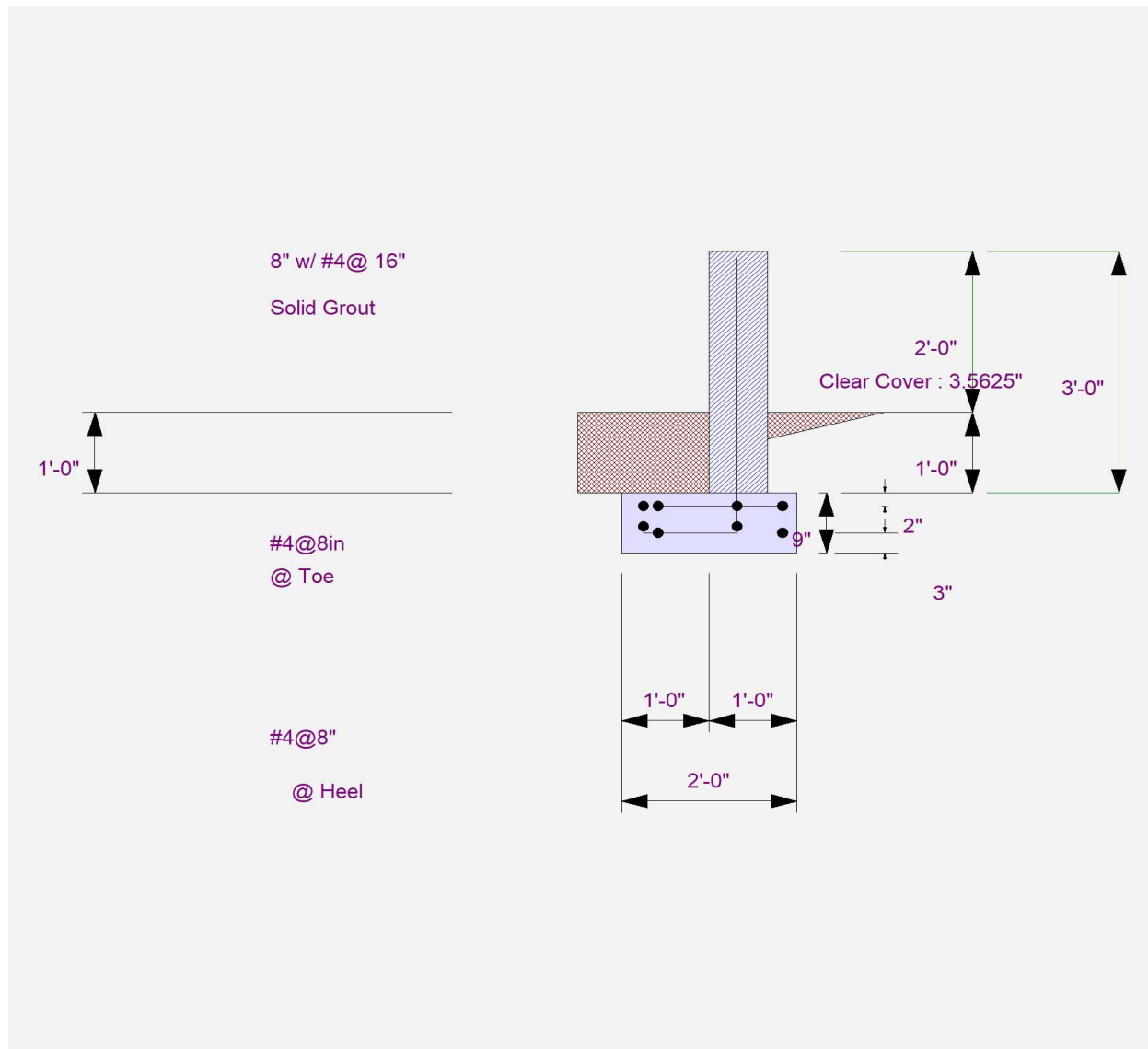
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 8. Seat Wall Adj. Light Pole



Cantilevered Retaining Wall

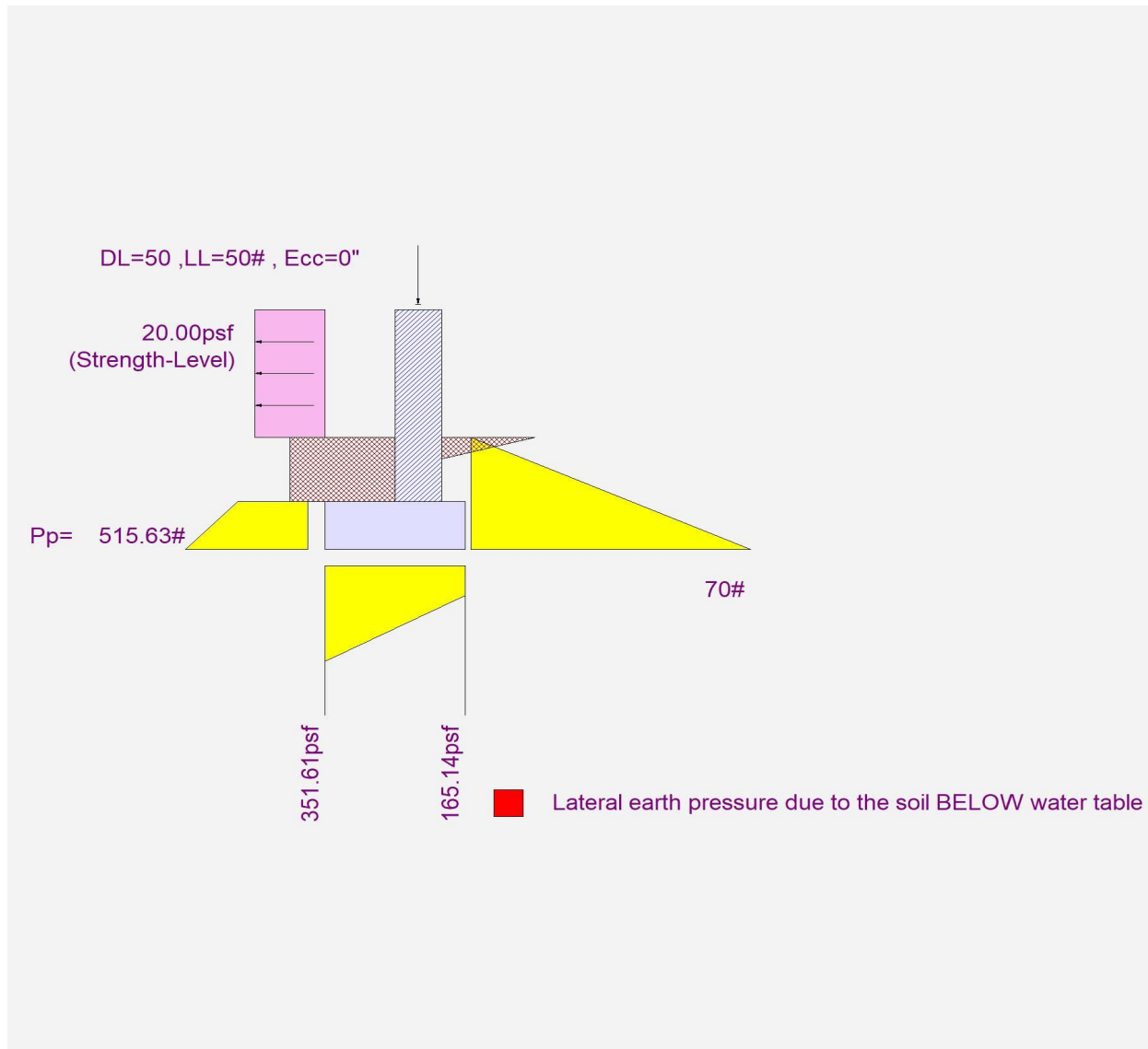
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 8. Seat Wall Adj. Light Pole



9. Retaining wall at Vineyard (Landscape Detail 1/L-2.07),
Retaining Wall w/ Fence at Soccer Play Area (2/ L-2.07),
-

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 3'

Code Reference

Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	3.00 ft
Wall height above soil	=	6.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

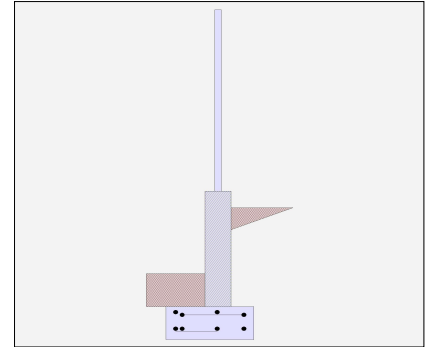
Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.480
Soil height to ignore for passive pressure	=	6.00 in

Lateral Load Applied to Stem

Lateral Load	=	50.0 #/ft
...Height to Top	=	6.50 ft
...Height to Bottom	=	5.50 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 3'

Design Summary

Wall Stability Ratios

Overturing	=	1.74	OK
Sliding	=	4.58	OK
Global Stability	=	3.46	

Total Bearing Load	=	812 lbs
...resultant ecc.	=	6.18 in

Eccentricity outside middle third

Soil Pressure @ Toe	=	888 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	2,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,043 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	3.7 psi	OK
Footing Shear @ Heel	=	5.6 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	290.0 lbs	
less 100% Passive Force	-	937.5 lbs	
less 100% Friction Force	= -	389.9 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht"

Design Method

Thickness

Rebar Size

Rebar Spacing

Rebar Placed at

Design Data

fb/FB + fa/Fa

Total Force @ Section

Service Level

Strength Level

Moment....Actual

Service Level

Strength Level

Moment.....Allowable

Shear.....Actual

Service Level

Strength Level

Shear.....Allowable

Anet (Masonry)

Wall Weight

Rebar Depth 'd'

Masonry Data

f'm

Fs

Solid Grouting

Modular Ratio 'n'

Equiv. Solid Thick.

Masonry Block Type

Masonry Design Method

Concrete Data

f'c

Fy

2nd

Bottom

Stem OK

0.00

Masonry

ASD

8.00

4

16.00

Center

0.509

185.0

435.0

854.2

2.0

44.4

91.50

0.0

3.81

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 3'

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.25
Total Footing Width	=	2.25
Footing Thickness	=	12.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	3.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,043	0	psf
Mu' : Upward	=	426	0	ft-#
Mu' : Downward	=	220	291	ft-#
Mu: Design	=	206	290	ft-#
ϕ Mn	=	11,415	11,415	ft-#
Actual 1-Way Shear	=	3.70	5.58	psi
Allow 1-Way Shear	=	46.63	46.63	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, ϕ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.58	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 3'

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	240.0	1.33	320.0	Soil Over HL (ab. water tbl)	218.8	1.96	428.4
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		1.96	428.4
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=	50.0	7.00	* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=			Soil Over Toe	=	125.0	0.50
	=			Surcharge Over Toe	=		62.5
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
				Footing Weight	=	337.5	1.13
				Key Weight	=		379.7
				Vert. Component	=	131.0	2.25
							294.9
Total	=	290.0	O.T.M.		Total =	812.3 lbs	R.M.=
			=				1,165.4
			670.0				
Resisting/Overturning Ratio			=				
			1.74				
Vertical Loads used for Soil Pressure =		812.3	lbs				

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.099 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

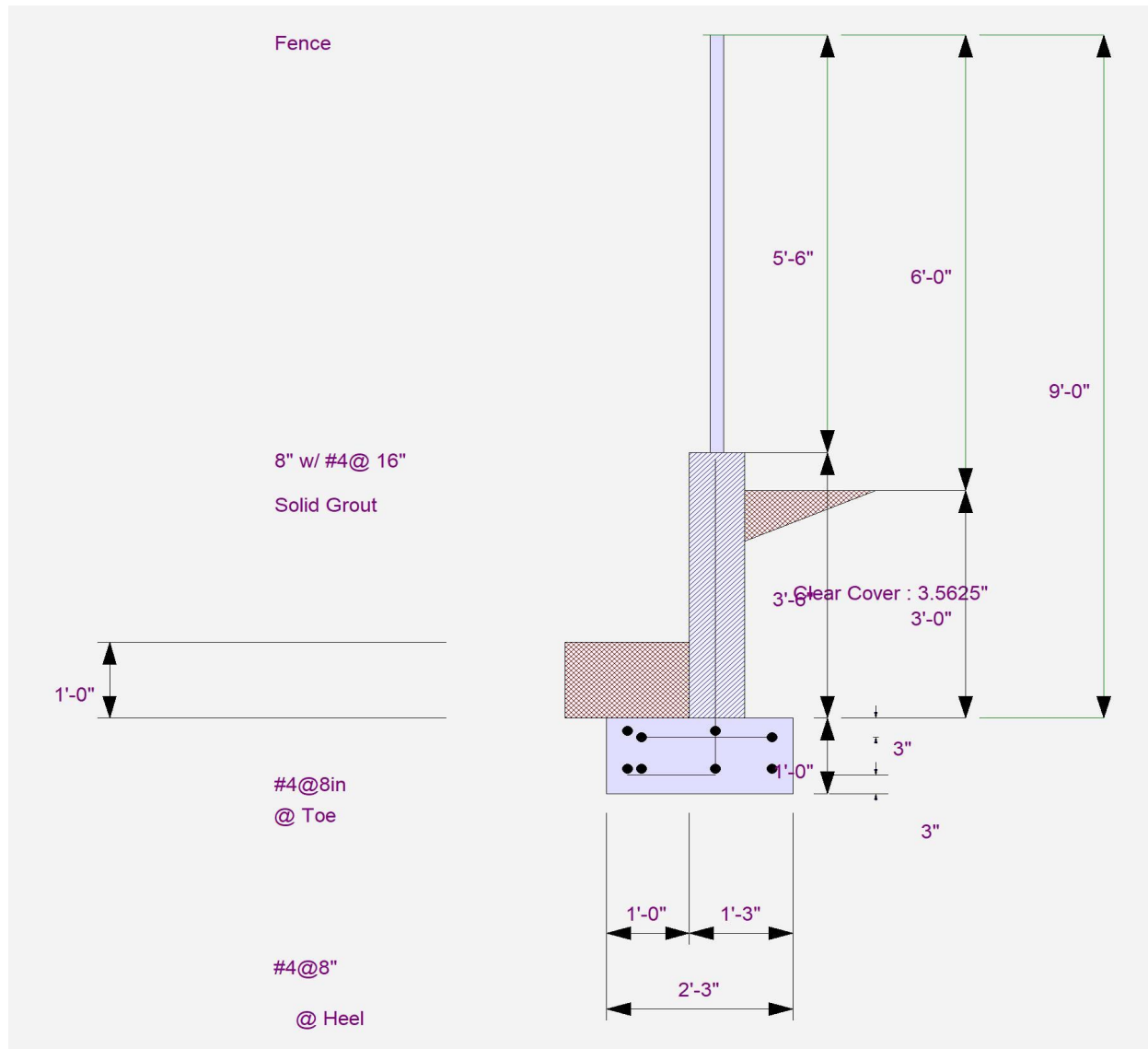
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 3'



Cantilevered Retaining Wall

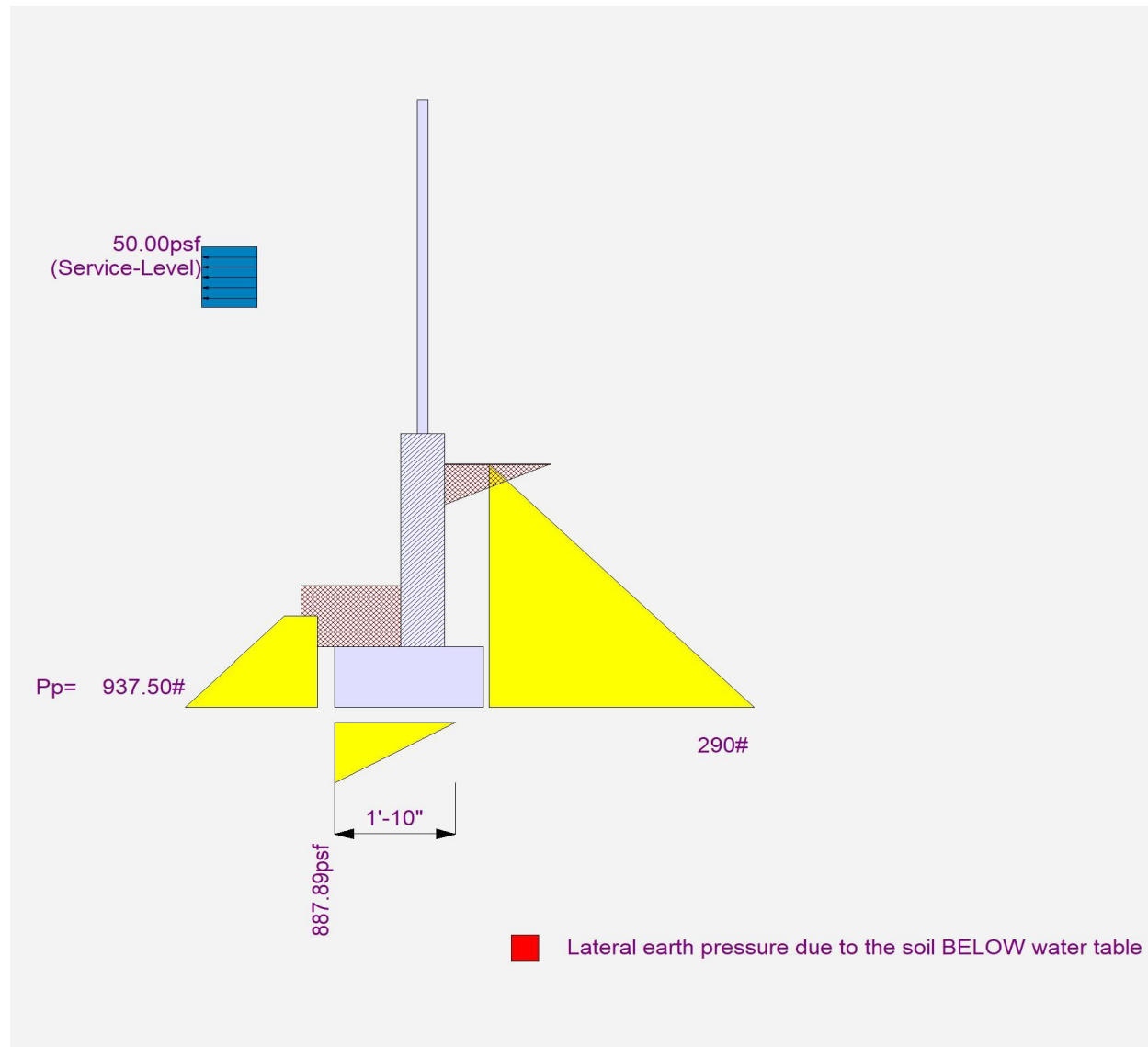
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 3'



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 4'

Code Reference

Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	4.00 ft
Wall height above soil	=	6.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

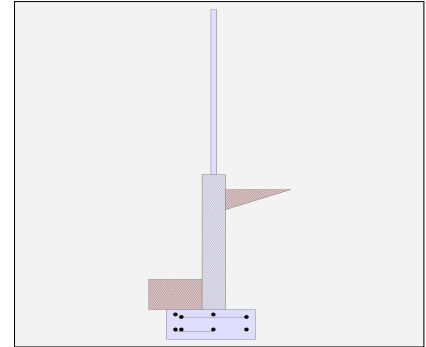
Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
	=	
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.480
Soil height to ignore for passive pressure	=	6.00 in

Lateral Load Applied to Stem

Lateral Load	=	50.0 #/ft
...Height to Top	=	7.50 ft
...Height to Bottom	=	6.50 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 4'

Design Summary

Wall Stability Ratios

Overtuning	=	1.86	OK
Sliding	=	3.47	OK
Global Stability	=	3.25	

Total Bearing Load	=	1,121	lbs
...resultant ecc.	=	5.52	in

Eccentricity outside middle third

Soil Pressure @ Toe	=	946	psf	OK
Soil Pressure @ Heel	=	0	psf	OK
Allowable	=	2,000	psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,083	psf	
ACI Factored @ Heel	=	0	psf	
Footing Shear @ Toe	=	4.7	psi	OK
Footing Shear @ Heel	=	8.5	psi	OK
Allowable	=	82.2	psi	

Sliding Calcs

Lateral Sliding Force	=	425.0 lbs	
less 100% Passive Force	-	937.5 lbs	
less 100% Friction Force	= -	538.3 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht"

Design Method

Thickness

Rebar Size

Rebar Spacing

Rebar Placed at

Design Data

fb/FB + fa/Fa

Total Force @ Section

Service Level

Strength Level

Moment....Actual

Service Level

Strength Level

Moment.....Allowable

Shear.....Actual

Service Level

Strength Level

Shear.....Allowable

Anet (Masonry)

Wall Weight

Rebar Depth 'd'

Masonry Data

f'm

Fs

Solid Grouting

Modular Ratio 'n'

Equiv. Solid Thick.

Masonry Block Type

Masonry Design Method

Concrete Data

f'c

Fy

2nd

Bottom

Stem OK

0.00

Masonry

ASD

8.00

4

16.00

Center

0.784

290.0

670.0

854.2

3.2

44.7

91.50

0.0

3.81

1,500

20,000

Yes

21.48

7.63

ASD

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 4'

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.50
Total Footing Width	=	2.50
Footing Thickness	=	12.00 in

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm = 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,083	0	psf
Mu' : Upward	=	465	27	ft-#
Mu' : Downward	=	220	652	ft-#
Mu: Design	=	245	626	ft-#
ϕ Mn	=	11,415	11,415	ft-#
Actual 1-Way Shear	=	4.65	8.47	psi
Allow 1-Way Shear	=	46.63	46.63	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, ϕ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area 0.65 in²
Min footing T&S reinf Area per foot 0.26 in² /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 4'

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	375.0	1.67	625.0	Soil Over HL (ab. water tbl)	416.7	2.08	868.1
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.08	868.1
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=	50.0	8.00	* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=		400.0	Soil Over Toe	=	125.0	62.5
	=			Surcharge Over Toe	=		
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
				Footing Weight	=	375.0	468.8
				Key Weight	=		
				Vert. Component	=	204.8	511.9

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.105 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

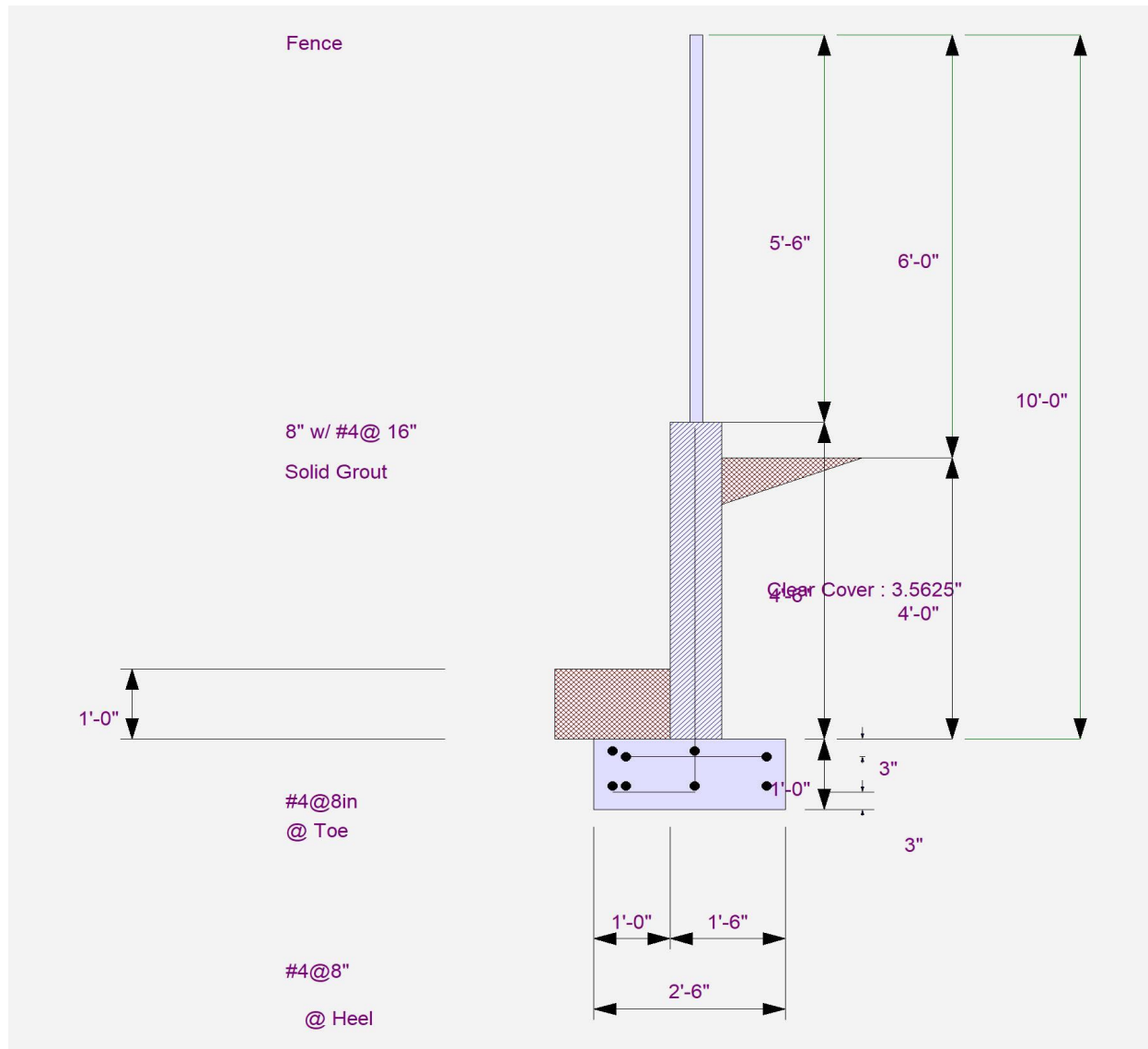
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 4'



Cantilevered Retaining Wall

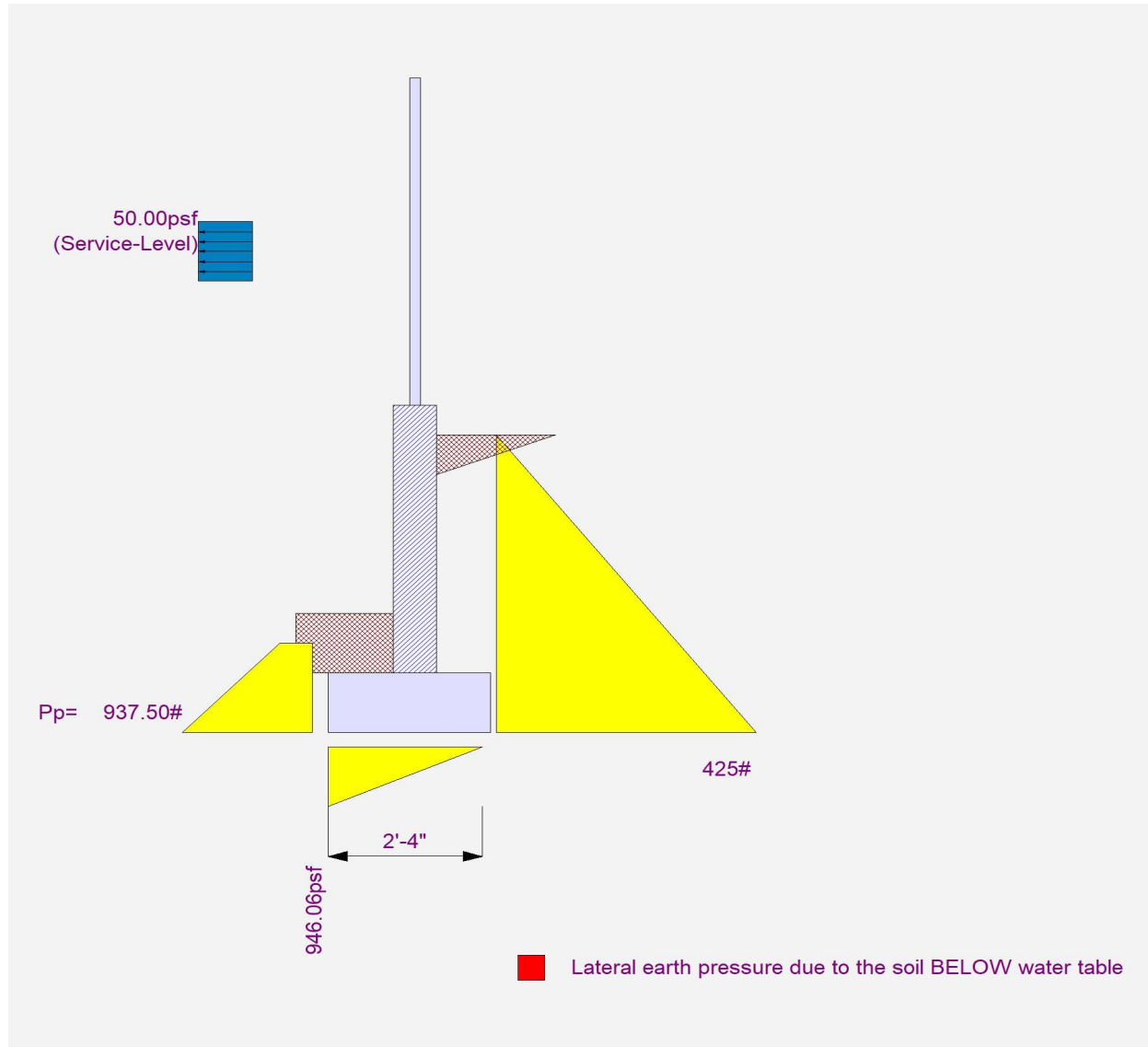
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 4'



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 5'

Code Reference

Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	5.00 ft
Wall height above soil	=	6.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

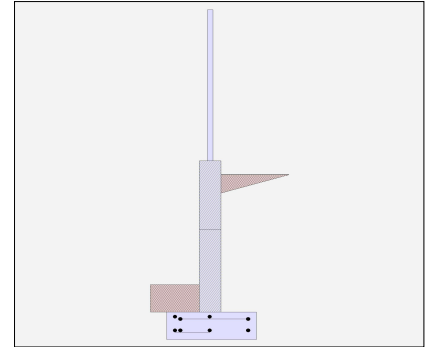
Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.480
Soil height to ignore for passive pressure	=	6.00 in

Lateral Load Applied to Stem

Lateral Load	=	50.0 #/ft
...Height to Top	=	8.50 ft
...Height to Bottom	=	7.50 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 5'

Design Summary			Stem Construction		3rd	2nd	Bottom		
Wall Stability Ratios			Design Height Above Ftg	ft =	5.50	Stem OK	Stem OK		
Overturing	=	1.92 OK	Wall Material Above "Ht"	=	Fence	Masonry	Masonry		
Sliding	=	2.82 OK	Design Method	=	ASD	ASD	ASD	ASD	SD
Global Stability	=	2.99	Thickness	=		8.00	8.00		
			Rebar Size	=		# 4	# 5		
			Rebar Spacing	=		16.00	16.00		
			Rebar Placed at	=		Center	Center		
Total Bearing Load	=	1,509 lbs	Design Data						
...resultant ecc.	=	5.32 in	fb/FB + fa/Fa	=		0.339	0.791		
Eccentricity within middle third			Total Force @ Section						
Soil Pressure @ Toe	=	1,080 psf OK	Service Level	lbs =		110.0	425.0		
Soil Pressure @ Heel	=	18 psf OK	Strength Level	lbs =					
Allowable	=	2,000 psf	Moment....Actual						
Soil Pressure Less Than Allowable			Service Level	ft-# =		290.0	1,025.0		
ACI Factored @ Toe	=	1,217 psf	Strength Level	ft-# =					
ACI Factored @ Heel	=	20 psf	Moment.....Allowable	ft-# =		854.2	1,294.8		
Footing Shear @ Toe	=	6.1 psi OK	Shear.....Actual						
Footing Shear @ Heel	=	11.8 psi OK	Service Level	psi =		1.2	4.6		
Allowable	=	82.2 psi	Strength Level	psi =					
Sliding Calcs			Shear.....Allowable	=		44.1	44.1		
Lateral Sliding Force	=	590.0 lbs	Anet (Masonry)	in2 =		91.50	91.50	91.50	
less 100% Passive Force	-	937.5 lbs	Wall Weight	psf =		0.0	0.0		
less 100% Friction Force	= -	724.5 lbs	Rebar Depth 'd'	in =		3.81	3.81		
Added Force Req'd	=	0.0 lbs OK	Masonry Data						
....for 1.5 Stability	=	0.0 lbs OK	f'm	psi =		1,500	1,500		
Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.			Fs	psi =		20,000	20,000		
Load Factors			Solid Grouting	=		Yes	Yes		
Building Code			Modular Ratio 'n'	=		21.48	21.48		
Dead Load		1.200	Equiv. Solid Thick.	=		7.63	7.63		
Live Load		1.600	Masonry Block Type	=					
Earth, H		1.600	Masonry Design Method	=	ASD				
Wind, W		1.600	Concrete Data						
Seismic, E		1.000	f'c	psi =					
			Fy	psi =					

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 5'

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.75
Total Footing Width	=	2.75
Footing Thickness	=	12.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	3.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,217	20	psf
Mu' : Upward	=	536	104	ft-#
Mu' : Downward	=	220	1,225	ft-#
Mu: Design	=	316	1,121	ft-#
ϕ Mn	=	11,415	11,415	ft-#
Actual 1-Way Shear	=	6.07	11.79	psi
Allow 1-Way Shear	=	46.63	46.63	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, ϕ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.71	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 5'

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	540.0	2.00	1,080.0	Soil Over HL (ab. water tbl)	677.1	2.21	1,495.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.21	1,495.2
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=	50.0	9.00	450.0	* Axial Live Load on Stem	=	
Load @ Stem Above Soil	=			Soil Over Toe	=	125.0	0.50
	=			Surcharge Over Toe	=		62.5
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
				Footing Weight	=	412.5	1.38
				Key Weight	=		567.2
				Vert. Component	=	294.9	2.75
							810.8
Total	=	590.0	O.T.M.	=			1,530.0
Resisting/Overturning Ratio		=	1.92				
Vertical Loads used for Soil Pressure	=	1,509.4	lbs				

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.120 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

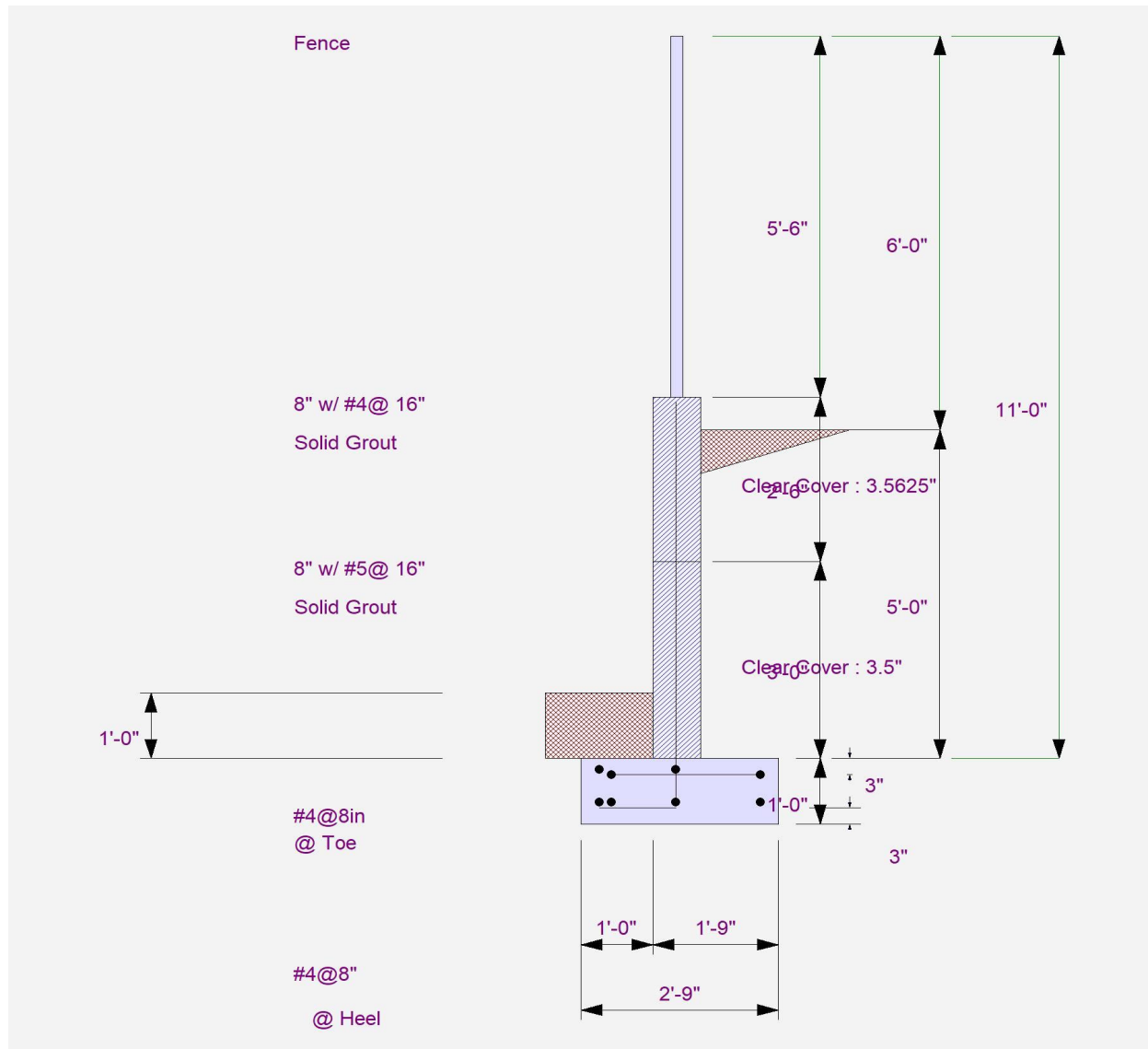
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 5'



Cantilevered Retaining Wall

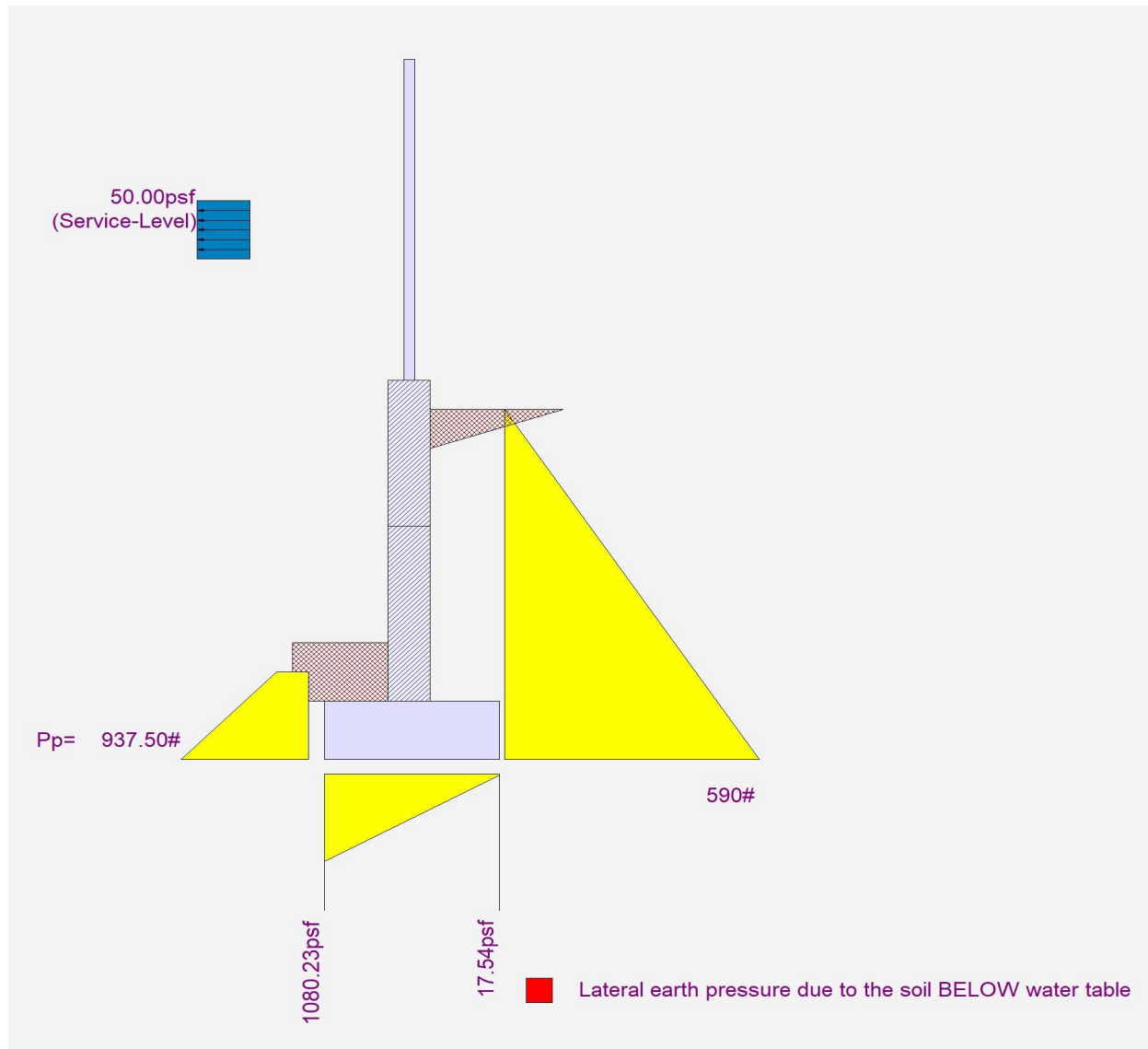
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 5'



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 6'

Code Reference

Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	6.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

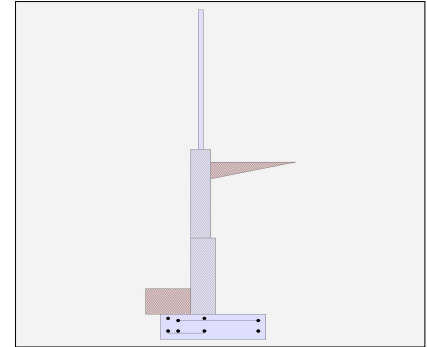
Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	51.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.480
Soil height to ignore for passive pressure	=	6.00 in

Lateral Load Applied to Stem

Lateral Load	=	50.0 #/ft
...Height to Top	=	9.50 ft
...Height to Bottom	=	8.50 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 6'

Design Summary

Wall Stability Ratios

Overturing	=	1.78	OK
Sliding	=	1.62	OK
Global Stability	=	1.53	

Total Bearing Load	=	2,437	lbs
...resultant ecc.	=	7.86	in

Eccentricity outside middle third

Soil Pressure @ Toe	=	1,483	psf	OK
Soil Pressure @ Heel	=	0	psf	OK
Allowable	=	2,000	psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,673	psf	
ACI Factored @ Heel	=	0	psf	
Footing Shear @ Toe	=	10.2	psi	OK
Footing Shear @ Heel	=	19.8	psi	OK
Allowable	=	82.2	psi	

Sliding Calcs

Lateral Sliding Force	=	1,299.5 lbs	
less 100% Passive Force	-	937.5 lbs	
less 100% Friction Force	= -	1,169.7 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht"

Design Method

Thickness

Rebar Size

Rebar Spacing

Rebar Placed at

Design Data

fb/FB + fa/Fa

Total Force @ Section

Service Level

Strength Level

Moment....Actual

Service Level

Strength Level

Moment.....Allowable

Shear.....Actual

Service Level

Strength Level

Shear.....Allowable

Anet (Masonry)

Wall Weight

Rebar Depth 'd'

Masonry Data

f'm

Fs

Solid Grouting

Modular Ratio 'n'

Equiv. Solid Thick.

Masonry Block Type

Masonry Design Method

Concrete Data

f'c

Fy

3rd

2nd

Bottom

Stem OK

3.00

Masonry

ASD

8.00

5

16.00

Center

5.5 in

0.408

0.861

279.5

968.0

529.5

2,286.0

1,294.8

2,653.6

3.1

8.4

44.4

91.50

115.50

0.0

3.81

5.50

1,500

20,000

Yes

21.48

7.63

21.48

9.63

ASD

psi =

psi =

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 6'

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	2.50
Total Footing Width	=	3.50
Footing Thickness	=	12.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	3.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,673	0	psf
Mu' : Upward	=	751	260	ft-#
Mu' : Downward	=	234	3,140	ft-#
Mu: Design	=	518	2,880	ft-#
φ Mn	=	11,415	11,415	ft-#
Actual 1-Way Shear	=	10.18	19.83	psi
Allow 1-Way Shear	=	46.63	46.63	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.91	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 6'

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,249.5	2.33	2,915.5	Soil Over HL (ab. water tbl)	1,250.0	2.67	3,333.3
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.67	3,333.3
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =	50.0	10.00	500.0	* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	125.0	0.50	62.5
				Surcharge Over Toe =			
				Stem Weight(s) =			
				Earth @ Stem Transitions =	62.5	1.75	109.4
				Footing Weight =	525.0	1.75	918.8
				Key Weight =			
				Vert. Component =	474.3	3.50	1,660.0
Total	= 1,299.5	O.T.M.	= 3,415.5	Total =	2,436.8 lbs	R.M.=	6,083.9
Resisting/Overturning Ratio		= 1.78		* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			
Vertical Loads used for Soil Pressure =		2,436.8	lbs				

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.141 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

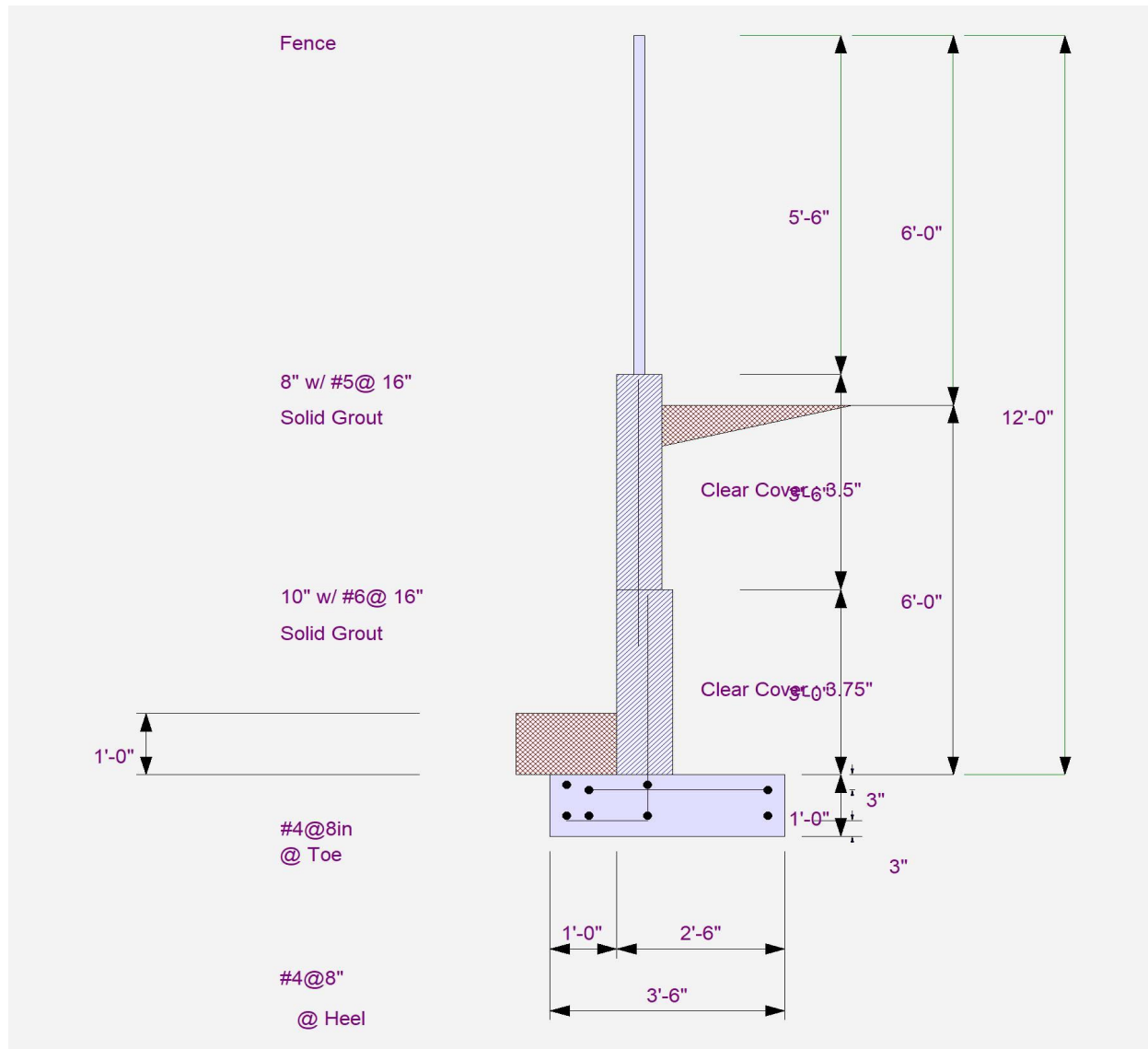
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 6'



Cantilevered Retaining Wall

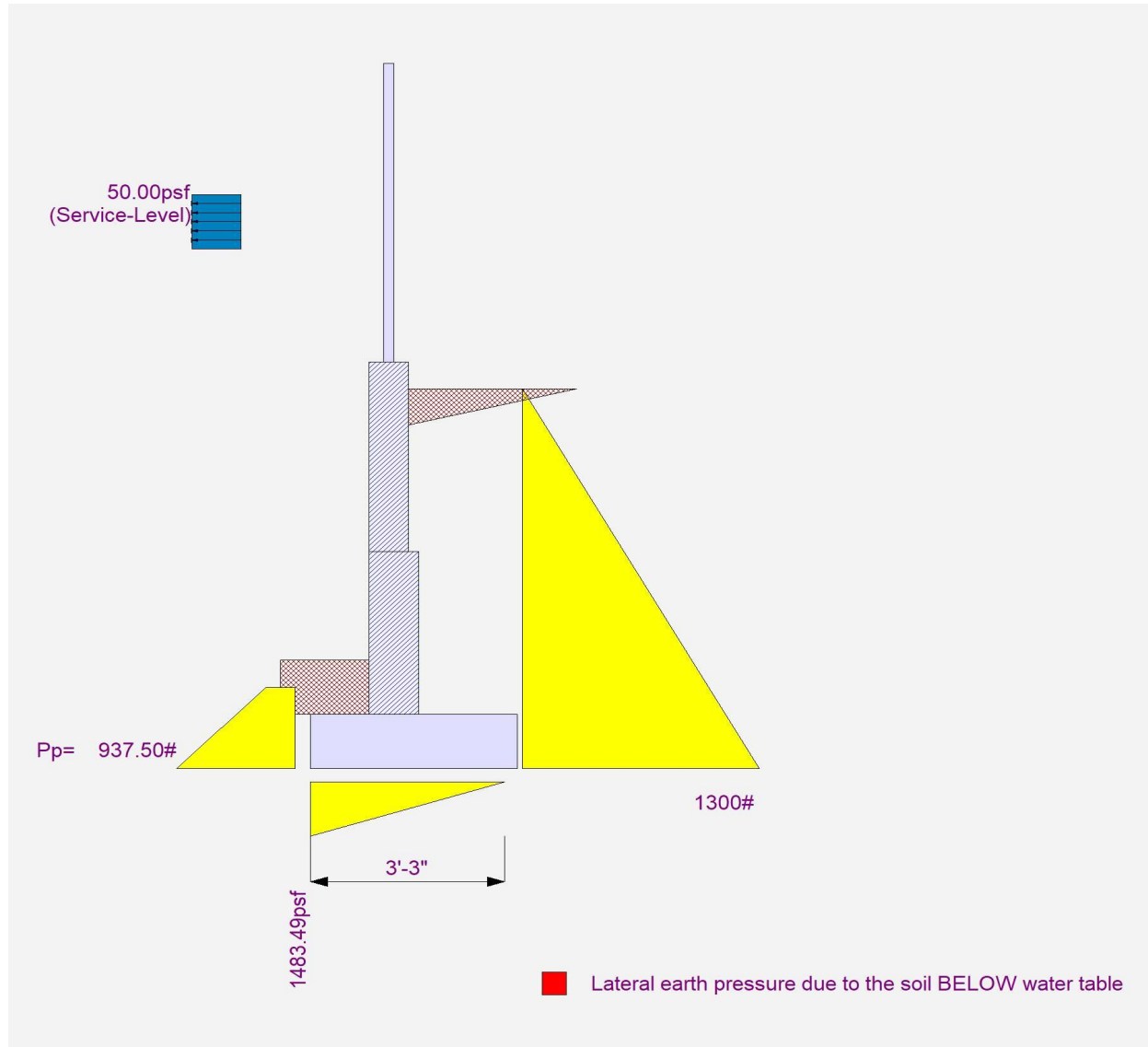
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard, 6'



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard

Code Reference

Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	7.33 ft
Wall height above soil	=	6.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

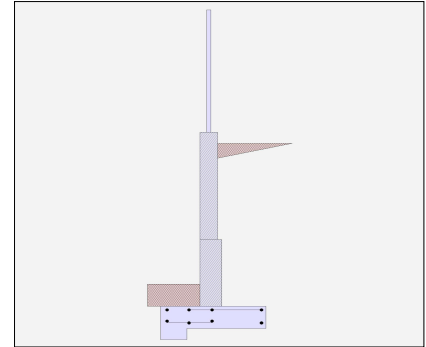
Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	51.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.480
Soil height to ignore for passive pressure	=	6.00 in

Lateral Load Applied to Stem

Lateral Load	=	50.0 #/ft
...Height to Top	=	10.83 ft
...Height to Bottom	=	9.83 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard

Design Summary

Wall Stability Ratios

Overturing	=	1.66	OK
Sliding	=	1.66	OK
Global Stability	=	1.29	

Total Bearing Load	=	3,151	lbs
...resultant ecc.	=	10.20	in

Eccentricity outside middle third

Soil Pressure @ Toe	=	1,827	psf	OK
Soil Pressure @ Heel	=	0	psf	OK
Allowable	=	2,000	psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	2,013	psf	
ACI Factored @ Heel	=	0	psf	
Footing Shear @ Toe	=	17.6	psi	OK
Footing Shear @ Heel	=	24.9	psi	OK
Allowable	=	82.2	psi	

Sliding Calcs

Lateral Sliding Force	=	1,819.4 lbs	
less 100% Passive Force	-	1,500.0 lbs	
less 100% Friction Force	= -	1,512.7 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	7.83	Stem OK	Stem OK
Wall Material Above "Ht"	=	Fence	Masonry
Design Method	=	ASD	ASD
Thickness	=	8.00	10.00
Rebar Size	=	# 5	# 6
Rebar Spacing	=	16.00	8.00
Rebar Placed at	=	Center	5.5 in

Design Data

fb/FB + fa/Fa	=	0.816	0.946
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =	528.1	1,420.1
Strength Level	lbs =		

Moment....Actual

Service Level	ft-# =	1,056.7	3,864.2
Strength Level	ft-# =		

Moment.....Allowable	ft-# =	1,294.8	4,081.3
----------------------	--------	---------	---------

Shear.....Actual

Service Level	psi =	5.8	12.3
Strength Level	psi =		

Shear.....Allowable	=	44.8	44.7
---------------------	---	------	------

Anet (Masonry)	in2 =	91.50	115.50	91.50
----------------	-------	-------	--------	-------

Wall Weight	psf =	0.0	0.0
-------------	-------	-----	-----

Rebar Depth 'd'	in =	3.81	5.50
-----------------	------	------	------

Masonry Data

f'm	psi =	1,500	1,500
Fs	psi =	20,000	20,000
Solid Grouting	=	Yes	Yes
Modular Ratio 'n'	=	21.48	21.48
Equiv. Solid Thick.	=	7.63	9.63
Masonry Block Type	=		
Masonry Design Method	=	ASD	

Concrete Data

f'c	psi =	
Fy	psi =	

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	2.50
Total Footing Width	=	4.00
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	6.00 in
Key Distance from Toe	=	0.00 ft
f'c =	3,000 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	<u>Key</u>	
Factored Pressure	= 2,013	0		psf
Mu' : Upward	= 1,936	135		ft-#
Mu' : Downward	= 474	4,012		ft-#
Mu: Design	= 1,462	3,877	528	ft-#
ϕ Mn	= 11,415	12,765	2,739	ft-#
Actual 1-Way Shear	= 17.58	24.94	12.54	psi
Allow 1-Way Shear	= 46.63	44.98	43.82	psi
Toe Reinforcing	= # 4 @ 8.00 in			
Heel Reinforcing	= # 4 @ 8.00 in			
Key Reinforcing	= None Spec'd			
Footing Torsion, Tu	=	0.00 ft-lbs		
Footing Allow. Torsion, ϕ Tn	=	0.00 ft-lbs		

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: $\phi Mn = \phi * 5 * \lambda * \sqrt{f_c} * S_m$

Min footing T&S reinf Area 1.04 in²
Min footing T&S reinf Area per foot 0.26 in² /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,769.4	2.78	4,913.1	Soil Over HL (ab. water tbl)	1,527.1	3.17	4,835.8
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.17	4,835.8
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =	50.0	11.33	566.7	* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	187.5	0.75	140.6
				Surcharge Over Toe =			
				Stem Weight(s) =			
				Earth @ Stem Transitions =	90.2	2.25	203.0
				Footing Weight =	600.0	2.00	1,200.0
				Key Weight =	75.0	0.50	37.5
				Vert. Component =	671.6	4.00	2,686.5
Total	= 1,819.4	O.T.M. =	5,479.7	Total =	3,151.4 lbs	R.M. =	9,103.3
Resisting/Overturning Ratio		= 1.66		* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			
Vertical Loads used for Soil Pressure =		3,151.4 lbs					

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.169 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

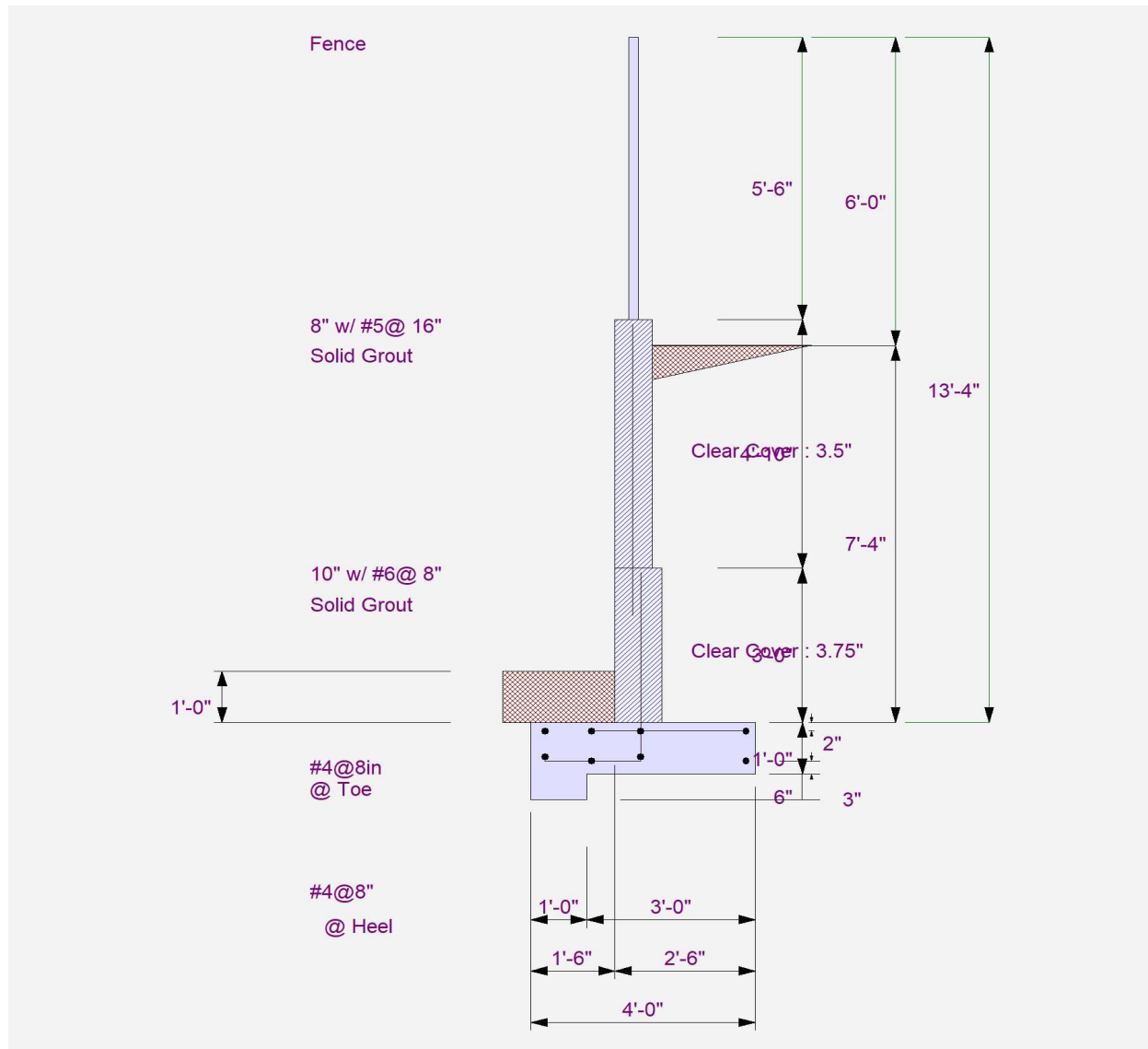
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard



Cantilevered Retaining Wall

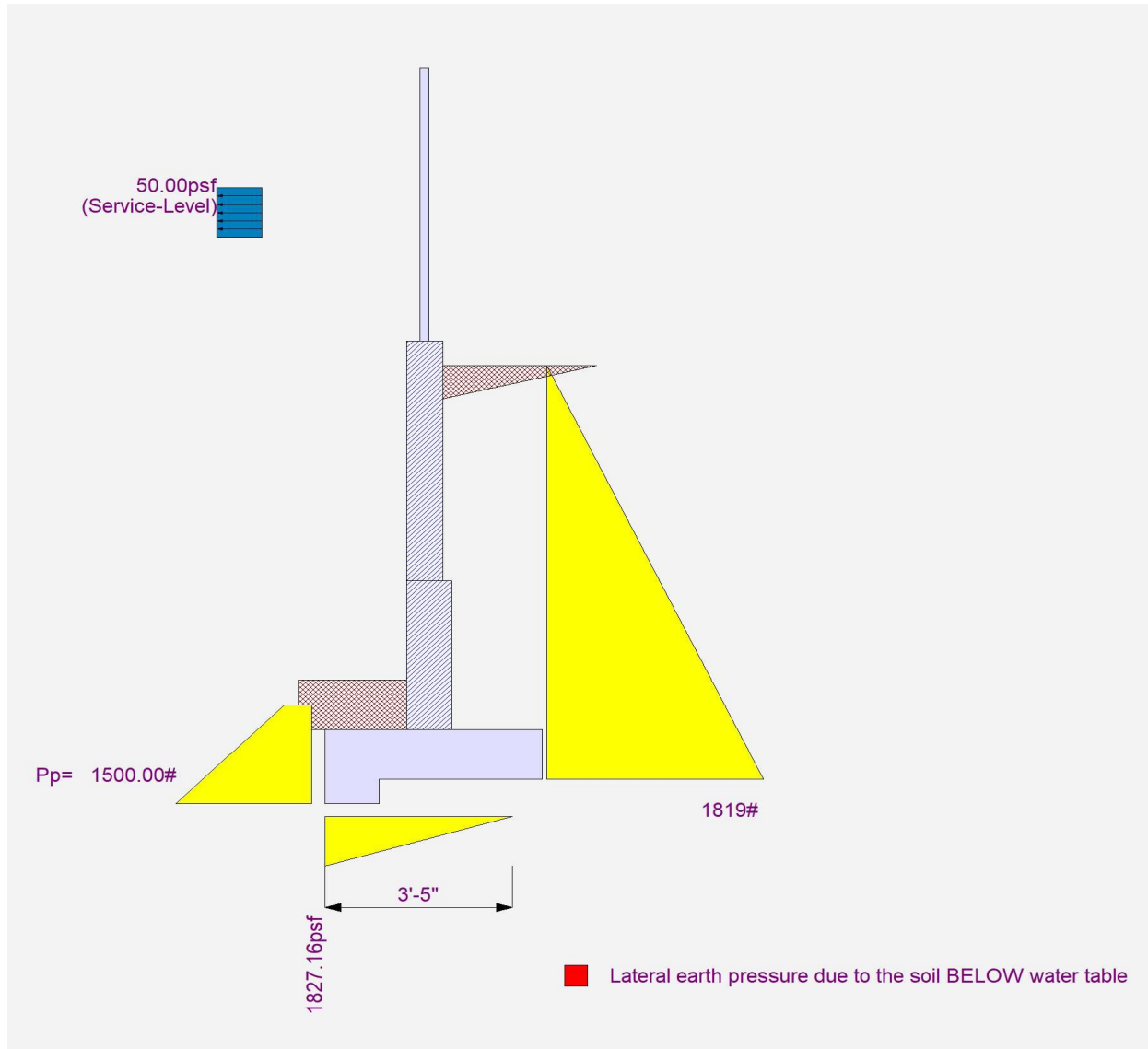
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 9. Retaining Wall at Vineyard



10. Retaining wall at South Home Run Way(Landscape Detail 1/L-2.08), Retaining wall at soccer fields, (Landscape Detail 1/L-2.09)

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'

Code References

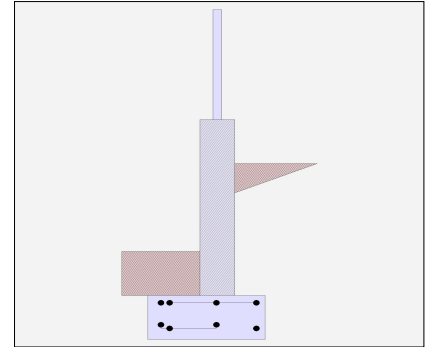
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	3.00 ft
Wall height above soil	=	3.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	6.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	50.0 #/ft
...Height to Top	=	6.50 ft
...Height to Bottom	=	5.50 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'

Design Summary

Wall Stability Ratios

Overtuning	=	1.74	OK
Sliding	=	4.35	OK
Global Stability	=	4.06	

Total Bearing Load	=	812 lbs	
...resultant ecc.	=	6.18 in	

Eccentricity outside middle third

Soil Pressure @ Toe	=	888 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	2,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,043 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	3.7 psi	OK
Footing Shear @ Heel	=	5.0 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	290.0 lbs	
less 100% Passive Force	=	937.5 lbs	
less 100% Friction Force	=	324.9 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht"

Design Method

Thickness

Rebar Size

Rebar Spacing

Rebar Placed at

Design Data

fb/FB + fa/Fa

Total Force @ Section

Service Level

Strength Level

Moment....Actual

Service Level

Strength Level

Moment.....Allowable

Shear.....Actual

Service Level

Strength Level

Shear.....Allowable

Anet (Masonry)

Wall Weight

Rebar Depth 'd'

Masonry Data

f'm

Fs

Solid Grouting

Modular Ratio 'n'

Equiv. Solid Thick.

Masonry Block Type

Masonry Design Method

Concrete Data

f'c

Fy

2nd	Bottom				
	Stem OK				
ft =	4.00	0.00			
=	Fence	Masonry			
=	ASD	ASD	ASD	ASD	SD
=		8.00			
=		# 4			
=		16.00			
=		Center			
=					
=		0.509			
lbs =		185.0			
lbs =					
ft-# =		435.0			
ft-# =					
ft-# =		854.2			
psi =		2.0			
psi =					
=		44.4			
in2 =		91.50			
psf =		0.0			
in =		3.81			

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.25
Total Footing Width	=	2.25
Footing Thickness	=	12.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,043	0	psf
Mu' : Upward	=	426	0	ft-#
Mu' : Downward	=	220	291	ft-#
Mu: Design	=	206	290	ft-#
ϕ Mn	=	11,415	12,765	ft-#
Actual 1-Way Shear	=	3.70	5.00	psi
Allow 1-Way Shear	=	46.63	44.98	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, ϕ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.58	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	240.0	1.33	320.0	Soil Over HL (ab. water tbl)	218.8	1.96	428.4
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		1.96	428.4
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	= 50.0	7.00	350.0	* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=			Soil Over Toe	= 125.0	0.50	62.5
	=			Surcharge Over Toe	=		
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
				Footing Weight	= 337.5	1.13	379.7
				Key Weight	=		
				Vert. Component	= 131.0	2.25	294.9
Total	= 290.0	O.T.M.	= 670.0	Total =	812.3 lbs	R.M.=	1,165.4
Resisting/Overturning Ratio		=	1.74	* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			
Vertical Loads used for Soil Pressure =		812.3	lbs				

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.071 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

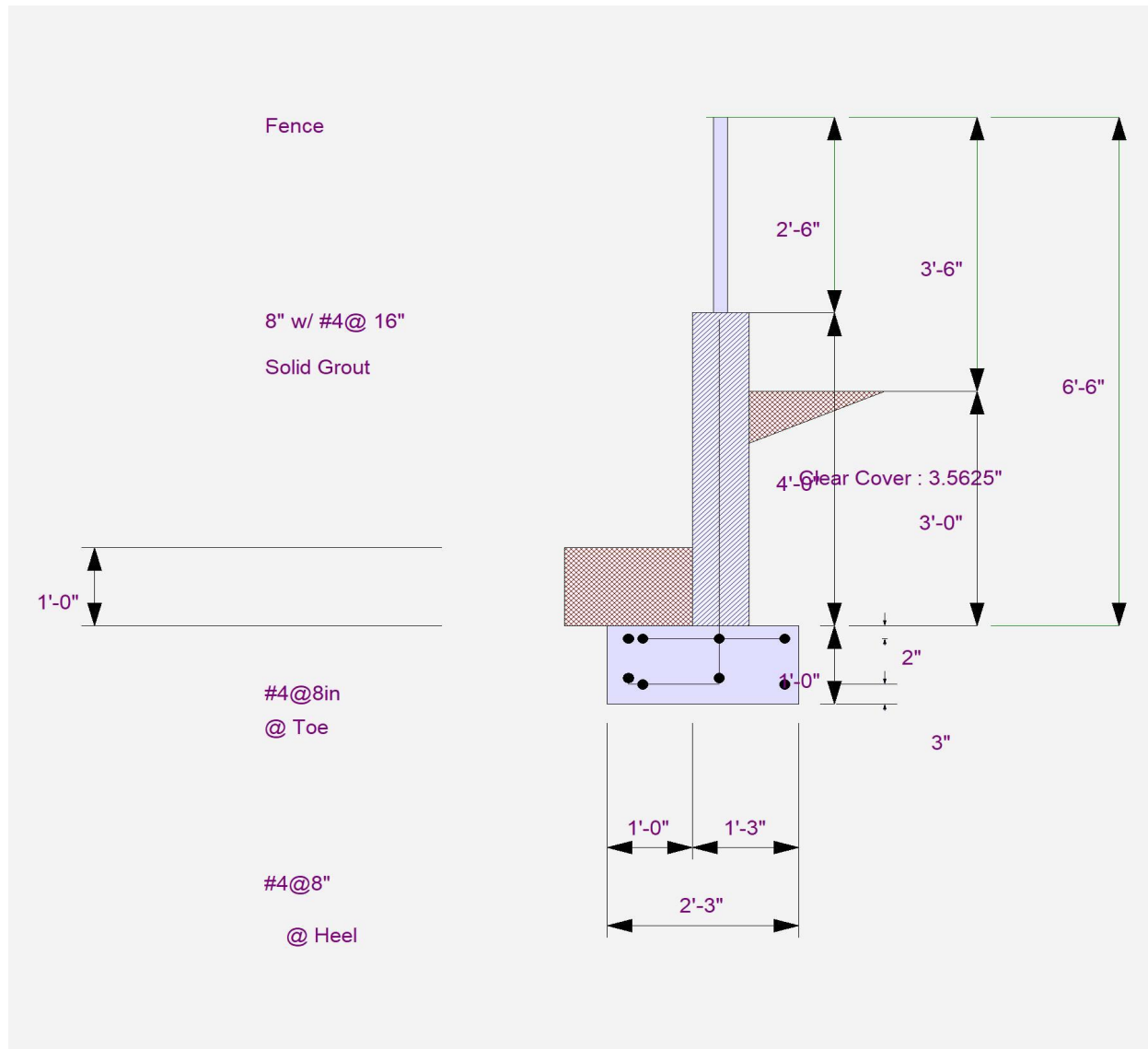
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'



Cantilevered Retaining Wall

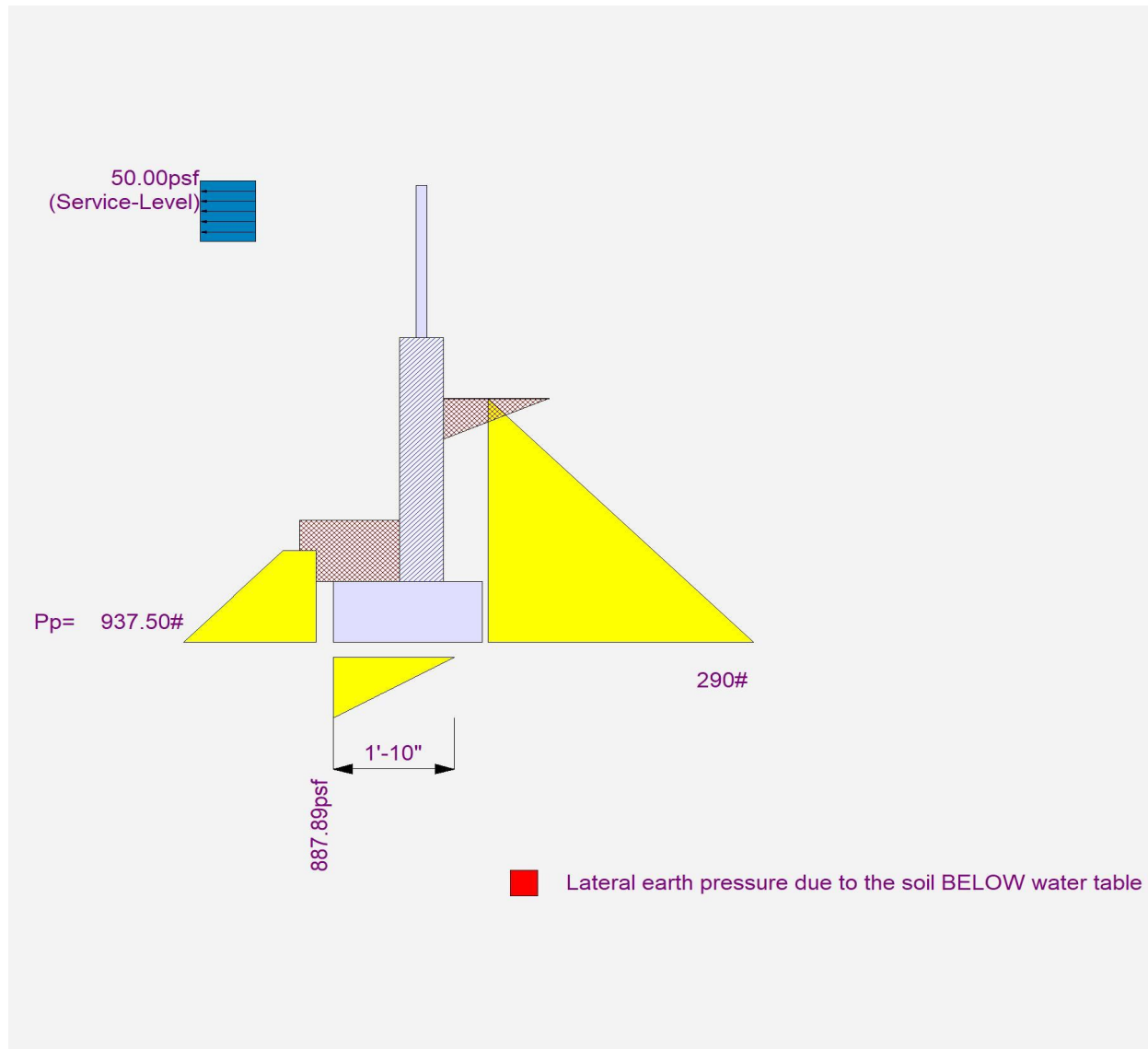
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'

Code References

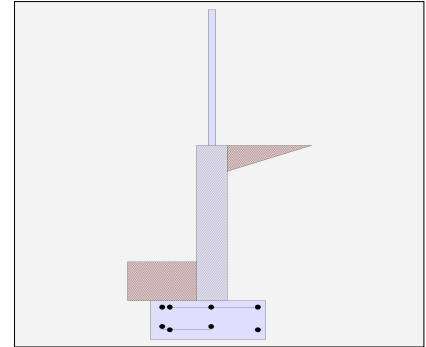
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	4.00 ft
Wall height above soil	=	3.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	6.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	50.0 #/ft
...Height to Top	=	7.50 ft
...Height to Bottom	=	6.50 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'

Design Summary

Wall Stability Ratios

Overturing	=	1.86	OK
Sliding	=	3.26	OK
Global Stability	=	3.53	

Total Bearing Load	=	1,121 lbs
...resultant ecc.	=	5.52 in

Eccentricity outside middle third

Soil Pressure @ Toe	=	946 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	2,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,083 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	4.7 psi	OK
Footing Shear @ Heel	=	7.6 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	425.0 lbs	
less 100% Passive Force	-	937.5 lbs	
less 100% Friction Force	= -	448.6 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	4.00	Stem OK			
Wall Material Above "Ht"	=	Fence	Masonry		
Design Method	=	ASD	ASD	ASD	SD
Thickness	=		8.00		
Rebar Size	=		# 4		
Rebar Spacing	=		16.00		
Rebar Placed at	=		Center		

Design Data

fb/FB + fa/Fa	=	0.784
---------------	---	-------

Total Force @ Section

Service Level	lbs =	290.0
Strength Level	lbs =	

Moment....Actual

Service Level	ft-# =	670.0
Strength Level	ft-# =	

Moment.....Allowable	ft-# =	854.2
----------------------	--------	-------

Shear.....Actual

Service Level	psi =	3.2
Strength Level	psi =	

Shear.....Allowable	=	44.7
---------------------	---	------

Anet (Masonry)	in2 =	91.50
----------------	-------	-------

Wall Weight	psf =	0.0
-------------	-------	-----

Rebar Depth 'd'	in =	3.81
-----------------	------	------

Masonry Data

f'm	psi =	1,500
Fs	psi =	20,000
Solid Grouting	=	Yes
Modular Ratio 'n'	=	21.48
Equiv. Solid Thick.	=	7.63
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	
Fy	psi =	

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.50
Total Footing Width	=	2.50
Footing Thickness	=	12.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,083	0	psf
Mu' : Upward	=	465	27	ft-#
Mu' : Downward	=	220	652	ft-#
Mu: Design	=	245	626	ft-#
ϕ Mn	=	11,415	12,765	ft-#
Actual 1-Way Shear	=	4.65	7.58	psi
Allow 1-Way Shear	=	46.63	44.98	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, ϕ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.65	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	375.0	1.67	625.0	Soil Over HL (ab. water tbl)	416.7	2.08	868.1
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.08	868.1
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=	50.0	8.00	* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=		400.0	Soil Over Toe	=	125.0	62.5
	=			Surcharge Over Toe	=	0.50	
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
				Footing Weight	=	375.0	468.8
				Key Weight	=		
				Vert. Component	=	204.8	511.9
Total	=	425.0	O.T.M. =				
			1,025.0				
Resisting/Overturning Ratio		=	1.86				
Vertical Loads used for Soil Pressure =		1,121.4	lbs				
							</

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.079 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

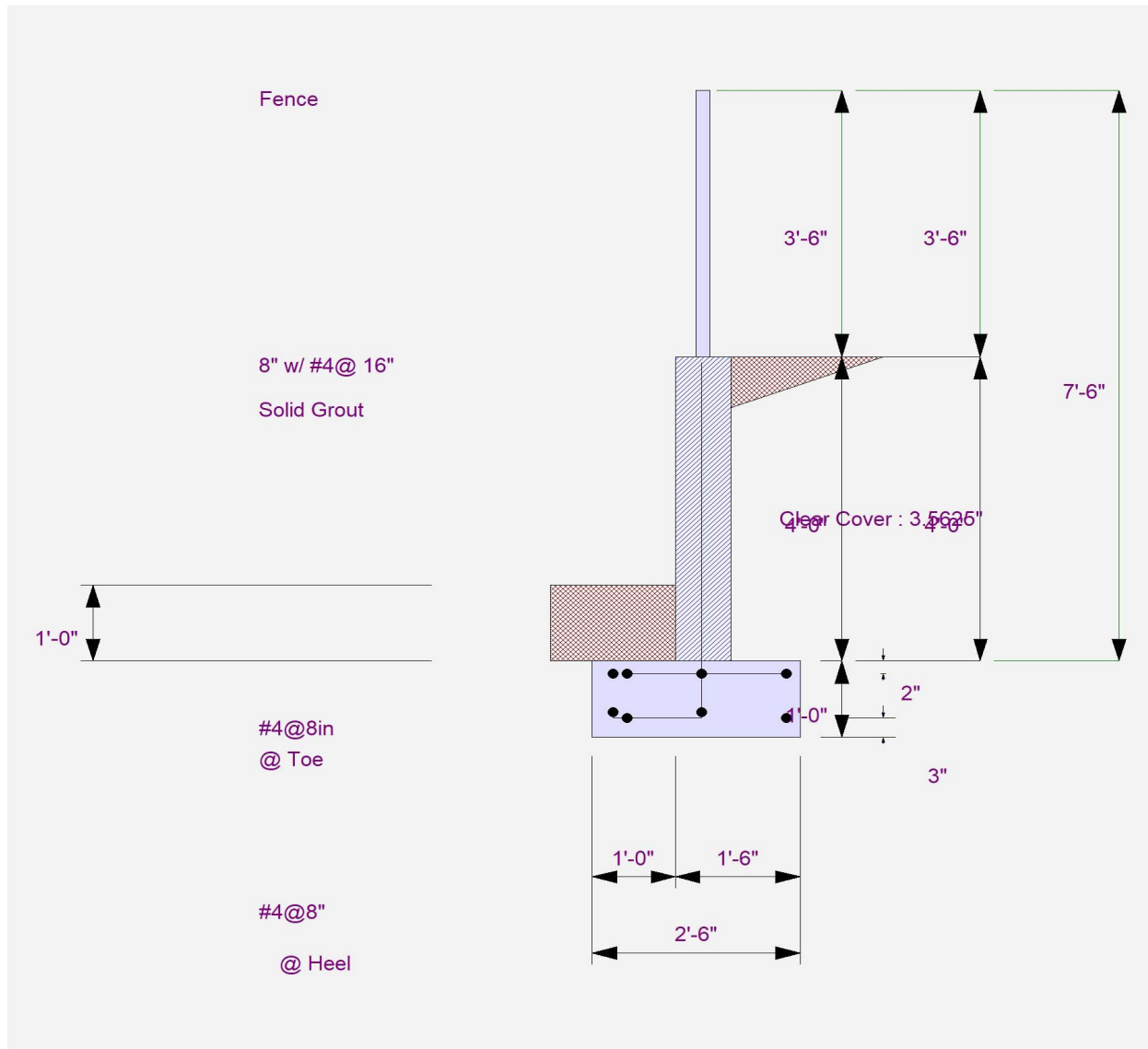
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'



Cantilevered Retaining Wall

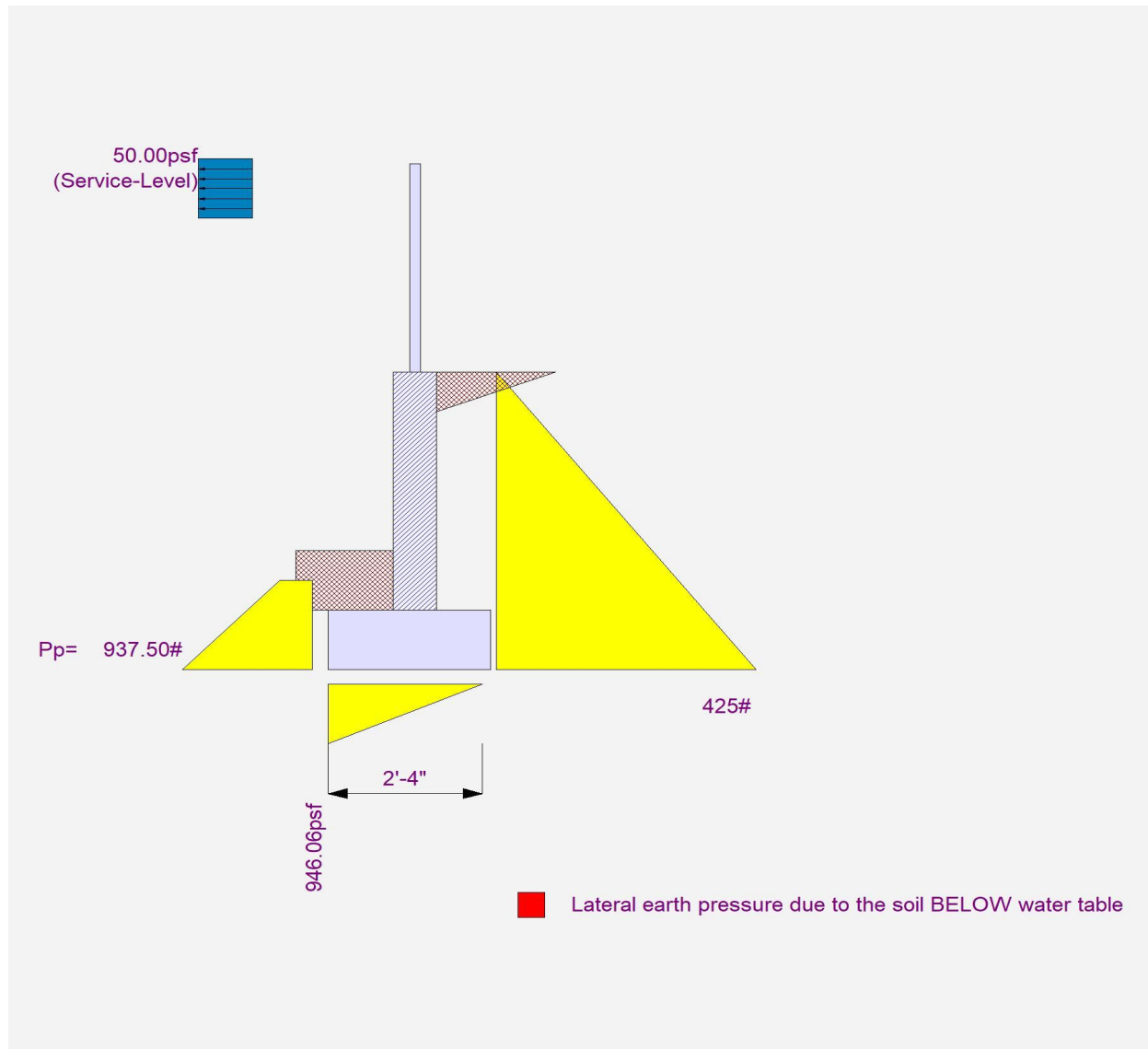
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_4.0'



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_5.0'

Code References

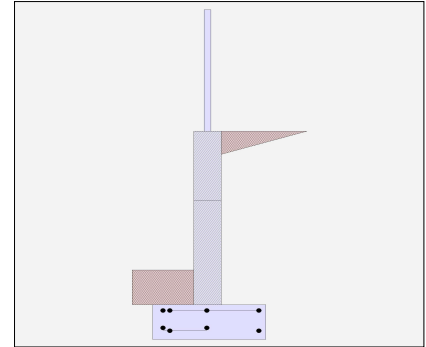
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	5.00 ft
Wall height above soil	=	3.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	6.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	50.0 #/ft
...Height to Top	=	8.50 ft
...Height to Bottom	=	7.50 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_5.0'

Design Summary

Wall Stability Ratios

Overturing	=	1.92	OK
Sliding	=	2.61	OK
Global Stability	=	3.12	

Total Bearing Load	=	1,509 lbs
...resultant ecc.	=	5.32 in

Eccentricity within middle third

Soil Pressure @ Toe	=	1,080 psf	OK
Soil Pressure @ Heel	=	18 psf	OK
Allowable	=	2,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,217 psf	
ACI Factored @ Heel	=	20 psf	
Footing Shear @ Toe	=	6.1 psi	OK
Footing Shear @ Heel	=	10.5 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	590.0 lbs	
less 100% Passive Force	-	937.5 lbs	
less 100% Friction Force	= -	603.8 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	5.00	Stem OK	Stem OK
Wall Material Above "Ht"	=	Fence	Masonry
Design Method	=	ASD	ASD
Thickness	=		8.00
Rebar Size	=		# 4
Rebar Spacing	=		16.00
Rebar Placed at	=	Center	Center

Design Data

fb/FB + fa/Fa	=	0.339	0.791
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =	110.0	425.0
Strength Level	lbs =		

Moment....Actual

Service Level	ft-# =	290.0	1,025.0
Strength Level	ft-# =		

Moment.....Allowable	ft-# =	854.2	1,294.8
----------------------	--------	-------	---------

Shear.....Actual

Service Level	psi =	1.2	4.6
Strength Level	psi =		

Shear.....Allowable	=	44.1	44.1
---------------------	---	------	------

Anet (Masonry)	in2 =	91.50	91.50
----------------	-------	-------	-------

Wall Weight	psf =	0.0	0.0
-------------	-------	-----	-----

Rebar Depth 'd'	in =	3.81	3.81
-----------------	------	------	------

Masonry Data

f'm	psi =	1,500	1,500
Fs	psi =	20,000	20,000
Solid Grouting	=	Yes	Yes
Modular Ratio 'n'	=	21.48	21.48
Equiv. Solid Thick.	=	7.63	7.63
Masonry Block Type	=		
Masonry Design Method	=	ASD	

Concrete Data

f'c	psi =		
Fy	psi =		

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_5.0'

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.75
Total Footing Width	=	2.75
Footing Thickness	=	12.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,217	20	psf
Mu' : Upward	=	536	104	ft-#
Mu' : Downward	=	220	1,225	ft-#
Mu: Design	=	316	1,121	ft-#
φ Mn	=	11,415	12,765	ft-#
Actual 1-Way Shear	=	6.07	10.55	psi
Allow 1-Way Shear	=	46.63	44.98	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.71	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_5.0'

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	540.0	2.00	1,080.0	Soil Over HL (ab. water tbl)	677.1	2.21	1,495.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.21	1,495.2
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=	50.0	9.00	* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=		450.0	Soil Over Toe	=	125.0	62.5
	=			Surcharge Over Toe	=	0.50	
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
				Footing Weight	=	412.5	567.2
				Key Weight	=		
				Vert. Component	=	294.9	810.8
Total	=	590.0	O.T.M.				
			=				
			1,530.0				
Resisting/Overturning Ratio			=				
			1.92				
Vertical Loads used for Soil Pressure	=	1,509.4	lbs				
			</				

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.093 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

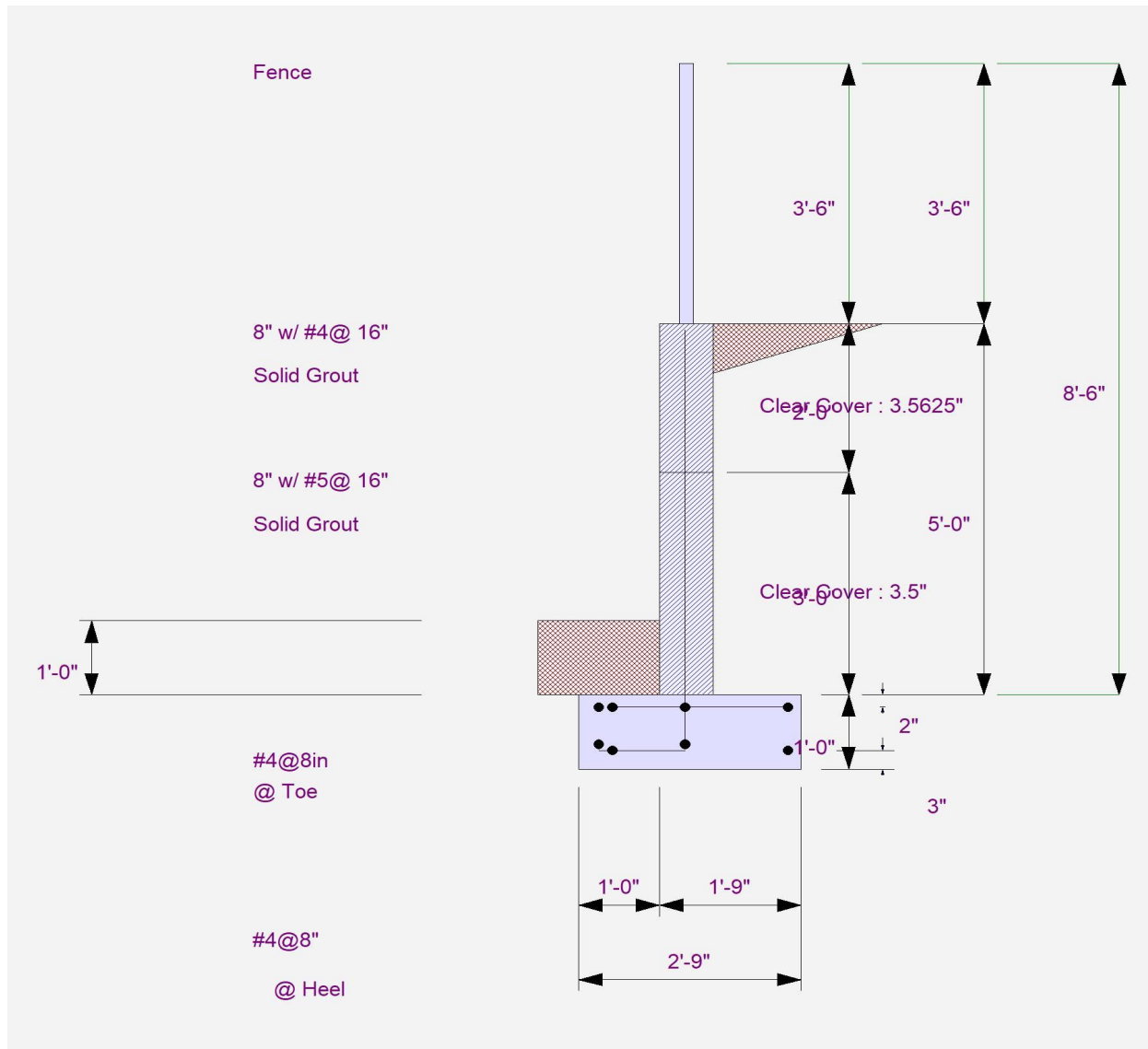
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_5.0'



Cantilevered Retaining Wall

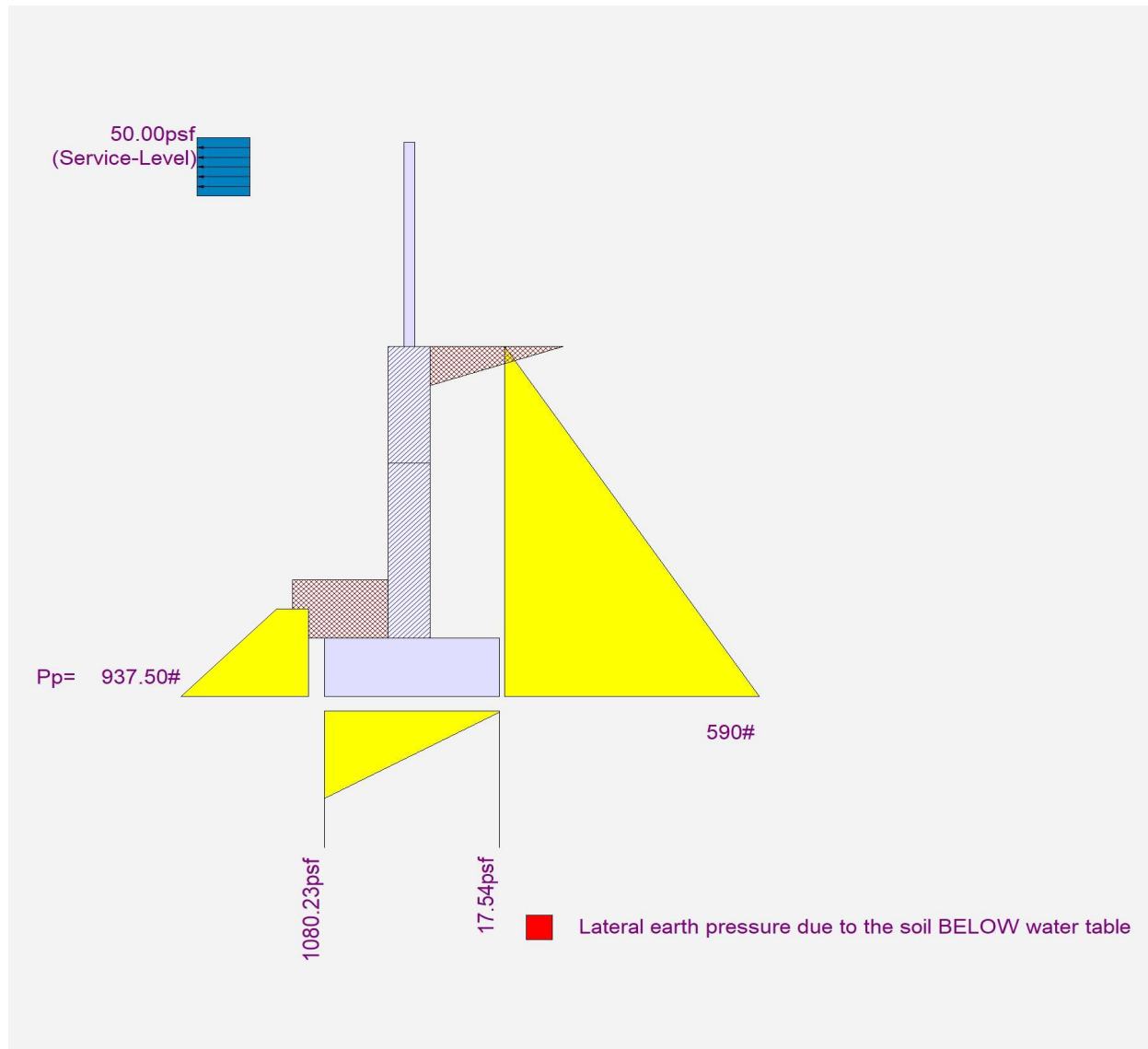
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_5.0'



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_6.67'

Code References

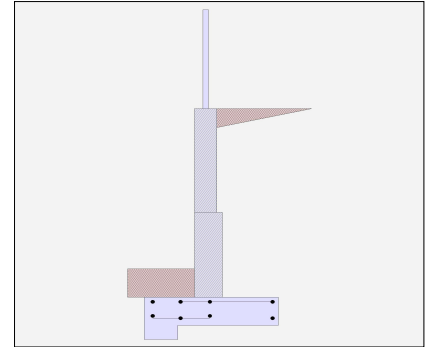
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	6.67 ft
Wall height above soil	=	3.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	51.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	6.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	50.0 #/ft
...Height to Top	=	10.17 ft
...Height to Bottom	=	9.17 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_6.67'

Design Summary

Wall Stability Ratios

Overturing	=	1.88	OK
Sliding	=	1.72	OK
Global Stability	=	1.37	

Total Bearing Load	=	2,898	lbs
...resultant ecc.	=	8.02	in

Eccentricity outside middle third

Soil Pressure @ Toe	=	1,451	psf	OK
Soil Pressure @ Heel	=	0	psf	OK
Allowable	=	2,000	psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,632	psf	
ACI Factored @ Heel	=	0	psf	
Footing Shear @ Toe	=	13.9	psi	OK
Footing Shear @ Heel	=	20.3	psi	OK
Allowable	=	82.2	psi	

Sliding Calcs

Lateral Sliding Force	=	1,550.1 lbs	
less 100% Passive Force	=	1,500.0 lbs	
less 100% Friction Force	=	1,159.2 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	6.67	Stem OK	Stem OK
Wall Material Above "Ht"	=	Fence	Masonry
Design Method	=	ASD	ASD
Thickness	=		8.00
Rebar Size	=		# 5
Rebar Spacing	=		16.00
Rebar Placed at	=	Center	5.5 in

Design Data

fb/FB + fa/Fa	=	0.581	0.736
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =	393.5	1,184.5
Strength Level	lbs =		

Moment....Actual

Service Level	ft-# =	753.5	3,005.6
Strength Level	ft-# =		

Moment.....Allowable	ft-# =	1,294.8	4,081.3
----------------------	--------	---------	---------

Shear.....Actual

Service Level	psi =	4.3	10.3
Strength Level	psi =		

Shear.....Allowable	=	44.6	44.5
---------------------	---	------	------

Anet (Masonry)	in2 =	91.50	115.50
----------------	-------	-------	--------

Wall Weight	psf =	0.0	0.0
-------------	-------	-----	-----

Rebar Depth 'd'	in =	3.81	5.50
-----------------	------	------	------

Masonry Data

f'm	psi =	1,500	1,500
Fs	psi =	20,000	20,000
Solid Grouting	=	Yes	Yes
Modular Ratio 'n'	=	21.48	21.48
Equiv. Solid Thick.	=	7.63	9.63
Masonry Block Type	=		
Masonry Design Method	=	ASD	

Concrete Data

f'c	psi =		
Fy	psi =		

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_6.67'

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	2.50
Total Footing Width	=	4.00
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	6.00 in
Key Distance from Toe	=	0.00 ft
f'c =	3,000 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	<u>Key</u>	
Factored Pressure	=	1,632	0		psf
Mu' : Upward	=	1,606	313		ft-#
Mu' : Downward	=	474	3,568		ft-#
Mu: Design	=	1,132	3,255	457	ft-#
ϕ Mn	=	11,415	12,765	2,739	ft-#
Actual 1-Way Shear	=	13.90	20.30	11.36	psi
Allow 1-Way Shear	=	46.63	44.98	43.82	psi
Toe Reinforcing	=	# 4 @ 8.00 in			
Heel Reinforcing	=	# 4 @ 8.00 in			
Key Reinforcing	=	None Spec'd			
Footing Torsion, Tu	=	0.00 ft-lbs			
Footing Allow. Torsion, ϕ Tn	=	0.00 ft-lbs			

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: $\phi Mn = \phi * 5 * \lambda * \sqrt{f'c} * S_m$

Min footing T&S reinf Area 1.04 in²
Min footing T&S reinf Area per foot 0.26 in² /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_6.67'

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,500.1	2.56	3,835.4	Soil Over HL (ab. water tbl)	1,389.6	3.17	4,400.3
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.17	4,400.3
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	= 50.0	10.67	533.3	* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=			Soil Over Toe	= 187.5	0.75	140.6
	=			Surcharge Over Toe	=		
				Stem Weight(s)	=		
				Earth @ Stem Transitions	= 76.5	2.25	172.0
Total	= 1,550.1	O.T.M.	= 4,368.7	Footing Weight	= 600.0	2.00	1,200.0
				Key Weight	= 75.0	0.50	37.5
Resisting/Overturning Ratio		=	1.88	Vert. Component	= 569.4	4.00	2,277.6
Vertical Loads used for Soil Pressure	=	2,898.0	lbs	Total	= 2,898.0	lbs	R.M.= 8,228.1

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.102 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

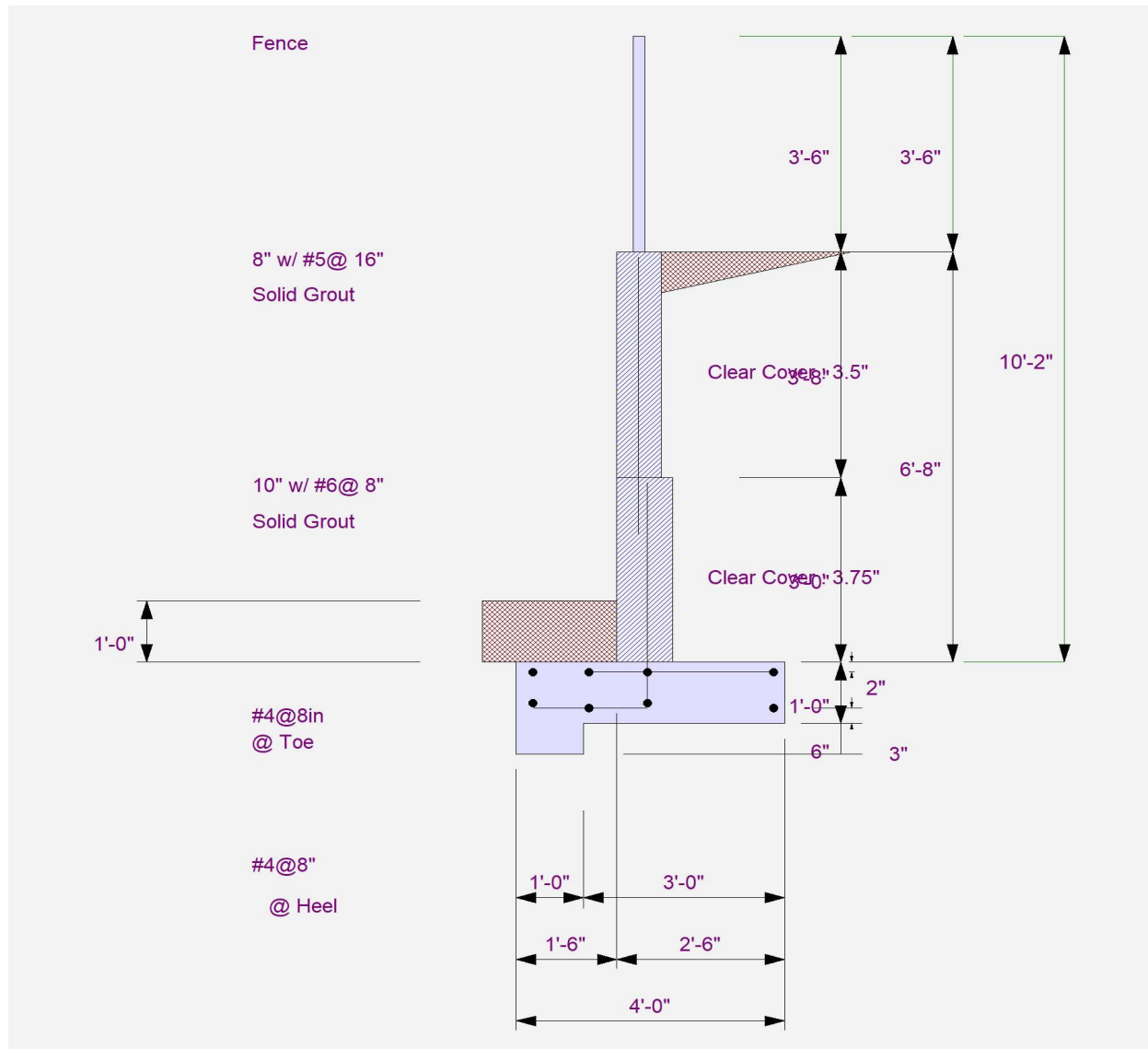
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_6.67'



Cantilevered Retaining Wall

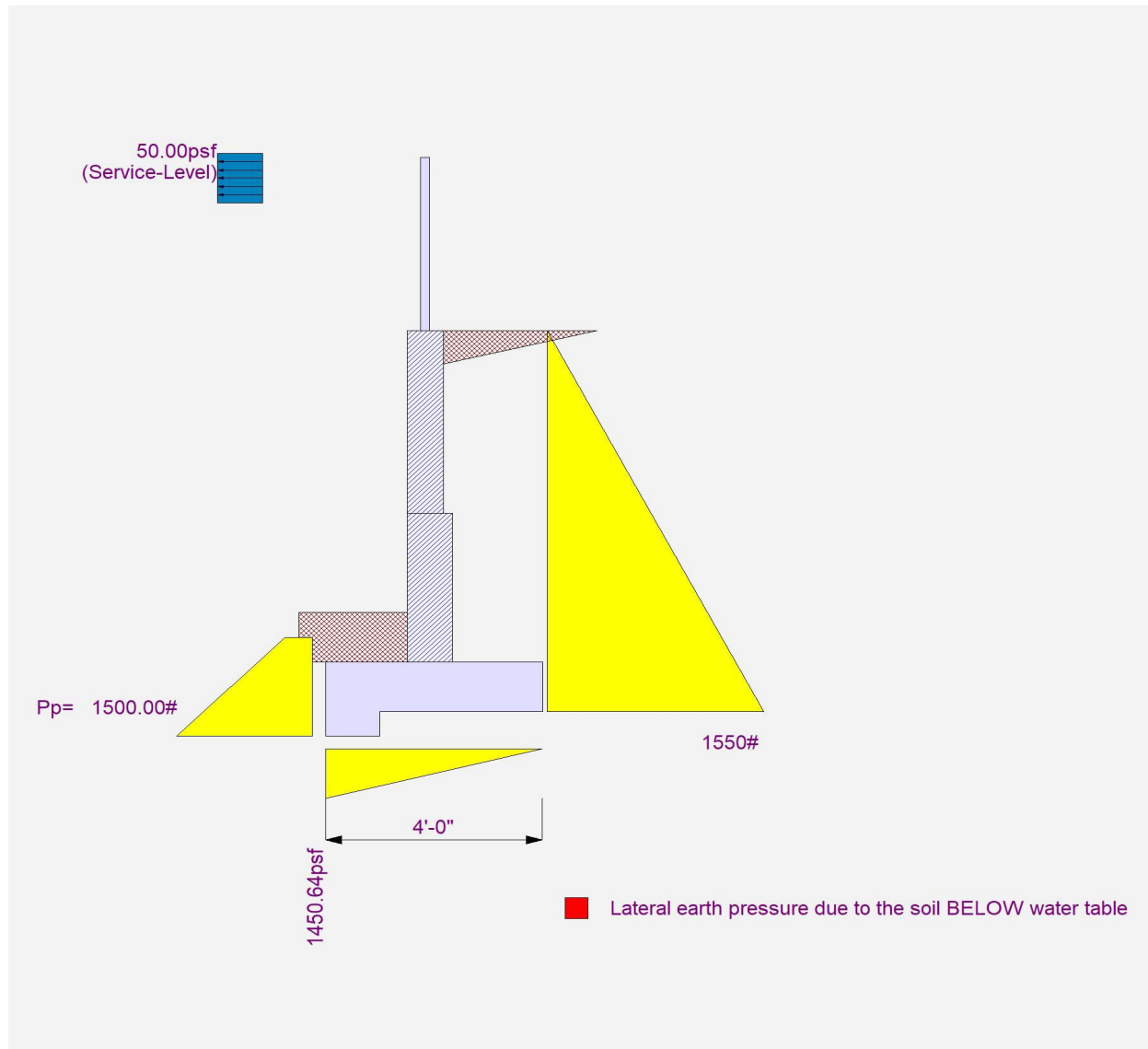
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 10 Retaining Wall at A Street & Soccer Fields_6.67'



11. CMU Block Walls at Shipping Containers, (4/L-2.30)

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.

Code Reference

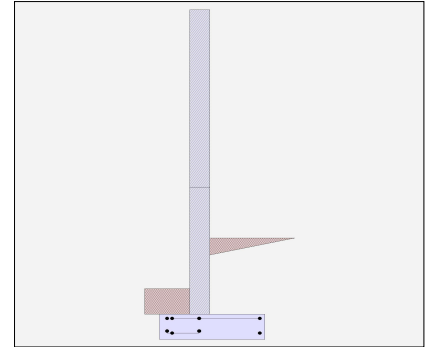
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	3.00 ft
Wall height above soil	=	9.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	6.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	7.50 ft
...Height to Bottom	=	6.50 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	30.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.

Design Summary

Wall Stability Ratios

Overturing	=	1.90	OK
Sliding	=	3.79	OK
Global Stability	=	4.62	

Total Bearing Load	=	1,469 lbs
...resultant ecc.	=	8.59 in

Eccentricity outside middle third

Soil Pressure @ Toe	=	947 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	2,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,207 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	6.2 psi	OK
Footing Shear @ Heel	=	8.5 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	402.0 lbs	
less 100% Passive Force	-	937.5 lbs	
less 100% Friction Force	= -	587.4 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht"	=	Masonry	Masonry	
Design Method	=	ASD	ASD	SD
Thickness	=	8.00	8.00	
Rebar Size	=	# 4	# 5	
Rebar Spacing	=	16.00	16.00	
Rebar Placed at	=	Center	Center	

Design Data

fb/FB + fa/Fa	=	0.516	1.042
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =	126.0	297.0
Strength Level	lbs =		

Moment....Actual

Service Level	ft-# =	441.0	1,350.0
Strength Level	ft-# =		

Moment.....Allowable	ft-# =	854.2	1,294.8
----------------------	--------	-------	---------

Shear.....Actual

Service Level	psi =	1.4	3.2
Strength Level	psi =		

Shear.....Allowable	psi =	43.6	43.6
---------------------	-------	------	------

Anet (Masonry)	in2 =	91.50	91.50
----------------	-------	-------	-------

Wall Weight	psf =	0.0	0.0
-------------	-------	-----	-----

Rebar Depth 'd'	in =	3.81	3.81
-----------------	------	------	------

Masonry Data

f'm	psi =	1,500	1,500
Fs	psi =	20,000	20,000
Solid Grouting	=	Yes	Yes
Modular Ratio 'n'	=	21.48	21.48
Equiv. Solid Thick.	in =	7.63	7.63
Masonry Block Type	=		
Masonry Design Method	=	ASD	

Concrete Data

f'c	psi =		
Fy	psi =		

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	2.50
Total Footing Width	=	3.50
Footing Thickness	=	12.00 in

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm = 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,207	0	psf
Mu' : Upward	=	539	192	ft-#
Mu' : Downward	=	220	1,636	ft-#
Mu: Design	=	319	1,444	ft-#
φ Mn	=	11,415	12,765	ft-#
Actual 1-Way Shear	=	6.20	8.45	psi
Allow 1-Way Shear	=	46.63	44.98	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area 0.91 in²
Min footing T&S reinf Area per foot 0.26 in² /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	240.0	1.33	320.0	Soil Over HL (ab. water tbl)	687.5	2.58	1,776.0
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.58	1,776.0
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=			* Axial Live Load on Stem	=		
Load @ Stem Above Soil	= 162.0	8.50	1,377.0	Soil Over Toe	= 125.0	0.50	62.5
	=			Surcharge Over Toe	=		
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
				Footing Weight	= 525.0	1.75	918.8
				Key Weight	=	1.50	
				Vert. Component	= 131.0	3.50	458.7
Total	= 402.0	O.T.M.	= 1,697.0				
Resisting/Overturning Ratio		=	1.90				
Vertical Loads used for Soil Pressure =		1,468.5	lbs				

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.090 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd

Stem Design Height: 5.00 ft above top of footing

Calculated Rebar Stress, f_s = 10325.70 psi

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) =

20.00 in

Development length for #4 bar specified in this stem design segment =

12.00 in

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Calculated Rebar Stress, f_s = 20852.59 psi

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =

39.10 in

Development length for #5 bar specified in this stem design segment =

39.10 in

Hooked embedment length into footing for #5 bar specified in this stem design segment =

6.00 in

As Provided =

0.2325 in²/ft

As Required =

0.2410 in²/ft

Cantilevered Retaining Wall

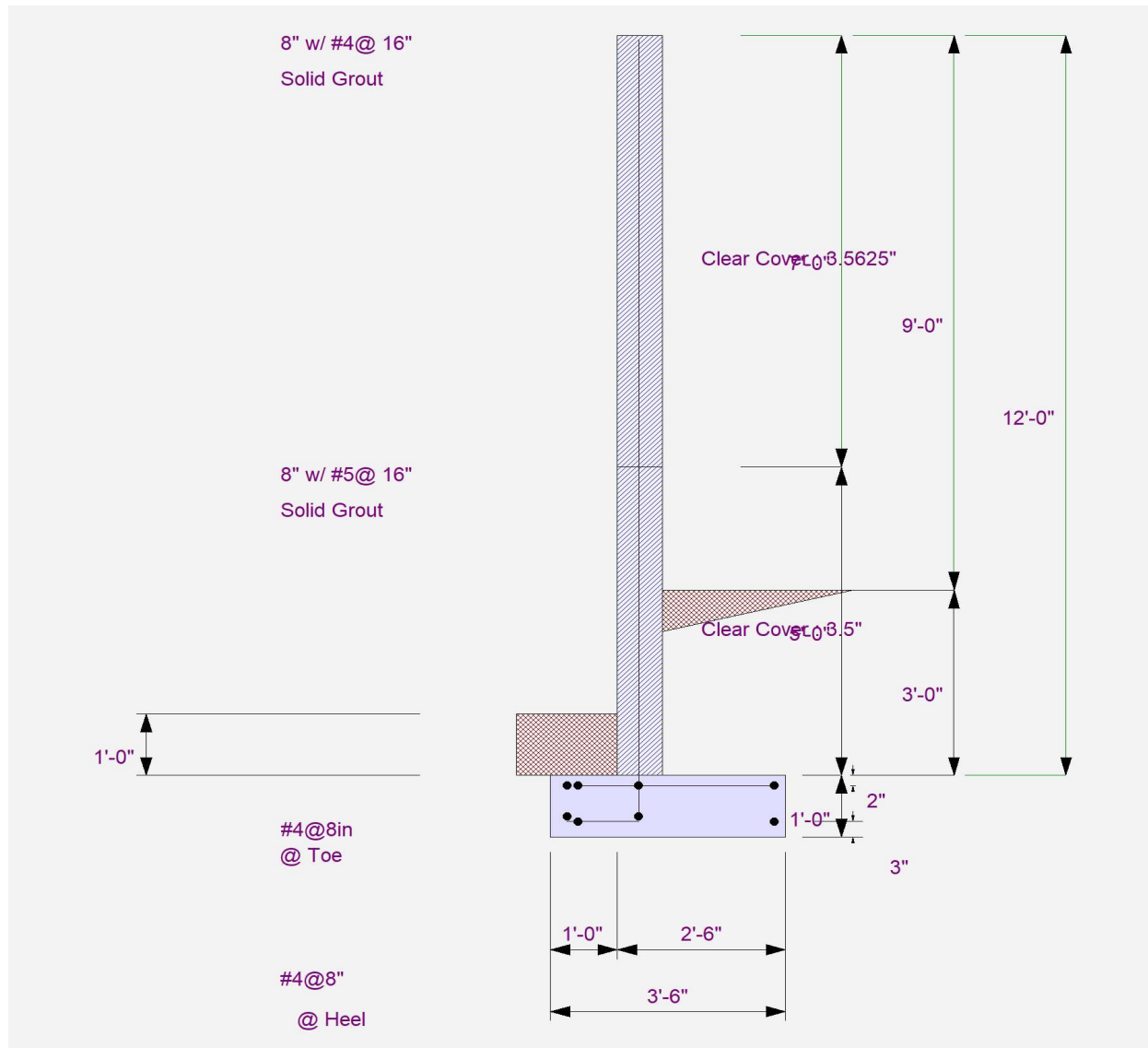
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.



Cantilevered Retaining Wall

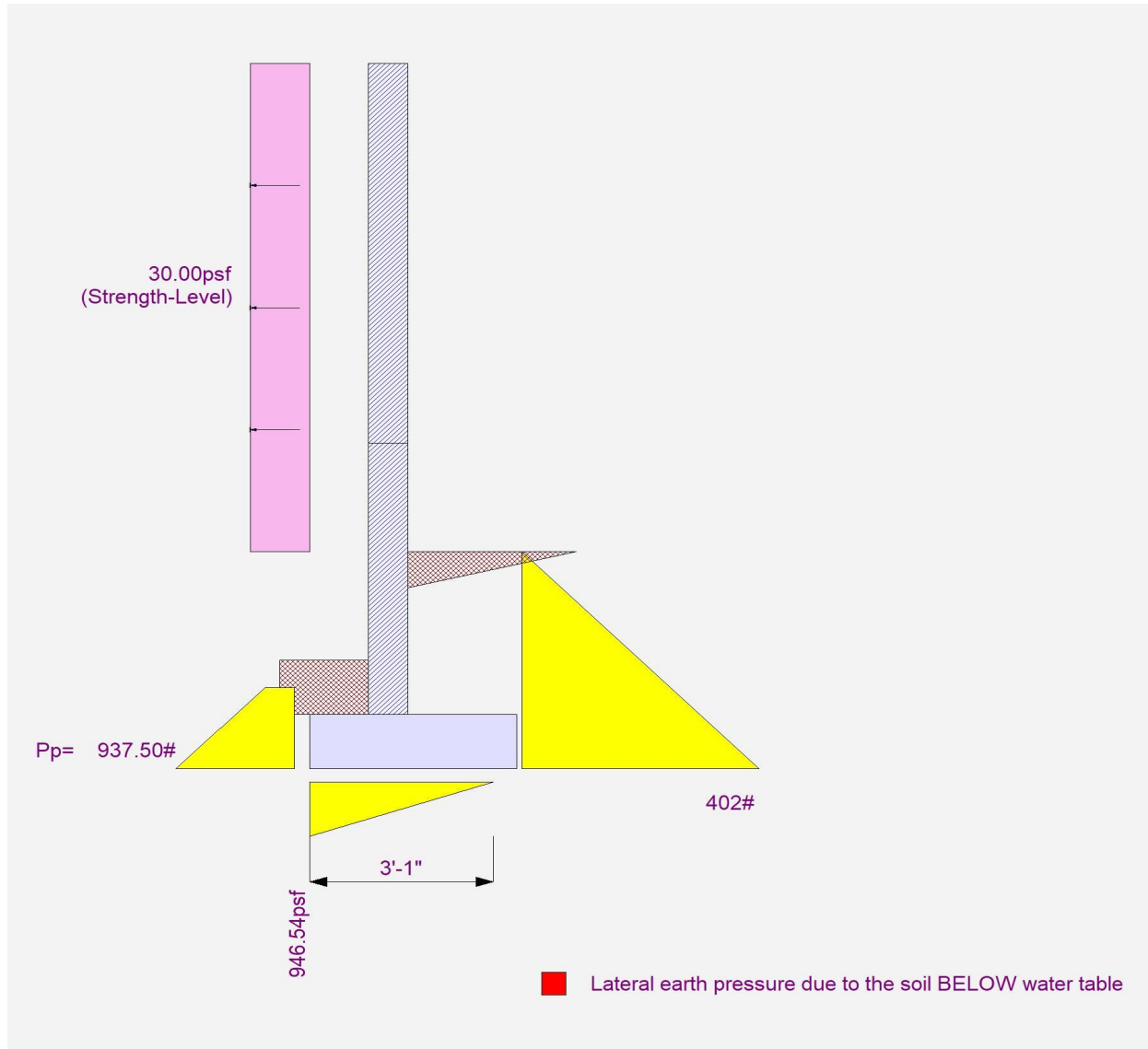
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.

Code Reference

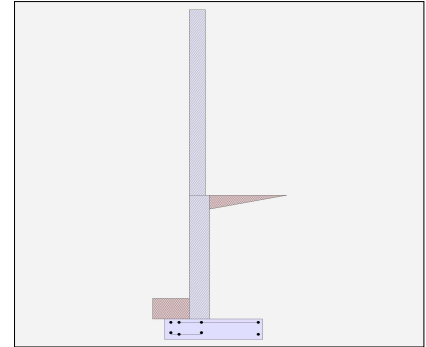
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	9.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	6.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	7.50 ft
...Height to Bottom	=	6.50 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	30.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.

Design Summary

Wall Stability Ratios

Overturing	=	2.13	OK
Sliding	=	2.27	OK
Global Stability	=	3.05	

Total Bearing Load	=	2,751 lbs	
...resultant ecc.	=	6.43 in	

Eccentricity within middle third

Soil Pressure @ Toe	=	1,240 psf	OK
Soil Pressure @ Heel	=	135 psf	OK
Allowable	=	2,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,483 psf	
ACI Factored @ Heel	=	162 psf	
Footing Shear @ Toe	=	9.2 psi	OK
Footing Shear @ Heel	=	16.3 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	897.0 lbs	
less 100% Passive Force	=	937.5 lbs	
less 100% Friction Force	=	1,100.5 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht"	=	Masonry	Masonry	
Design Method	=	ASD	ASD	SD
Thickness	=	8.00	10.00	
Rebar Size	=	# 5	# 6	
Rebar Spacing	=	16.00	16.00	
Rebar Placed at	=	Center	6 in	

Design Data

fb/FB + fa/Fa	=	0.563	0.956
---------------	---	-------	-------

Total Force @ Section

Service Level	lbs =	162.0	702.0
Strength Level	lbs =		

Moment....Actual

Service Level	ft-# =	729.0	2,781.0
Strength Level	ft-# =		

Moment.....Allowable	ft-# =	1,294.8	2,908.3
----------------------	--------	---------	---------

Shear.....Actual

Service Level	psi =	1.8	6.1
Strength Level	psi =		

Shear.....Allowable	psi =	43.6	43.9
---------------------	-------	------	------

Anet (Masonry)	in2 =	91.50	115.50
----------------	-------	-------	--------

Wall Weight	psf =	0.0	0.0
-------------	-------	-----	-----

Rebar Depth 'd'	in =	3.81	6.00
-----------------	------	------	------

Masonry Data

f'm	psi =	1,500	1,500
Fs	psi =	20,000	20,000
Solid Grouting	=	Yes	Yes
Modular Ratio 'n'	=	21.48	21.48
Equiv. Solid Thick.	in =	7.63	9.63
Masonry Block Type	=		
Masonry Design Method	=	ASD	

Concrete Data

f'c	psi =		
Fy	psi =		

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	3.00
Total Footing Width	=	4.00
Footing Thickness	=	12.00 in

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm = 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,483	162	psf
Mu' : Upward	=	687	940	ft-#
Mu' : Downward	=	234	4,414	ft-#
Mu: Design	=	453	3,474	ft-#
φ Mn	=	11,415	12,765	ft-#
Actual 1-Way Shear	=	9.20	16.28	psi
Allow 1-Way Shear	=	46.63	44.98	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area 1.04 in²
Min footing T&S reinf Area per foot 0.26 in² /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	735.0	2.33	1,715.0	Soil Over HL (ab. water tbl)	1,625.0	2.92	4,739.6
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.92	4,739.6
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=			* Axial Live Load on Stem	=		
Load @ Stem Above Soil	= 162.0	11.50	1,863.0	Soil Over Toe	= 125.0	0.50	62.5
	=			Surcharge Over Toe	=		
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
Total	= 897.0	O.T.M.	= 3,578.0	Footing Weight	= 600.0	2.00	1,200.0
				Key Weight	=	1.50	
				Vert. Component	= 401.3	4.00	1,605.3
Resisting/Overturning Ratio		=	2.13	Total =	2,751.3 lbs	R.M.=	7,607.4
Vertical Loads used for Soil Pressure =		2,751.3	lbs				
* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.							

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.129 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd

Stem Design Height: 6.00 ft above top of footing

Calculated Rebar Stress, f_s = 11260.40 psi

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =

25.00 in

Development length for #5 bar specified in this stem design segment =

14.08 in

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Calculated Rebar Stress, f_s = 19124.52 psi

Lap Splice length for #6 bar specified in this stem design segment (25.4.2.4a) =

43.03 in

Development length for #6 bar specified in this stem design segment =

43.03 in

Hooked embedment length into footing for #6 bar specified in this stem design segment =

6.90 in

As Provided =

0.3300 in²/ft

As Required =

0.3144 in²/ft

Cantilevered Retaining Wall

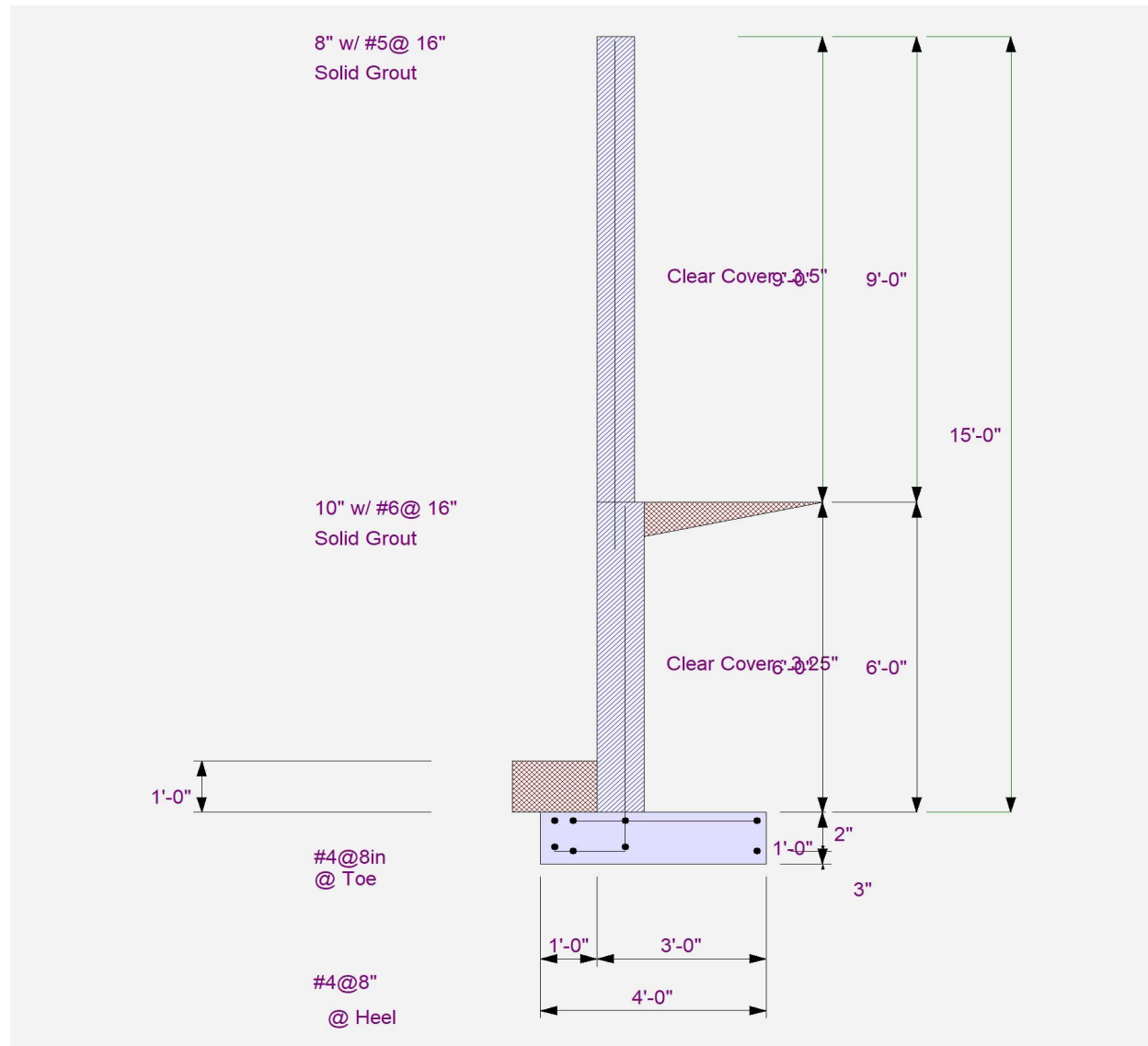
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.



Cantilevered Retaining Wall

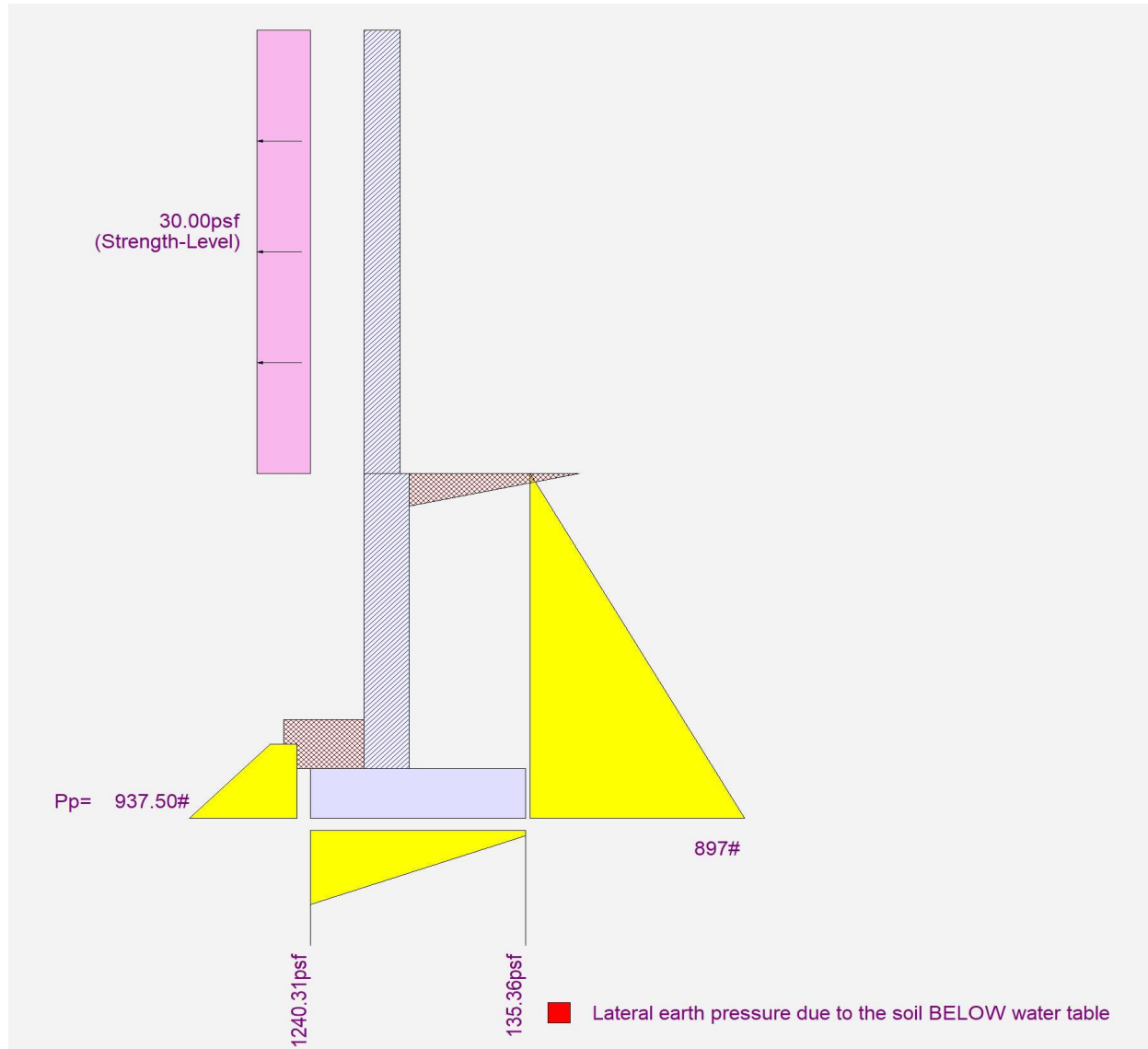
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 11 CMU Block Wall @ Shipping Containers_3'ret.



12. Scoreboards (Landscape Detail 1-4/L-2.10)

Scoreboard, (Landscape Detail 1-4/L-2.10)

1. Soccer Tournament Scoreboard – 7'-6" (H) x 16'-0" (W)

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, (C_s)

$I_e = 1.0$, (Risk Category II)

$R = 1.25$

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)}, \text{ (ASCE 7 - 16, 12.8 - 2), } C_s = \frac{1.349}{\left(\frac{1.25}{1.0}\right)} = 1.08$$

$$C_{s-\text{Min}} = 0.044S_{DS}I_e, \text{ (ASCE 7 - 16, 12.8 - 5), } C_{s-\text{Min}} = (0.044(1.08)(1)) = 0.05$$

Therefore Use $C_s = 1.08$

Seismic Weight, (W)

- Scoreboard SO-2008+SL-03761. = 520 lbs @ 13.75'
- HSS12x12x1/2 Columns, (2) (49.6 lbs plf)(19ft) = 1,885 lbs @ 9.5' to center of gravity from F.G.

Seismic Base Shear, (V)

$$V = C_s W, \text{ (ASCE 7 - 16, 12.8 - 1)}$$

$$V = \text{Seismic Base Shear} = (1.08)(1,462.0 \text{ lbs}) = 1,579 \text{ lbs}$$

$$V_{ASD} = (0.7)(1,310.3 \text{ lbs}) = 1,106 \text{ lbs}$$

Feature	Seismic Weight (lbs)	Height to Feature (ft)	Seismic Base Shear (lbs)	OT Moment (ft-lbs)
Scoreboard	520#	13.75	562#	7,150
HSS12x12x0.25	942#	9.5	1,017#	8,949
Total (per column)	1,462#		1,579#	16,099

Applied Moment to each footing, (seismic) = 16,099 ft-lbs = 16.1 ft-kips, 8 ft-kip per column

Wind Load, (ASCE 7-22)

$$\text{Wind Load} = 30 \text{ psf} \times 16' \times 9.5' + 30 \text{ psf} \times 10' \times 2' \times \frac{2}{3} = 4,960 \text{ lbs}$$

$$\text{Applied Moment, (wind)} = (4,960 \text{ lbs})(13.75') = 68,200 \text{ ft} - \text{lbs} = 68.2 \text{ ft} - \text{kips}, 34.1 \text{ ft-kip per column}$$

(Wind Controls)

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.1 Signboard Post (Soccer Tournament Scoreboard)

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name :	HSS8x8x3/8	Overall Column Height	18.50 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade	, A500, Grade B, Fy = 46 ksi, Carbon Steel	Brace condition :	
Fy : Steel Yield	46.0 ksi	Unbraced Length for buckling ABOUT X-X Axis =	18.50 ft, K = 2.1
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis =	18.50 ft, K = 2.1

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 697.27 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 18.50 ft, D = 2.0 k

BENDING LOADS . . .

Wind Shear-x: Moment acting about Y-Y axis at 18.50 ft, W = 34.0 k-ft

EQ-x: Moment acting about Y-Y axis at 18.50 ft, E = 8.0 k-ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.3508 : 1	Maximum Load Reactions . .	
Load Combination	+1.20D+W	Top along X-X	0.0 k
Location of max.above base	0.0 ft	Bottom along X-X	0.0 k
At maximum location values are . . .		Top along Y-Y	0.0 k
Pu	3.237 k	Bottom along Y-Y	0.0 k
0.9 * Pn	103.885 k	Maximum Load Deflections . . .	
Mu-x	0.0 k-ft	Along Y-Y	-2.712 in at 8.0ft above base
0.9 * Mn-x :	101.430 k-ft	for load combination : D Only	
Mu-y	34.0 k-ft	Along X-X	0.0 in at 0.0ft above base
0.9 * Mn-y :	101.430 k-ft	for load combination :	
PASS Maximum Shear Stress Ratio	0.0 : 1		
Load Combination	0.0		
Location of max.above base	0.0 ft		
At maximum location values are . . .			
Vu : Applied	0.0 k		
Vn * Phi : Allowable	0.0 k		

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
------------------	--------------------------	-----------------------------------	---	-----------------------------------	----------------------------------	------	----------------------------------

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
------	---------------	--------------------------	-----------------------------------	---	-----------------------------------	----------------------------------	------	----------------------------------

Steel Section Properties : HSS8x8x3/8

Steel Section Properties : HSS8x8x3/8

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

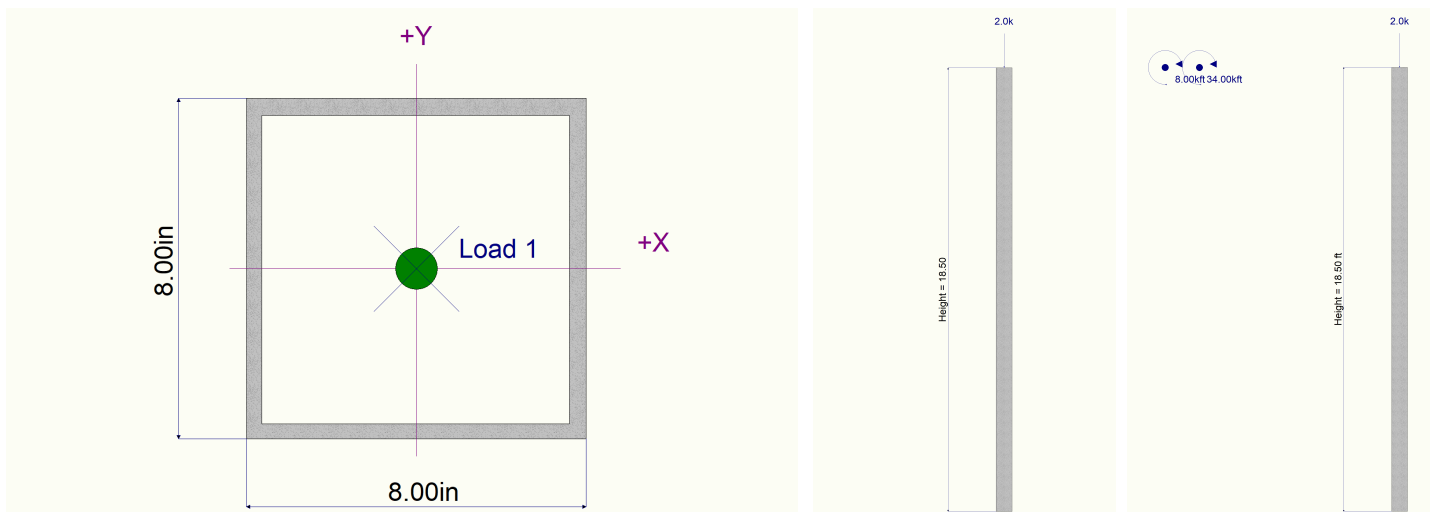
(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.1 Signboard Post (Soccer Tournament Scoreboard)

Depth	=	8.000 in	I xx	=	100.00 in ⁴	J	=	160.000 in ⁴
Design Thick	=	0.349 in	S xx	=	24.90 in ³			
Width	=	8.000 in	R xx	=	3.100 in			
Wall Thick	=	0.375 in	Zx	=	29.400 in ³			
Area	=	10.400 in ²	I yy	=	100.000 in ⁴	C	=	40.700 in ³
Weight	=	37.690 #/ft	S yy	=	24.900 in ³			
			R yy	=	3.100 in			

Ycg = 0.000 in

Sketches



Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.1 Signboard Post Embedment (Soccer Tournament Scoreboard)

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 24.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination 0.60W
Lateral Load 2.040 k
Moment 20.40 k-ft

NO Ground Surface Restraint

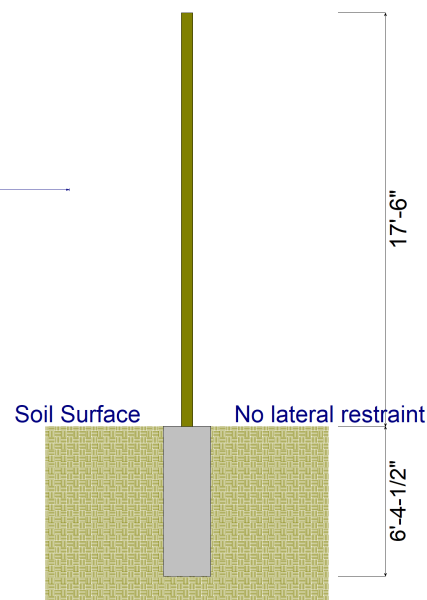
Pressures at 1/3 Depth

Actual 1,043.97 psf
Allowable 1,044.07 psf

Minimum Required Depth 6.375 ft

Footing Base Area 3.142 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	3.40 k		k/ft	k
E : Earthquake	0.80 k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	10.0 ft	TOP of Load above ground surface	17.50 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	2.040	20.400	6.38	1,044.0	1,044.1	1.000
+0.450W	1.530	15.300	5.63	935.8	937.0	1.000
E Only * 0.70	0.560	5.600	4.00	642.9	646.8	1.000
E Only * 0.5250	0.420	4.200	3.50	580.4	581.8	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.1 Signboard Post CIDH Caisson (Soccer Tournament Scoreboard)

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

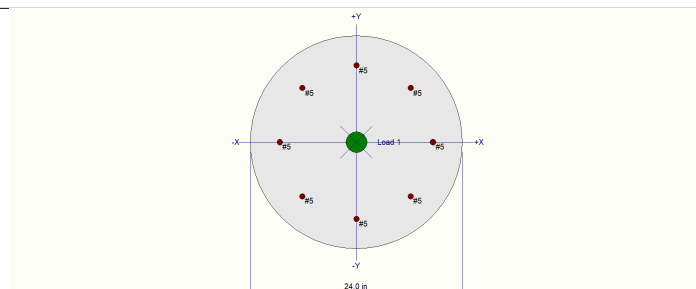
f'c : Concrete 28 day strength = 4.0 ksi
E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.0
fy - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 0.50 %
Max. Reinf. = 8.0 %
Seismic Design Category = D

Overall Column Height = 7.333 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along column
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 24.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 8 - #5 bars



Applied Loads

Entered loads are factored per load combinations specified by user.

Column self weight included : 3,455.60 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 7.333 ft above base, D = 5.0 k

BENDING LOADS . . .

Wind + Seismic Moment: Moment acting about X-X axis at 7.333 ft, W = 34.10, E = 8.0 k-ft

DESIGN SUMMARY

Load Combination	0.0	Maximum SERVICE Load Reactions .			
Location of max.above base	0.0ft	Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.0 : 1	Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5					
Pu =	0.0 k	φ * Pn =	0.0 k	Maximum SERVICE Load Deflections . .	
Mu-x =	0.0 k-ft	φ * Mn-x =	0.0 k-ft	Along Y-Y	0.0 in at 0.0 ft above base
Mu-y =	0.0 k-ft	φ* Mn-y =	0.0 k-ft	for load combination : 0.0	
Mu Angle =	18.0 deg	φ =	0.90	Along X-X	0.0in at 0.0 ft above base
Mu at Angle =	156.501 k-ft	φMn at Angle =	395.048 k-ft	for load combination : 0.0	
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>					
Column Capacities . .		General Section Information		β =0.0	θ = 0.0
Pnmax : Nominal Max. Compressive Axial Capacity	0.0 k	ρ : % Reinforcing	0.0 %	Rebar < Min of 0.50 %	
Pnmin : Nominal Min. Tension Axial Capacity	k	Reinforcing Area	0.0 in2		
φ Pn, max : Usable Compressive Axial Capacity	0.0 k	Concrete Area	0.0 in2		
φ Pn, min : Usable Tension Axial Capacity	k				

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.1 Signboard Post CIDH Caisson (Soccer Tournament Scoreboard)

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load		Bending Analysis k-ft							Utilization	
	X-X	Y-Y		Pu	$\phi * Pn$	δx	$\delta x * Mux$	δy	$\delta y * Muy$	Alpha (deg)	δMu	ϕMn	Ratio	

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments	k-ft
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Top

Maximum Moment Reactions

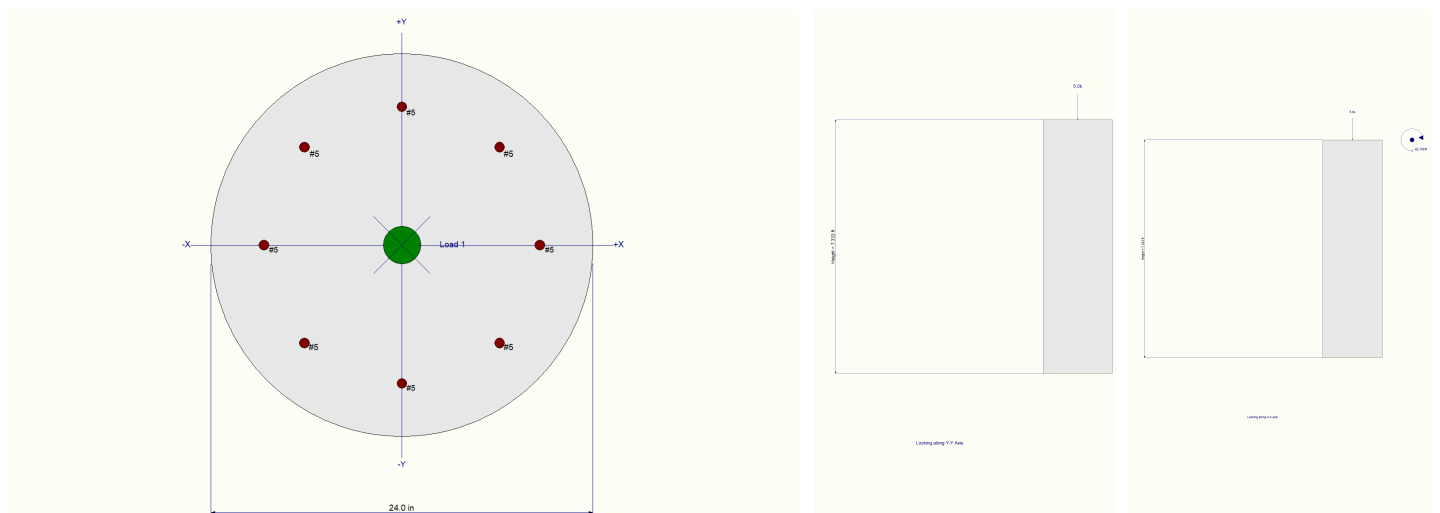
Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		k	Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
------------------	---------------------	----------	---------------------	----------

Sketches



2. Soccer Championship Scoreboard – 10'-0" (H) x 25'-0" (W)

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, (C_s)

$I_e = 1.0$, (Risk Category II)

$R = 1.25$

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)}, \text{ (ASCE 7 - 16, 12.8 - 2), } C_s = \frac{1.349}{\left(\frac{1.25}{1.0}\right)} = 1.08$$

$$C_{s-\text{Min}} = 0.044 S_{DS} I_e, \text{ (ASCE 7 - 16, 12.8 - 5), } C_{s-\text{Min}} = (0.044)(1.08)(1) = 0.05$$

Therefore Use $C_s = 1.08$

Seismic Weight, (W)

- Scoreboard SO-2021+SL-03761. = 1,080 lbs @ 13.75'
- HSS12x12x1/2Columns, (2) (49.6 lbs plf)(20ft) = 1,984 lbs @ 10' to center of gravity from F.G.

Seismic Base Shear, (V)

$$V = C_s W, \text{ (ASCE 7 - 16, 12.8 - 1)}$$

$$V = \text{Seismic Base Shear} = (1.08)(3,064.0 \text{ lbs}) = 3,309 \text{ lbs}$$

$$V_{ASD} = (0.7)(1,310.3 \text{ lbs}) = 2,316 \text{ lbs}$$

Feature	Seismic Weight (lbs)	Height to Feature (ft)	Seismic Base Shear (lbs)	OT Moment (ft-lbs)
Scoreboard	1,080#	14	1,166#	16,324
HSS12x12x0.25	1,984#	10	2,143#	21,430
Total (per column)	3,064#		3,309#	37,754

Applied Moment to each footing, (seismic) = 37,754 ft-lbs = 37.8 ft-kips, 18.9ft-kips per column

Wind Load, (ASCE 7-22)

$$\text{Wind Load} = 30\text{psf} \times 25' \times 10' + 30\text{psf} \times 10' \times 2 \times \frac{2}{3} = 7,900 \text{ lbs}$$

$$\text{Applied Moment, (wind)} = (7,900 \text{ lbs})(15') = 118,500 \text{ ft-lb} = 115 \text{ ft-kips, 57.5 ft-kips per column}$$

(Wind Controls)

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.2 Signboard Post (Soccer Championship Scoreboard)

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name :	HSS8x8x3/8	Overall Column Height	20 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade	, A500, Grade B, Fy = 46 ksi, Carbon Steel	Brace condition :	
Fy : Steel Yield	46.0 ksi	Unbraced Length for buckling ABOUT X-X Axis = 20 ft, K = 2.1	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 20 ft, K = 2.1	

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 753.80 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 20.0 ft, D = 2.0 k

BENDING LOADS . . .

Wind Shear-x: Moment acting about Y-Y axis at 20.0 ft, W = 57.50 k-ft

EQ-x: Moment acting about Y-Y axis at 20.0 ft, E = 18.90 k-ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.5855 : 1	Maximum Load Reactions . .	
Load Combination	+1.20D+W	Top along X-X	0.0 k
Location of max.above base	0.0 ft	Bottom along X-X	0.0 k
At maximum location values are . . .		Top along Y-Y	0.0 k
Pu	3.305 k	Bottom along Y-Y	0.0 k
0.9 * Pn	88.886 k	Maximum Load Deflections . . .	
Mu-x	0.0 k-ft	Along Y-Y	-2.712 in at 8.0ft above base
0.9 * Mn-x :	101.430 k-ft	for load combination : D Only	
Mu-y	57.50 k-ft	Along X-X	0.0 in at 0.0ft above base
0.9 * Mn-y :	101.430 k-ft	for load combination :	
PASS Maximum Shear Stress Ratio	0.0 : 1		
Load Combination	0.0		
Location of max.above base	0.0 ft		
At maximum location values are . . .			
Vu : Applied	0.0 k		
Vn * Phi : Allowable	0.0 k		

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location						Stress Ratio	Status	Location

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
------------------	--------------------------	-----------------------------------	---	-----------------------------------	----------------------------------	------	----------------------------------

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
------	---------------	--------------------------	-----------------------------------	---	-----------------------------------	----------------------------------	------	----------------------------------

Steel Section Properties : HSS8x8x3/8

Steel Section Properties : HSS8x8x3/8

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

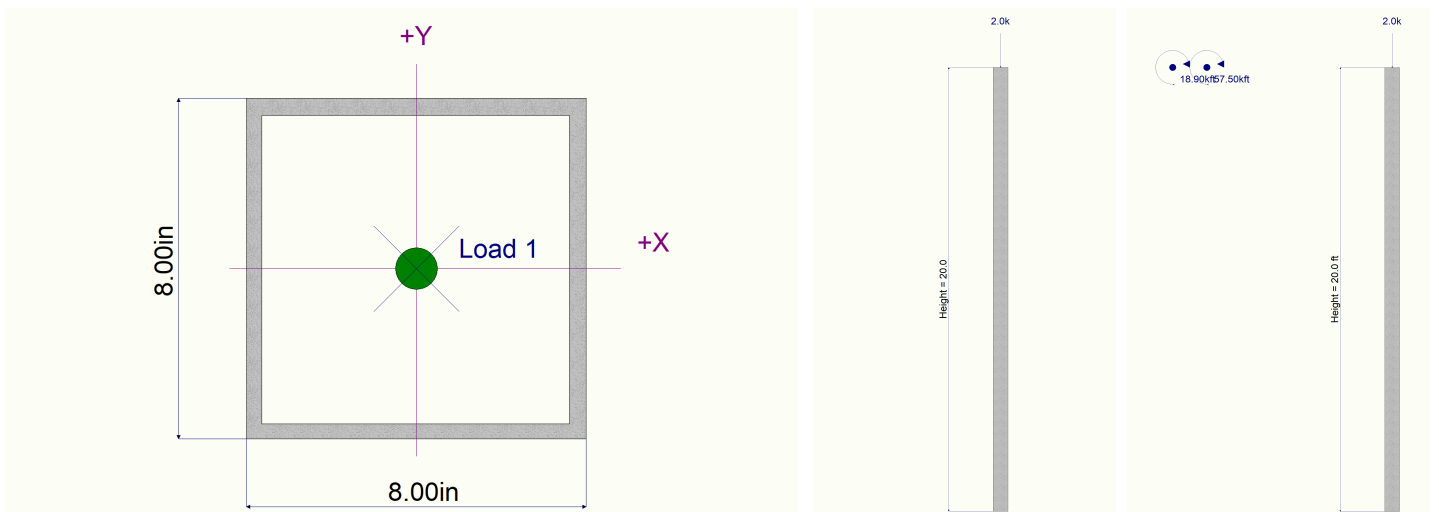
(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.2 Signboard Post (Soccer Championship Scoreboard)

Depth	=	8.000 in	I xx	=	100.00 in ⁴	J	=	160.000 in ⁴
Design Thick	=	0.349 in	S xx	=	24.90 in ³			
Width	=	8.000 in	R xx	=	3.100 in			
Wall Thick	=	0.375 in	Zx	=	29.400 in ³			
Area	=	10.400 in ²	I yy	=	100.000 in ⁴	C	=	40.700 in ³
Weight	=	37.690 #/ft	S yy	=	24.900 in ³			
			R yy	=	3.100 in			

Ycg = 0.000 in

Sketches



Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.2 Signboard Post Embedment (Soccer Championship Scoreboard)

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 24.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination 0.60W
Lateral Load 3.450 k
Moment 34.50 k-ft

NO Ground Surface Restraint

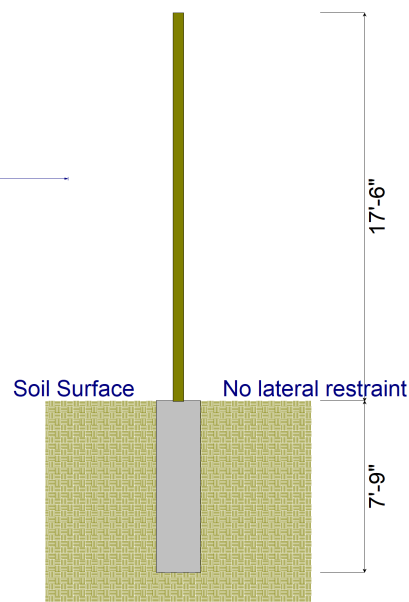
Pressures at 1/3 Depth

Actual 1,275.65 psf
Allowable 1,277.40 psf

Minimum Required Depth 7.750 ft

Footing Base Area 3.142 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	5.750 k		k/ft	k
E : Earthquake	1.890 k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	10.0 ft	TOP of Load above ground surface	17.50 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	3.450	34.500	7.75	1,275.6	1,277.4	1.000
+0.450W	2.588	25.875	6.88	1,142.0	1,143.6	1.000
E Only * 0.70	1.323	13.230	5.38	885.2	887.8	1.000
E Only * 0.5250	0.992	9.923	4.88	795.3	797.5	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.2 Signboard Post CIDH Caisson (Soccer Championship Scoreboard)

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

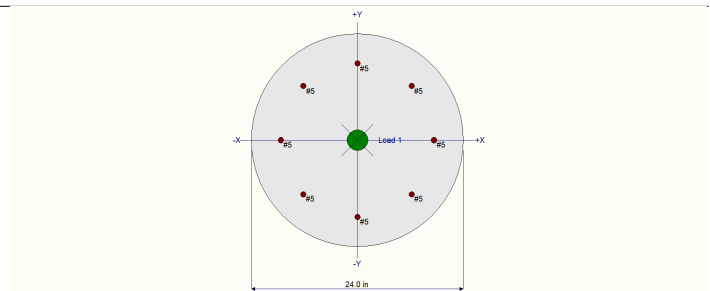
f'c : Concrete 28 day strength = 4.0 ksi
E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.0
fy - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 0.50 %
Max. Reinf. = 8.0 %
Seismic Design Category = D

Overall Column Height = 8.750 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along column
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 24.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 8 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 4,123.34 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 8.750 ft above base, D = 5.0 k

BENDING LOADS . . .

Wind + Seismic Moment: Moment acting about X-X axis at 8.750 ft, W = 57.50, E = 18.90 k-ft

DESIGN SUMMARY

Load Combination	0.0	Maximum SERVICE Load Reactions .			
Location of max. above base	0.0 ft	Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Maximum Stress Ratio		Maximum SERVICE Load Deflections . .			
Ratio = $(P_u^2 + M_u^2)^{.5} / (\Phi P_n^2 + \Phi M_n^2)^{.5}$	0.0 : 1	Along Y-Y	0.0 in at	0.0 ft above base	
Pu = 0.0 k	$\phi * P_n = 0.0 k$	for load combination : 0.0			
Mu-x = 0.0 k-ft	$\phi * M_n-x = 0.0 k-ft$	Along X-X	0.0 in at	0.0 ft above base	
Mu-y = 0.0 k-ft	$\phi * M_n-y = 0.0 k-ft$	for load combination : 0.0			
Mu Angle = 18.0 deg	$\phi = 0.90$				
Mu at Angle = 156.501 k-ft	ϕM_n at Angle = 395.048 k-ft				
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>		General Section Information			
Column Capacities . .		$\beta = 0.0$	$\theta = 0.0$		
Pnmax : Nominal Max. Compressive Axial Capacity	0.0 k	ρ : % Reinforcing	0.0 %	Rebar < Min of 0.50 %	
Pnmin : Nominal Min. Tension Axial Capacity	k	Reinforcing Area	0.0 in ²		
ϕP_n , max : Usable Compressive Axial Capacity	0.0 k	Concrete Area	0.0 in ²		
ϕP_n , min : Usable Tension Axial Capacity	k				

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.2 Signboard Post CIDH Caisson (Soccer Championship Scoreboard)

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load		Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	$\phi * Pn$	δx	$\delta x * Mux$	δy	$\delta y * Muy$	Alpha (deg)	δMu	ϕMn	Ratio

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top

Maximum Moment Reactions

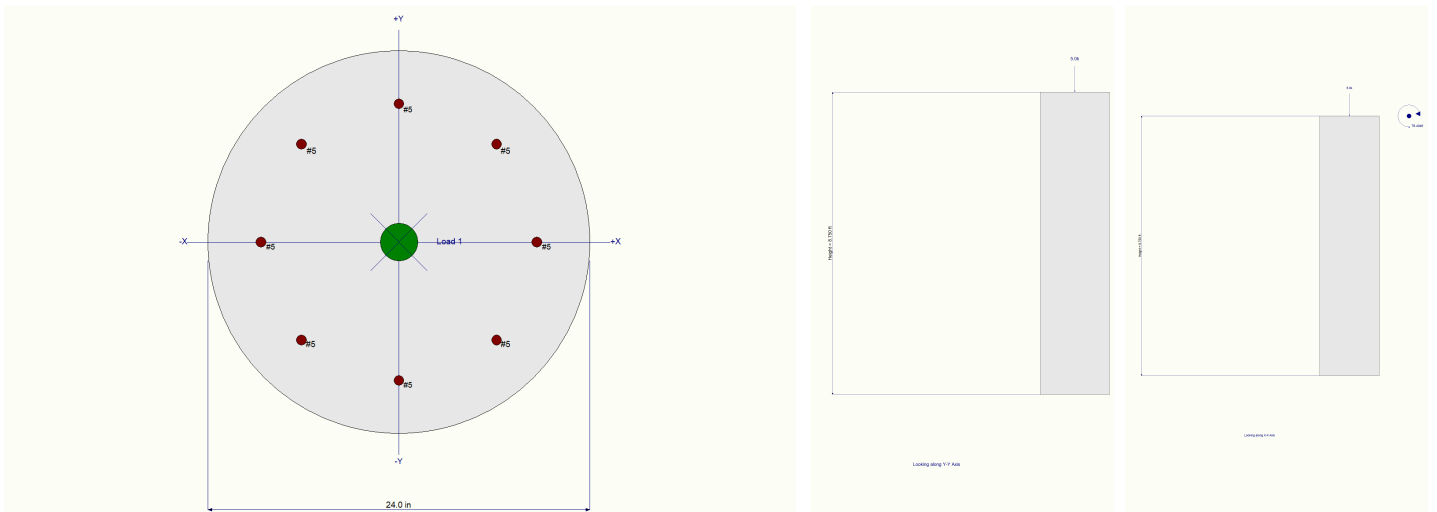
Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		Moment About Y-Y Axis	
	@ Base	@ Top	@ Base	@ Top

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
------------------	---------------------	----------	---------------------	----------

Sketches



3. Baseball Tournament Scoreboard – 8'-6" (H) x 20'-0" (W)

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, (C_s)

$I_e = 1.0$, (Risk Category II)

$R = 1.25$

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)}, \text{ (ASCE 7 - 16, 12.8 - 2), } C_s = \frac{1.349}{\left(\frac{1.25}{1.0}\right)} = 1.08$$

$$C_{s-\text{Min}} = 0.044S_{DS}I_e, \text{ (ASCE 7 - 16, 12.8 - 5), } C_{s-\text{Min}} = (0.044(1.08)(1)) = 0.05$$

Therefore Use $C_s = 1.08$

Seismic Weight, (W)

- Scoreboard SO-2021+SL-03761. = 734 lbs @ 14.25'
- HSS12x12x1/2Columns, (2) (49.6 lbs plf)(18.5ft) = 1,835 lbs @ 9.25' to center of gravity from F.G.

Seismic Base Shear, (V)

$$V = C_s W, \text{ (ASCE 7 - 16, 12.8 - 1)}$$

$$V = \text{Seismic Base Shear} = (1.08)(2,569 \text{ lbs}) = 2,775 \text{ lbs}$$

$$V_{\text{ASD}} = (0.7)(1,310.3 \text{ lbs}) = 1,943 \text{ lbs}$$

Feature	Seismic Weight (lbs)	Height to Feature (ft)	Seismic Base Shear (lbs)	OT Moment (ft-lbs)
Scoreboard	734#	14	793#	11,102
HSS12x12x0.25	1,835#	10	1,982#	19,820
Total (per column)	2,569#		2,775#	30,922

Applied Moment to each footing, (seismic) = 30,922 ft-lbs = 30.9 ft-kips, 15.5ft-kips per column

Wind Load, (ASCE 7-22)

$$\text{Wind Load} = 30\text{psf} \times 20' \times 8.5' + 30\text{psf} \times 10' \times 2 \times \frac{2}{3} = 5,500 \text{ lbs}$$

$$\text{Applied Moment, (wind)} = (5,500 \text{ lbs})(14.25') = 78,375 \text{ ft-lb} = 78.4 \text{ ft-kips, 39.2 ft-kips per column}$$

(Wind Controls)

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.3 Signboard Post (Baseball Tournament Scoreboard)

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : **HSS8x8x3/8**

Analysis Method : Load Resistance Factor

Steel Stress Grade : A500, Grade B, Fy = 46 ksi, Carbon Steel

Fy : Steel Yield 46.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height

18.5 ft

Top & Bottom Fixity

Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 18.5 ft, K = 2.1

Unbraced Length for buckling ABOUT Y-Y Axis = 18.5 ft, K = 2.1

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 697.27 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 18.50 ft, D = 2.0 k

BENDING LOADS . . .

Wind Shear-x: Moment acting about Y-Y axis at 18.50 ft, W = 39.20 k-ft

EQ-x: Moment acting about Y-Y axis at 18.50 ft, E = 15.50 k-ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =

Load Combination

Location of max.above base

At maximum location values are . . .

Pu

0.9 * Pn

Mu-x

0.9 * Mn-x :

Mu-y

0.9 * Mn-y :

0.4021 : 1

+1.20D+W

0.0 ft

3.237 k

103.885 k

0.0 k-ft

101.430 k-ft

39.20 k-ft

101.430 k-ft

Maximum Load Reactions . .

Top along X-X

0.0 k

Bottom along X-X

0.0 k

Top along Y-Y

0.0 k

Bottom along Y-Y

0.0 k

Maximum Load Deflections . . .

Along Y-Y -2.712 in at

8.0ft above base

for load combination : D Only

Along X-X 0.0 in at

0.0ft above base

for load combination :

PASS Maximum Shear Stress Ratio

0.0 : 1

Load Combination

Location of max.above base

At maximum location values are . . .

Vu : Applied

Vn * Phi : Allowable

0.0

0.0 ft

0.0 k

0.0 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
------------------	--------------------------	-----------------------------------	---	-----------------------------------	----------------------------------	------	----------------------------------

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
------	---------------	--------------------------	-----------------------------------	---	-----------------------------------	----------------------------------	------	----------------------------------

Steel Section Properties : HSS8x8x3/8

Steel Section Properties : HSS8x8x3/8

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

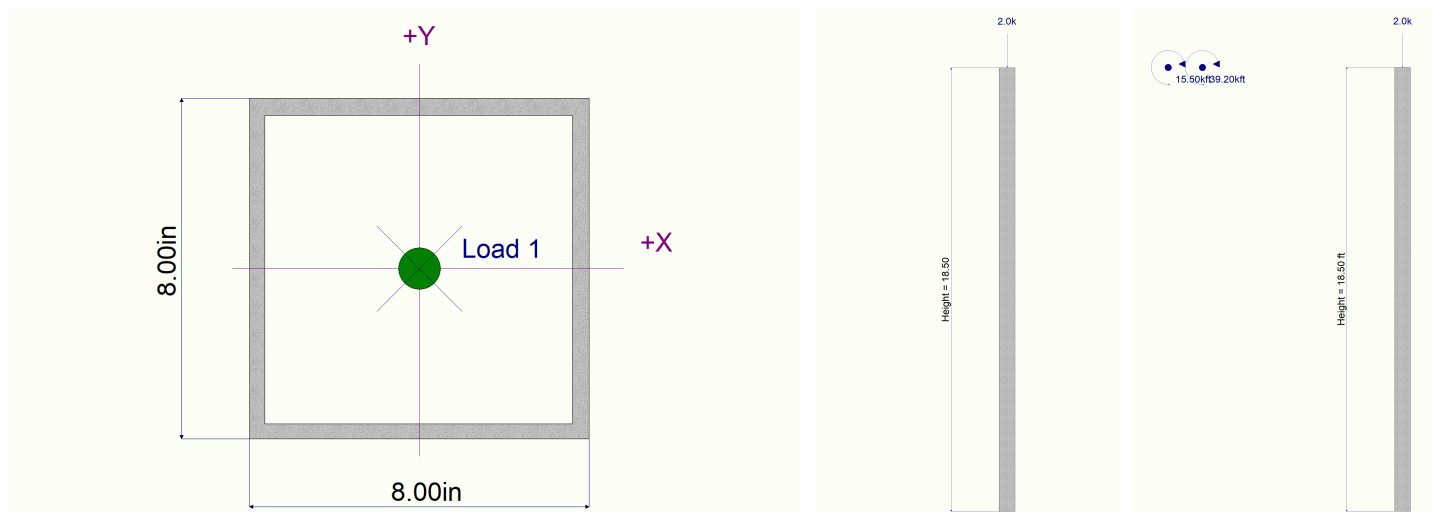
(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.3 Signboard Post (Baseball Tournament Scoreboard)

Depth	=	8.000 in	I xx	=	100.00 in ⁴	J	=	160.000 in ⁴
Design Thick	=	0.349 in	S xx	=	24.90 in ³			
Width	=	8.000 in	R xx	=	3.100 in			
Wall Thick	=	0.375 in	Zx	=	29.400 in ³			
Area	=	10.400 in ²	I yy	=	100.000 in ⁴	C	=	40.700 in ³
Weight	=	37.690 #/ft	S yy	=	24.900 in ³			
			R yy	=	3.100 in			

Ycg = 0.000 in

Sketches



Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.3 Signboard Post Embedment (Baseball Tournament Scoreboard)

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 24.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination 0.60W
Lateral Load 2.352 k
Moment 23.520 k-ft

NO Ground Surface Restraint

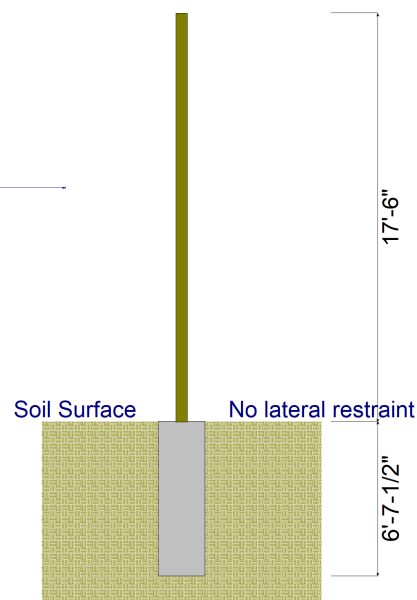
Pressures at 1/3 Depth

Actual 1,100.27 psf
Allowable 1,103.24 psf

Minimum Required Depth 6.625 ft

Footing Base Area 3.142 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	3.920 k		k/ft	k
E : Earthquake	1.550 k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	10.0 ft	TOP of Load above ground surface	17.50 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	2.352	23.520	6.63	1,100.3	1,103.2	1.000
+0.450W	1.764	17.640	6.00	986.2	989.3	1.000
E Only * 0.70	1.085	10.850	5.00	822.0	824.5	1.000
E Only * 0.5250	0.814	8.138	4.50	738.5	741.4	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.3 Signboard Post CIDH Caisson (Baseball Tournament Scoreboard)

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

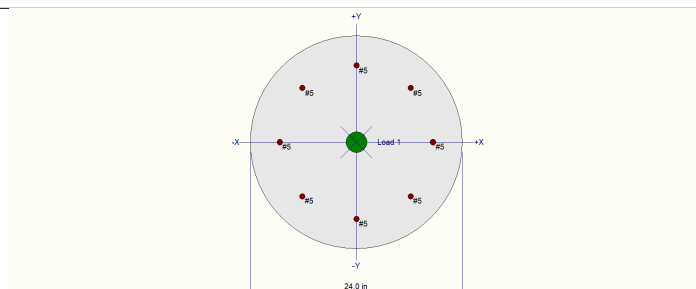
f'c : Concrete 28 day strength = 4.0 ksi
E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.0
fy - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 0.50 %
Max. Reinf. = 8.0 %
Seismic Design Category = D

Overall Column Height = 7.667 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along column
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 24.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 8 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 3,612.99 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 7.667 ft above base, D = 5.0 k

BENDING LOADS . . .

Wind + Seismic Moment: Moment acting about X-X axis at 7.667 ft, W = 39.20, E = 15.50 k-ft

DESIGN SUMMARY

Load Combination	0.0	Maximum SERVICE Load Reactions .			
Location of max.above base	0.0ft	Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.0 : 1	Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5					
Pu =	0.0 k	φ * Pn =	0.0 k	Maximum SERVICE Load Deflections . .	
Mu-x =	0.0 k-ft	φ * Mn-x =	0.0 k-ft	Along Y-Y	0.0in at 0.0ft above base
Mu-y =	0.0 k-ft	φ* Mn-y =	0.0 k-ft	for load combination : 0.0	
Mu Angle =	18.0 deg	φ =	0.90	Along X-X	0.0in at 0.0ft above base
Mu at Angle =	156.501 k-ft	φMn at Angle =	395.048 k-ft	for load combination : 0.0	
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>					
Column Capacities . .		General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacity	0.0 k	ρ : % Reinforcing	0.0 %	Rebar	β =0.0 θ = 0.0
Pnmin : Nominal Min. Tension Axial Capacity	k	Reinforcing Area	0.0 in2	< Min of 0.50 %	
φ Pn, max : Usable Compressive Axial Capacity	0.0 k	Concrete Area	0.0 in2		
φ Pn, min : Usable Tension Axial Capacity	k				

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.3 Signboard Post CIDH Caisson (Baseball Tournament Scoreboard)

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load		Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	$\phi * Pn$	δx	$\delta x * Mux$	δy	$\delta y * Muy$	Alpha (deg)	δMu	ϕMn	Ratio

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	

Maximum Moment Reactions

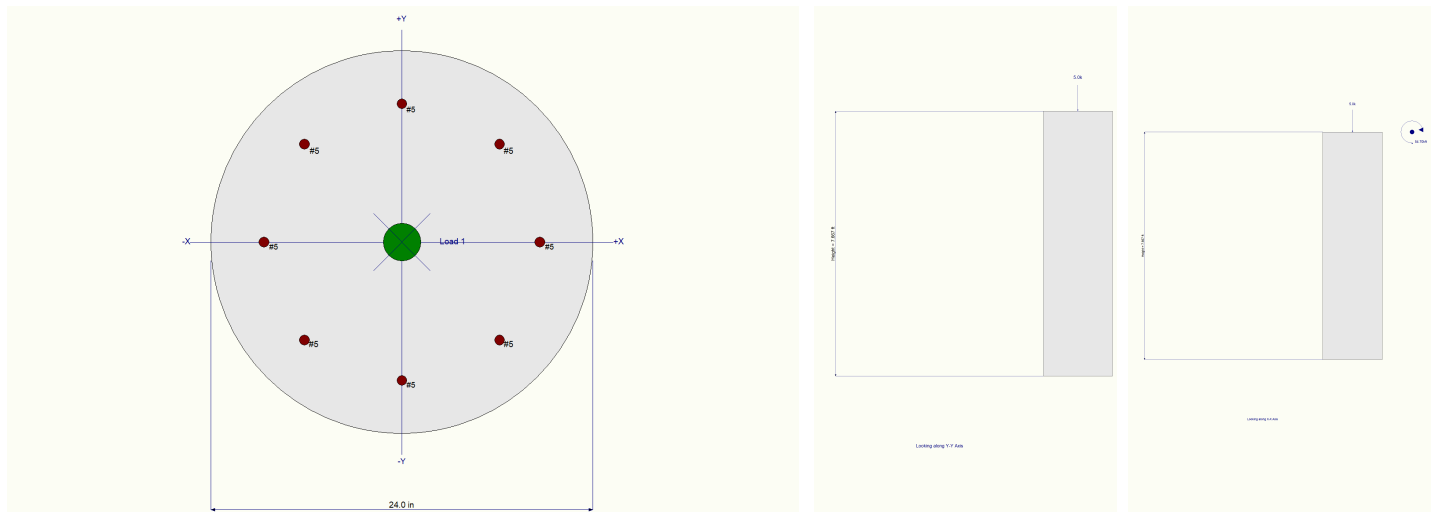
Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		k	Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
------------------	---------------------	----------	---------------------	----------

Sketches



4. Baseball Championship Scoreboard – 11'-4" (H) x 36'-0" (W) (3 columns)

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, (C_s)

$I_e = 1.0$, (Risk Category II)

$R = 1.25$

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)}, \text{ (ASCE 7 - 16, 12.8 - 2), } C_s = \frac{1.349}{\left(\frac{1.25}{1.0}\right)} = 1.08$$

$$C_{s-\text{Min}} = 0.044S_{DS}I_e, \text{ (ASCE 7 - 16, 12.8 - 5), } C_{s-\text{Min}} = (0.044)(1.08)(1) = 0.05$$

Therefore Use $C_s = 1.08$

Seismic Weight, (W)

- Scoreboard SO-2021+SL-03761. = 1,765 lbs @ 15.67'
- HSS12x12x1/2Columns, (3) (49.6 lbs plf)(22.333ft) = 3,323 lbs @ 11.17' to center of gravity from F.G.

Seismic Base Shear, (V)

$$V = C_s W, \text{ (ASCE 7 - 16, 12.8 - 1)}$$

$$V = \text{Seismic Base Shear} = (1.08)(5,088 \text{ lbs}) = 5,495 \text{ lbs}$$

$$V_{\text{ASD}} = (0.7)(1,310.3 \text{ lbs}) = 3,847 \text{ lbs}$$

Feature	Seismic Weight (lbs)	Height to Feature (ft)	Seismic Base Shear (lbs)	OT Moment (ft-lbs)
Scoreboard	1,765#	15.67	1,906#	29,861
HSS12x12x0.25	3,323#	11.17	3,589#	40,077
Total (per column)	5,088#		5,495#	69,938

Applied Moment to each footing, (seismic) = 69,938 ft-lbs = 70 ft-kips, 35ft-kips @ interior, 17.5ft-kips @ exterior

Wind Load, (ASCE 7-22)

$$\text{Wind Load} = 30\text{psf} \times 36' \times 11.33' + 30\text{psf} \times 10' \times 3 \times \frac{2}{3} = 12,840 \text{ lbs}$$

Applied Moment, (wind) = (12,840 lbs)(15.67') = 201,160 ft-lb = 201 ft-kips @ interior column, 51ft-kips @ exterior

(Wind Controls)

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.4 Signboard Post (Baseball Championship Scoreboard)

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name :	HSS9x9x3/8	Overall Column Height	21.33333333 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade	, A500, Grade B, Fy = 46 ksi, Carbon Steel	Brace condition :	
Fy : Steel Yield	46.0 ksi	Unbraced Length for buckling ABOUT X-X Axis =	21.33333333 ft, K =
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis =	21.33333333 ft, K =

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 912.85 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 21.333 ft, D = 2.0 k

BENDING LOADS . . .

Wind x: Moment acting about Y-Y axis at 21.333 ft, W = 101.0 k-ft

EQ-x: Moment acting about Y-Y axis at 21.333 ft, E = 35.0 k-ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.7899 : 1	Maximum Load Reactions . .	
Load Combination	+1.20D+W	Top along X-X	0.0 k
Location of max.above base	18.613 ft	Bottom along X-X	0.0 k
At maximum location values are . . .		Top along Y-Y	0.0 k
Pu	3.495 k	Bottom along Y-Y	0.0 k
0.9 * Pn	113.636 k	Maximum Load Deflections . . .	
Mu-x	0.0 k-ft	Along Y-Y	-2.712 in at 8.0ft above base
0.9 * Mn-x :	130.410 k-ft	for load combination : D Only	
Mu-y	101.0 k-ft	Along X-X	0.0 in at 0.0ft above base
0.9 * Mn-y :	130.410 k-ft	for load combination :	
PASS Maximum Shear Stress Ratio	0.0 : 1		
Load Combination	0.0		
Location of max.above base	0.0 ft		
At maximum location values are . . .			
Vu : Applied	0.0 k		
Vn * Phi : Allowable	0.0 k		

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
------------------	--------------------------	-----------------------------------	---	-----------------------------------	----------------------------------	------	----------------------------------

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
------	---------------	--------------------------	-----------------------------------	---	-----------------------------------	----------------------------------	------	----------------------------------

Steel Section Properties : HSS9x9x3/8

Steel Section Properties : HSS9x9x3/8

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

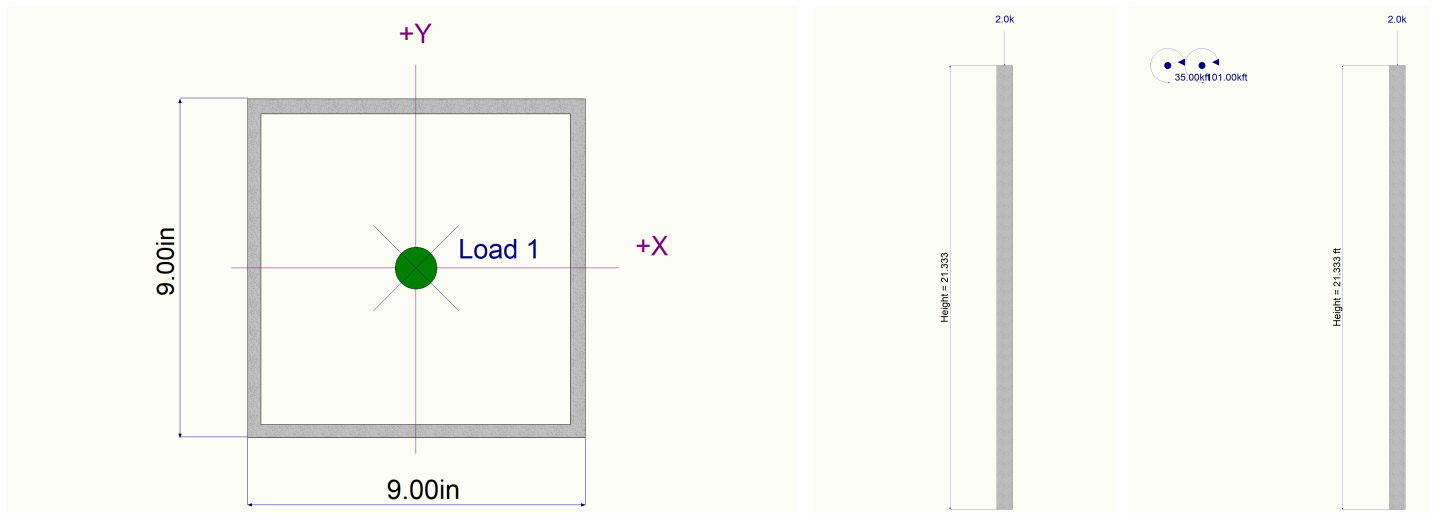
(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.4 Signboard Post (Baseball Championship Scoreboard)

Depth	=	9.000 in	I xx	=	145.00 in ⁴	J	=	231.000 in ⁴
Design Thick	=	0.349 in	S xx	=	32.20 in ³			
Width	=	9.000 in	R xx	=	3.510 in			
Wall Thick	=	0.375 in	Zx	=	37.800 in ³			
Area	=	11.800 in ²	I yy	=	145.000 in ⁴	C	=	52.100 in ³
Weight	=	42.790 #/ft	S yy	=	32.200 in ³			
			R yy	=	3.510 in			

Ycg = 0.000 in

Sketches



Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.4 Signboard Post Embedment (Baseball Championship Scoreboard)

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 24.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination 0.60W
Lateral Load 6.060 k
Moment 60.60 k-ft

NO Ground Surface Restraint

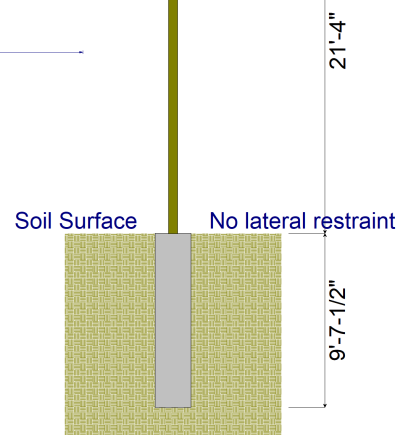
Pressures at 1/3 Depth

Actual 1,588.60 psf
Allowable 1,592.46 psf

Minimum Required Depth 9.625 ft

Footing Base Area 3.142 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	10.10 k		k/ft	k
E : Earthquake	3.50 k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	10.0 ft	TOP of Load above ground surface	21.333 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	6.060	60.600	9.63	1,588.6	1,592.5	1.000
+0.450W	4.545	45.450	8.63	1,418.5	1,422.7	1.000
E Only * 0.70	2.450	24.500	6.75	1,116.9	1,121.0	1.000
E Only * 0.5250	1.838	18.375	6.13	1,002.1	1,004.3	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.4 Signboard Post CIDH Caisson (Baseball Championship Scoreboard)

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

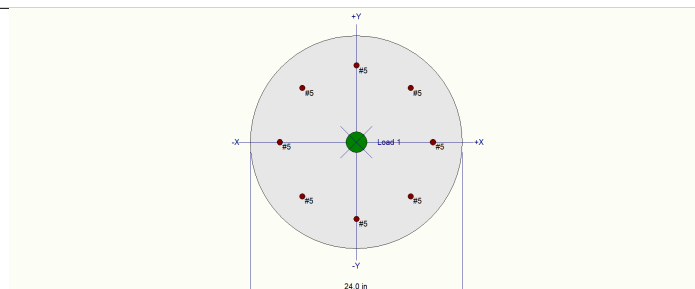
f'_c : Concrete 28 day strength = 4.0 ksi
E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.0
 f_y - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 0.50 %
Max. Reinf. = 8.0 %
Seismic Design Category = D

Overall Column Height = 10.667 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along column
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 24.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 8 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 5,026.71 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 10.667 ft above base, D = 5.0 k

BENDING LOADS . . .

Wind + Seismic Moment: Moment acting about X-X axis at 10.667 ft, W = 101.0, E = 35.0 k-ft

DESIGN SUMMARY

Load Combination	0.0	Maximum SERVICE Load Reactions .			
Location of max.above base	0.0ft	Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.0 : 1	Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5					
Pu =	0.0 k	φ * Pn =	0.0 k	Maximum SERVICE Load Deflections . .	
Mu-x =	0.0 k-ft	φ * Mn-x =	0.0 k-ft	Along Y-Y	0.0 in at 0.0 ft above base
Mu-y =	0.0 k-ft	φ* Mn-y =	0.0 k-ft	for load combination : 0.0	
Mu Angle =	18.0 deg	φ =	0.90	Along X-X	0.0in at 0.0ft above base
Mu at Angle =	156.501 k-ft	φMn at Angle =	395.048 k-ft	for load combination : 0.0	
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>					
Column Capacities . .		General Section Information		β =0.0	θ = 0.0
Pnmax : Nominal Max. Compressive Axial Capacity	0.0 k	ρ : % Reinforcing	0.0 %	Rebar < Min of 0.50 %	
Pnmin : Nominal Min. Tension Axial Capacity	k	Reinforcing Area	0.0 in2		
φ Pn, max : Usable Compressive Axial Capacity	0.0 k	Concrete Area	0.0 in2		
φ Pn, min : Usable Tension Axial Capacity	k				

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 12.4 Signboard Post CIDH Caisson (Baseball Championship Scoreboard)

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft					Utilization	
	X-X	Y-Y		Pu	$\phi * Pn$	δx	$\delta x * Mux$	δy	$\delta y * Muy$	Alpha (deg)	δMu	ϕMn Ratio

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top

Maximum Moment Reactions

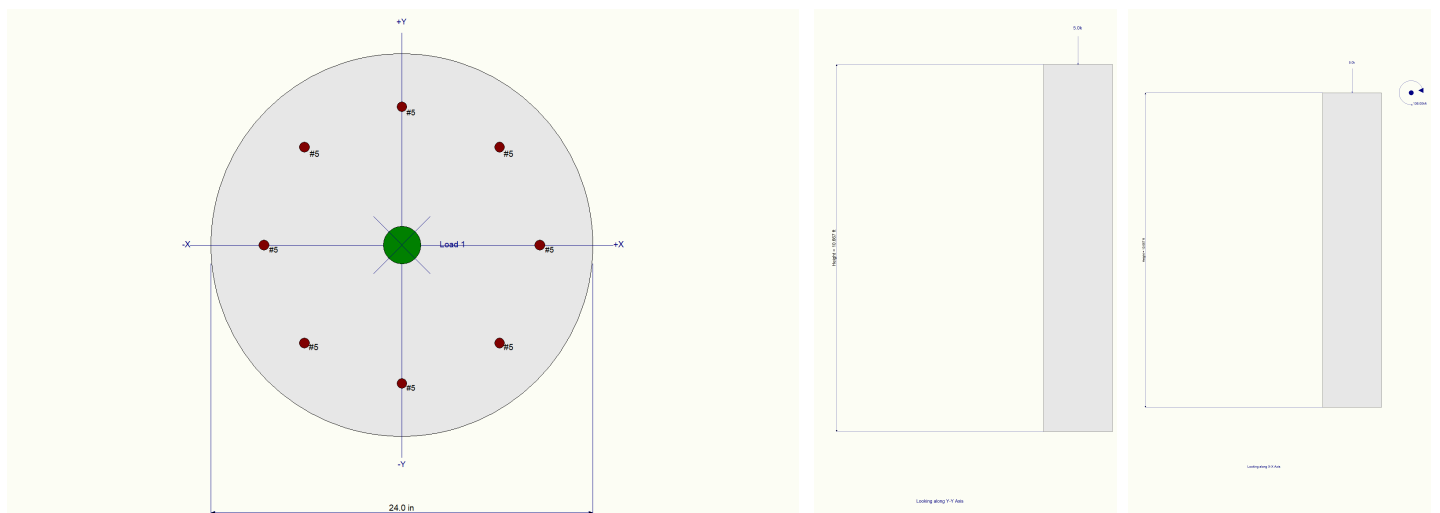
Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
------------------	---------------------	----------	---------------------	----------

Sketches



13. 8' Ht. Backstop Fencing, (Landscape Detail 1/L-2.11)

8' Ht. Backstop Fencing, (Landscape Detail 1/L-2.11)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 8'-0" Tall
- 8'-0" (max) spacing between posts

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% wind loading due to open nature of chain-link fencing

Total Wind Load per Post = 30 psf x 8' x 8' x 0.25 = 480 lbs

Applied Moment due to Wind = 480 lbs x $8 - ft / 2$ = 1,920 ft – lbs

$M_u = 1,920 \text{ ft} - \text{lbs}$

$V_u = 480 \text{ lbs}$

Enercalc: 1,920/8 = **240 lbs @ 8'**

Pole Capacity Check

$\phi M_n = 0.9(3,657.5 \text{ ft} - \text{lbs}) = 3,291.8 \text{ ft} - \text{lbs}$

$\phi M_n = 3,291.8 \text{ ft} - \text{lbs} > M_u = 1,920 \text{ ft} - \text{lbs}, (OK)$

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 13. Backstop Fence Post Embedment - 8' High Fence

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination 0.60W
Lateral Load 0.1440 k
Moment 1.152 k-ft

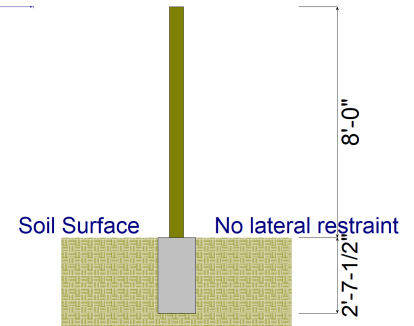
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 427.347 psf
Allowable 430.950 psf

Minimum Required Depth 2.625 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.240 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.144	1.152	2.63	427.3	430.9	1.000
+0.450W	0.108	0.864	2.38	385.2	388.7	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 13. Backstop Fence Post CIDH Caisson- 8' High Fence

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

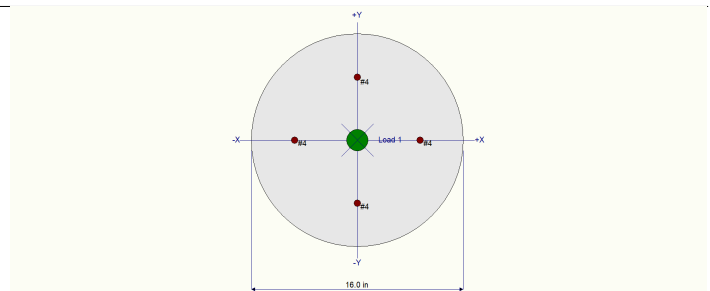
f'_c : Concrete 28 day streng	=	3.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.20 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	4.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum		
X-X (width) axis :		
Unbraced Length for buckling ABOUT X-X Axis = 4.0 ft, K = 1.0		
Y-Y (depth) axis :		
Unbraced Length for buckling ABOUT Y-Y Axis = 4.0 ft, K = 1.0		

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 4 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 837.76 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 4.0 ft above base, D = 1.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 3.750 ft, W = 2.280 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W		Maximum SERVICE Load Reactions .			
Location of max.above base	3.973 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
			Top along X-X	0.0 k	Bottom along X-X	0.0 k
Maximum Stress Ratio	0.068 : 1		Maximum SERVICE Load Deflections . . Along Y-Y -0.003106 in at 4.0 ft above base for load combination : W Only Along X-X 0.0in at 0.0 ft above base for load combination : General Section Information ρ : % Reinforcing 0.3979 % Rebar % Ok Reinforcing Area 0.80 in^2 Concrete Area 201.062 in^2			
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu = 1.654 k	ϕ * Pn = 23.579 k					
Mu-x = 2.280 k-ft	ϕ * Mn-x = 34.189 k-ft					
Mu-y = 0.1489 k-ft	ϕ * Mn-y = 2.074 k-ft					
	ϕ = 0.90					
Mu Angle = 4.0 deg						
Mu at Angle = 2.285 k-ft	ϕ Mn at Angle = 33.650 k-ft					
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .						
Pnmax : Nominal Max. Compressive Axial Capacit	558.67 k					
Pnmin : Nominal Min. Tension Axial Capacity	k					
ϕ Pn, max : Usable Compressive Axial Capacity	290.507 k					
ϕ Pn, min : Usable Tension Axial Capacity	k					

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 13. Backstop Fence Post CIDH Caisson- 8' High Fence

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft								Utilization	
	X-X	Y-Y		Pu	ϕ * Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δMu	ϕMn	Ratio		
+1.40D	Actual	M2,min	3.97	2.57	290.51	1.000		1.000	0.23	90.000	0.23	26.32	0.009		
+1.40D	M2,min	Actual	3.97	2.57	290.51	1.000	0.23	1.000		0.000	0.23	26.32	0.009		
+1.20D	Actual	M2,min	3.97	2.21	290.51	1.000		1.000	0.20	90.000	0.20	26.32	0.008		
+1.20D	M2,min	Actual	3.97	2.21	290.51	1.000	0.20	1.000		0.000	0.20	26.32	0.008		
+1.20D+0.50W	Actual	M2,min	3.97	2.21	96.13	1.000	1.14	1.000	0.20	10.000	1.16	50.40	0.023		
+1.20D+W	Actual	M2,min	3.97	2.21	39.13	1.000	2.28	1.000	0.20	5.000	2.29	39.98	0.057		
+0.90D+W	Actual	M2,min	3.97	1.65	23.58	1.000	2.28	1.000	0.15	4.000	2.29	33.65	0.068		
+0.90D	Actual	M2,min	3.97	1.65	290.51	1.000		1.000	0.15	90.000	0.15	26.32	0.006		
+0.90D	M2,min	Actual	3.97	1.65	290.51	1.000	0.15	1.000		0.000	0.15	26.32	0.006		

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k		Y-Y Axis Reaction k		Axial Reaction @ Base	Mx - End Moments k-ft		My - End Moments k-ft	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					1.838				
+D+0.60W					1.838	-1.368			
+D+0.450W					1.838	-1.026			
+0.60D+0.60W					1.103	-1.368			
+0.60D					1.103				
W Only						-2.280			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		Moment About Y-Y Axis	
	@ Base	@ Top	@ Base	@ Top
D Only				
+D+0.60W	-1.368			
+D+0.450W	-1.026			
+0.60D+0.60W	-1.368			
+0.60D				
W Only	-2.280			

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Max. Y-Y Deflection	
	Distance	Distance	Distance	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	-0.002 in	4.000 ft
+D+0.450W	0.0000 in	0.000 ft	-0.001 in	4.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	-0.002 in	4.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	-0.003 in	3.973 ft

14. 20' Ht. Backstop Fencing/Soccer Containment Netting,
(Landscape Detail 1/L-2.11)

20' Ht. Backstop Fencing/Soccer Containment Netting, (Landscape Detail 1/L-2.11)

Weight of netting above grade is insignificant, seismic loading is ignored.

- 20'-0" Tall
- 44'-0" (max) spacing between posts

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 10% wind loading due to open nature of netting

Total Wind Load per Post = 1,707.5 lbs, (See *Wind Loading Spreadsheet*)

Applied Moment due to Wind = 23.9 ft – kips, (See *Wind Loading Spreadsheet*)

$M_u = 23.9 \text{ ft} - \text{kips}$

$V_u = 1.71 \text{ kips}$

Enercalc: $23.9 \text{ k-ft}/20\text{ft} = 1.2 \text{ kips @ } 20'$

Wind Load (ASCE 7-22) - Chapter 29, Solid Free-Standing Wall

Improvement: Baseball Field Netting Wind Load, (20-foot tall pole)

Velocity Pressure $q_z = 0.00256 K_z K_{zt} K_d K_e V^2$ (lb/ft²); V in mi/h (26.10-1)

Risk Category	II	(table 1.5-1)
Basic Wind Speed (V)	110	(figure 26.5-1B)

Wind Load Parameters

K_d	0.85	(table 26.6-1)
Exposure Category	C	(section 26.7)
K_{zt}	1	(section 26.8) - Assume no speed-up
K_z	0.85	(table 26.10-1)
K_e	1	(section 26.9)
G	0.85	(section 26.11.1) - Rigid Structure
q_z	22.38016	(equation 26.10-1)

Wind Load on Netting $F = q_h G C_f A_s$ (Eqn. 29.3-1)

B = (Maximum Tributary Width)	44	feet
S = (Maximum Tributary Height)	12	feet
H = (Height to top of Wind Loaded Area)	20	feet
B/S	3.7	Aspect Ratio
S/H	0.6	Clearance Ratio
C_f	1.7	(Force Coefficient, Figure 29.3-1)
A_s	528	Unit Area of Loading, sqft
Total Wind Load	17,075.2	lbs
Sports netting; use 10% wind load	1,707.5	lbs
Height to Center of Wind Loaded Area	14	feet
Moment due to Wind Loading	23.9	ft-kips

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 14. Backstop Fence Post Embedment - 20' High Fence

Code References

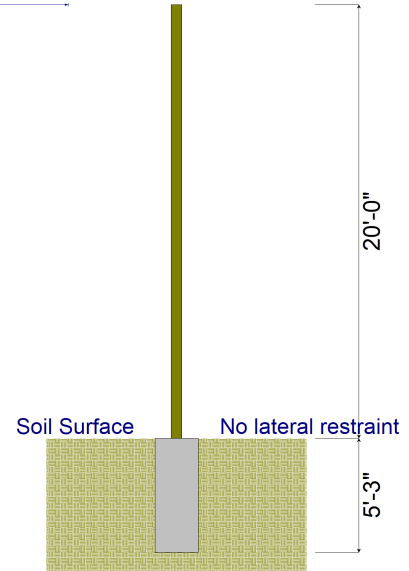
Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 24.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 psf

Point Load



Controlling Values

Governing Load Combination 0.60W
Lateral Load 0.720 k
Moment 14.40 k-ft
NO Ground Surface Restraint
Pressures at 1/3 Depth
Actual 856.63 psf
Allowable 857.97 psf

Minimum Required Depth 5.250 ft

Footing Base Area 3.142 ft²
Maximum Soil Pressure 0.0 ksf

Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	1.20 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	20.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.720	14.400	5.25	856.6	858.0	1.000
+0.450W	0.540	10.800	4.75	773.1	774.9	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 14. Backstop Fence Post CIDH Caisson- 20' High Fence

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

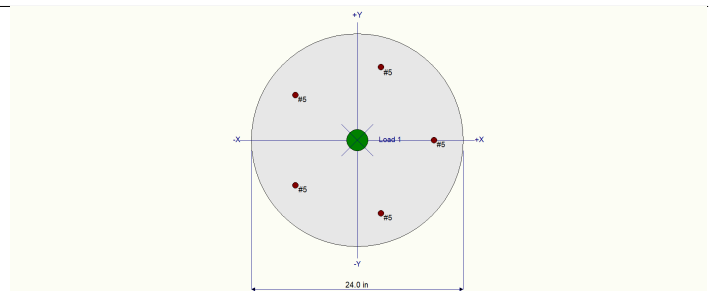
f'c : Concrete 28 day strength = 3.0 ksi
E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.850
fy - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 0.20 %
Max. Reinf. = 8.0 %
Seismic Design Category = D

Overall Column Height = 7.50 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along column
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 24.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 5 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 3,534.29 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 7.50 ft above base, D = 2.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 8.50 ft, W = 60.0 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W	Maximum SERVICE Load Reactions .			
Location of max. above base	7.450 ft	Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Maximum Stress Ratio		Maximum SERVICE Load Deflections . .			
Ratio = $(P_u^2 + M_u^2)^{.5} / (\Phi P_n^2 + \Phi M_n^2)^{.5}$		Along Y-Y -0.05697 in at 7.50 ft above base			
Pu = 4.981 k	$\phi * P_n = 5.584 k$	for load combination : W Only			
Mu-x = 60.0 k-ft	$\phi * M_n-x = 75.433 k-ft$	Along X-X 0.0in at 0.0 ft above base			
Mu-y = 0.5479 k-ft	$\phi * M_n-y = 4.674 k-ft$	for load combination :			
Mu Angle = 1.0 deg	$\phi = 0.90$				
Mu at Angle = 60.003 k-ft	$\phi M_n \text{ at Angle} = 73.719 k-ft$				
Pn & Mn values located at Pu-Mu vector intersection with capacity curve		General Section Information			
Column Capacities . .		$\beta = 0.850$ $\theta = 0.80$			
Pnmax : Nominal Max. Compressive Axial Capacity	1,242.64 k	ρ : % Reinforcing 0.3426 % Rebar % Ok			
Pnmin : Nominal Min. Tension Axial Capacity	k	Reinforcing Area 1.550 in ²			
ϕP_n , max : Usable Compressive Axial Capacity	646.17 k	Concrete Area 452.389 in ²			
ϕP_n , min : Usable Tension Axial Capacity	k				

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 14. Backstop Fence Post CIDH Caisson- 20' High Fence

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	$\delta x * \text{Mux}$	δy	$\delta y * \text{Muy}$	Alpha (deg)	δMu	$\phi \text{ Mn}$	Ratio
+1.40D	Actual	M2,min	7.45	7.75	646.17	1.000			1.000	0.85	90.000	0.85	71.27	0.012
+1.40D	M2,min	Actual	7.45	7.75	646.17	1.000	0.85	1.000			0.000	0.85	71.36	0.012
+1.20D	Actual	M2,min	7.45	6.64	646.17	1.000			1.000	0.73	90.000	0.73	71.27	0.010
+1.20D	M2,min	Actual	7.45	6.64	646.17	1.000	0.73	1.000			0.000	0.73	71.36	0.010
+1.20D+0.50W	Actual	M2,min	7.45	6.64	20.07	1.000	30.00	1.000			1.000	30.01	84.32	0.356
+1.20D+W	Actual	M2,min	7.45	6.64	10.41	1.000	60.00	1.000			1.000	60.00	77.29	0.776
+0.90D+W	Actual	M2,min	7.45	4.98	5.58	1.000	60.00	1.000			1.000	60.00	73.72	0.814
+0.90D	Actual	M2,min	7.45	4.98	646.17	1.000			1.000	0.55	90.000	0.55	71.27	0.008
+0.90D	M2,min	Actual	7.45	4.98	646.17	1.000	0.55	1.000			0.000	0.55	71.36	0.008

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		My - End Moments
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	
D Only						5.534			
+D+0.60W						5.534	-36.000		
+D+0.450W						5.534	-27.000		
+0.60D+0.60W						3.321	-36.000		
+0.60D						3.321			
W Only								-60.000	

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		k-ft	Moment About Y-Y Axis		k-ft
	@ Base	@ Top		@ Base	@ Top	
D Only						
+D+0.60W	-36.000		k-ft			k-ft
+D+0.450W	-27.000		k-ft			k-ft
+0.60D+0.60W	-36.000		k-ft			k-ft
+0.60D			k-ft			k-ft
W Only	-60.000		k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.034	in	7.500 ft
+D+0.450W	0.0000	in	0.000 ft	-0.026	in	7.500 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.034	in	7.500 ft
+0.60D	0.0000	in	0.000 ft	0.000	in	0.000 ft
W Only	0.0000	in	0.000 ft	-0.056	in	7.450 ft

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 14. Backstop Fence Post - 20' High Fence

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name :	Pipe6STD	Overall Column Height	20.0 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade	, ASTM A1085, Fy = 50 ksi, Carbon Steel	Brace condition :	
Fy : Steel Yield	50.0 ksi	Unbraced Length for buckling ABOUT X-X Axis = 12 ft, K = 2.1	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 8 ft, K = 2.1	

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 380.0 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 20.0 ft, D = 2.0 k

BENDING LOADS . . .

Wind Shear: Lat. Point Load at 20.0 ft creating Mx-x, W = 1.20 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.6257 : 1	Maximum Load Reactions . .	
Load Combination	+1.20D+W	Top along X-X	0.0 k
Location of max.above base	0.0 ft	Bottom along X-X	0.0 k
At maximum location values are . . .		Top along Y-Y	0.0 k
Pu	2.856 k	Bottom along Y-Y	1.20 k
0.9 * Pn	65.035 k	Maximum Load Deflections . . .	
Mu-x	-24.0 k-ft	Along Y-Y	7.159 in at 20.0ft above base
0.9 * Mn-x :	39.750 k-ft	for load combination :W Only	
Mu-y	0.0 k-ft	Along X-X	0.0 in at 0.0ft above base
0.9 * Mn-y :	39.750 k-ft	for load combination :	
PASS Maximum Shear Stress Ratio	0.02051 : 1		
Load Combination	+1.20D+W		
Location of max.above base	0.0 ft		
At maximum location values are . . .			
Vu : Applied	1.20 k		
Vn * Phi : Allowable	58.50 k		

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location						Stress Ratio	Status	Location
+1.40D	0.051	PASS	0.00 ft		1.67	1.00	134.40	89.60	0.000	PASS	0.00 ft
+1.20D	0.044	PASS	0.00 ft		1.67	1.00	134.40	89.60	0.000	PASS	0.00 ft
+1.20D+0.50W	0.324	PASS	0.00 ft		1.67	1.00	134.40	89.60	0.010	PASS	0.00 ft
+1.20D+W	0.626	PASS	0.00 ft		1.67	1.00	134.40	89.60	0.021	PASS	0.00 ft
+0.90D+W	0.620	PASS	0.00 ft		1.67	1.00	134.40	89.60	0.021	PASS	0.00 ft
+0.90D	0.033	PASS	0.00 ft		1.67	1.00	134.40	89.60	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
	@ Base		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	2.380										
+D+0.60W	2.380					0.720		-14.400			
+D+0.450W	2.380					0.540		-10.800			
+0.60D+0.60W	1.428					0.720		-14.400			
+0.60D	1.428										
W Only						1.200		-24.000			

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 14. Backstop Fence Post - 20' High Fence

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	2.380						
"	Minimum				1.200	-24.000		
Reaction, X-X Axis Base	Maximum	2.380						
"	Minimum	2.380						
Reaction, Y-Y Axis Base	Maximum				1.200	-24.000		
"	Minimum	2.380						
Reaction, X-X Axis Top	Maximum	2.380						
"	Minimum	2.380						
Reaction, Y-Y Axis Top	Maximum	2.380						
"	Minimum	2.380						
Moment, X-X Axis Base	Maximum	2.380						
"	Minimum		-24.000		1.200	-24.000		
Moment, Y-Y Axis Base	Maximum	2.380						
"	Minimum	2.380						
Moment, X-X Axis Top	Maximum	2.380						
"	Minimum	2.380						
Moment, Y-Y Axis Top	Maximum	2.380						
"	Minimum	2.380						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	4.295 in	20.000 ft
+D+0.450W	0.0000 in	0.000 ft	3.222 in	20.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	4.295 in	20.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	7.087 in	19.866 ft

Steel Section Properties : Pipe6STD

Depth	=	6.625 in	I xx	=	26.50 in^4	J	=	52.900 in^4
			S xx	=	7.99 in^3			
Diameter	=	6.625 in	R xx	=	2.250 in			
Wall Thick	=	0.280 in	Zx	=	10.600 in^3			
Area	=	5.200 in^2	I yy	=	26.500 in^4			
Weight	=	19.000 plf	S yy	=	7.990 in^3			
			R yy	=	2.250 in			
Ycg	=	0.000 in						

Steel Column

Project File: 24-130-00_ontario sports park.ec6

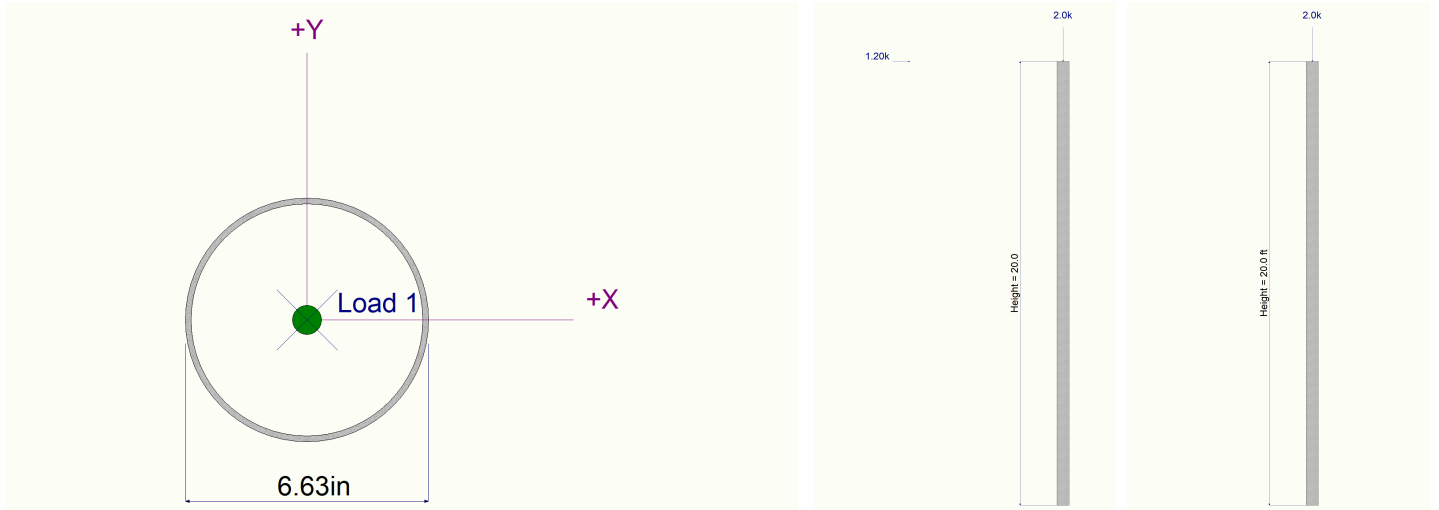
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 14. Backstop Fence Post - 20' High Fence

Sketches



15. 30' Ht. Backstop Fencing, (Landscape Detail 1/L-2.11)

30' Ht. Backstop Fencing, (Landscape Detail 1/L-2.11)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 30'-0" Tall
- 44'-0" (typ.) spacing between posts

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 10% wind loading due to open nature of netting

Total Wind Load per Post = 2,964.3 lbs, (See *Wind Loading Spreadsheet*)

Applied Moment due to Wind = 56.0 *ft – kips*, (See *Wind Loading Spreadsheet*)

$M_u = 56 \text{ k} - \text{ft}$

$V_u = 2.95 \text{ kips}$

Enercalc: 56-ft-kips/30ft = 1.9 kips @ 30'

Wind Load (ASCE 7-22) - Chapter 29, Solid Free-Standing Wall

Improvement: Baseball Field Netting Wind Load, (30-foot tall pole)

Velocity Pressure $q_z = 0.00256 K_z K_{zt} K_d K_e V^2$ (lb/ft²); V in mi/h (26.10-1)

Risk Category	II	(table 1.5-1)
Basic Wind Speed (V)	110	(figure 26.5-1B)

Wind Load Parameters

K_d	0.85	(table 26.6-1)
Exposure Category	C	(section 26.7)
K_{zt}	1	(section 26.8) - Assume no speed-up
K_z	0.85	(table 26.10-1)
K_e	1	(section 26.9)
G	0.85	(section 26.11.1) - Rigid Structure
q_z	22.38016	(equation 26.10-1)

Wind Load on Netting $F = q_h G C_f A_s$ (Eqn. 29.3-1)

B = (Maximum Tributary Width)	44	feet
S = (Maximum Tributary Height)	22	feet
H = (Height to top of Wind Loaded Area)	30	feet
B/S	2.0	Aspect Ratio
S/H	0.733333333	Clearance Ratio
C_f	1.6	(Force Coefficient, Figure 29.3-1)
A_s	968	Unit Area of Loading, sqft
Total Wind Load	29,463.0	lbs
Sports netting; use 10% wind load	2,946.3	lbs
Height to Center of Wind Loaded Area	19	feet
Moment due to Wind Loading	56.0	ft-kips

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 15. Backstop Fence Post Embedment - 30' High Fence

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 30.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

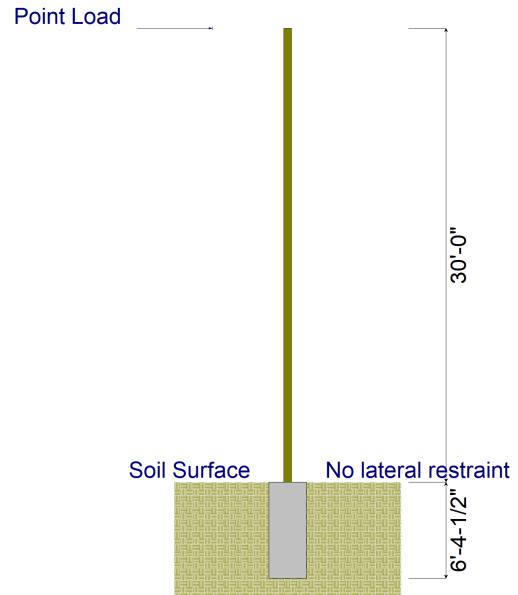
Governing Load Combination 0.60W
Lateral Load 1.140 k
Moment 34.20 k-ft

NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 1,048.79 psf
Allowable 1,049.84 psf

Minimum Required Depth 6.375 ft

Footing Base Area 4.909 ft²
Maximum Soil Pressure 0.0 ksf



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	1.90 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	30.0 ft	TOP of Load above ground surface	30.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	1.140	34.200	6.38	1,048.8	1,049.8	1.000
+0.450W	0.855	25.650	5.75	945.9	950.0	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 15. Backstop Fence Post CIDH Caisson- 30' High Fence

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

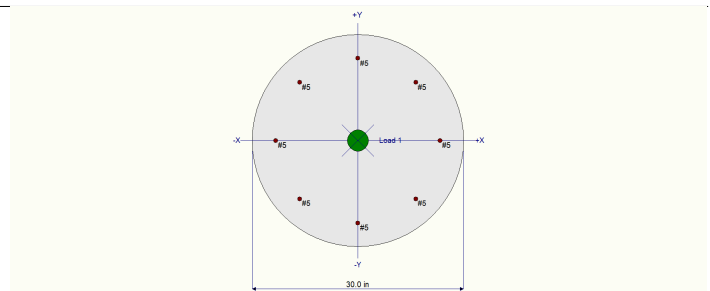
f'_c : Concrete 28 day strength	=	3.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.20 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	8.750 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 30.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 8 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 6,442.72 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 8.750 ft above base, D = 2.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 8.750 ft, W = 56.0 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W		Maximum SERVICE Load Reactions .			
Location of max.above base	8.691 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.353 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	7.598 k	φ * Pn =	21.166 k			
Mu-x =	56.0 k-ft	φ * Mn-x =	161.781 k-ft			
Mu-y =	0.9498 k-ft	φ* Mn-y =	3.343 k-ft			
Mu Angle =	1.0 deg	φ =	0.90			
Mu at Angle =	56.008 k-ft	φMn at Angle =	158.532 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .						
Pnmax : Nominal Max. Compressive Axial Capacity	1,944.97 k					
Pnmin : Nominal Min. Tension Axial Capacity	k					
φ Pn, max : Usable Compressive Axial Capacity	1,011.38 k					
φ Pn, min : Usable Tension Axial Capacity	k					
Maximum SERVICE Load Deflections . .						
Along Y-Y			-0.02964 in at	8.750 ft above base		
for load combination : W Only						
Along X-X			0.0in at	0.0 ft above base		
for load combination :						
General Section Information						
				β =0.850	θ = 0.80	
ρ : % Reinforcing		0.3508 %	Rebar % Ok			
Reinforcing Area		2.480 in^2				
Concrete Area		706.86 in^2				

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 15. Backstop Fence Post CIDH Caisson- 30' High Fence

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft								Utilization	
	X-X	Y-Y		Pu	ϕ * Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio		
+1.40D	Actual	M2,min	8.69	11.82	1,011.38	1.000		1.000	1.48	90.000	1.48	126.40	0.012		
+1.40D	M2,min	Actual	8.69	11.82	1,011.38	1.000	1.48	1.000		0.000	1.48	126.40	0.012		
+1.20D	Actual	M2,min	8.69	10.13	1,011.38	1.000		1.000	1.27	90.000	1.27	126.40	0.010		
+1.20D	M2,min	Actual	8.69	10.13	1,011.38	1.000	1.27	1.000		0.000	1.27	126.40	0.010		
+1.20D+0.50W	Actual	M2,min	8.69	10.13	74.20	1.000	28.00	1.000	1.27	3.000	28.03	203.77	0.138		
+1.20D+W	Actual	M2,min	8.69	10.13	28.71	1.000	56.00	1.000	1.27	1.000	56.01	165.05	0.339		
+0.90D+W	Actual	M2,min	8.69	7.60	21.17	1.000	56.00	1.000	0.95	1.000	56.01	158.53	0.353		
+0.90D	Actual	M2,min	8.69	7.60	1,011.38	1.000		1.000	0.95	90.000	0.95	126.40	0.008		
+0.90D	M2,min	Actual	8.69	7.60	1,011.38	1.000	0.95	1.000		0.000	0.95	126.40	0.008		

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		My - End Moments
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	
D Only						8.443			
+D+0.60W						8.443	-33.600		
+D+0.450W						8.443	-25.200		
+0.60D+0.60W						5.066	-33.600		
+0.60D						5.066			
W Only								-56.000	

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		k-ft	Moment About Y-Y Axis		k-ft
	@ Base	@ Top		@ Base	@ Top	
D Only						
+D+0.60W	-33.600		k-ft			k-ft
+D+0.450W	-25.200		k-ft			k-ft
+0.60D+0.60W	-33.600		k-ft			k-ft
+0.60D			k-ft			k-ft
W Only	-56.000		k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.018	in	8.750 ft
+D+0.450W	0.0000	in	0.000 ft	-0.013	in	8.750 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.018	in	8.750 ft
+0.60D	0.0000	in	0.000 ft	0.000	in	0.000 ft
W Only	0.0000	in	0.000 ft	-0.029	in	8.691 ft

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 15. Backstop Fence Post - 30' High Fence

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name :	Pipe8STD	Overall Column Height	30.0 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade	, ASTM A1085, Fy = 50 ksi, Carbon Steel	Brace condition :	
Fy : Steel Yield	50.0 ksi	Unbraced Length for buckling ABOUT X-X Axis = 22 ft, K = 2.1	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 8 ft, K = 2.1	

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 858.0 lbs * Dead Load Factor

BENDING LOADS . . .

Wind Shear: Lat. Point Load at 30.0 ft creating Mx-x, W = 1.90 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.7410 : 1	Maximum Load Reactions . .	
Load Combination	+1.20D+W	Top along X-X	0.0 k
Location of max.above base	0.0 ft	Bottom along X-X	0.0 k
At maximum location values are . . .		Top along Y-Y	0.0 k
Pu	1.030 k	Bottom along Y-Y	1.90 k
0.9 * Pn	50.212 k	Maximum Load Deflections . . .	
Mu-x	-57.0 k-ft	Along Y-Y	14.887 in at 30.0ft above base
0.9 * Mn-x :	78.0 k-ft	for load combination : W Only	
Mu-y	0.0 k-ft	Along X-X	0.0 in at 0.0ft above base
0.9 * Mn-y :	78.0 k-ft	for load combination :	
PASS Maximum Shear Stress Ratio	0.02152 : 1		
Load Combination	+1.20D+W		
Location of max.above base	0.0 ft		
At maximum location values are . . .			
Vu : Applied	1.90 k		
Vn * Phi : Allowable	88.313 k		

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Maximum Shear Ratios					
	Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Stress Ratio	Status	Location
+1.40D	0.024	PASS	0.00 ft	1.67	1.00	187.93	68.34	0.000	PASS	0.00 ft
+1.20D	0.021	PASS	0.00 ft	1.67	1.00	187.93	68.34	0.000	PASS	0.00 ft
+1.20D+0.50W	0.376	PASS	0.00 ft	1.67	1.00	187.93	68.34	0.011	PASS	0.00 ft
+1.20D+W	0.741	PASS	0.00 ft	1.67	1.00	187.93	68.34	0.022	PASS	0.00 ft
+0.90D+W	0.738	PASS	0.00 ft	1.67	1.00	187.93	68.34	0.022	PASS	0.00 ft
+0.90D	0.015	PASS	0.00 ft	1.67	1.00	187.93	68.34	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
D Only	0.858						
+D+0.60W	0.858			1.140	-34.200		
+D+0.450W	0.858			0.855	-25.650		
+0.60D+0.60W	0.515			1.140	-34.200		
+0.60D	0.515						
W Only				1.900	-57.000		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	0.858						



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 15. Backstop Fence Post - 30' High Fence

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
"	Minimum				1.900	-57.000		
Reaction, X-X Axis Base	Maximum	0.858						
"	Minimum	0.858						
Reaction, Y-Y Axis Base	Maximum				1.900	-57.000		
"	Minimum	0.858						
Reaction, X-X Axis Top	Maximum	0.858						
"	Minimum	0.858						
Reaction, Y-Y Axis Top	Maximum	0.858						
"	Minimum	0.858						
Moment, X-X Axis Base	Maximum	0.858						
"	Minimum		-57.000		1.900	-57.000		
Moment, Y-Y Axis Base	Maximum	0.858						
"	Minimum	0.858						
Moment, X-X Axis Top	Maximum	0.858						
"	Minimum	0.858						
Moment, Y-Y Axis Top	Maximum	0.858						
"	Minimum	0.858						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	8.932 in	30.000 ft
+D+0.450W	0.0000 in	0.000 ft	6.699 in	30.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	8.932 in	30.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	14.736 in	29.799 ft

Steel Section Properties : Pipe8STD

Depth	=	8.625 in	I xx	=	68.10 in^4	J	=	136.000 in^4
			S xx	=	15.80 in^3			
Diameter	=	8.625 in	R xx	=	2.950 in			
Wall Thick	=	0.322 in	Zx	=	20.800 in^3			
Area	=	7.850 in^2	I yy	=	68.100 in^4			
Weight	=	28.600 plf	S yy	=	15.800 in^3			
			R yy	=	2.950 in			
Ycg	=	0.000 in						

Steel Column

Project File: 24-130-00_ontario sports park.ec6

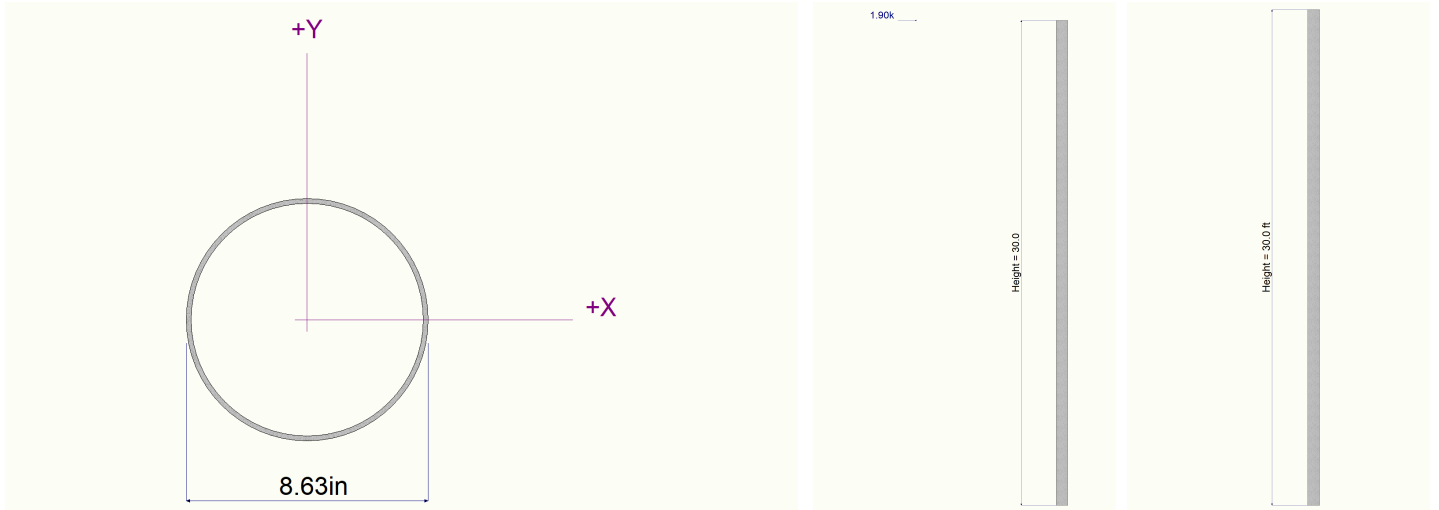
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 15. Backstop Fence Post - 30' High Fence

Sketches



16. 40' Ht. Backstop Fencing, (Landscape Detail 1/L-2.11)

40' Ht. Backstop Fencing, (Landscape Detail 1/L-2.11)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 40'-0" Tall
- 40'-0" (typ.) spacing between posts

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 10% wind loading due to open nature of netting

Total Wind Load per Post = 4,017.7 lbs, (See *Wind Loading Spreadsheet*)

Applied Moment due to Wind = 96.4 ft – kips, (See *Wind Loading Spreadsheet*)

$M_u = 96.4 \text{ ft} - \text{kips}$

$V_u = 4.0 \text{ kips}$

Enercalc: $96.4 \text{ ft-kips}/40\text{ft} = 2.41 \text{ kips @ } 40'$

Wind Load (ASCE 7-22) - Chapter 29, Solid Free-Standing Wall

Improvement: Baseball Field Netting Wind Load, (40-foot tall pole)

Velocity Pressure $q_z = 0.00256 K_z K_{zt} K_d K_e V^2$ (lb/ft²); V in mi/h (26.10-1)

Risk Category	II	(table 1.5-1)
Basic Wind Speed (V)	110	(figure 26.5-1B)

Wind Load Parameters

K_d	0.85	(table 26.6-1)
Exposure Category	C	(section 26.7)
K_{zt}	1	(section 26.8) - Assume no speed-up
K_z	0.85	(table 26.10-1)
K_e	1	(section 26.9)
G	0.85	(section 26.11.1) - Rigid Structure
q_z	22.38016	(equation 26.10-1)

Wind Load on Netting $F = q_h G C_f A_s$ (Eqn. 29.3-1)

B = (Maximum Tributary Width)	40	feet
S = (Maximum Tributary Height)	32	feet
H = (Height to top of Wind Loaded Area)	40	feet
B/S	1.3	Aspect Ratio
S/H	0.8	Clearance Ratio
C_f	1.65	(Force Coefficient, Figure 29.3-1)
A_s	1280	Unit Area of Loading, sqft
Total Wind Load	40,176.9	lbs
Sports netting; use 10% wind load	4,017.7	lbs
Height to Center of Wind Loaded Area	24	feet
Moment due to Wind Loading	96.4	ft-kips

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 16. Backstop Fence Post Embedment - 40' High Fence

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 30.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

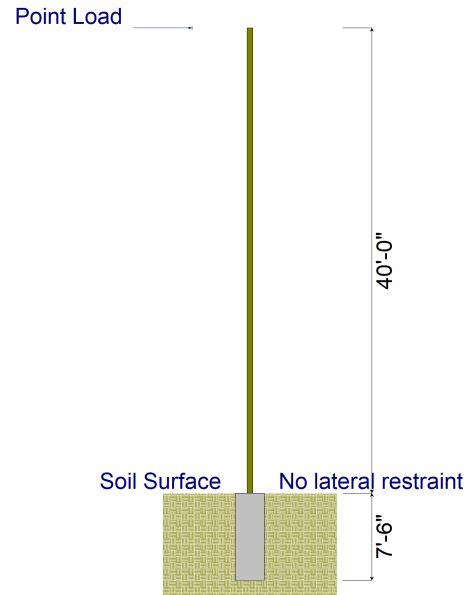
Governing Load Combination 0.60W
Lateral Load 1.446 k
Moment 57.840 k-ft

NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 1,240.70 psf
Allowable 1,243.92 psf

Minimum Required Depth 7.50 ft

Footing Base Area 4.909 ft²
Maximum Soil Pressure 0.0 ksf



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	2.410 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	40.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	40.0 ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	1.446	57.840	7.50	1,240.7	1,243.9	1.000
+0.450W	1.085	43.380	6.75	1,121.9	1,124.9	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 16. Backstop Fence Post CIDH Caisson- 40' High Fence

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

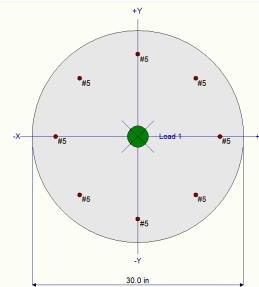
f'_c : Concrete 28 day strength = 3.0 ksi
 E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.850
 f_y - Main Rebar = 60.0 ksi
 E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 0.20 %
Max. Reinf. = 8.0 %
Seismic Design Category = D

Overall Column Height = 10.0 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along column
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 30.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 8 - #5 bars



Applied Loads

Entered loads are factored per load combinations specified by user.

Column self weight included : 7,363.11 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 10.0 ft above base, D = 5.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 10.0 ft, W = 96.40 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+W	Maximum SERVICE Load Reactions .			
Location of max. above base	9.933 ft	Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.608 : 1	Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = $(P_u^2 + M_u^2)^{.5} / (\Phi P_n^2 + \Phi M_n^2)^{.5}$		Maximum SERVICE Load Deflections . .			
P_u = 14.836 k	$\Phi * P_n$ = 21.166 k	Along Y-Y	-0.06665 in	at 10.0 ft above base	
M_{u-x} = 96.40 k-ft	$\Phi * M_{n-x}$ = 161.781 k-ft	for load combination : W Only			
M_{u-y} = 1.854 k-ft	$\Phi * M_{n-y}$ = 3.343 k-ft	Along X-X	0.0 in	at 0.0 ft above base	
M_u Angle = 1.0 deg	Φ = 0.90	for load combination :			
M_u at Angle = 96.418 k-ft	ΦM_n at Angle = 158.532 k-ft	General Section Information			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>		β	0.850	θ	0.80
Column Capacities . .		ρ : % Reinforcing	0.3508 %	Rebar	% Ok
Pnmax : Nominal Max. Compressive Axial Capacity	1,944.97 k	Reinforcing Area	2.480 in ²	Concrete Area	706.86 in ²
Pnmin : Nominal Min. Tension Axial Capacity	k				
ΦP_n , max : Usable Compressive Axial Capacity	1,011.38 k				
ΦP_n , min : Usable Tension Axial Capacity	k				

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 16. Backstop Fence Post CIDH Caisson- 40' High Fence

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δMu	ϕMn	Ratio
+1.40D	Actual	M2,min	9.93	17.31	1,011.38	1.000			1.000	2.16	90.000	2.16	126.40	0.017
+1.40D	M2,min	Actual	9.93	17.31	1,011.38	1.000		2.16	1.000		0.000	2.16	126.40	0.017
+1.20D	Actual	M2,min	9.93	14.84	1,011.38	1.000			1.000	1.85	90.000	1.85	126.40	0.015
+1.20D	M2,min	Actual	9.93	14.84	1,011.38	1.000		1.85	1.000		0.000	1.85	126.40	0.015
+1.20D+0.50W	Actual	M2,min	9.93	14.84	59.00	1.000		48.20	1.000	1.85	2.000	48.24	190.97	0.253
+1.20D+W	Actual	M2,min	9.93	14.84	21.17	1.000		96.40	1.000	1.85	1.000	96.42	158.53	0.608
+0.90D+W	Actual	M2,min	9.93	11.13	21.17	1.000		96.40	1.000	1.39	1.000	96.41	158.53	0.608
+0.90D	Actual	M2,min	9.93	11.13	1,011.38	1.000			1.000	1.39	90.000	1.39	126.40	0.011
+0.90D	M2,min	Actual	9.93	11.13	1,011.38	1.000		1.39	1.000		0.000	1.39	126.40	0.011

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k		Y-Y Axis Reaction k		Axial Reaction k	Mx - End Moments k-ft		My - End Moments k-ft	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					12.363				
+D+0.60W					12.363	-57.840			
+D+0.450W					12.363	-43.380			
+0.60D+0.60W					7.418	-57.840			
+0.60D					7.418				
W Only						-96.400			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis k-ft		Moment About Y-Y Axis k-ft	
	@ Base	@ Top	@ Base	@ Top
D Only				
+D+0.60W	-57.840			
+D+0.450W	-43.380			
+0.60D+0.60W	-57.840			
+0.60D				
W Only	-96.400			

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Max. Y-Y Deflection	
	Distance	Distance	Distance	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	-0.040 in	10.000 ft
+D+0.450W	0.0000 in	0.000 ft	-0.030 in	10.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	-0.040 in	10.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	-0.066 in	9.933 ft

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 16. Backstop Fence Post - 40' High Fence

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name :	Pipe14STD	Overall Column Height	40.0 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade	, ASTM A1085, Fy = 50 ksi, Carbon Steel	Brace condition :	
Fy : Steel Yield	50.0 ksi	Unbraced Length for buckling ABOUT X-X Axis = 32 ft, K = 2.1	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 8 ft, K = 1.20	

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 2,184.0 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 40.0 ft, D = 4.0 k

BENDING LOADS . . .

Wind Shear: Lat. Point Load at 40.0 ft creating Mx-x, W = 2.410 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.4248 : 1
Load Combination	+1.20D+W
Location of max.above base	0.0 ft
At maximum location values are . . .	
Pu	7.421 k
0.9 * Pn	121.569 k
Mu-x	-96.40 k-ft
0.9 * Mn-x :	244.50 k-ft
Mu-y	0.0 k-ft
0.9 * Mn-y :	244.50 k-ft

Maximum Load Reactions . .	
Top along X-X	0.0 k
Bottom along X-X	0.0 k
Top along Y-Y	0.0 k
Bottom along Y-Y	2.410 k

Maximum Load Deflections . . .	
Along Y-Y	8.709 in at 40.0ft above base
for load combination :W Only	
Along X-X	0.0 in at 0.0ft above base
for load combination :	

PASS Maximum Shear Stress Ratio	0.01428 : 1
Load Combination	+1.20D+W
Location of max.above base	0.0 ft
At maximum location values are . . .	
Vu : Applied	2.410 k
Vn * Phi : Allowable	168.750 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location
+1.40D	0.071	PASS	0.00 ft	1.67	1.00	166.96	23.85	0.000	PASS	0.00 ft
+1.20D	0.061	PASS	0.00 ft	1.67	1.00	166.96	23.85	0.000	PASS	0.00 ft
+1.20D+0.50W	0.228	PASS	0.00 ft	1.67	1.00	166.96	23.85	0.007	PASS	0.00 ft
+1.20D+W	0.425	PASS	0.00 ft	1.67	1.00	166.96	23.85	0.014	PASS	0.00 ft
+0.90D+W	0.417	PASS	0.00 ft	1.67	1.00	166.96	23.85	0.014	PASS	0.00 ft
+0.90D	0.046	PASS	0.00 ft	1.67	1.00	166.96	23.85	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
	@ Base		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	6.184										
+D+0.60W	6.184					1.446		-57.840			
+D+0.450W	6.184					1.085		-43.380			
+0.60D+0.60W	3.710					1.446		-57.840			
+0.60D	3.710										
W Only						2.410		-96.400			



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 16. Backstop Fence Post - 40' High Fence

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	6.184						
"	Minimum				2.410	-96.400		
Reaction, X-X Axis Base	Maximum	6.184						
"	Minimum	6.184						
Reaction, Y-Y Axis Base	Maximum				2.410	-96.400		
"	Minimum	6.184						
Reaction, X-X Axis Top	Maximum	6.184						
"	Minimum	6.184						
Reaction, Y-Y Axis Top	Maximum	6.184						
"	Minimum	6.184						
Moment, X-X Axis Base	Maximum	6.184						
"	Minimum		-96.400		2.410	-96.400		
Moment, Y-Y Axis Base	Maximum	6.184						
"	Minimum	6.184						
Moment, X-X Axis Top	Maximum	6.184						
"	Minimum	6.184						
Moment, Y-Y Axis Top	Maximum	6.184						
"	Minimum	6.184						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	5.225 in	40.000 ft
+D+0.450W	0.0000 in	0.000 ft	3.919 in	40.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	5.225 in	40.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	8.621 in	39.732 ft

Steel Section Properties : Pipe14STD

Depth	=	14.000 in	I xx	=	350.00 in^4	J	=	700.000 in^4
			S xx	=	50.00 in^3			
Diameter	=	14.000 in	R xx	=	4.830 in			
Wall Thick	=	0.375 in	Zx	=	65.200 in^3			
Area	=	15.000 in^2	I yy	=	350.000 in^4			
Weight	=	54.600 plf	S yy	=	50.000 in^3			
			R yy	=	4.830 in			
Ycg	=	0.000 in						

Steel Column

Project File: 24-130-00_ontario sports park.ec6

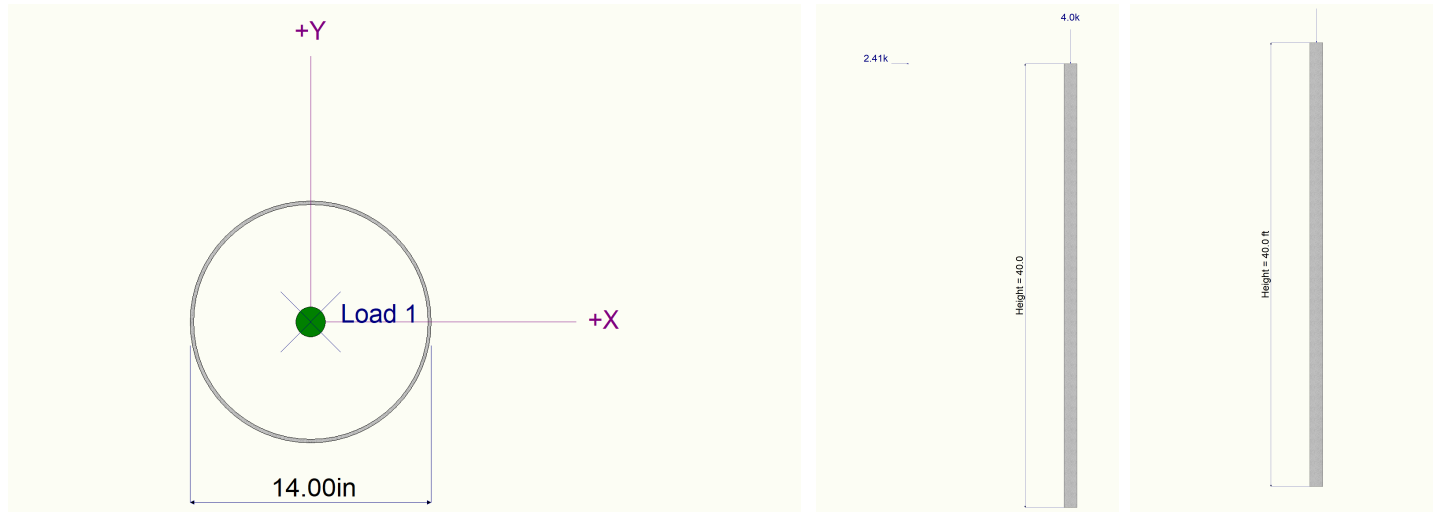
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 16. Backstop Fence Post - 40' High Fence

Sketches



17. 9' Ht. Dugout Fencing & Wall, (Landscape Detail 1/L-2.12)

9' Ht. Dugout Fencing, (Landscape Detail 1/L-2.12)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 9'-0" Tall (max)
- 8'-0" (typ.) spacing between posts

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% wind loading due to open nature of chain-link fencing

Total Wind Load per Post = 30 psf x 9' x 8' x 0.25 = 540 lbs

Applied Moment due to Wind = 540 lbs x 4.5' = 2,430 ft – lbs

$M_u = 2,430 \text{ ft} - \text{lbs}$

$V_u = 540 \text{ lbs}$

Enercalc: 2,430 / 9 = 270 lbs @ 9'

Pole Capacity Check

$\phi M_n = 0.9(3,657.5 \text{ ft} - \text{lbs}) = 3,291.8 \text{ ft} - \text{lbs}$

$\phi M_n = 3,291.8 \text{ ft} - \text{lbs} > M_u = 2,430 \text{ ft} - \text{lbs}, (OK)$

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 17. Dugout Wall

Code Reference

Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	1.00 ft
Wall height above soil	=	8.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

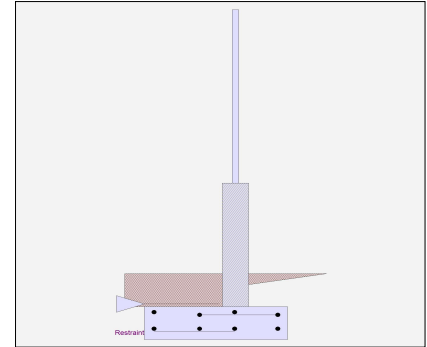
Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	6.00 in

Lateral Load Applied to Stem

Lateral Load	=	150.0 #/ft
...Height to Top	=	4.00 ft
...Height to Bottom	=	3.00 ft
Load Type	=	Live Load (L) (Service Level)
Wind on Exposed Stem	=	7.5 psf (Strength Level)



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 17. Dugout Wall

Design Summary

Wall Stability Ratios

Overtuning = 1.69 OK
Slab Resists All Sliding !

Global Stability = 4.30

Total Bearing Load = 909 lbs
...resultant ecc. = 13.19 in

Eccentricity outside middle third

Soil Pressure @ Toe = 799 psf OK

Soil Pressure @ Heel = 0 psf OK

Allowable = 2,000 psf

Soil Pressure Less Than Allowable

ACI Factored @ Toe = 1,119 psf

ACI Factored @ Heel = 0 psf

Footing Shear @ Toe = 5.0 psi OK

Footing Shear @ Heel = 3.1 psi OK

Allowable = 82.2 psi

Sliding Calcs

Lateral Sliding Force = 246.0 lbs

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht" =

Design Method =

Thickness =

Rebar Size =

Rebar Spacing =

Rebar Placed at =

Design Data

fb/FB + fa/Fa =

Total Force @ Section

Service Level lbs =

Strength Level lbs =

Moment....Actual

Service Level ft-# =

Strength Level ft-# =

Moment.....Allowable ft-# =

Shear.....Actual

Service Level psi =

Strength Level psi =

Shear.....Allowable =

Anet (Masonry) in2 =

Wall Weight psf =

Rebar Depth 'd' in =

Masonry Data

f'm psi =

Fs psi =

Solid Grouting =

Modular Ratio 'n' =

Equiv. Solid Thick. =

Masonry Block Type =

Masonry Design Method = ASD

Concrete Data

f'c psi =

Fy psi =

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code

Dead Load 1.200

Live Load 1.600

Earth, H 1.600

Wind, W 1.600

Seismic, E 1.000

2nd

Bottom

Stem OK

0.00

Masonry

ASD

SD

SD

SD

8.00

5

8.00

Center

0.360

201.0

1,245.7

710.0

2,769.6

1,970.0

2.2

13.8

43.8

91.50

0.0

3.81

1,500

20,000

Yes

21.48

7.63

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 17. Dugout Wall

Footing Data

Toe Width	=	2.00 ft
Heel Width	=	1.67
Total Footing Width	=	3.67
Footing Thickness	=	12.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	3.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,119	0	psf
Mu' : Upward	=	1,561	0	ft-#
Mu' : Downward	=	728	208	ft-#
Mu: Design	=	833	208	ft-#
φ Mn	=	11,415	11,415	ft-#
Actual 1-Way Shear	=	5.00	3.06	psi
Allow 1-Way Shear	=	46.63	46.63	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.95	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 17. Dugout Wall

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	60.0	0.67	40.0	Soil Over HL (ab. water tbl)	110.0	3.17	348.5
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.17	348.5
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =	150.0	4.50	675.0	* Axial Live Load on Stem =			
Load @ Stem Above Soil =	36.0	6.00	216.0	Soil Over Toe =	220.0	1.00	220.0
=				Surcharge Over Toe =			
				Stem Weight(s) =			
				Earth @ Stem Transitions =			
Total	= 246.0	O.T.M.	= 931.0	Footing Weight =	550.1	1.83	1,008.5
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio		=	1.69	Total =	880.1 lbs	R.M. =	1,577.0
Vertical Loads used for Soil Pressure =		908.9 lbs					

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.054 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

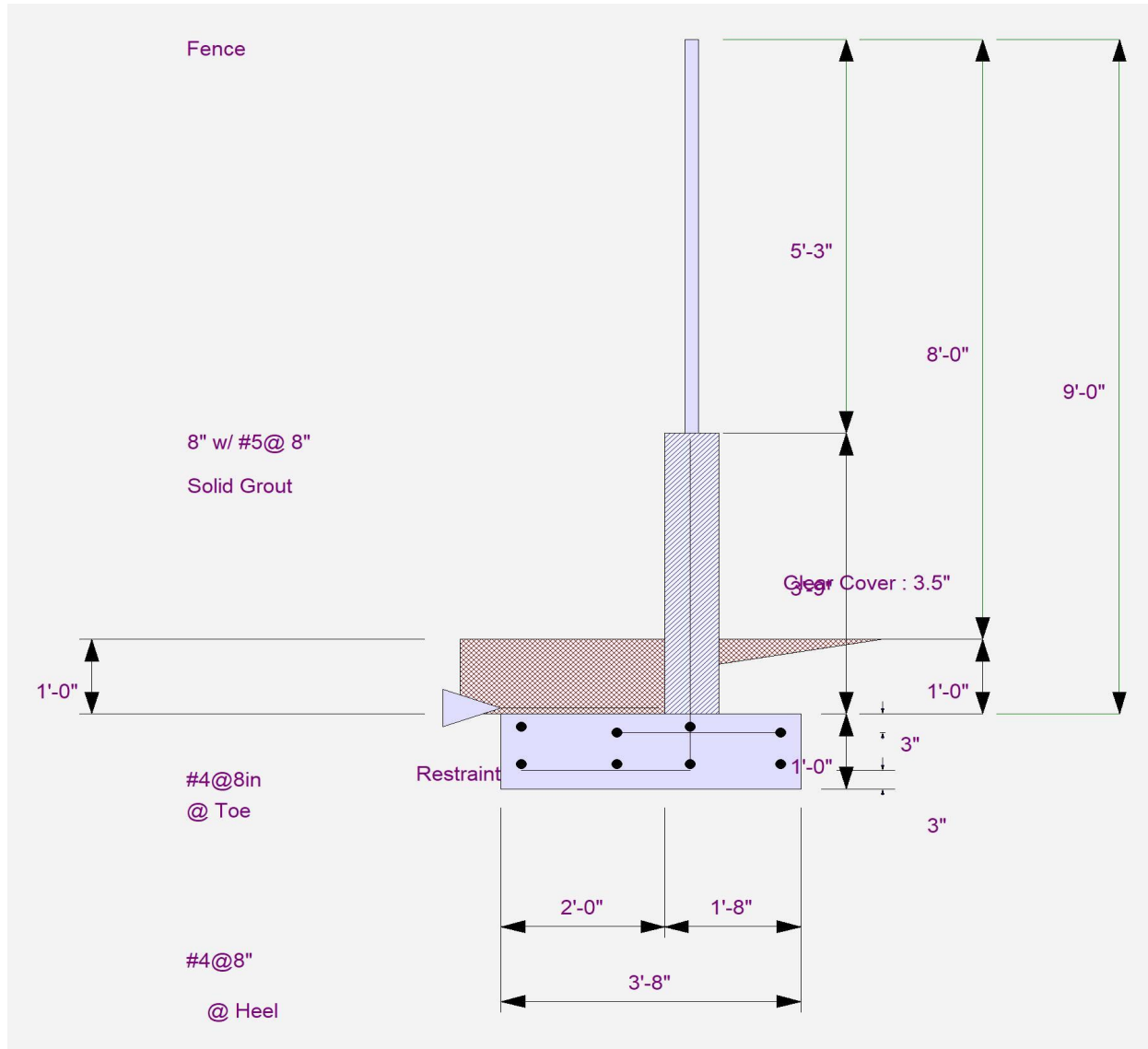
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 17. Dugout Wall



Cantilevered Retaining Wall

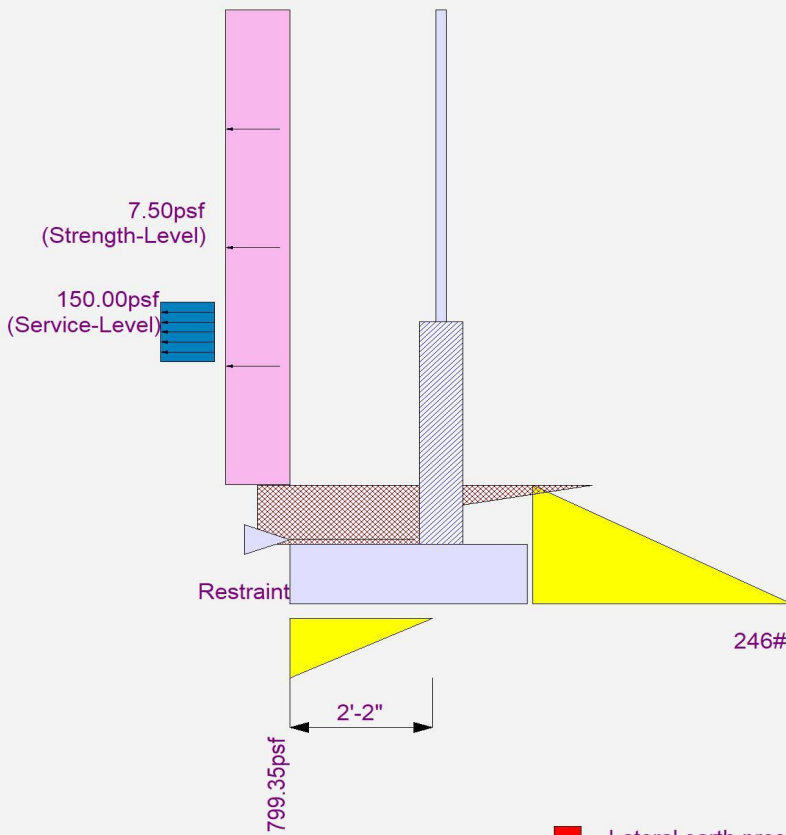
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 17. Dugout Wall



■ Lateral earth pressure due to the soil BELOW water table

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 17. 9' Dugout Fence Embedment

Code References

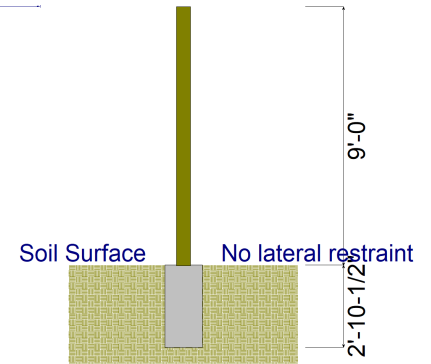
Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Point Load



Controlling Values

Governing Load Combination +0.60W
Lateral Load 0.1620 k
Moment 1.458 k-ft

NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 462.218 psf
Allowable 463.862 psf

Minimum Required Depth 2.875 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	0.0 k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.270 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	9.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.162	1.458	2.88	462.2	463.9	1.000
+0.450W	0.122	1.094	2.63	416.5	418.6	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 17. 9' Dugout Fence Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

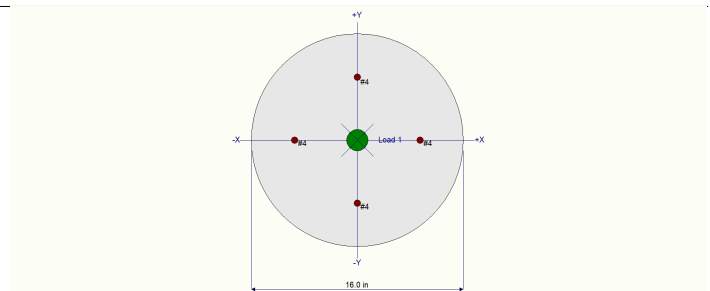
f'_c : Concrete 28 day streng	=	3.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.20 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	3.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum:		
X-X (width) axis :		
Unbraced Length for buckling ABOUT X-X Axis = 3.0 ft, K = 1.0		
Y-Y (depth) axis :		
Unbraced Length for buckling ABOUT Y-Y Axis = 3.0 ft, K = 1.0		

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 4 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 628.32 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 3.0 ft above base, D = 1.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 3.0 ft, W = 2.430 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W			Maximum SERVICE Load Reactions .			
Location of max.above base	2.980 ft			Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio				Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5							
Pu =	1.465 k	φ * Pn =	19.340 k	Maximum SERVICE Load Deflections . .			
Mu-x =	2.430 k-ft	φ * Mn-x =	32.419 k-ft	Along Y-Y	-0.001869 in at	3.0 ft above base	
Mu-y =	0.1319 k-ft	φ* Mn-y =	1.476 k-ft	for load combination : W Only			
Mu Angle =	3.0 deg	φ =	0.90	Along X-X	0.0in at	0.0 ft above base	
Mu at Angle =	2.434 k-ft	φMn at Angle =	31.838 k-ft	for load combination :			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>							
Column Capacities . .				General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacit	558.67 k			ρ : % Reinforcing	0.3979 %	Rebar % Ok	β =0.850 θ = 0.80
Pnmin : Nominal Min. Tension Axial Capacity	k			Reinforcing Area	0.80 in^2		
φ Pn, max : Usable Compressive Axial Capacity	290.507 k			Concrete Area	201.062 in^2		
φ Pn, min : Usable Tension Axial Capacity	k						

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 17. 9' Dugout Fence Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δMu	ϕMn	Ratio
+1.40D	Actual	M2,min	2.98	2.28	290.51	1.000			1.000	0.21	90.000	0.21	26.32	0.008
+1.40D	M2,min	Actual	2.98	2.28	290.51	1.000	0.21	1.000		0.000	0.000	0.21	26.32	0.008
+1.20D	Actual	M2,min	2.98	1.95	290.51	1.000			1.000	0.18	90.000	0.18	26.32	0.007
+1.20D	M2,min	Actual	2.98	1.95	290.51	1.000	0.18	1.000		0.000	0.000	0.18	26.32	0.007
+1.20D+0.50W	Actual	M2,min	2.98	1.95	79.78	1.000	1.22	1.000	0.18	8.000	1.23	49.84	0.025	
+1.20D+W	Actual	M2,min	2.98	1.95	28.20	1.000	2.43	1.000	0.18	4.000	2.44	35.59	0.068	
+0.90D+W	Actual	M2,min	2.98	1.47	19.34	1.000	2.43	1.000	0.13	3.000	2.43	31.84	0.076	
+0.90D	Actual	M2,min	2.98	1.47	290.51	1.000			1.000	0.13	90.000	0.13	26.32	0.005
+0.90D	M2,min	Actual	2.98	1.47	290.51	1.000	0.13	1.000		0.000	0.000	0.13	26.32	0.005

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k		Y-Y Axis Reaction k		Axial Reaction @ Base	Mx - End Moments k-ft		My - End Moments k-ft	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					1.628				
+D+0.60W					1.628	-1.458			
+D+0.450W					1.628	-1.094			
+0.60D+0.60W					0.977	-1.458			
+0.60D					0.977				
W Only						-2.430			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top
D Only			k-ft		k-ft
+D+0.60W	-1.458		k-ft		k-ft
+D+0.450W	-1.094		k-ft		k-ft
+0.60D+0.60W	-1.458		k-ft		k-ft
+0.60D			k-ft		k-ft
W Only	-2.430		k-ft		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.001	in	3.000 ft
+D+0.450W	0.0000	in	0.000 ft	-0.001	in	3.000 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.001	in	3.000 ft
+0.60D	0.0000	in	0.000 ft	0.000	in	0.000 ft
W Only	0.0000	in	0.000 ft	-0.002	in	2.980 ft

18. Guardrail (Landscape Detail 1/L-2.13)

Guardrail (Landscape Detail 1/L-2.13)

Guard Loading, (ASCE 7-22) 4.5.1 & 4.5.1.1

3'-6" high guardrail with support posts @ 6' O.C. with 50lb/ft or 200 lbs point load.

$$50 \times 6 = 300 \text{ lbs} \times 3.5' = 1,050 \text{ lb-ft (max moment)}$$

Wind Load, (ASCE 7-22)

Wind Load = 30 psf, Use 15psf, (open Guardrail)

$$\text{Total Wind Shear Load per Post} = 15 \text{ psf} \times (3.5')(6.0') = 315 \text{ lbs}$$

$$315 \text{ lbs} \times 3.5'/2 = 551.25 \text{ lb-ft (max moment)}$$

Guard Rail Loading Governs

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 18. Guardrail Post Embedment - 3'-6" Fence

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape	Circular
Pole Footing Diameter	12.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	500.0 pcf
Max Passive	5,000.0 pcf

Controlling Values

Governing Load Combination	L Only
Lateral Load	0.30 k
Moment	1.050 k-ft

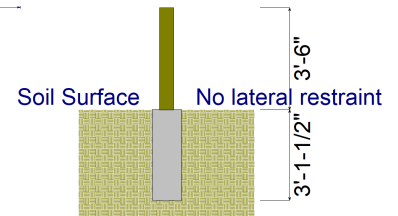
NO Ground Surface Restraint

Pressures at 1/3 Depth	
Actual	511.77 psf
Allowable	512.34 psf

Minimum Required Depth 3.125 ft

Footing Base Area	0.7854 ft ²
Maximum Soil Pressure	0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)	Lateral Distributed Loads (k)	Vertical Load (k)
D : Dead Load k	k/ft	k
Lr : Roof Live k	k/ft	k
L : Live 0.30 k	k/ft	k
S : Snow k	k/ft	k
W : Wind 0.1575 k	k/ft	k
E : Earthquake k	k/ft	k
H : Lateral Earth k	k/ft	k
Load distance above ground surface 3.50 ft	TOP of Load above ground surface ft	
	BOTTOM of Load above ground surface ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
L Only	0.300	1.050	3.13	511.8	512.3	1.000
+0.750L	0.225	0.788	2.88	455.7	459.2	1.000
+0.60W	0.095	0.331	2.00	327.8	329.5	1.000
+0.750L+0.450W	0.296	1.036	3.13	508.9	509.7	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 18. Guardrail Post Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

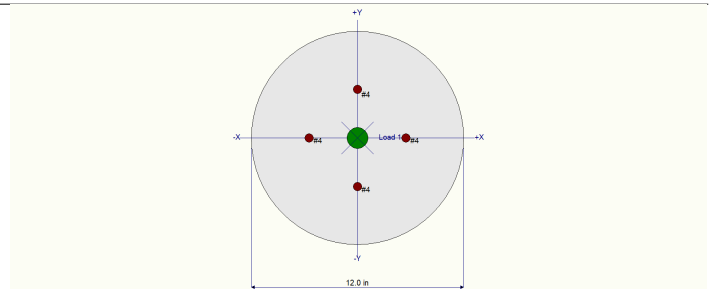
f'_c : Concrete 28 day strength	=	3.0 ksi
E	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	3.125 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column		
X-X (width) axis :		
Unbraced Length for buckling ABOUT X-X Axis = 3.125 ft, K = 1.0		
Y-Y (depth) axis :		
Unbraced Length for buckling ABOUT Y-Y Axis = 3.125 ft, K = 1.0		

Column Cross Section

Column Dimensions : 12.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 4 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 368.155 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 3.125 ft above base, D = 1.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 4.750 ft, L = 1.050, W = 0.5510 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+1.60L		Maximum SERVICE Load Reactions .			
Location of max.above base	3.104 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
			Top along X-X	0.0 k	Bottom along X-X	0.0 k
Maximum Stress Ratio	0.087 : 1		Maximum SERVICE Load Deflections . .			
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	1.642 k	φ * Pn =	Along Y-Y -0.002769 in at 3.125 ft above base			
			for load combination : +D+L			
Mu-x =	1.681 k-ft	φ * Mn-x =	Along X-X 0.0in at 0.0ft above base			
Mu-y =	0.1313 k-ft	φ* Mn-y =	for load combination :			
		φ =				
Mu Angle =	4.0 deg					
Mu at Angle =	1.686 k-ft	φMn at Angle =				
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .			General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacity	334.358 k		ρ : % Reinforcing	0.7074 %	Rebar % Ok	β =0.850 θ = 0.80
Pnmin : Nominal Min. Tension Axial Capacity	k		Reinforcing Area	0.80 in^2		
φ Pn, max : Usable Compressive Axial Capacity	173.866 k		Concrete Area	113.097 in^2		
φ Pn, min : Usable Tension Axial Capacity	k					

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 18. Guardrail Post Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio
+1.40D	Actual	M2,min	3.10	1.92	171.80	1.000			1.000	0.15	90.000	0.15	13.67	0.011
+1.40D	M2,min	Actual	3.10	1.92	171.80	1.000	0.15	1.000			0.000	0.15	13.67	0.011
+1.20D+1.60L	Actual	M2,min	3.10	1.64	18.44	1.000	1.68	1.000	0.13	4.000		1.69	19.39	0.087
+1.20D+0.50L	Actual	M2,min	3.10	1.64	64.08	1.000	0.53	1.000	0.13	14.000		0.54	21.04	0.026
+1.20D+0.50W	Actual	M2,min	3.10	1.64	115.03	1.000	0.28	1.000	0.13	25.000		0.31	21.38	0.014
+1.20D+0.50L+W	Actual	M2,min	3.10	1.64	30.46	1.000	1.08	1.000	0.13	7.000		1.08	19.98	0.054
+1.20D+L+W	Actual	M2,min	3.10	1.64	19.59	1.000	1.60	1.000	0.13	5.000		1.61	19.44	0.083
+0.90D+W	Actual	M2,min	3.10	1.23	45.25	1.000	0.55	1.000	0.10	10.000		0.56	20.42	0.027
+0.90D	Actual	M2,min	3.10	1.23	171.80	1.000			1.000	0.10	90.000	0.10	13.67	0.007
+0.90D	M2,min	Actual	3.10	1.23	171.80	1.000	0.10	1.000			0.000	0.10	13.67	0.007

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only						1.368				
+D+L						1.368	-1.050			
+D+0.750L						1.368	-0.788			
+D+0.60W						1.368	-0.331			
+D+0.750L+0.450W						1.368	-1.035			
+0.60D+0.60W						0.821	-0.331			
+0.60D						0.821				
L Only							-1.050			
W Only							-0.551			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top
D Only			k-ft		k-ft
+D+L	-1.050		k-ft		k-ft
+D+0.750L	-0.788		k-ft		k-ft
+D+0.60W	-0.331		k-ft		k-ft
+D+0.750L+0.450W	-1.035		k-ft		k-ft
+0.60D+0.60W	-0.331		k-ft		k-ft
+0.60D			k-ft		k-ft
L Only	-1.050		k-ft		k-ft
W Only	-0.551		k-ft		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
+D+L	0.0000	in	0.000 ft	-0.003	in	3.125 ft
+D+0.750L	0.0000	in	0.000 ft	-0.002	in	3.125 ft
+D+0.60W	0.0000	in	0.000 ft	-0.001	in	3.125 ft
+D+0.750L+0.450W	0.0000	in	0.000 ft	-0.003	in	3.125 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.001	in	3.125 ft
+0.60D	0.0000	in	0.000 ft	0.000	in	0.000 ft
L Only	0.0000	in	0.000 ft	-0.003	in	3.125 ft
W Only	0.0000	in	0.000 ft	-0.001	in	3.104 ft

19. Bullpen Fence CIDH Caisson (Landscape Detail 1/L-2.14)

Bullpen Fence Post Footing (Landscape Detail 1/L-2.14)

8' high @ 8' spacing, (max)

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% reduction in wind loading due to open nature of netting /chain-link fencing

Total Wind Load per Post = 30 psf x 8' x 8' x 0.25 = 480 lbs

Applied Moment due to Wind = 480 lbs x $\frac{8'}{2}$ = 1,920 ft – lbs

$M_u = 1,920 \text{ ft – lbs}$

$V_u = 480 \text{ lbs}$

Enercalc: 1,920 / 8 = **240lbs @ 8'**

$M_n - 2 \frac{7}{8}'' \text{ OD } F_y = 50 \text{ KSI } post = 3,657.5 \text{ ft – lbs, } \therefore OK$

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 20a. Bullpen Post Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 psf

Controlling Values

Governing Load Combination **+0.60W**
Lateral Load 0.1440 k
Moment 1.152 k-ft

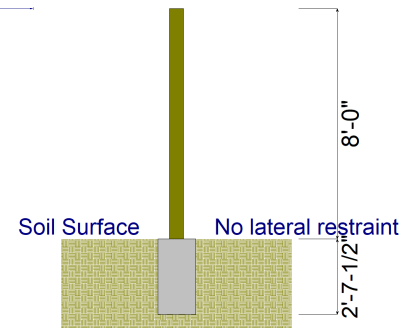
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual **427.347** psf
Allowable **430.950** psf

Minimum Required Depth 2.625 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.240 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.144	1.152	2.63	427.3	430.9	1.000
+0.450W	0.108	0.864	2.38	385.2	388.7	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 20a. Bullpen Post Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

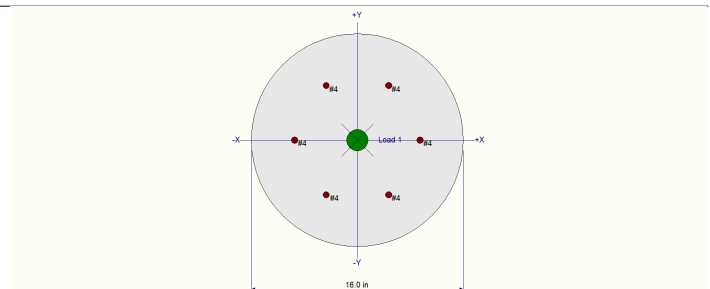
f'_c : Concrete 28 day strength = 3.0 ksi
E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.850
 f_y - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 0.50 %
Max. Reinf. = 8.0 %
Seismic Design Category = D

Overall Column Height = 2.670 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along column
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 6 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 559.20 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 2.670 ft above base, D = 1.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 2.670 ft, W = 1.920 k-ft

DESIGN SUMMARY

Load Combination +0.90D+W
Location of max. above base 2.652 ft
Maximum Stress Ratio 0.043 : 1
Ratio = $(P_u^2 + M_u^2)^{.5} / (\Phi P_n^2 + \Phi M_n^2)^{.5}$
 P_u = 1.403 k $\Phi * P_n$ = 33.387 k
 M_{u-x} = 1.920 k-ft $\Phi * M_{n-x}$ = 45.178 k-ft
 M_{u-y} = 0.1263 k-ft $\Phi * M_{n-y}$ = 2.843 k-ft
 Φ = 0.90
 M_u Angle = 4.0 deg
 V_u at Angle = 1.924 k-ft ΦM_n at Angle = 44.965 k-ft

P_n & M_n values located at P_u-M_u vector intersection with capacity curve

Column Capacities . .

P_{nmax} : Nominal Max. Compressive Axial Capacity 581.65 k
P_{nmin} : Nominal Min. Tension Axial Capacity k
 ΦP_n , max : Usable Compressive Axial Capacity 302.457 k
 ΦP_n , min : Usable Tension Axial Capacity k

Maximum SERVICE Load Reactions .

Location	Top along Y-Y	Bottom along Y-Y	Top along X-X	Bottom along X-X
Reactions	0.0 k	0.0 k	0.0 k	0.0 k

Maximum SERVICE Load Deflections . .

Along Y-Y -0.001170 in at 2.670 ft above base
for load combination : W Only
Along X-X 0.0 in at 0.0 ft above base
for load combination :

General Section Information

β = 0.850 θ = 0.80
 ρ : % Reinforcing 0.5968 % Rebar % Ok
Reinforcing Area 1.20 in²
Concrete Area 201.062 in²

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 20a. Bullpen Post Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δMu	ϕMn	Ratio
+1.40D	Actual	M2,min	2.65	2.18	302.46	1.000			1.000	0.20	90.000	0.20	27.01	0.007
+1.40D	M2,min	Actual	2.65	2.18	302.46	1.000	0.20	1.000		0.000	0.000	0.20	27.49	0.007
+1.20D	Actual	M2,min	2.65	1.87	302.46	1.000			1.000	0.17	90.000	0.17	27.01	0.006
+1.20D	M2,min	Actual	2.65	1.87	302.46	1.000	0.17	1.000		0.000	0.000	0.17	27.49	0.006
+1.20D+0.50W	Actual	M2,min	2.65	1.87	101.75	1.000	0.96	1.000	0.17	10.000	0.97	53.18	0.018	
+1.20D+W	Actual	M2,min	2.65	1.87	49.58	1.000	1.92	1.000	0.17	5.000	1.93	50.27	0.038	
+0.90D+W	Actual	M2,min	2.65	1.40	33.39	1.000	1.92	1.000	0.13	4.000	1.92	44.96	0.043	
+0.90D	Actual	M2,min	2.65	1.40	302.46	1.000			1.000	0.13	90.000	0.13	27.01	0.005
+0.90D	M2,min	Actual	2.65	1.40	302.46	1.000	0.13	1.000		0.000	0.000	0.13	27.49	0.005

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base @ Top		k	Y-Y Axis Reaction @ Base @ Top		Axial Reaction @ Base	Mx - End Moments k-ft @ Base @ Top		My - End Moments @ Base @ Top	
D Only						1.559				
+D+0.60W						1.559	-1.152			
+D+0.450W						1.559	-0.864			
+0.60D+0.60W						0.936	-1.152			
+0.60D						0.936				
W Only							-1.920			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis @ Base @ Top		k-ft	Moment About Y-Y Axis @ Base @ Top		k-ft
D Only						
+D+0.60W	-1.152		k-ft			k-ft
+D+0.450W	-0.864		k-ft			k-ft
+0.60D+0.60W	-1.152		k-ft			k-ft
+0.60D			k-ft			k-ft
W Only	-1.920		k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.001	in	2.670 ft
+D+0.450W	0.0000	in	0.000 ft	-0.001	in	2.670 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.001	in	2.670 ft
+0.60D	0.0000	in	0.000 ft	0.000	in	0.000 ft
W Only	0.0000	in	0.000 ft	-0.001	in	2.652 ft

20. Batting Cage Fence CIDH Caisson (Landscape Detail 2/L-2.14)

Batting Cage Fence Post Footing (Landscape Detail 2/L-2.14)

12' high (11' high loading) @ 8' spacing

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% wind loading due to open nature of netting /chain-link fencing

Total Wind Load per Post = 30 psf x 11' x 8' x 0.25 = 660 lbs

Applied Moment due to Wind = 660 lbs x $\frac{11'}{2}$ = 3,630 ft – lbs

$M_u = 3,630 \text{ ft – lbs}$

$V_u = 660 \text{ lbs}$

Enercalc: 3,630 / 11 = **330 lbs @ 11'**

$M_n - 2 \frac{7}{8}'' \text{ OD } F_y = 50 \text{ KSI } post = 3,657.5 \text{ ft – lbs, } \therefore OK$

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 20. Batting Cage Post Embedment

Code References

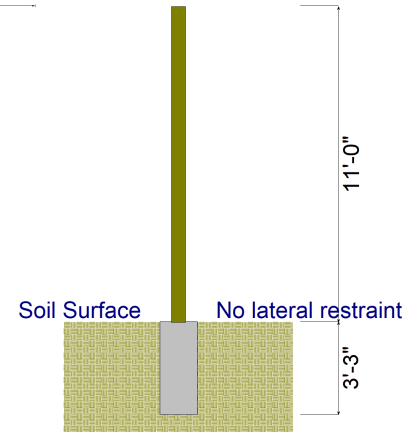
Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Point Load



Controlling Values

Governing Load Combination 0.60W
Lateral Load 0.1980 k
Moment 2.178 k-ft

NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 526.41 psf
Allowable 527.11 psf

Minimum Required Depth 3.250 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.330 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	11.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.198	2.178	3.25	526.4	527.1	1.000
+0.450W	0.149	1.634	2.88	474.9	475.7	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 20. Batting Cage Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

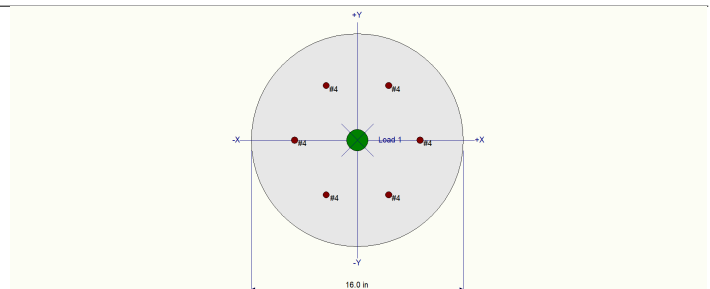
f'_c : Concrete 28 day strength = 3.0 ksi
E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.850
 f_y - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 0.50 %
Max. Reinf. = 8.0 %
Seismic Design Category = D

Overall Column Height = 3.50 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along column
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 6 - #4 bars



Applied Loads

Entered loads are factored per load combinations specified by user.

Column self weight included : 733.04 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 3.50 ft above base, D = 2.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 3.50 ft, W = 3.630 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W		
Location of max.above base	3.477 ft		
Maximum Stress Ratio	0.083 : 1		
Ratio = $(Pu^2+Mu^2)^{.5} / (\Phi Pn^2+\Phi Mn^2)^{.5}$			
Pu =	2.460 k	$\phi * Pn$ =	30.941 k
Mu-x =	3.630 k-ft	$\phi * Mn$ -x =	44.624 k-ft
Mu-y =	0.2214 k-ft	$\phi * Mn$ -y =	2.110 k-ft
Mu Angle =	3.0 deg	ϕ =	0.90
Mu at Angle =	3.637 k-ft	ϕMn at Angle =	44.059 k-ft
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>			
Column Capacities . .			
Pnmax : Nominal Max. Compressive Axial Capacity	581.65 k		
Pnmin : Nominal Min. Tension Axial Capacity	k		
ϕ Pn, max : Usable Compressive Axial Capacity	302.457 k		
ϕ Pn, min : Usable Tension Axial Capacity	k		

Maximum SERVICE Load Reactions .			
Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Deflections . .			
Along Y-Y	-0.00380 in	at	3.50 ft above base
for load combination : W Only			
Along X-X	0.0 in	at	0.0 ft above base
for load combination :			

General Section Information			
β : % Reinforcing	0.5968 %	Rebar	% Ok
Reinforcing Area	1.20 in ²		
Concrete Area	201.062 in ²		

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 20. Batting Cage Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft							Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δMu	ϕMn	Ratio	
+1.40D	Actual	M2,min	3.48	3.83	302.46	1.000		1.000	0.34	90.000	0.34	27.01		0.013	
+1.40D	M2,min	Actual	3.48	3.83	302.46	1.000	0.34	1.000		0.000	0.34	27.49		0.013	
+1.20D	Actual	M2,min	3.48	3.28	302.46	1.000		1.000	0.30	90.000	0.30	27.01		0.011	
+1.20D	M2,min	Actual	3.48	3.28	302.46	1.000	0.30	1.000		0.000	0.30	27.49		0.011	
+1.20D+0.50W	Actual	M2,min	3.48	3.28	94.18	1.000	1.82	1.000	0.30	9.000	1.84	53.10		0.035	
+1.20D+W	Actual	M2,min	3.48	3.28	42.68	1.000	3.63	1.000	0.30	5.000	3.64	48.31		0.075	
+0.90D+W	Actual	M2,min	3.48	2.46	30.94	1.000	3.63	1.000	0.22	3.000	3.64	44.06		0.083	
+0.90D	Actual	M2,min	3.48	2.46	302.46	1.000		1.000	0.22	90.000	0.22	27.01		0.008	
+0.90D	M2,min	Actual	3.48	2.46	302.46	1.000	0.22	1.000		0.000	0.22	27.49		0.008	

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k		Y-Y Axis Reaction k		Axial Reaction k	Mx - End Moments k-ft		My - End Moments k-ft	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					2.733				
+D+0.60W					2.733	-2.178			
+D+0.450W					2.733	-1.634			
+0.60D+0.60W					1.640	-2.178			
+0.60D					1.640				
W Only						-3.630			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis k-ft		Moment About Y-Y Axis k-ft	
	@ Base	@ Top	@ Base	@ Top
D Only				
+D+0.60W	-2.178			
+D+0.450W	-1.634			
+0.60D+0.60W	-2.178			
+0.60D				
W Only	-3.630			

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Max. Y-Y Deflection	
	Distance	Distance	Distance	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	-0.002 in	3.500 ft
+D+0.450W	0.0000 in	0.000 ft	-0.002 in	3.500 ft
+0.60D+0.60W	0.0000 in	0.000 ft	-0.002 in	3.500 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	-0.004 in	3.477 ft

21. Baseball field Terraced Seating, Stairs, and Scorer Table

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 21. Baseball Field Terraced Seating Foundation

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	Yes
Use Pedestal wt for stability, mom & shear	:	Yes

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	1.50 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.0 ft

Increases based on footing plan dimension

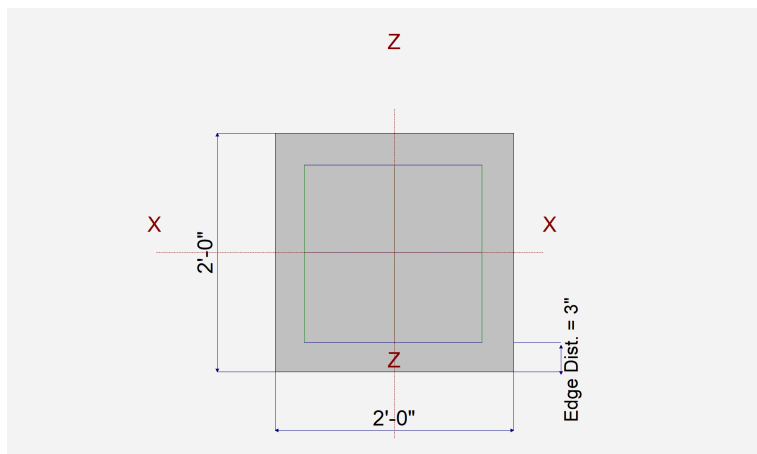
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	2.0 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



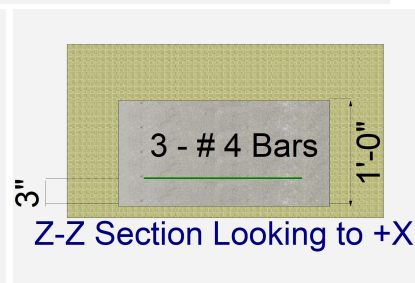
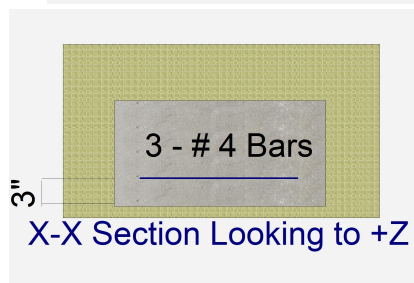
Reinforcing

Bars parallel to X-X Axis	=	3
Number of Bars	=	# 4

Bars parallel to Z-Z Axis	=	3
Number of Bars	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	1.0					k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 21. Baseball Field Terraced Seating Foundation

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.1989	Soil Bearing	0.4575 ksf	2.30 ksf	D Only about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.01477	Z Flexure (+X)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01477	Z Flexure (-X)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01477	X Flexure (+Z)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01477	X Flexure (-Z)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01458	1-way Shear (+X)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01458	1-way Shear (-X)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01458	1-way Shear (+Z)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01458	1-way Shear (-Z)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01949	2-way Punching	3.697 psi	189.737 psi	+1.40D

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc		Zecc		Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				(in)		Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.30	n/a	0.0			0.4575	0.4575	n/a	n/a	0.199
X-X, +0.60D	2.30	n/a	0.0			0.2745	0.2745	n/a	n/a	0.119
Z-Z, D Only	2.30	0.0	n/a			n/a	n/a	0.4575	0.4575	0.199
Z-Z, +0.60D	2.30	0.0	n/a			n/a	n/a	0.2745	0.2745	0.119

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				
All units k				

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in2	Gvrn. As in2	Actual As in2	Phi*Mn k-ft	Status
X-X, +1.40D	0.1750	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +1.40D	0.1750	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +1.20D	0.150	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +1.20D	0.150	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +0.90D	0.1125	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +0.90D	0.1125	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.40D	0.1750	-X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.40D	0.1750	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.20D	0.150	-X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.20D	0.150	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +0.90D	0.1125	-X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +0.90D	0.1125	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.78 psi	0.78 psi	0.78 psi	53.34 psi	0.01	OK
+1.20D	0.67 psi	0.67 psi	0.67 psi	53.34 psi	0.01	OK
+0.90D	0.50 psi	0.50 psi	0.50 psi	53.34 psi	0.01	OK

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 21. Baseball Field Terraced Seating Foundation

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.78 psi	0.78 psi	0.78 psi	53.34 psi	0.01	OK
+1.20D	0.67 psi	0.67 psi	0.67 psi	53.34 psi	0.01	OK
+0.90D	0.50 psi	0.50 psi	0.50 psi	53.34 psi	0.01	OK

All units k

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	3.70 psi	189.74psi	0.01949	OK
+1.20D	3.17 psi	189.74psi	0.0167	OK
+0.90D	2.38 psi	189.74psi	0.01253	OK

22. Chain Link Fence at Ballfields (Landscape Detail 1-2/L-2.17)

8' Ht. Single Chain Link Fence & Gate, (& at Ballfields), (Landscape Details 1, & 2/L-2.17)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 8'-0" Tall
- 8'-0" (max) spacing between posts

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% wind loading due to open nature of chain-link fencing

Total Wind Load per Post = 30 psf x 8' x 8' x 0.25 = 480 lbs

Applied Moment due to Wind = 480 lbs x $8 - ft / 2$ = 1,920 ft – lbs

$M_u = 1,920 \text{ ft} - \text{lbs}$

$V_u = 480 \text{ lbs}$

Enercalc: 1,920/8 = **240 lbs @ 8'**

Pole Capacity Check

$\phi M_n = 0.9(3,657.5 \text{ ft} - \text{lbs}) = 3,291.8 \text{ ft} - \text{lbs}$

$\phi M_n = 3,291.8 \text{ ft} - \text{lbs} > M_u = 1,920 \text{ ft} - \text{lbs}, (OK)$

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 22. Chain Link Fence @ Ballfields

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination 0.60W
Lateral Load 0.1440 k
Moment 1.152 k-ft

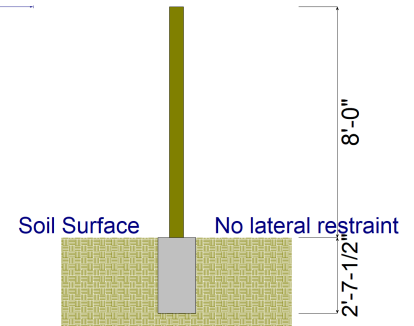
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 427.347 psf
Allowable 430.950 psf

Minimum Required Depth 2.625 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.240 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.144	1.152	2.63	427.3	430.9	1.000
+0.450W	0.108	0.864	2.38	385.2	388.7	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 22. Chain Link Fence @ Ballfields

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

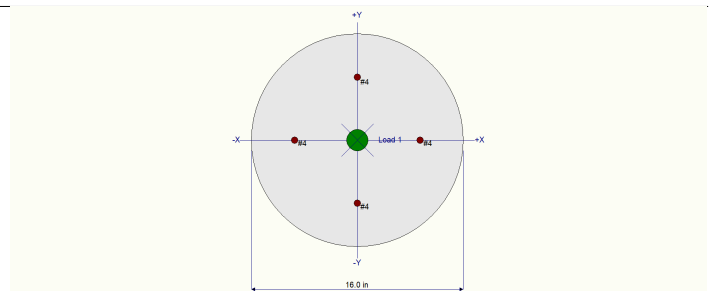
f'_c : Concrete 28 day streng	=	3.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.20 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	4.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum:		
X-X (width) axis :		
Unbraced Length for buckling ABOUT X-X Axis = 4.0 ft, K = 1.0		
Y-Y (depth) axis :		
Unbraced Length for buckling ABOUT Y-Y Axis = 4.0 ft, K = 1.0		

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 4 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 837.76 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 4.0 ft above base, D = 1.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 3.750 ft, W = 2.280 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W		Maximum SERVICE Load Reactions .			
Location of max.above base	3.973 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.068 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	1.654 k	φ * Pn =	23.579 k			
Mu-x =	2.280 k-ft	φ * Mn-x =	34.189 k-ft			
Mu-y =	0.1489 k-ft	φ * Mn-y =	2.074 k-ft			
Mu Angle =	4.0 deg	φ =	0.90			
Mu at Angle =	2.285 k-ft	φMn at Angle =	33.650 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .			General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacit	558.67 k		ρ : % Reinforcing		0.3979 %	Rebar % Ok
Pnmin : Nominal Min. Tension Axial Capacity	k		Reinforcing Area		0.80 in^2	
φ Pn, max : Usable Compressive Axial Capacity	290.507 k		Concrete Area		201.062 in^2	
φ Pn, min : Usable Tension Axial Capacity	k					
					β =0.850	θ = 0.80

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 22. Chain Link Fence @ Ballfields

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k				Bending Analysis k-ft					Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio
+1.40D	Actual	M2,min	3.97	2.57	290.51	1.000		1.000	0.23	90.000	0.23	26.32	0.009	
+1.40D	M2,min	Actual	3.97	2.57	290.51	1.000	0.23	1.000		0.000	0.23	26.32	0.009	
+1.20D	Actual	M2,min	3.97	2.21	290.51	1.000		1.000	0.20	90.000	0.20	26.32	0.008	
+1.20D	M2,min	Actual	3.97	2.21	290.51	1.000	0.20	1.000		0.000	0.20	26.32	0.008	
+1.20D+0.50W	Actual	M2,min	3.97	2.21	96.13	1.000	1.14	1.000	0.20	10.000	1.16	50.40	0.023	
+1.20D+W	Actual	M2,min	3.97	2.21	39.13	1.000	2.28	1.000	0.20	5.000	2.29	39.98	0.057	
+0.90D+W	Actual	M2,min	3.97	1.65	23.58	1.000	2.28	1.000	0.15	4.000	2.29	33.65	0.068	
+0.90D	Actual	M2,min	3.97	1.65	290.51	1.000		1.000	0.15	90.000	0.15	26.32	0.006	
+0.90D	M2,min	Actual	3.97	1.65	290.51	1.000	0.15	1.000		0.000	0.15	26.32	0.006	

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k		Y-Y Axis Reaction k		Axial Reaction @ Base	Mx - End Moments k-ft		My - End Moments k-ft	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					1.838				
+D+0.60W					1.838	-1.368			
+D+0.450W					1.838	-1.026			
+0.60D+0.60W					1.103	-1.368			
+0.60D					1.103				
W Only						-2.280			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top
D Only			k-ft		k-ft
+D+0.60W	-1.368		k-ft		k-ft
+D+0.450W	-1.026		k-ft		k-ft
+0.60D+0.60W	-1.368		k-ft		k-ft
+0.60D			k-ft		k-ft
W Only	-2.280		k-ft		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.002	in	4.000 ft
+D+0.450W	0.0000	in	0.000 ft	-0.001	in	4.000 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.002	in	4.000 ft
+0.60D	0.0000	in	0.000 ft	0.000	in	0.000 ft
W Only	0.0000	in	0.000 ft	-0.003	in	3.973 ft

23. Sliding Ball Field Maintenance Access Gate (Landscape Detail 3/L-2.17)

Sliding Ball Field Maintenance Access Gate, (Landscape Detail 1/L-2.17)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 8'-0" Tall
- 16'-0" Wide

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% wind loading due to open nature of chain-link fencing

Total Wind Load per Post = 30 psf x 8' x 16' x 0.25 = 960 lbs

Applied Moment due to Wind = 960 lbs x $8 - \frac{ft}{2}$ = 3,840 ft – lbs

$M_u = 3,840 \text{ ft} - \text{lbs}$

$V_u = 960 \text{ lbs}$

Enercalc: 3,840/8 = **480 lbs @ 8'**

Dead Load Moment, Hanging Gate

Assume max 750# hanging weight per post @ max 6" from post center line

Applied Moment due to Dead Loading = 375 ft – lbs

Enercalc: 375/8 = **46.9 lbs @ 8'**

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 23. Sliding Ball Field Maintenance Access Gate

Code References

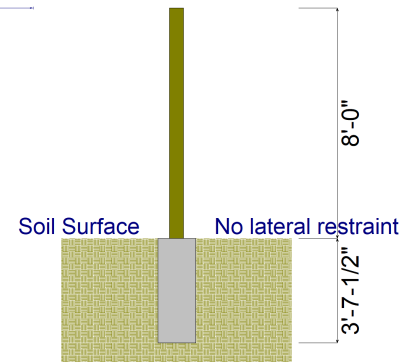
Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Point Load



Controlling Values

Governing Load Combination **D+0.60W**
Lateral Load 0.3350 k
Moment 2.680 k-ft
NO Ground Surface Restraint
Pressures at 1/3 Depth
Actual **582.84** psf
Allowable **585.46** psf

Minimum Required Depth 3.625 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.8952 ksf

Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	0.0470 k		k/ft	1.250 k
Lr : Roof Live	k		k/ft	k
L : Live	0.0 k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.480 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.047	0.376	1.75	285.5	289.7	1.000
+D+0.60W	0.335	2.680	3.63	582.8	585.5	1.000
+D+0.450W	0.263	2.104	3.25	532.9	535.8	1.000
+0.60D+0.60W	0.316	2.530	3.50	571.7	572.5	1.000
+0.60D	0.028	0.226	1.50	240.4	241.1	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 23. Sliding Ball Field Maintenance Access Gate

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

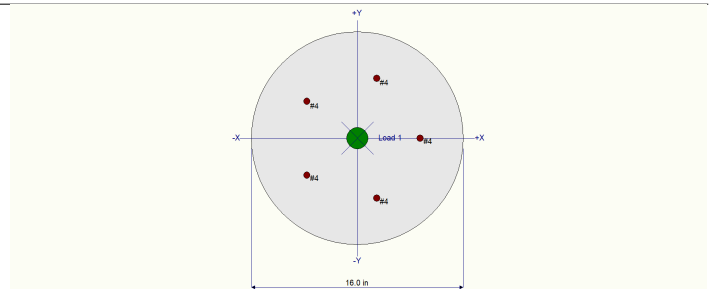
f'_c : Concrete 28 day streng	=	3.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.20 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	4.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column		
X-X (width) axis :		
Unbraced Length for buckling ABOUT X-X Axis = 4.0 ft, K = 1.0		
Y-Y (depth) axis :		
Unbraced Length for buckling ABOUT Y-Y Axis = 4.0 ft, K = 1.0		

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 5 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 837.76 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 4.0 ft above base, D = 1.250 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 4.0 ft, D = 0.3750, W = 0.960 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+W		Maximum SERVICE Load Reactions .			
Location of max.above base	3.973 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.028 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	2.505 k	φ * Pn =	89.179 k			
Mu-x =	1.410 k-ft	φ * Mn-x =	50.318 k-ft			
Mu-y =	0.2255 k-ft	φ* Mn-y =	8.038 k-ft			
Mu Angle =	9.0 deg	φ =	0.7373			
Mu at Angle =	1.428 k-ft	φMn at Angle =	50.934 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .			General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacit	570.16 k		ρ : % Reinforcing		0.4974 %	Rebar % Ok
Pnmin : Nominal Min. Tension Axial Capacity	k		Reinforcing Area		1.0 in^2	
φ Pn, max : Usable Compressive Axial Capacity	296.482 k		Concrete Area		201.062 in^2	
φ Pn, min : Usable Tension Axial Capacity	k					
					β =0.850	θ = 0.80

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 23. Sliding Ball Field Maintenance Access Gate

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft								Utilization	
	X-X	Y-Y		Pu	$\phi * Pn$	δx	$\delta x * Mux$	δy	$\delta y * Muy$	Alpha (deg)	δMu	ϕMn	Ratio		
+1.40D	Actual	M2,min	3.97	2.92	234.83	1.000	0.53	1.000	0.26	27.000	0.59	47.21	0.012		
+1.20D	Actual	M2,min	3.97	2.51	234.83	1.000	0.45	1.000	0.23	27.000	0.50	47.21	0.011		
+1.20D+0.50W	Actual	M2,min	3.97	2.51	136.32	1.000	0.93	1.000	0.23	14.000	0.96	52.16	0.018		
+1.20D+W	Actual	M2,min	3.97	2.51	89.18	1.000	1.41	1.000	0.23	9.000	1.43	50.93	0.028		
+0.90D+W	Actual	M2,min	3.97	1.88	72.24	1.000	1.30	1.000	0.17	7.000	1.31	50.02	0.026		
+0.90D	Actual	M2,min	3.97	1.88	234.83	1.000	0.34	1.000	0.17	27.000	0.38	47.21	0.008		

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only						2.088	-0.375			
+D+0.60W						2.088	-0.951			
+D+0.450W						2.088	-0.807			
+0.60D+0.60W						1.253	-0.801			
+0.60D						1.253	-0.225			
W Only							-0.960			

Maximum Moment Reactions

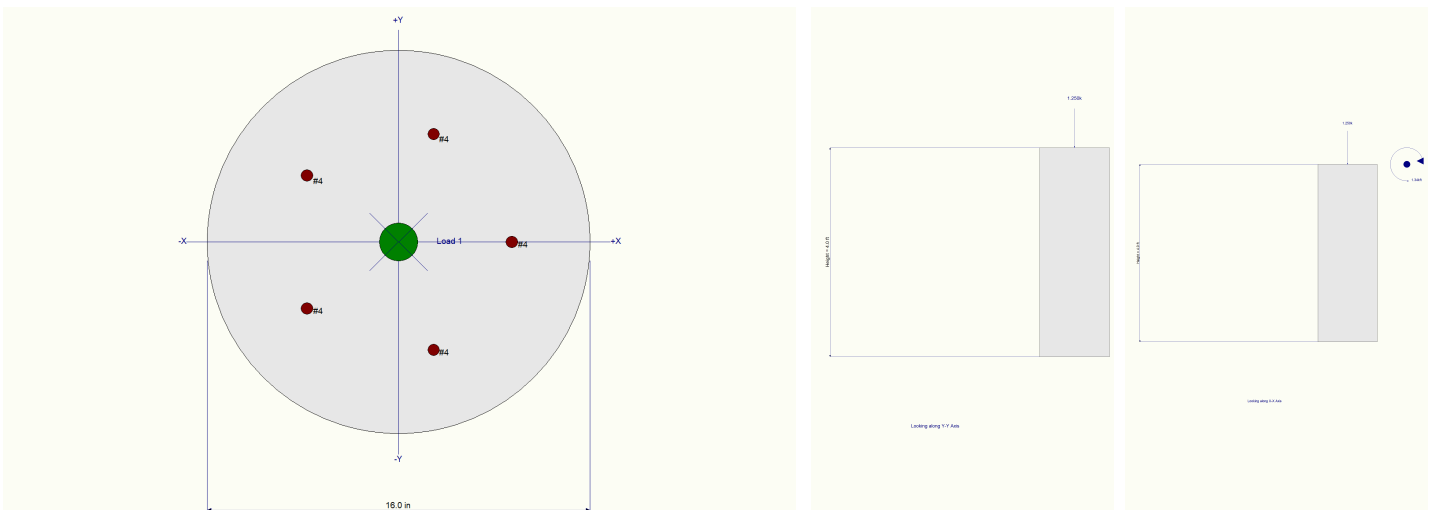
Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis		
	@ Base	@ Top		@ Base	@ Top	
D Only	-0.375		k-ft			k-ft
+D+0.60W	-0.951		k-ft			k-ft
+D+0.450W	-0.807		k-ft			k-ft
+0.60D+0.60W	-0.801		k-ft			k-ft
+0.60D	-0.225		k-ft			k-ft
W Only	-0.960		k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	-0.001	in	4.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.001	in	4.000 ft
+D+0.450W	0.0000	in	0.000 ft	-0.001	in	4.000 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.001	in	4.000 ft
+0.60D	0.0000	in	0.000 ft	-0.000	in	4.000 ft
W Only	0.0000	in	0.000 ft	-0.001	in	3.973 ft

Sketches



Interaction Diagrams

24. Double Swing Chain-link Baseball Gate, (Landscape Detail 1/L-2.18),
12'-0" Swinging Entry Gate, (Landscape Detail 2/L-2.23),
Double Swinging Gate with Pilasters, (Landscape Detail 1/L-2.45)
-

Double Swing Chain Link Baseball Gate, (Landscape Details 1/L-2.18)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 8'-0" Tall
- 6'-0" Wide

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% wind loading due to open nature of chain-link fencing

Total Wind Load per Post = 30 psf x 8' x 6' x 0.25 = 360 lbs

Applied Moment due to Wind = 360 lbs x $\frac{8ft}{2}$ = 1,440 ft – lbs

Dead and Live Loading

Total Dead Load per Post = 600 lbs

Applied Moment due to Dead Load = 600 lbs x $\frac{6ft}{2}$ = 1,800 ft – lbs

Total Live Load per Post = 250 lbs

Applied Moment due to Live Load = 250 lbs x 6ft = 1,500 ft – lbs

Pole Capacity Check

$\phi M_n = 0.9(3,657.5 ft - lbs) = 3,291.8 ft - lbs$

$\phi M_n = 3,291.8 ft - lbs > M_u = 1,800 ft - lbs, (OK)$

$M_u = 1,800 ft - lbs$

$V_u = 360 lbs$

Enercalc: 1,800/8 = **225 lbs @ 8'**

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 24. Double Swinging Ballfield Gate Post Embedment - Wind

Code References

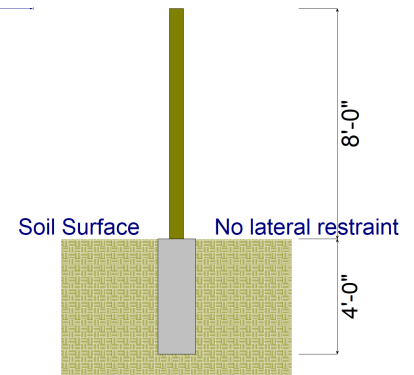
Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Point Load



Controlling Values

Governing Load Combination $1.2D+0.750L+0.450W$
Lateral Load 0.4466 k
Moment 3.573 k-ft

NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 649.42 psf
Allowable 650.56 psf

Minimum Required Depth 4.0 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	0.2250 k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	0.1875 k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.180 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	8.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.225	1.800	3.13	504.8	505.3	1.000
+D+L	0.413	3.300	3.88	631.1	631.3	1.000
+D+0.750L	0.366	2.925	3.75	601.6	604.9	1.000
+D+0.60W	0.333	2.664	3.63	580.5	584.8	1.000
+D+0.750L+0.450W	0.447	3.573	4.00	649.4	650.6	1.000
+0.60D+0.60W	0.243	1.944	3.13	517.8	520.5	1.000
+0.60D	0.135	1.080	2.63	417.2	421.2	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 24. Double Swinging Ballfield Gate Post CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

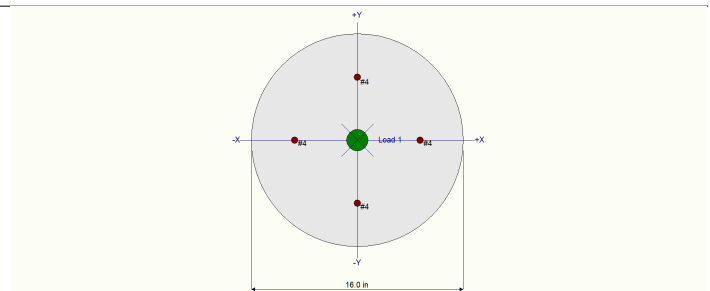
f'_c : Concrete 28 day streng = 4.0 ksi
E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.850
 f_y - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 0.20 %
Max. Reinf. = 8.0 %
Seismic Design Category = D

Overall Column Height = 4.50 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along colum
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 4 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 942.48 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 4.50 ft above base, D = 0.50 k

BENDING LOADS . . .

Wind: Moment acting about X-X axis at 4.50 ft, D = 1.80, L = 1.50, W = 1.440 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+L+W	Maximum SERVICE Load Reactions .			
Location of max. above base	4.470 ft	Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Maximum Stress Ratio		Maximum SERVICE Load Deflections . .			
Ratio = $(P_u^2 + M_u^2)^{.5} / (\Phi P_n^2 + \Phi M_n^2)^{.5}$		Along Y-Y -0.006183 in at 4.50 ft above base			
P_u = 1.731 k	$\Phi * P_n$ = 11.371 k	for load combination : +D+0.750L+0.450W			
M_u -x = 5.10 k-ft	$\Phi * M_n$ -x = 30.458 k-ft	Along X-X 0.0 in at 0.0 ft above base			
M_u -y = 0.1558 k-ft	$\Phi * M_n$ -y = 0.9740 k-ft	for load combination :			
M_u Angle = 2.0 deg	Φ = 0.90				
M_u at Angle = 5.102 k-ft	ΦM_n at Angle = 29.621 k-ft				
<i>P_n & M_n values located at P_u-M_u vector intersection with capacity curve</i>		General Section Information			
Column Capacities . .		β = 0.850 θ = 0.80			
P _n max : Nominal Max. Compressive Axial Capacity	728.89 k	ρ : % Reinforcing	0.3979 %	Rebar % Ok	
P _n min : Nominal Min. Tension Axial Capacity	k	Reinforcing Area	0.80 in ²		
ΦP_n , max : Usable Compressive Axial Capacity	379.023 k	Concrete Area	201.062 in ²		
ΦP_n , min : Usable Tension Axial Capacity	k				

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 24. Double Swinging Ballfield Gate Post CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base	Axial Load		Bending Analysis k-ft								Utilization	
	X-X	Y-Y		Pu	ϕ * Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio		
+1.40D	Actual	M2,min	4.47	2.02	31.22	1.000	2.52	1.000	0.18	4.000	2.53	38.67	0.065		
+1.20D+1.60L	Actual	M2,min	4.47	1.73	11.37	1.000	4.56	1.000	0.16	2.000	4.56	29.62	0.154		
+1.20D+0.50L	Actual	M2,min	4.47	1.73	19.96	1.000	2.91	1.000	0.16	3.000	2.91	33.60	0.087		
+1.20D+0.50W	Actual	M2,min	4.47	1.73	19.96	1.000	2.88	1.000	0.16	3.000	2.88	33.60	0.086		
+1.20D+L	Actual	M2,min	4.47	1.73	14.55	1.000	3.66	1.000	0.16	2.000	3.66	31.11	0.118		
+1.20D+0.50L+W	Actual	M2,min	4.47	1.73	11.37	1.000	4.35	1.000	0.16	2.000	4.35	29.62	0.147		
+1.20D+L+W	Actual	M2,min	4.47	1.73	11.37	1.000	5.10	1.000	0.16	2.000	5.10	29.62	0.172		
+0.90D+W	Actual	M2,min	4.47	1.30	11.37	1.000	3.06	1.000	0.12	2.000	3.06	29.62	0.103		
+0.90D	Actual	M2,min	4.47	1.30	31.22	1.000	1.62	1.000	0.12	4.000	1.62	38.67	0.042		

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only						1.442	-1.800			
+D+L						1.442	-3.300			
+D+0.750L						1.442	-2.925			
+D+0.60W						1.442	-2.664			
+D+0.750L+0.450W						1.442	-3.573			
+0.60D+0.60W						0.865	-1.944			
+0.60D						0.865	-1.080			
L Only							-1.500			
W Only							-1.440			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top
D Only	-1.800		k-ft		k-ft
+D+L	-3.300		k-ft		k-ft
+D+0.750L	-2.925		k-ft		k-ft
+D+0.60W	-2.664		k-ft		k-ft
+D+0.750L+0.450W	-3.573		k-ft		k-ft
+0.60D+0.60W	-1.944		k-ft		k-ft
+0.60D	-1.080		k-ft		k-ft
L Only	-1.500		k-ft		k-ft
W Only	-1.440		k-ft		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	-0.003	in	4.500 ft
+D+L	0.0000	in	0.000 ft	-0.006	in	4.500 ft
+D+0.750L	0.0000	in	0.000 ft	-0.005	in	4.500 ft
+D+0.60W	0.0000	in	0.000 ft	-0.005	in	4.500 ft
+D+0.750L+0.450W	0.0000	in	0.000 ft	-0.006	in	4.500 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.003	in	4.500 ft
+0.60D	0.0000	in	0.000 ft	-0.002	in	4.500 ft
L Only	0.0000	in	0.000 ft	-0.003	in	4.500 ft
W Only	0.0000	in	0.000 ft	-0.002	in	4.470 ft

25. Soccer Concourse Details (Seating Details) (Landscape
Detail 1/L-2.19)

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 25. Soccer Concourse Seating Foundation

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	Yes
Use Pedestal wt for stability, mom & shear	:	Yes

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	1.50 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.0 ft

Increases based on footing plan dimension

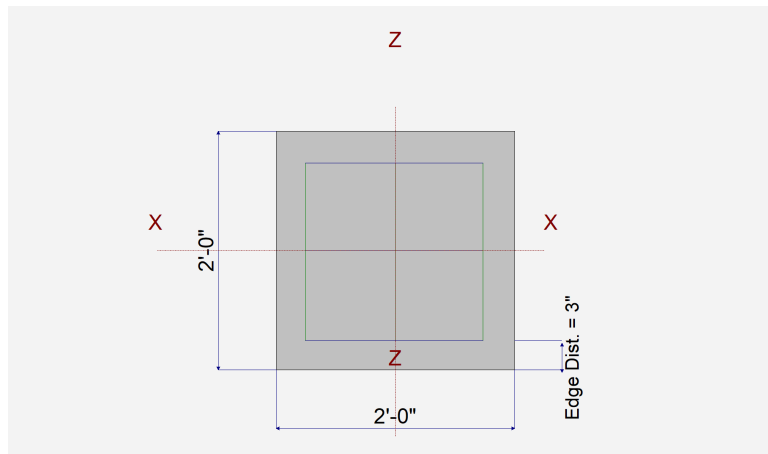
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	2.0 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



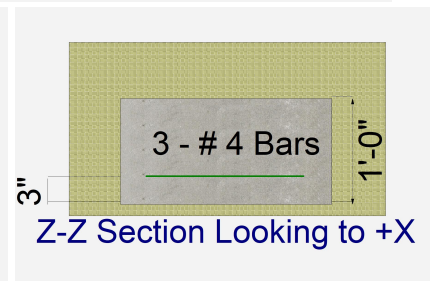
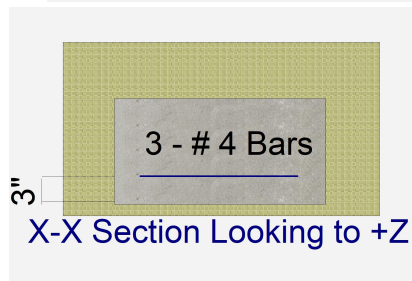
Reinforcing

Bars parallel to X-X Axis	=	3.0
Number of Bars	=	# 4

Bars parallel to Z-Z Axis	=	3.0
Number of Bars	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	1.0					k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 25. Soccer Concourse Seating Foundation

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.1989	Soil Bearing	0.4575 ksf	2.30 ksf	D Only about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.01477	Z Flexure (+X)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01477	Z Flexure (-X)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01477	X Flexure (+Z)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01477	X Flexure (-Z)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01458	1-way Shear (+X)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01458	1-way Shear (-X)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01458	1-way Shear (+Z)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01458	1-way Shear (-Z)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01949	2-way Punching	3.697 psi	189.737 psi	+1.40D

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc		Zecc		Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				(in)		Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.30	n/a	0.0			0.4575	0.4575	n/a	n/a	0.199
X-X, +0.60D	2.30	n/a	0.0			0.2745	0.2745	n/a	n/a	0.119
Z-Z, D Only	2.30	0.0	n/a			n/a	n/a	0.4575	0.4575	0.199
Z-Z, +0.60D	2.30	0.0	n/a			n/a	n/a	0.2745	0.2745	0.119

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				
All units k				

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in2	Gvrn. As in2	Actual As in2	Phi*Mn k-ft	Status
X-X, +1.40D	0.1750	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +1.40D	0.1750	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +1.20D	0.150	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +1.20D	0.150	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +0.90D	0.1125	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +0.90D	0.1125	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.40D	0.1750	-X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.40D	0.1750	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.20D	0.150	-X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.20D	0.150	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +0.90D	0.1125	-X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +0.90D	0.1125	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.78 psi	0.78 psi	0.78 psi	53.34 psi	0.01	OK
+1.20D	0.67 psi	0.67 psi	0.67 psi	53.34 psi	0.01	OK
+0.90D	0.50 psi	0.50 psi	0.50 psi	53.34 psi	0.01	OK

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 25. Soccer Concourse Seating Foundation

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.78 psi	0.78 psi	0.78 psi	53.34 psi	0.01	OK
+1.20D	0.67 psi	0.67 psi	0.67 psi	53.34 psi	0.01	OK
+0.90D	0.50 psi	0.50 psi	0.50 psi	53.34 psi	0.01	OK

All units k

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	3.70 psi	189.74psi	0.01949	OK
+1.20D	3.17 psi	189.74psi	0.0167	OK
+0.90D	2.38 psi	189.74psi	0.01253	OK

26. Seating at Soccer Concourse (Landscape Detail 1/L-2.20)

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 26. Soccer Concourse Seating Foundation

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	Yes
Use Pedestal wt for stability, mom & shear	:	Yes

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	1.50 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.0 ft

Increases based on footing plan dimension

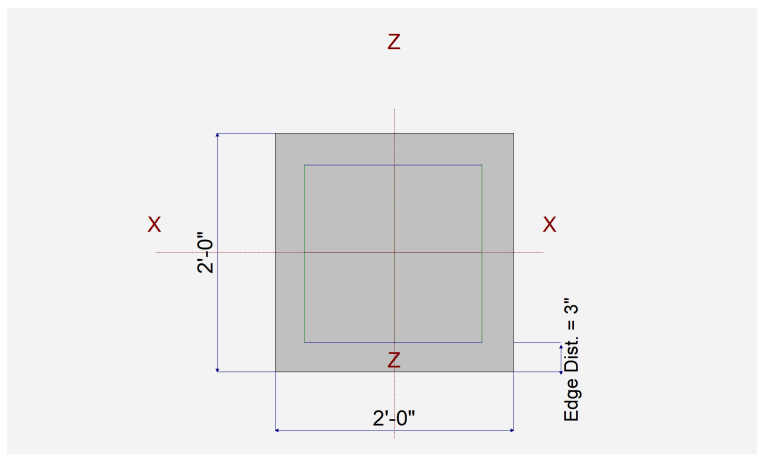
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	2.0 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



Reinforcing

Bars parallel to X-X Axis	=	3.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	3.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4

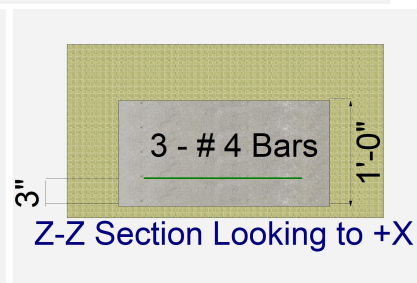
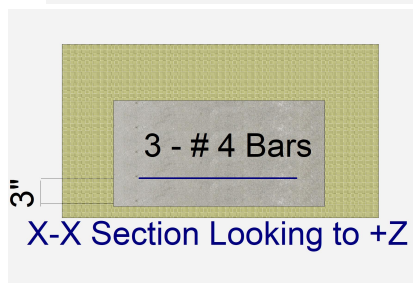
Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

Bars required within zone

Bars required on each side of zone

n/a
n/a
n/a



Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	1.0						k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=							k-ft
V-x	=							k
V-z	=							k

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 26. Soccer Concourse Seating Foundation

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.1989	Soil Bearing	0.4575 ksf	2.30 ksf	D Only about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.01477	Z Flexure (+X)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01477	Z Flexure (-X)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01477	X Flexure (+Z)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01477	X Flexure (-Z)	0.1750 k-ft/ft	11.852 k-ft/ft	+1.40D
PASS	0.01458	1-way Shear (+X)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01458	1-way Shear (-X)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01458	1-way Shear (+Z)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01458	1-way Shear (-Z)	0.7778 psi	53.343 psi	+1.40D
PASS	0.01949	2-way Punching	3.697 psi	189.737 psi	+1.40D

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc		Zecc		Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				(in)		Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.30	n/a	0.0			0.4575	0.4575	n/a	n/a	0.199
X-X, +0.60D	2.30	n/a	0.0			0.2745	0.2745	n/a	n/a	0.119
Z-Z, D Only	2.30	0.0	n/a			n/a	n/a	0.4575	0.4575	0.199
Z-Z, +0.60D	2.30	0.0	n/a			n/a	n/a	0.2745	0.2745	0.119

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				
All units k				

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in2	Gvrn. As in2	Actual As in2	Phi*Mn k-ft	Status
X-X, +1.40D	0.1750	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +1.40D	0.1750	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +1.20D	0.150	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +1.20D	0.150	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +0.90D	0.1125	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
X-X, +0.90D	0.1125	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.40D	0.1750	-X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.40D	0.1750	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.20D	0.150	-X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +1.20D	0.150	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +0.90D	0.1125	-X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK
Z-Z, +0.90D	0.1125	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.852	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.78 psi	0.78 psi	0.78 psi	53.34 psi	0.01	OK
+1.20D	0.67 psi	0.67 psi	0.67 psi	53.34 psi	0.01	OK
+0.90D	0.50 psi	0.50 psi	0.50 psi	53.34 psi	0.01	OK

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.01.29

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 26. Soccer Concourse Seating Foundation

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.78 psi	0.78 psi	0.78 psi	53.34 psi	0.01	OK
+1.20D	0.67 psi	0.67 psi	0.67 psi	53.34 psi	0.01	OK
+0.90D	0.50 psi	0.50 psi	0.50 psi	53.34 psi	0.01	OK

All units k

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	3.70 psi	189.74psi	0.01949	OK
+1.20D	3.17 psi	189.74psi	0.0167	OK
+0.90D	2.38 psi	189.74psi	0.01253	OK

27. Soccer Containment Netting (Landscape Detail 1/L-2.21)

Soccer Containment Netting, (Landscape Detail 1/L-2.21)

Weight of netting above grade is insignificant, seismic loading is ignored.

- 20'-0" Tall
- 40'-0" (max) spacing between posts

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 10% wind loading due to open nature of netting

Total Wind Load per Post = 2,130.6 lbs, (See *Wind Loading Spreadsheet*)

Applied Moment due to Wind = 21.3 ft – kips, (See *Wind Loading Spreadsheet*)

$M_u = 21.3 \text{ ft} - \text{kips}$

$V_u = 2.13 \text{ kips}$

Enercalc: $21.3\text{k-ft}/20\text{ft} = \mathbf{1.1\text{kips @ 20'}}$

Wind Load (ASCE 7-22) - Chapter 29, Solid Free-Standing Wall

Improvement: Soccer Containment Netting Wind Load, (20-foot tall pole)

Velocity Pressure $q_z = 0.00256 K_z K_{zt} K_d K_e V^2$ (lb/ft²); V in mi/h (26.10-1)

Risk Category	II	(table 1.5-1)
Basic Wind Speed (V)	110	(figure 26.5-1B)

Wind Load Parameters

K_d	0.85	(table 26.6-1)
Exposure Category	C	(section 26.7)
K_{zt}	1	(section 26.8) - Assume no speed-up
K_z	0.85	(table 26.10-1)
K_e	1	(section 26.9)
G	0.85	(section 26.11.1) - Rigid Structure
q_z	22.38016	(equation 26.10-1)

Wind Load on Netting $F = q_h G C_f A_s$ (Eqn. 29.3-1)

B = (Maximum Tributary Width)	40	feet
S = (Maximum Tributary Height)	20	feet
H = (Height to top of Wind Loaded Area)	20	feet
B/S	2.0	Aspect Ratio
S/H	1	Clearance Ratio
C_f	1.4	(Force Coefficient, Figure 29.3-1)
A_s	800	Unit Area of Loading, sqft
Total Wind Load	21,305.9	lbs
Sports netting; use 10% wind load	2,130.6	lbs
Height to Center of Wind Loaded Area	10	feet
Moment due to Wind Loading	21.3	ft-kips

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 27. Soccer Containment Netting Post Embedment - 20' High Fence

Code References

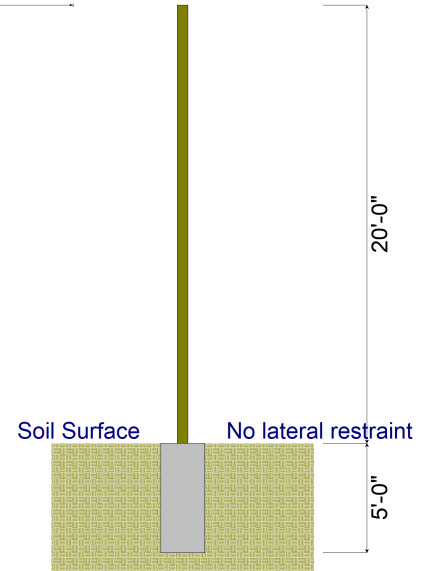
Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 24.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 psf

Point Load



Controlling Values

Governing Load Combination +0.60W
Lateral Load 0.660 k
Moment 13.20 k-ft
NO Ground Surface Restraint
Pressures at 1/3 Depth
Actual **830.31** psf
Allowable **831.94** psf

Minimum Required Depth 5.0 ft

Footing Base Area 3.142 ft²
Maximum Soil Pressure 0.0 ksf

Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	1.10 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	20.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.660	13.200	5.00	830.3	831.9	1.000
+0.450W	0.495	9.900	4.63	750.4	751.0	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 27. Soccer Containment Netting Post CIDH Caisson- 20' High Fence

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

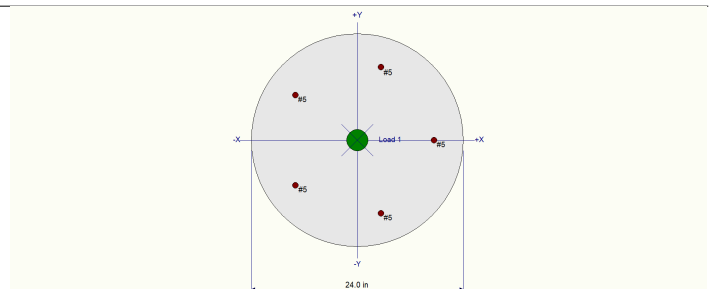
f'_c : Concrete 28 day streng	=	3.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.20 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	7.50 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 24.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 5 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 3,534.29 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 7.50 ft above base, D = 2.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 8.50 ft, W = 21.30 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W		Maximum SERVICE Load Reactions .			
Location of max.above base	7.450 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.253 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	4.981 k	φ * Pn =	20.072 k			
Mu-x =	21.30 k-ft	φ * Mn-x =	85.830 k-ft			
Mu-y =	0.5479 k-ft	φ* Mn-y =	5.362 k-ft			
Mu Angle =	1.0 deg	φ =	0.90			
Mu at Angle =	21.307 k-ft	φMn at Angle =	84.319 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .			General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacit	1,242.64 k		ρ : % Reinforcing	0.3426 %	Rebar % Ok	β = 0.850 θ = 0.80
Pnmin : Nominal Min. Tension Axial Capacity	k		Reinforcing Area	1.550 in^2		
φ Pn, max : Usable Compressive Axial Capacity	646.17 k		Concrete Area	452.389 in^2		
φ Pn, min : Usable Tension Axial Capacity	k					

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 27. Soccer Containment Netting Post CIDH Caisson- 20' High Fence

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δMu	ϕMn	Ratio
+1.40D	Actual	M2,min	7.45	7.75	646.17	1.000			1.000	0.85	90.000	0.85	71.27	0.012
+1.40D	M2,min	Actual	7.45	7.75	646.17	1.000	0.85	1.000		0.000	0.000	0.85	71.36	0.012
+1.20D	Actual	M2,min	7.45	6.64	646.17	1.000			1.000	0.73	90.000	0.73	71.27	0.010
+1.20D	M2,min	Actual	7.45	6.64	646.17	1.000	0.73	1.000		0.000	0.000	0.73	71.36	0.010
+1.20D+0.50W	Actual	M2,min	7.45	6.64	73.21	1.000	10.65	1.000	0.73	4.000	10.68	119.04	0.090	
+1.20D+W	Actual	M2,min	7.45	6.64	29.74	1.000	21.30	1.000	0.73	2.000	21.31	91.28	0.233	
+0.90D+W	Actual	M2,min	7.45	4.98	20.07	1.000	21.30	1.000	0.55	1.000	21.31	84.32	0.253	
+0.90D	Actual	M2,min	7.45	4.98	646.17	1.000			1.000	0.55	90.000	0.55	71.27	0.008
+0.90D	M2,min	Actual	7.45	4.98	646.17	1.000	0.55	1.000		0.000	0.000	0.55	71.36	0.008

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		My - End Moments
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	
D Only						5.534			
+D+0.60W						5.534	-12.780		
+D+0.450W						5.534	-9.585		
+0.60D+0.60W						3.321	-12.780		
+0.60D						3.321			
W Only								-21.300	

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		k-ft	Moment About Y-Y Axis		k-ft
	@ Base	@ Top		@ Base	@ Top	
D Only						
+D+0.60W	-12.780		k-ft			k-ft
+D+0.450W	-9.585		k-ft			k-ft
+0.60D+0.60W	-12.780		k-ft			k-ft
+0.60D			k-ft			k-ft
W Only	-21.300		k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.012	in	7.500 ft
+D+0.450W	0.0000	in	0.000 ft	-0.009	in	7.500 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.012	in	7.500 ft
+0.60D	0.0000	in	0.000 ft	0.000	in	0.000 ft
W Only	0.0000	in	0.000 ft	-0.020	in	7.450 ft

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 27. Soccer Containment Netting Fence Post - 20' High Fence

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name :	Pipe8STD	Overall Column Height	20.0 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade	, A53, Grade B, Fy = 35 ksi, Carbon Steel	Brace condition :	
Fy : Steel Yield	35.0 ksi	Unbraced Length for buckling ABOUT X-X Axis = 8 ft, K = 2.1	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 8 ft, K = 2.1	

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 572.0 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 20.0 ft, D = 1.0 k

BENDING LOADS . . .

Wind Shear: Lat. Point Load at 20.0 ft creating Mx-x, W = 1.10 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.4078 : 1
Load Combination	+1.20D+W
Location of max.above base	0.0 ft
At maximum location values are . . .	
Pu	1.886 k
0.9 * Pn	194.871 k
Mu-x	-22.0 k-ft
0.9 * Mn-x :	54.60 k-ft
Mu-y	0.0 k-ft
0.9 * Mn-y :	54.60 k-ft

Maximum Load Reactions . .	
Top along X-X	0.0 k
Bottom along X-X	0.0 k
Top along Y-Y	0.0 k
Bottom along Y-Y	1.10 k

Maximum Load Deflections . . .	
Along Y-Y	2.554 in at 20.0ft above base
for load combination :W Only	
Along X-X	0.0 in at 0.0ft above base
for load combination :	

PASS Maximum Shear Stress Ratio	0.01779 : 1
Load Combination	+1.20D+W
Location of max.above base	0.0 ft
At maximum location values are . . .	
Vu : Applied	1.10 k
Vn * Phi : Allowable	61.819 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Maximum Shear Ratios					
	Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Stress Ratio	Status	Location
+1.40D	0.011	PASS	0.00 ft	1.67	1.00	68.34	68.34	0.000	PASS	0.00 ft
+1.20D	0.010	PASS	0.00 ft	1.67	1.00	68.34	68.34	0.000	PASS	0.00 ft
+1.20D+0.50W	0.206	PASS	0.00 ft	1.67	1.00	68.34	68.34	0.009	PASS	0.00 ft
+1.20D+W	0.408	PASS	0.00 ft	1.67	1.00	68.34	68.34	0.018	PASS	0.00 ft
+0.90D+W	0.407	PASS	0.00 ft	1.67	1.00	68.34	68.34	0.018	PASS	0.00 ft
+0.90D	0.007	PASS	0.00 ft	1.67	1.00	68.34	68.34	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments k-ft @ Base @ Top	My - End Moments @ Base @ Top
D Only	1.572					
+D+0.60W	1.572			0.660	-13.200	
+D+0.450W	1.572			0.495	-9.900	
+0.60D+0.60W	0.943			0.660	-13.200	
+0.60D	0.943					
W Only				1.100	-22.000	

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 27. Soccer Containment Netting Fence Post - 20' High Fence

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	1.572						
"	Minimum				1.100	-22.000		
Reaction, X-X Axis Base	Maximum	1.572						
"	Minimum	1.572						
Reaction, Y-Y Axis Base	Maximum				1.100	-22.000		
"	Minimum	1.572						
Reaction, X-X Axis Top	Maximum	1.572						
"	Minimum	1.572						
Reaction, Y-Y Axis Top	Maximum	1.572						
"	Minimum	1.572						
Moment, X-X Axis Base	Maximum	1.572						
"	Minimum		-22.000		1.100	-22.000		
Moment, Y-Y Axis Base	Maximum	1.572						
"	Minimum	1.572						
Moment, X-X Axis Top	Maximum	1.572						
"	Minimum	1.572						
Moment, Y-Y Axis Top	Maximum	1.572						
"	Minimum	1.572						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	1.532 in	20.000 ft
+D+0.450W	0.0000 in	0.000 ft	1.149 in	20.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	1.532 in	20.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	2.528 in	19.866 ft

Steel Section Properties : Pipe8STD

Depth	=	8.625 in	I xx	=	68.10 in^4	J	=	136.000 in^4
			S xx	=	15.80 in^3			
Diameter	=	8.625 in	R xx	=	2.950 in			
Wall Thick	=	0.322 in	Zx	=	20.800 in^3			
Area	=	7.850 in^2	I yy	=	68.100 in^4			
Weight	=	28.600 plf	S yy	=	15.800 in^3			
			R yy	=	2.950 in			
Ycg	=	0.000 in						

Steel Column

Project File: 24-130-00_ontario sports park.ec6

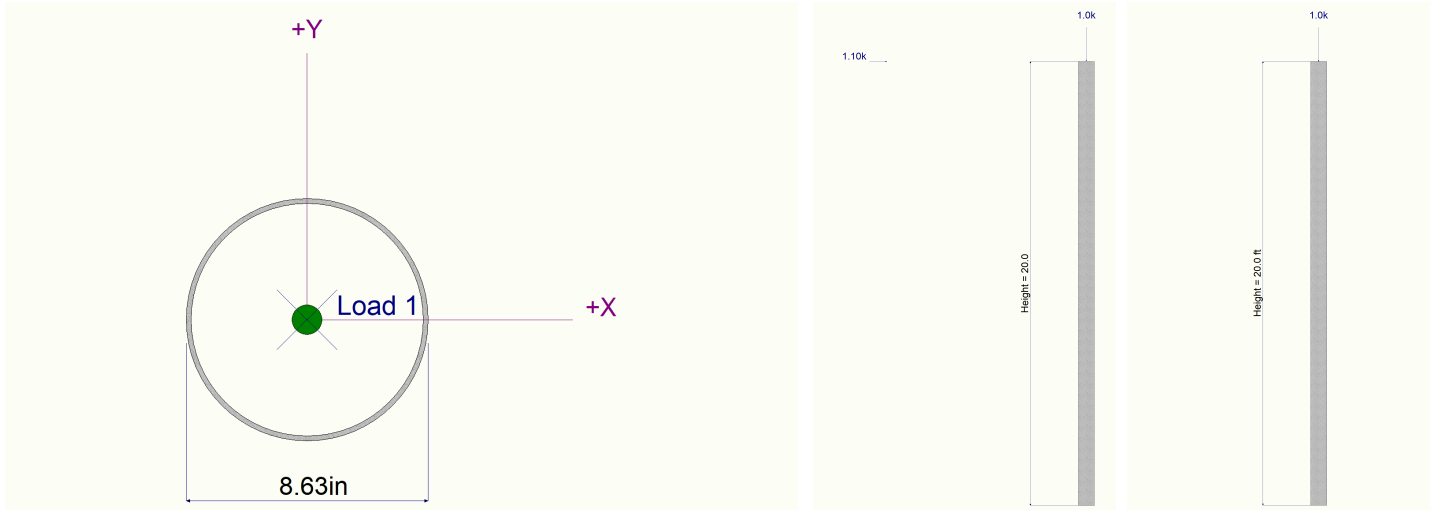
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 27. Soccer Containment Netting Fence Post - 20' High Fence

Sketches



28. 8'-2" Ht. Omega Fencing, (Landscape Detail 2&4/L-2.22))

8'-2" Ht. Omega Fencing, (Landscape Detail 2/L-2.22)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 8'-2" Tall
- 8'-0" (typ.) spacing between main set of posts

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% reduction in wind loading due to open nature of chain-link fencing

Total Wind Load per Post = 30 psf x 8.2' x 8' x 0.25 = 492 lbs

Applied Moment due to Wind = 492 lbs x $\frac{8.2'}{2}$ = 2,017.2 ft – lbs

$M_u = 2,017.2 \text{ ft} - \text{lbs}$

$V_u = 492 \text{ lbs}$

Enercalc: 2,018/8' = **252.3 lbs @ 8'**

8'-2" Ht. Omega Gate, (Landscape Detail 4/L-2.22)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 8'-0" Tall
- 4'-0" Wide

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% wind loading due to open nature of chain-link fencing

Total Wind Load per Post = 30 psf x 8' x 4' x 0.25 = 240 lbs

Applied Moment due to Wind = 240 lbs x $\frac{8ft}{2}$ = 960 ft – lbs

Dead and Live Loading

Total Dead Load per Post = 600 lbs

Applied Moment due to Dead Load = 600 lbs x $\frac{4ft}{2}$ = 1,200 ft – lbs

Total Live Load per Post = 250 lbs

Applied Moment due to Live Load = 250 lbs x 4ft = 1,000 ft – lbs

Pole Capacity Check

$\phi M_n = 0.9(3,657.5 \text{ ft} - \text{lbs}) = 3,291.8 \text{ ft} - \text{lbs}$

$\phi M_n = 3,291.8 \text{ ft} - \text{lbs} > M_u = 2,017.2 \text{ ft} - \text{lbs}, (OK)$

$M_u = 1,200 \text{ ft} - \text{lbs}$

$V_u = 240 \text{ lbs}$

Enercalc: 1,200/8 = **150 lbs @ 8'**

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 28. 8' Omega Fence Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination +0.60W
Lateral Load 0.1512 k
Moment 1.210 k-ft

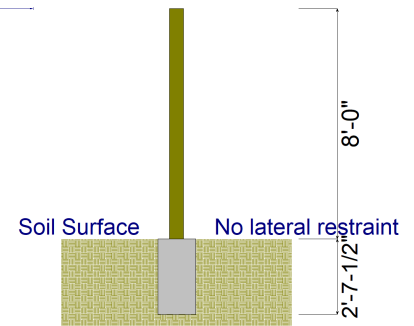
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 436.910 psf
Allowable 437.490 psf

Minimum Required Depth 2.625 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	0.0 k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.2520 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.151	1.210	2.63	436.9	437.5	1.000
+0.450W	0.113	0.907	2.38	391.9	395.6	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 28. 8' Omega Fence Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

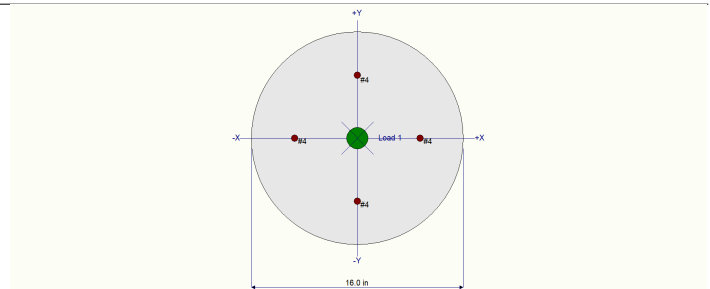
f'c : Concrete 28 day streng	=	3.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
fy - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.20 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	4.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column		
X-X (width) axis :		
Unbraced Length for buckling ABOUT X-X Axis = 4.0 ft, K = 1.0		
Y-Y (depth) axis :		
Unbraced Length for buckling ABOUT Y-Y Axis = 4.0 ft, K = 1.0		

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 4 - #4 bars



Applied Loads

Entered loads are factored per load combinations specified by user.

Column self weight included : 837.76 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 4.0 ft above base, D = 1.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 4.0 ft, W = 2.280 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W		Maximum SERVICE Load Reactions .			
Location of max.above base	3.973 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.068 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	1.654 k	φ * Pn =	23.579 k			
Mu-x =	2.280 k-ft	φ * Mn-x =	34.189 k-ft			
Mu-y =	0.1489 k-ft	φ* Mn-y =	2.074 k-ft			
Mu Angle =	4.0 deg	φ =	0.90			
Mu at Angle =	2.285 k-ft	φMn at Angle =	33.650 k-ft			
Pn & Mn values located at Pu-Mu vector intersection with capacity curve						
Column Capacities . .			General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacit	558.67 k		ρ : % Reinforcing			0.3979 % Rebar % Ok
Pnmin : Nominal Min. Tension Axial Capacity	k		Reinforcing Area			0.80 in^2
φ Pn, max : Usable Compressive Axial Capacity	290.507 k		Concrete Area			201.062 in^2
φ Pn, min : Usable Tension Axial Capacity	k					
			β =0.850 θ = 0.80			

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 28. 8' Omega Fence Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft								Utilization	
	X-X	Y-Y		Pu	ϕ * Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio		
+1.40D	Actual	M2,min	3.97	2.57	290.51	1.000		1.000	0.23	90.000	0.23	26.32	0.009		
+1.40D	M2,min	Actual	3.97	2.57	290.51	1.000	0.23	1.000		0.000	0.23	26.32	0.009		
+1.20D	Actual	M2,min	3.97	2.21	290.51	1.000		1.000	0.20	90.000	0.20	26.32	0.008		
+1.20D	M2,min	Actual	3.97	2.21	290.51	1.000	0.20	1.000		0.000	0.20	26.32	0.008		
+1.20D+0.50W	Actual	M2,min	3.97	2.21	96.13	1.000	1.14	1.000	0.20	10.000	1.16	50.40	0.023		
+1.20D+W	Actual	M2,min	3.97	2.21	39.13	1.000	2.28	1.000	0.20	5.000	2.29	39.98	0.057		
+0.90D+W	Actual	M2,min	3.97	1.65	23.58	1.000	2.28	1.000	0.15	4.000	2.28	33.65	0.068		
+0.90D	Actual	M2,min	3.97	1.65	290.51	1.000		1.000	0.15	90.000	0.15	26.32	0.006		
+0.90D	M2,min	Actual	3.97	1.65	290.51	1.000	0.15	1.000		0.000	0.15	26.32	0.006		

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		My - End Moments
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	
D Only						1.838			
+D+0.60W						1.838	-1.368		
+D+0.450W						1.838	-1.026		
+0.60D+0.60W						1.103	-1.368		
+0.60D						1.103			
W Only							-2.280		

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		k-ft	Moment About Y-Y Axis		k-ft
	@ Base	@ Top		@ Base	@ Top	
D Only						
+D+0.60W	-1.368		k-ft			k-ft
+D+0.450W	-1.026		k-ft			k-ft
+0.60D+0.60W	-1.368		k-ft			k-ft
+0.60D			k-ft			k-ft
W Only	-2.280		k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	0.000	in	0.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.002	in	4.000 ft
+D+0.450W	0.0000	in	0.000 ft	-0.001	in	4.000 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.002	in	4.000 ft
+0.60D	0.0000	in	0.000 ft	0.000	in	0.000 ft
W Only	0.0000	in	0.000 ft	-0.003	in	3.973 ft

29. 6'-0" Ht. Tubular Fencing, (Landscape Detail 1&3/L-2.22))

6'-0" Ht. Tubular Fencing, (Landscape Detail 1/L-2.22))

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 6'-0" Tall
- 8'-0" (typ.) spacing between main set of posts

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% reduction in wind loading due to open nature of chain-link fencing

Total Wind Load per Post = 30 psf x 6' x 6' x 0.25 = 270 lbs

Applied Moment due to Wind = 270 lbs x $\frac{6'}{2}$ = 810 ft – lbs

$M_u = 810 \text{ ft} - \text{lbs}$

$V_u = 270 \text{ lbs}$

Enercalc: 810/6' = **135 lbs @ 6'**

6'-0" Tall by 5'-0" Wide Gate

Gate Load: 200lbs @ 2.5' load centroid = 500 ft-lbs **DL**

500 ft-lbs/6' = 83.33lbs

Gate Load: 150 lbs @ 5.0' = 750 ft-lbs **LL**

750 ft-lbs/6' = 125lbs

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 29. 6' Tubular Fence Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination $0.750L+0.450W$
Lateral Load 0.1358 k
Moment 0.8145 k-ft

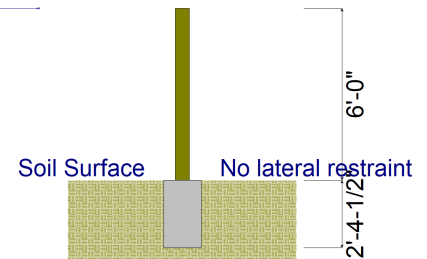
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 386.173 psf
Allowable 390.112 psf

Minimum Required Depth 2.375 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	0.10 k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.1350 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	6.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
L Only	0.100	0.600	2.13	347.0	348.2	1.000
+0.750L	0.075	0.450	2.00	311.6	314.4	1.000
+0.60W	0.081	0.486	2.00	321.2	322.8	1.000
+0.750L+0.450W	0.136	0.815	2.38	386.2	390.1	1.000

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 29. 6' Tubular Fence Gate Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination **D+L**
Lateral Load 0.2333 k
Moment 1.40 k-ft

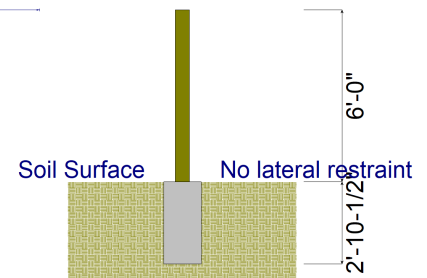
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual **473.453** psf
Allowable **474.930** psf

Minimum Required Depth 2.875 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	0.08330 k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	0.150 k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.0 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	6.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.083	0.500	2.00	324.3	326.2	1.000
+D+L	0.233	1.400	2.88	473.5	474.9	1.000
+D+0.750L	0.196	1.175	2.75	443.7	445.1	1.000
+0.60D	0.050	0.300	1.75	269.5	271.8	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 29. 6' Tubular Fence Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

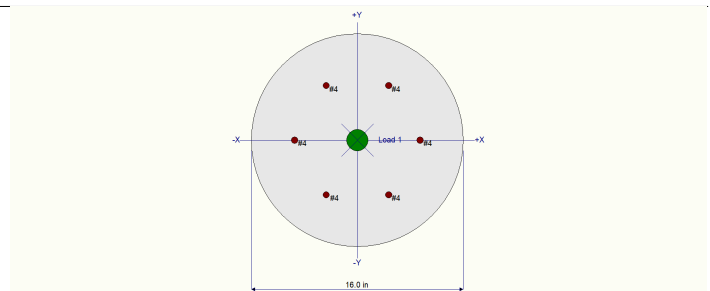
f'c : Concrete 28 day streng	=	3.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
fy - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	3.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column		
X-X (width) axis :		
Unbraced Length for buckling ABOUT X-X Axis = 3.0 ft, K = 1.0		
Y-Y (depth) axis :		
Unbraced Length for buckling ABOUT Y-Y Axis = 3.0 ft, K = 1.0		

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 6 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 628.32 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 3.0 ft above base, D = 1.0 k

BENDING LOADS . . .

Wind Moment: Moment acting about X-X axis at 3.0 ft, W = 0.810 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+W		Maximum SERVICE Load Reactions .			
Location of max.above base	2.980 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
			Top along X-X	0.0 k	Bottom along X-X	0.0 k
Maximum Stress Ratio	0.016 : 1		Maximum SERVICE Load Deflections . .			
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5			Along Y-Y -0.000623 in at 3.0 ft above base			
Pu =	1.954 k	φ * Pn =	for load combination : W Only			
			Along X-X 0.0in at 0.0 ft above base			
Mu-x =	0.810 k-ft	φ * Mn-x =	for load combination :			
Mu-y =	0.1759 k-ft	φ* Mn-y =				
		φ =				
Mu Angle =	12.0 deg					
Mu at Angle =	0.8289 k-ft	φMn at Angle =				
Pn & Mn values located at Pu-Mu vector intersection with capacity curve			General Section Information			
Column Capacities . .			β =0.850 θ = 0.80			
Pnmax : Nominal Max. Compressive Axial Capacity	581.65 k		ρ : % Reinforcing	0.5968 %	Rebar	% Ok
Pnmin : Nominal Min. Tension Axial Capacity	k		Reinforcing Area	1.20 in^2		
φ Pn, max : Usable Compressive Axial Capacity	302.457 k		Concrete Area	201.062 in^2		
φ Pn, min : Usable Tension Axial Capacity	k					

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 29. 6' Tubular Fence Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δMu	ϕMn	Ratio
+1.40D	Actual	M2,min	2.98	2.28	302.46	1.000			1.000	0.21	90.000	0.21	27.01	0.008
+1.40D	M2,min	Actual	2.98	2.28	302.46	1.000	0.21	1.000		0.000	0.000	0.21	27.49	0.007
+1.20D	Actual	M2,min	2.98	1.95	302.46	1.000			1.000	0.18	90.000	0.18	27.01	0.006
+1.20D	M2,min	Actual	2.98	1.95	302.46	1.000	0.18	1.000		0.000	0.000	0.18	27.49	0.006
+1.20D+0.50W	Actual	M2,min	2.98	1.95	223.45	1.000	0.41	1.000	0.18	23.000	0.44	50.22	0.009	
+1.20D+W	Actual	M2,min	2.98	1.95	124.37	1.000	0.81	1.000	0.18	12.000	0.83	52.91	0.016	
+0.90D+W	Actual	M2,min	2.98	1.47	94.18	1.000	0.81	1.000	0.13	9.000	0.82	53.10	0.015	
+0.90D	Actual	M2,min	2.98	1.47	302.46	1.000			1.000	0.13	90.000	0.13	27.01	0.005
+0.90D	M2,min	Actual	2.98	1.47	302.46	1.000	0.13	1.000		0.000	0.000	0.13	27.49	0.005

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k		Y-Y Axis Reaction k		Axial Reaction k	Mx - End Moments k-ft		My - End Moments k-ft	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					1.628				
+D+0.60W					1.628	-0.486			
+D+0.450W					1.628	-0.365			
+0.60D+0.60W					0.977	-0.486			
+0.60D					0.977				
W Only						-0.810			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis k-ft		Moment About Y-Y Axis k-ft	
	@ Base	@ Top	@ Base	@ Top
D Only				
+D+0.60W	-0.486			
+D+0.450W	-0.365			
+0.60D+0.60W	-0.486			
+0.60D				
W Only	-0.810			

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Max. Y-Y Deflection	
	Distance	Distance	Distance	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	-0.000 in	3.000 ft
+D+0.450W	0.0000 in	0.000 ft	-0.000 in	3.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	-0.000 in	3.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	-0.001 in	2.980 ft

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 29. 6' Tubular Fence Post

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : **HSS2x2x3/16**

Analysis Method : Load Resistance Factor

Steel Stress Grade : A53, Grade B, Fy = 35 ksi, Carbon Steel

Fy : Steel Yield 35.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 6.0 ft

Top & Bottom Fixity Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 6.0 ft, K = 1.20

Unbraced Length for buckling ABOUT Y-Y Axis = 6.0 ft, K = 1.20

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 25.920 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 6.0 ft, Yecc = 2.0 in, D = 0.150 k

BENDING LOADS . . .

Wind Shear: Lat. Point Load at 6.0 ft creating Mx-x, W = 0.1350 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.4072** : 1
Load Combination +1.20D+W
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu 0.2111 k
0.9 * Pn 18.409 k
Mu-x -0.840 k-ft
0.9 * Mn-x : 2.092 k-ft
Mu-y 0.0 k-ft
0.9 * Mn-y : 2.092 k-ft

Maximum Load Reactions . .
Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.1350 k

Maximum Load Deflections . . .
Along Y-Y 0.8990 in at 6.0ft above base
for load combination :W Only
Along X-X 0.0 in at 0.0ft above base
for load combination :

PASS Maximum Shear Stress Ratio = **0.01667** : 1
Load Combination +1.20D+W
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 0.1350 k
Vn * Phi : Allowable 8.101 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location						Stress Ratio	Status	Location
+1.40D	0.023	PASS	0.00 ft		1.63	1.00	117.87	117.87	0.000	PASS	0.00 ft
+1.20D	0.020	PASS	3.34 ft		1.63	1.00	117.87	117.87	0.000	PASS	0.00 ft
+1.20D+0.50W	0.214	PASS	0.00 ft		1.63	1.00	117.87	117.87	0.008	PASS	0.00 ft
+1.20D+W	0.407	PASS	0.00 ft		1.63	1.00	117.87	117.87	0.017	PASS	0.00 ft
+0.90D+W	0.402	PASS	0.00 ft		1.63	1.00	117.87	117.87	0.017	PASS	0.00 ft
+0.90D	0.015	PASS	0.00 ft		1.63	1.00	117.87	117.87	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments k-ft		My - End Moments	
	@ Base		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	0.176							-0.025			
+D+0.60W	0.176					0.081		-0.511			
+D+0.450W	0.176					0.061		-0.390			
+0.60D+0.60W	0.106					0.081		-0.501			
+0.60D	0.106							-0.015			
W Only						0.135		-0.810			

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 29. 6' Tubular Fence Post

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	0.176				-0.025		
"	Minimum				0.135	-0.810		
Reaction, X-X Axis Base	Maximum	0.176				-0.025		
"	Minimum	0.176				-0.025		
Reaction, Y-Y Axis Base	Maximum				0.135	-0.810		
"	Minimum	0.176						-0.025
Reaction, X-X Axis Top	Maximum	0.176				-0.025		
"	Minimum	0.176				-0.025		
Reaction, Y-Y Axis Top	Maximum	0.176				-0.025		
"	Minimum	0.176				-0.025		
Moment, X-X Axis Base	Maximum	0.106	-0.015			-0.015		
"	Minimum		-0.810		0.135	-0.810		
Moment, Y-Y Axis Base	Maximum	0.176				-0.025		
"	Minimum	0.176				-0.025		
Moment, X-X Axis Top	Maximum	0.176				-0.025		
"	Minimum	0.176				-0.025		
Moment, Y-Y Axis Top	Maximum	0.176				-0.025		
"	Minimum	0.176				-0.025		

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.042 in	6.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.581 in	6.000 ft
+D+0.450W	0.0000 in	0.000 ft	0.446 in	6.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.564 in	6.000 ft
+0.60D	0.0000 in	0.000 ft	0.025 in	6.000 ft
W Only	0.0000 in	0.000 ft	0.890 in	5.960 ft

Steel Section Properties : HSS2x2x3/16

Depth	=	2.000 in	I xx	=	0.64 in^4	J	=	1.090 in^4
Design Thick	=	0.174 in	S xx	=	0.64 in^3			
Width	=	2.000 in	R xx	=	0.733 in			
Wall Thick	=	0.187 in	Zx	=	0.797 in^3			
Area	=	1.190 in^2	I yy	=	0.641 in^4	C	=	1.140 in^3
Weight	=	4.320 plf	S yy	=	0.641 in^3			
			R yy	=	0.733 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park.ec6

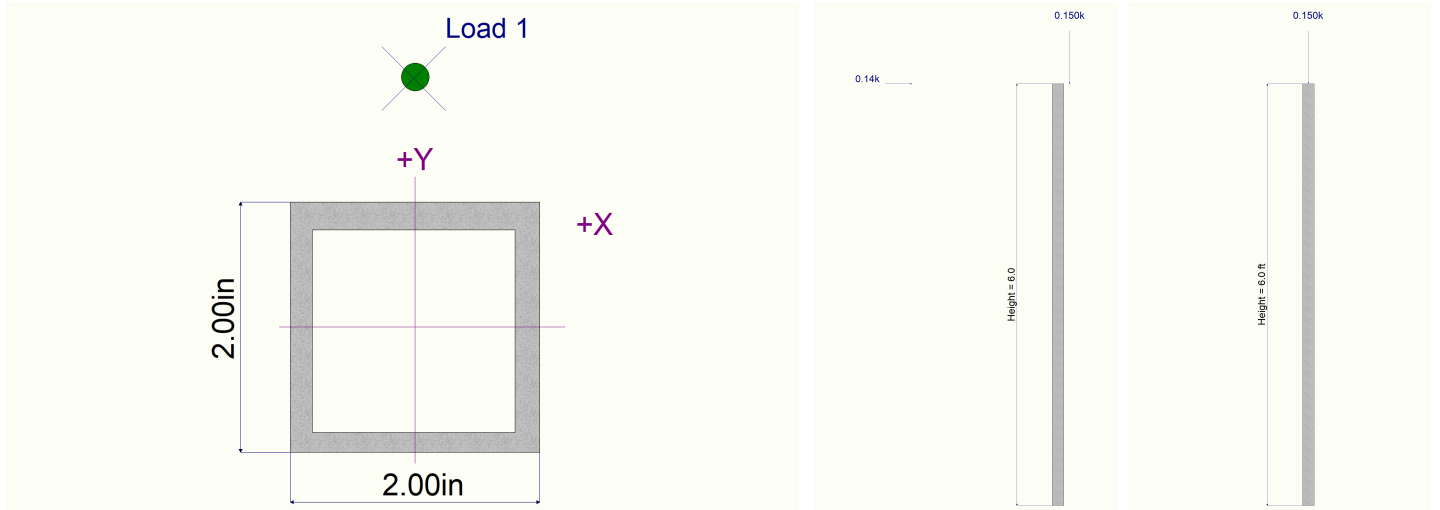
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 29. 6' Tubular Fence Post

Sketches



Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 29. 6' Tubular Gate Post

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : **HSS2-1/2x2-1/2x1/4**

Analysis Method : Load Resistance Factor

Steel Stress Grade : A53, Grade B, Fy = 35 ksi, Carbon Steel

Fy : Steel Yield 35.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 6.0 ft

Top & Bottom Fixity Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 6.0 ft, K = 1.20

Unbraced Length for buckling ABOUT Y-Y Axis = 6.0 ft, K = 1.20

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 42.660 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 6.0 ft, Yecc = 2.0 in, D = 0.150 k

BENDING LOADS . . .

Wind Shear: Lat. Point Load at 6.0 ft creating Mx-x, D = 0.08330, L = 0.1250 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.4306** : 1
Load Combination +1.20D+1.60L
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu 0.2312 k
0.9 * Pn 39.041 k
Mu-x -1.830 k-ft
0.9 * Mn-x : 4.279 k-ft
Mu-y 0.0 k-ft
0.9 * Mn-y : 4.279 k-ft

Maximum Load Reactions . .
Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.2083 k

Maximum Load Deflections . . .
Along Y-Y 0.5618 in at 6.0ft above base
for load combination : +D+L
Along X-X 0.0 in at 0.0ft above base
for load combination :

PASS Maximum Shear Stress Ratio = **0.02269** : 1
Load Combination +1.20D+1.60L
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 0.30 k
Vn * Phi : Allowable 13.218 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				CbX	CbY	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location						Stress Ratio	Status	Location
+1.40D	0.175	PASS	0.00 ft		1.65	1.00	95.15	95.15	0.009	PASS	0.00 ft
+1.20D+1.60L	0.431	PASS	0.00 ft		1.65	1.00	95.15	95.15	0.023	PASS	0.00 ft
+1.20D+0.50L	0.238	PASS	0.00 ft		1.65	1.00	95.15	95.15	0.012	PASS	0.00 ft
+1.20D	0.150	PASS	0.00 ft		1.65	1.00	95.15	95.15	0.008	PASS	0.00 ft
+1.20D+L	0.325	PASS	0.00 ft		1.65	1.00	95.15	95.15	0.017	PASS	0.00 ft
+0.90D	0.113	PASS	0.00 ft		1.65	1.00	95.15	95.15	0.006	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
	@ Base		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	0.193					0.083		-0.525			
+D+L	0.193					0.208		-1.275			
+D+0.750L	0.193					0.177		-1.087			
+0.60D	0.116					0.050		-0.315			
L Only						0.125		-0.750			

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 29. 6' Tubular Gate Post

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	0.193			0.083	-0.525		
"	Minimum				0.125	-0.750		
Reaction, X-X Axis Base	Maximum	0.193			0.083	-0.525		
"	Minimum	0.193			0.083	-0.525		
Reaction, Y-Y Axis Base	Maximum	0.193			0.208	-1.275		
"	Minimum	0.116			0.050			-0.315
Reaction, X-X Axis Top	Maximum	0.193			0.083	-0.525		
"	Minimum	0.193			0.083	-0.525		
Reaction, Y-Y Axis Top	Maximum	0.193			0.083	-0.525		
"	Minimum	0.193			0.083	-0.525		
Moment, X-X Axis Base	Maximum	0.116	-0.315		0.050	-0.315		
"	Minimum	0.193	-1.275		0.208	-1.275		
Moment, Y-Y Axis Base	Maximum	0.193			0.083	-0.525		
"	Minimum	0.193			0.083	-0.525		
Moment, X-X Axis Top	Maximum	0.193			0.083	-0.525		
"	Minimum	0.193			0.083	-0.525		
Moment, Y-Y Axis Top	Maximum	0.193			0.083	-0.525		
"	Minimum	0.193			0.083	-0.525		

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.234 in	6.000 ft
+D+L	0.0000 in	0.000 ft	0.562 in	6.000 ft
+D+0.750L	0.0000 in	0.000 ft	0.480 in	6.000 ft
+0.60D	0.0000 in	0.000 ft	0.141 in	6.000 ft
L Only	0.0000 in	0.000 ft	0.324 in	5.960 ft

Steel Section Properties : HSS2-1/2x2-1/2x1/4

Depth	=	2.500 in	I xx	=	1.63 in^4	J	=	2.790 in^4
Design Thick	=	0.233 in	S xx	=	1.30 in^3			
Width	=	2.500 in	R xx	=	0.908 in			
Wall Thick	=	0.250 in	Zx	=	1.630 in^3			
Area	=	1.970 in^2	I yy	=	1.630 in^4	C	=	2.350 in^3
Weight	=	7.110 plf	S yy	=	1.300 in^3			
			R yy	=	0.908 in			
Ycg	=	0.000 in						

Steel Column

Project File: 24-130-00_ontario sports park.ec6

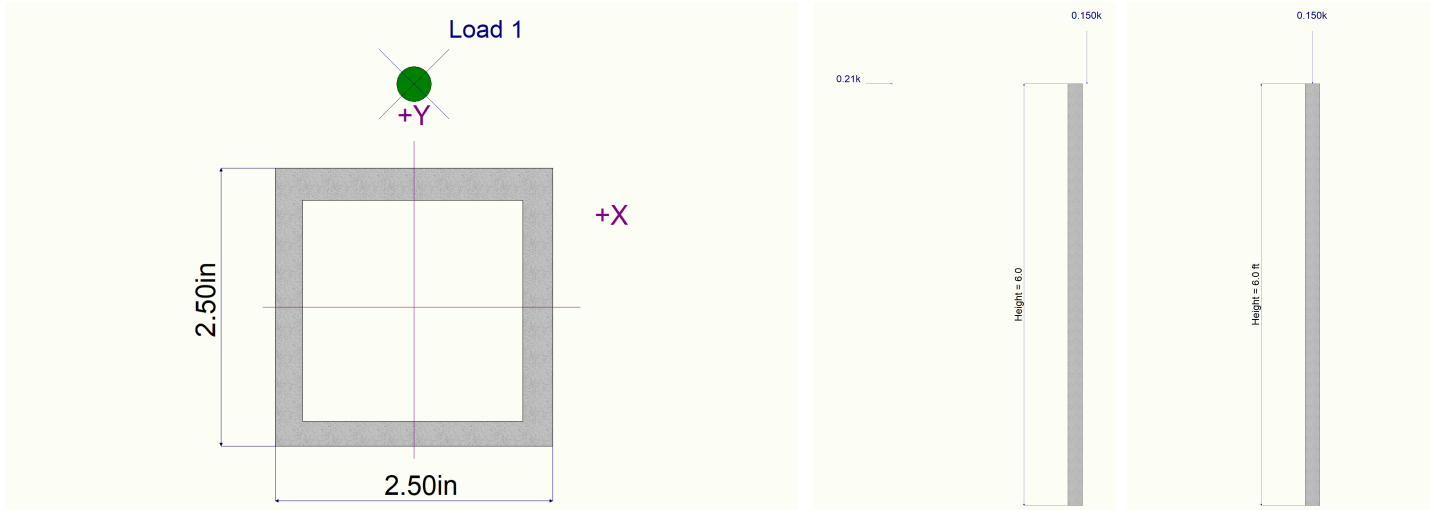
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 29. 6' Tubular Gate Post

Sketches



30. Maintenance Yard Perimeter Wall (Landscape Detail 1/L-2.24)

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30. Maintenance Gate Wall (1/ L-2.24)

Code Reference

Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	1.00 ft
Wall height above soil	=	8.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

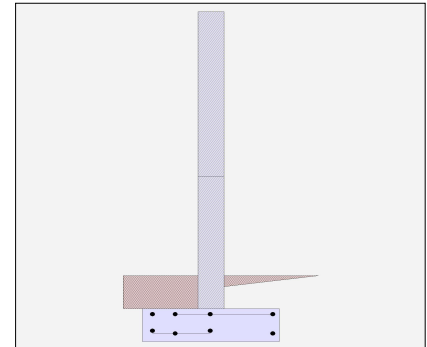
Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
	=	
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	30.0 psf (Strength Level)



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30. Maintenance Gate Wall (1/ L-2.24)

Design Summary

Wall Stability Ratios

Overturing	=	1.83	OK
Sliding	=	5.46	OK
Global Stability	=	6.13	

Total Bearing Load	=	912 lbs
...resultant ecc.	=	11.14 in

Eccentricity outside middle third

Soil Pressure @ Toe	=	740 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	2,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	999 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	4.6 psi	OK
Footing Shear @ Heel	=	4.3 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	204.0 lbs	
less 100% Passive Force	-	750.0 lbs	
less 100% Friction Force	= -	364.8 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht"

Design Method

Thickness

Rebar Size

Rebar Spacing

Rebar Placed at

Design Data

fb/FB + fa/Fa

Total Force @ Section

Service Level

Strength Level

Moment.....Actual

Service Level

Strength Level

Moment.....Allowable

Shear.....Actual

Service Level

Strength Level

Shear.....Allowable

Anet (Masonry)

Wall Weight

Rebar Depth 'd'

2nd

Bottom

Stem OK

Stem OK

Masonry

Masonry

ASD

ASD

8.00

8.00

4

5

16.00

16.00

Center

Center

SD

SD

SD

1,294.8

1.7

43.6

91.50

0.0

3.81

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30. Maintenance Gate Wall (1/ L-2.24)

Footing Data

Toe Width	=	1.42 ft
Heel Width	=	2.08
Total Footing Width	=	3.50
Footing Thickness	=	12.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	999	0	psf
Mu' : Upward	=	810	4	ft-#
Mu' : Downward	=	409	483	ft-#
Mu: Design	=	401	480	ft-#
φ Mn	=	11,415	12,765	ft-#
Actual 1-Way Shear	=	4.61	4.30	psi
Allow 1-Way Shear	=	46.63	44.98	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.91	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

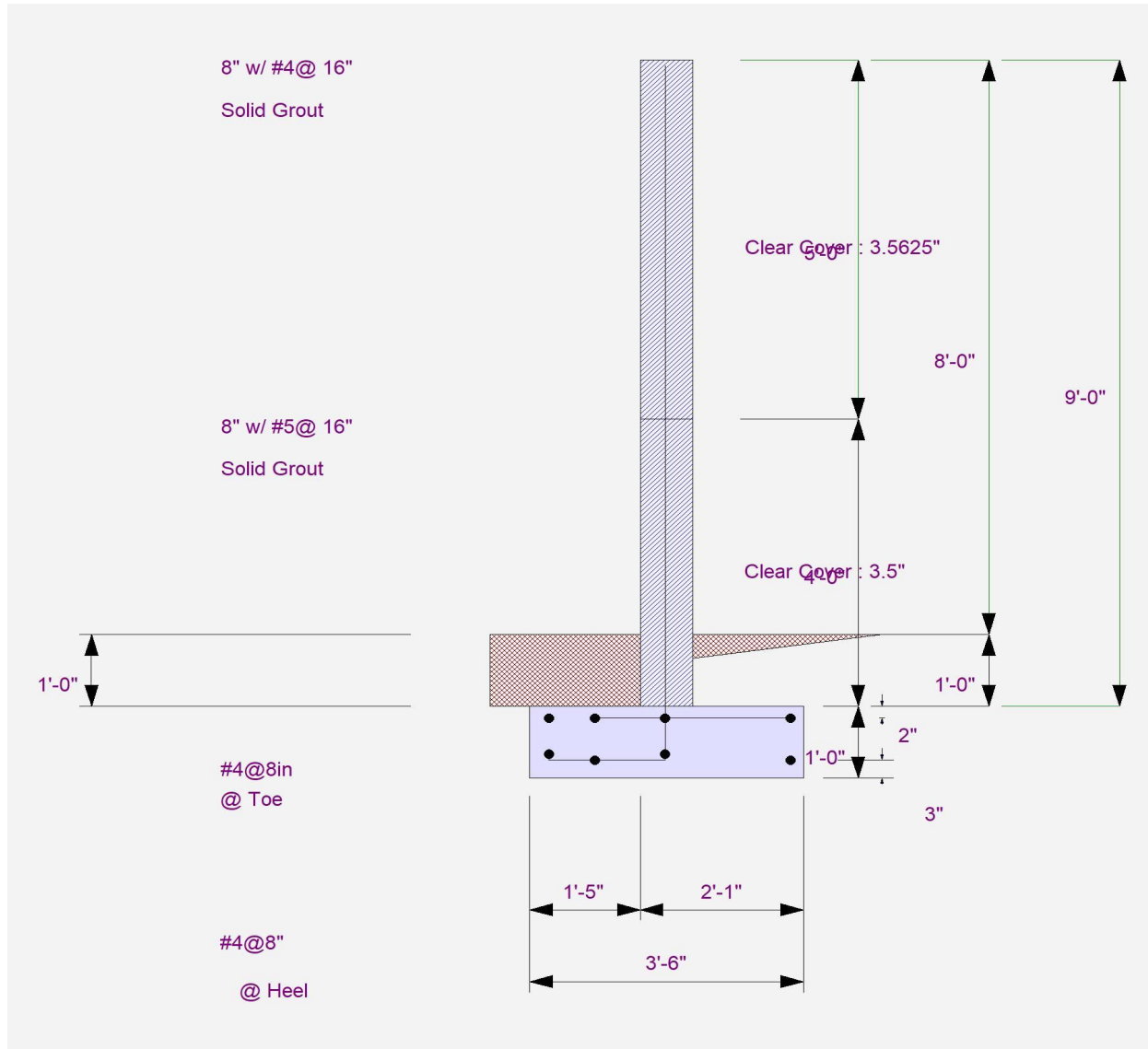
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30. Maintenance Gate Wall (1/ L-2.24)



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30. Maintenance Gate Wall (1/ L-2.24)



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30c. Maintenance Gate Wall (1/ L-2.24) - 8 ft 2ft diff

Code Reference.

Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	3.00 ft
Wall height above soil	=	8.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

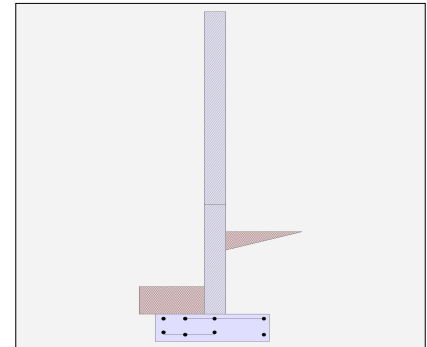
Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	30.0 psf (Strength Level)



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30c. Maintenance Gate Wall (1/ L-2.24) - 8 ft 2ft diff

Design Summary

Wall Stability Ratios

Overturing	=	1.99	OK
Sliding	=	3.35	OK
Global Stability	=	3.74	

Total Bearing Load	=	1,344	lbs
...resultant ecc.	=	7.94	in

Eccentricity outside middle third

Soil Pressure @ Toe	=	823	psf	OK
Soil Pressure @ Heel	=	0	psf	OK
Allowable	=	2,000	psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,039	psf
ACI Factored @ Heel	=	0	psf
Footing Shear @ Toe	=	6.2	psi OK
Footing Shear @ Heel	=	7.5	psi OK
Allowable	=	82.2	psi

Sliding Calcs

Lateral Sliding Force	=	384.0 lbs	
less 100% Passive Force	-	750.0 lbs	
less 100% Friction Force	= -	537.4 lbs	
Added Force Req'd	=	0.0 lbs	OK
...for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht"

Design Method

Thickness

Rebar Size

Rebar Spacing

Rebar Placed at

Design Data

fb/FB + fa/Fa

Total Force @ Section

Service Level

Strength Level

Moment....Actual

Service Level

Strength Level

Moment.....Allowable

Shear.....Actual

Service Level

Strength Level

Shear.....Allowable

Anet (Masonry)

Wall Weight

Rebar Depth 'd'

Masonry Data

f'm

Fs

Solid Grouting

Modular Ratio 'n'

Equiv. Solid Thick.

Masonry Block Type

Masonry Design Method

Concrete Data

f'c

Fy

2nd Bottom

Stem OK Stem OK

ft = 4.00 0.00

Masonry Masonry

ASD ASD

8.00 8.00

4 # 5

16.00 16.00

Center Center

0.516 0.882

lbs = 126.0 279.0

lbs =

ft-# = 441.0 1,143.0

ft-# =

854.2 1,294.8

psi = 2.7 3.0

psi =

psi = 43.6 43.6

in2 = 47.54 91.50

psf = 0.0 0.0

in = 3.81 3.81

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30c. Maintenance Gate Wall (1/ L-2.24) - 8 ft 2ft diff

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	2.00
Total Footing Width	=	3.50
Footing Thickness	=	12.00 in

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm = 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,039	0	psf
Mu' : Upward	=	990	70	ft-#
Mu' : Downward	=	454	980	ft-#
Mu: Design	=	537	909	ft-#
ϕ Mn	=	11,415	12,765	ft-#
Actual 1-Way Shear	=	6.19	7.52	psi
Allow 1-Way Shear	=	46.63	44.98	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=	0.00 ft-lbs		
Footing Allow. Torsion, ϕ Tn	=	0.00 ft-lbs		

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area 0.91 in²
Min footing T&S reinf Area per foot 0.26 in² /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in



GMU Engineers and Geologists
30336 Esperanza

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Printed: 1 APR 2025, 7:33AM

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30c. Maintenance Gate Wall (1/ L-2.24) - 8 ft 2ft diff

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	240.0	1.33	320.0	Soil Over HL (ab. water tbl)	500.0	2.83	1,416.7
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.83	1,416.7
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=			* Axial Live Load on Stem	=		
Load @ Stem Above Soil	= 144.0	8.00	1,152.0	Soil Over Toe	= 187.5	0.75	140.6
	=			Surcharge Over Toe	=		
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
Total	= 384.0	O.T.M.	= 1,472.0	Footing Weight	= 525.0	1.75	918.8
				Key Weight	=	1.92	
Resisting/Overturning Ratio		=	1.99	Vert. Component	= 131.0	3.50	458.7
Vertical Loads used for Soil Pressure	=	1,343.5	lbs	Total	= 1,343.5	lbs	R.M.= 2,934.7
				* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.072 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



GMU Engineers and Geologists
30336 Esperanza

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Printed: 1 APR 2025, 7:33AM

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30c. Maintenance Gate Wall (1/ L-2.24) - 8 ft 2ft diff

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd

Stem Design Height: 4.00 ft above top of footing

Calculated Rebar Stress, f_s = 10325.70 psi

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) =

20.00 in

Development length for #4 bar specified in this stem design segment =

12.00 in

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Calculated Rebar Stress, f_s = 17655.19 psi

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =

33.10 in

Development length for #5 bar specified in this stem design segment =

33.10 in

Hooked embedment length into footing for #5 bar specified in this stem design segment =

6.00 in

As Provided =

0.2325 in2/ft

As Required =

0.2034 in2/ft

Cantilevered Retaining Wall

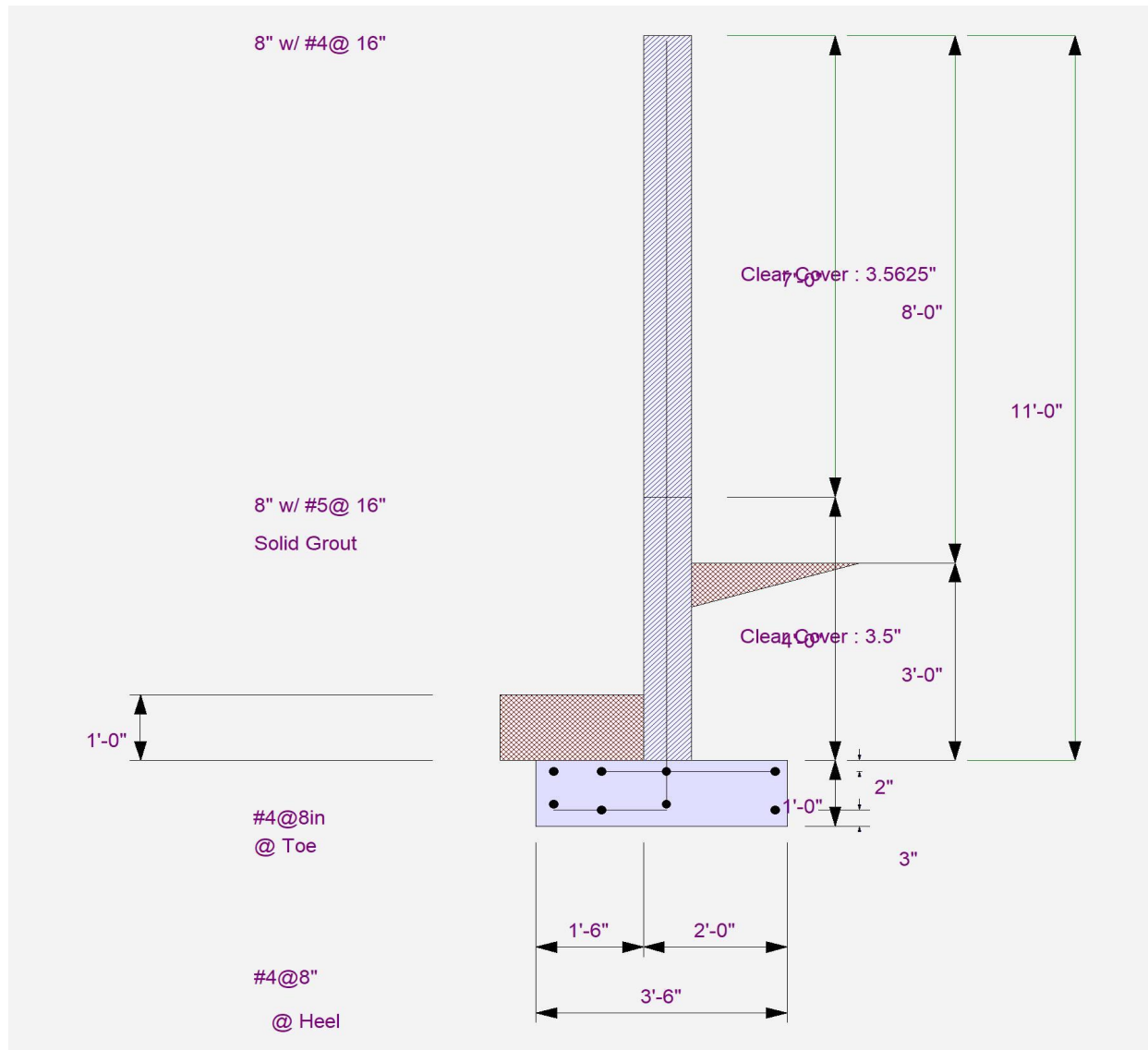
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30c. Maintenance Gate Wall (1/ L-2.24) - 8 ft 2ft diff



Cantilevered Retaining Wall

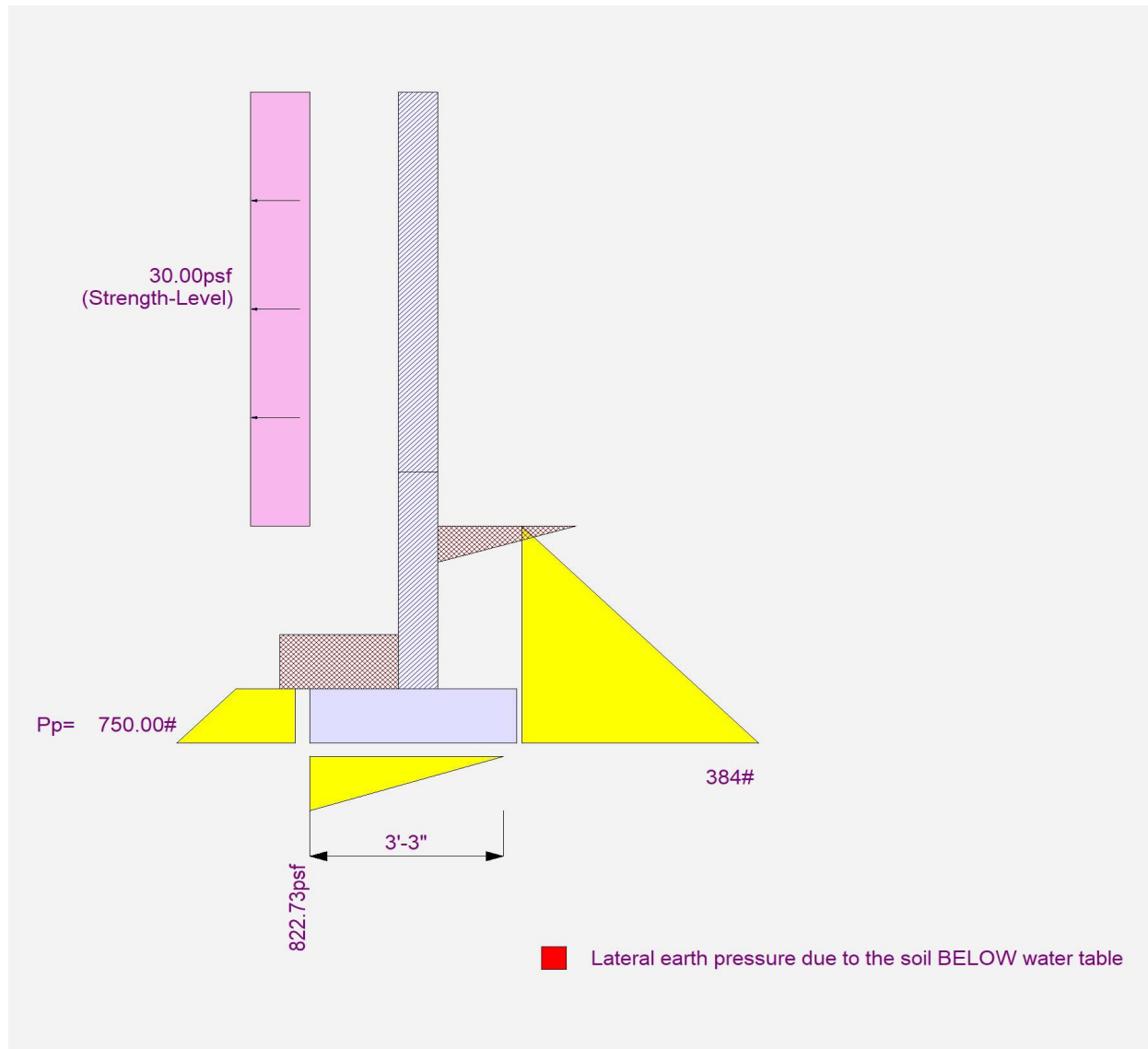
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30c. Maintenance Gate Wall (1/ L-2.24) - 8 ft 2ft diff



Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30d. Maintenance Gate Wall (1/ L-2.24) - 9ft 2ft diff

Code Reference.

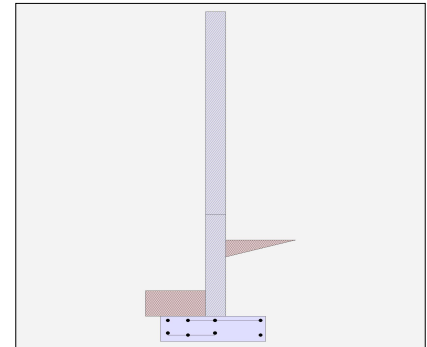
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	3.00 ft
Wall height above soil	=	9.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	30.0 psf/ft
Passive Pressure	=	500.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	30.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30d. Maintenance Gate Wall (1/ L-2.24) - 9ft 2ft diff

Design Summary

Wall Stability Ratios

Overturing	=	1.73	OK
Sliding	=	3.20	OK
Global Stability	=	3.60	

Total Bearing Load	=	1,344	lbs
...resultant ecc.	=	9.95	in

Eccentricity outside middle third

Soil Pressure @ Toe	=	972	psf	OK
Soil Pressure @ Heel	=	0	psf	OK
Allowable	=	2,000	psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,228 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	7.6 psi	OK
Footing Shear @ Heel	=	8.5 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	402.0 lbs	
less 100% Passive Force	-	750.0 lbs	
less 100% Friction Force	= -	537.4 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

Wall Material Above "Ht"

Design Method

Thickness

Rebar Size

Rebar Spacing

Rebar Placed at

Design Data

fb/FB + fa/Fa

Total Force @ Section

Service Level

Strength Level

Moment....Actual

Service Level

Strength Level

Moment.....Allowable

Shear.....Actual

Service Level

Strength Level

Shear.....Allowable

Anet (Masonry)

Wall Weight

Rebar Depth 'd'

Masonry Data

f'm

Fs

Solid Grouting

Modular Ratio 'n'

Equiv. Solid Thick.

Masonry Block Type

Masonry Design Method

Concrete Data

f'c

Fy

2nd

Stem OK

ft = 4.00

Masonry

ASD

8.00

4

16.00

Center

0.674

lbs = 144.0

lbs = 297.0

ft-# = 576.0

ft-# = 1,350.0

ft-# = 854.2

ft-# = 1,646.8

psi = 3.0

psi = 3.2

psi = 43.6

in2 = 47.54

psf = 91.50

psi = 0.0

in = 0.0

psi = 1,500

psi = 20,000

= No

= Yes

= 21.48

in = 7.63

= ASD

Bottom

Stem OK

ft = 0.00

Masonry

ASD

8.00

4

8.00

Center

0.819

lbs = 144.0

lbs = 297.0

ft-# = 576.0

ft-# = 1,350.0

ft-# = 854.2

ft-# = 1,646.8

psi = 3.0

psi = 3.2

psi = 43.6

in2 = 47.54

psf = 91.50

psi = 0.0

in = 0.0

psi = 1,500

psi = 20,000

= No

= Yes

= 21.48

in = 7.63

= ASD

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30d. Maintenance Gate Wall (1/ L-2.24) - 9ft 2ft diff

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	2.00
Total Footing Width	=	3.50
Footing Thickness	=	12.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,228	0	psf
Mu' : Upward	=	1,132	16	ft-#
Mu' : Downward	=	454	980	ft-#
Mu: Design	=	678	964	ft-#
ϕ Mn	=	11,415	12,765	ft-#
Actual 1-Way Shear	=	7.57	8.51	psi
Allow 1-Way Shear	=	46.63	44.98	psi
Toe Reinforcing	=	# 4 @ 8.00 in		
Heel Reinforcing	=	# 4 @ 8.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, ϕ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.91	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30d. Maintenance Gate Wall (1/ L-2.24) - 9ft 2ft diff

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				.....RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	240.0	1.33	320.0	Soil Over HL (ab. water tbl)	500.0	2.83	1,416.7
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.83	1,416.7
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=			* Axial Live Load on Stem	=		
Load @ Stem Above Soil	= 162.0	8.50	1,377.0	Soil Over Toe	= 187.5	0.75	140.6
	=			Surcharge Over Toe	=		
				Stem Weight(s)	=		
				Earth @ Stem Transitions	=		
Total	= 402.0	O.T.M.	= 1,697.0	Footing Weight	= 525.0	1.75	918.8
				Key Weight	=	1.92	
Resisting/Overturning Ratio		=	1.73	Vert. Component	= 131.0	3.50	458.7
Vertical Loads used for Soil Pressure =		1,343.5	lbs	Total =	1,343.5	lbs	R.M.= 2,934.7
				* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.093 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



GMU Engineers and Geologists
30336 Esperanza

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Printed: 1 APR 2025, 7:36AM

Cantilevered Retaining Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30d. Maintenance Gate Wall (1/ L-2.24) - 9ft 2ft diff

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd

Stem Design Height: 4.00 ft above top of footing

Calculated Rebar Stress, f_s = 13486.63 psi

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) =

20.00 in

Development length for #4 bar specified in this stem design segment =

13.49 in

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Calculated Rebar Stress, f_s = 16395.27 psi

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) =

24.59 in

Development length for #4 bar specified in this stem design segment =

24.59 in

Hooked embedment length into footing for #4 bar specified in this stem design segment =

6.00 in

As Provided =

0.3000 in²/ft

As Required =

0.2410 in²/ft

Cantilevered Retaining Wall

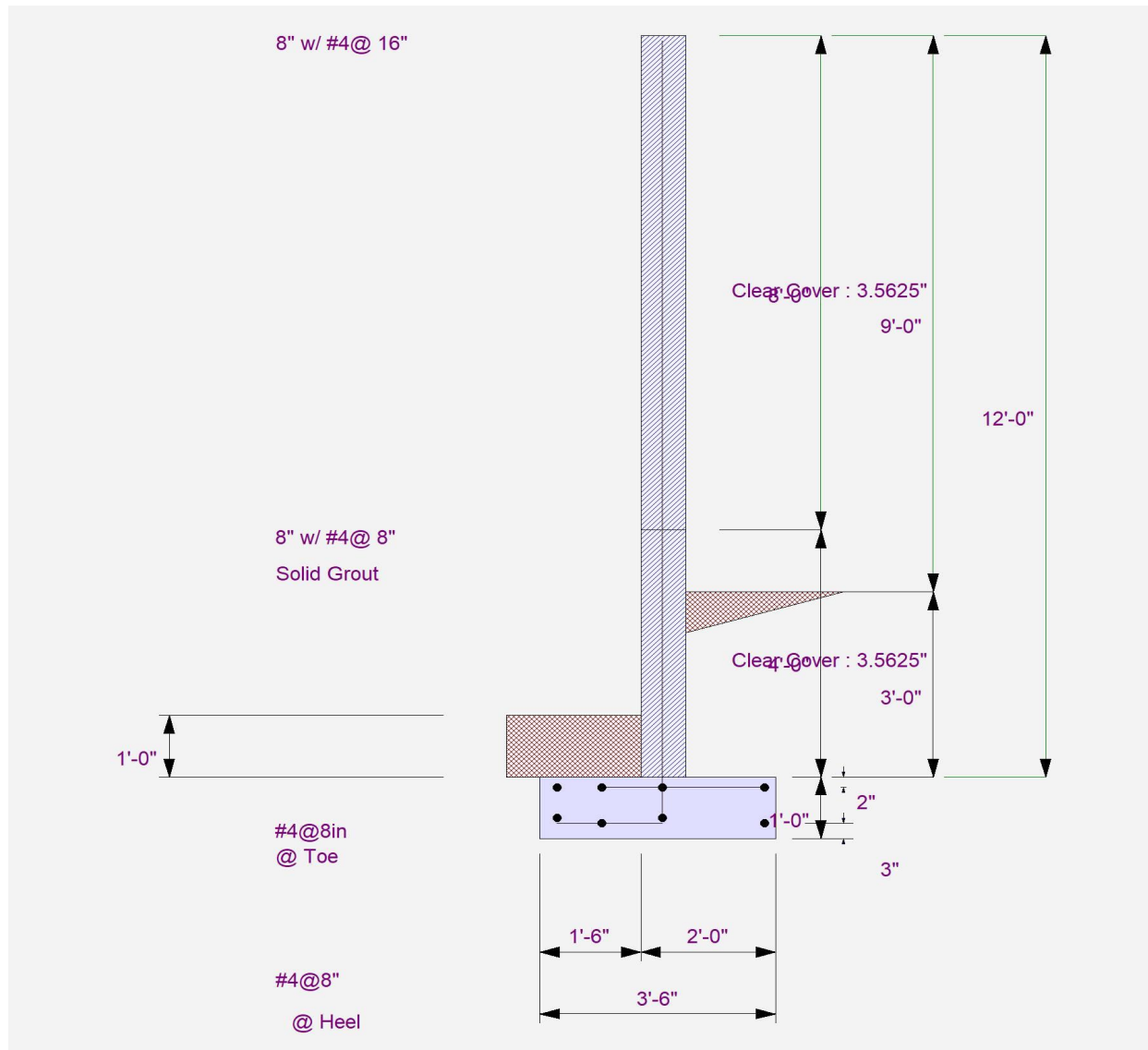
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30d. Maintenance Gate Wall (1/ L-2.24) - 9ft 2ft diff



Cantilevered Retaining Wall

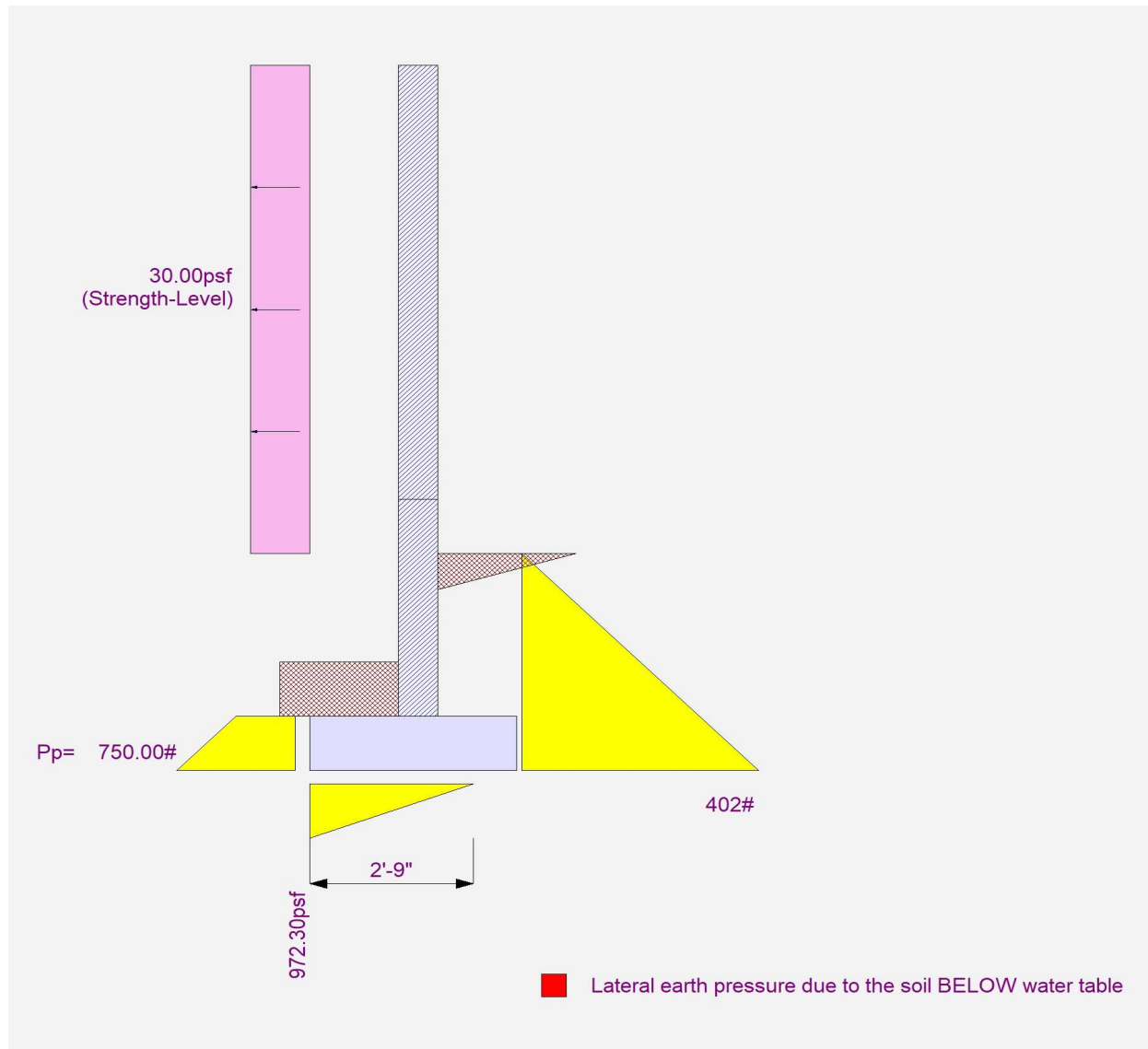
Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 30d. Maintenance Gate Wall (1/ L-2.24) - 9ft 2ft diff



31. Maintenance Yard Pilaster (Landscape Detail 1/L-2.25) & Pilaster with Light Standard, (1/L-2.25)

Satellite Maintenance Walls – Pilaster, (Landscape Detail 1/L-2.25))

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, (C_s)

$I_e = 1.0$, (Risk Category II)

$R = 1.25$

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)}, \text{ (ASCE 7 - 16, 12.8 - 2)}, \quad C_s = \frac{1.349}{\left(\frac{1.25}{1.0}\right)} = 1.08$$

$$C_{s-\text{Min}} = 0.044S_{DS}I_e, \text{ (ASCE 7 - 16, 12.8 - 5)}, \quad C_{s-\text{Min}} = (0.044(1.08)(1)) = 0.05$$

Therefore Use $C_s = 1.08$

Seismic Weight, (W)

2'-0" square pilaster w/solid grouted 8" x 8" x 16" CMU and hollow center = 415 lbs per linear foot (vertical)

Seismic Base Shear, (V)

$$V = C_s W, \text{ (ASCE 7 - 16, 12.8 - 1)}$$

$$V = \text{Seismic Base Shear} = (1.08)(415 \text{ lbs per linear foot})(8.33 \text{ ft}) = 3,733.5 \text{ lbs}$$

$$\text{Applied Moment to footing, (seismic)} = (3,733.5 \text{ lbs})(8.33 \text{ ft}/3) = 10.4 \text{ ft-kips}$$

Wind Load, (ASCE 7-22)

$$\text{Wind Load} = 30 \text{ psf} \times 2 \times 8.33 \text{ ft} = 500 \text{ lbs}$$

$$\text{Applied Moment to footing, (wind)} = (500 \text{ lbs})(8.33 \text{ ft}/2) = 2,082.5 \text{ ft-lbs} = 2.0 \text{ ft-kips}$$

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31. Satellite Maintenance Wall Pilaster Footing

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	Yes
Use Pedestal wt for stability, mom & shear	:	Yes

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing depth

Footing base depth below soil surface	=	1.50 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.0 ft

Increases based on footing plan dimension

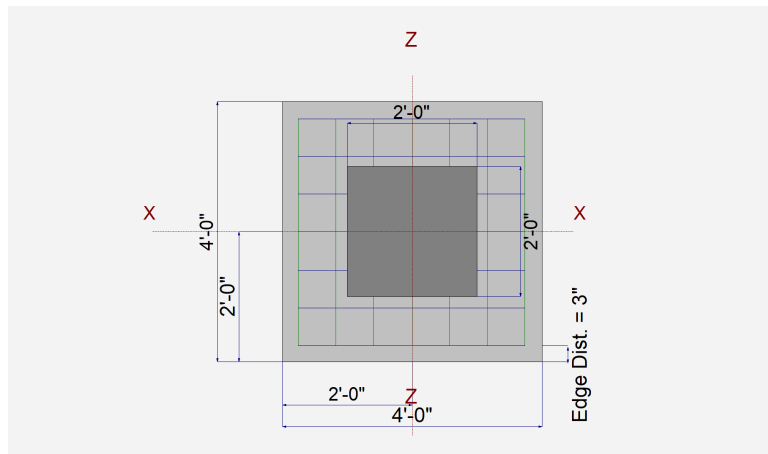
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	4.0 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	14.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	24.0 in
pz : parallel to Z-Z Axis	=	24.0 in
Height	=	96.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	7
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	7
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	3.90							k
OB : Overburden	=								ksf
M-xx	=					2.0	10.40		k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=					0.0	0.0		k

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31. Satellite Maintenance Wall Pilaster Footing

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS 0.5222	Soil Bearing	1.410 ksf	2.70 ksf	+D+0.70E about X-X axis
PASS 1.936	Overturning - X-X	7.280 k-ft	14.096 k-ft	+0.60D+0.70E
PASS n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS 0.02165	Z Flexure (+X)	0.3663 k-ft/ft	16.920 k-ft/ft	+1.40D
PASS 0.02165	Z Flexure (-X)	0.3663 k-ft/ft	16.920 k-ft/ft	+1.40D
PASS 0.04268	X Flexure (+Z)	0.7222 k-ft/ft	16.920 k-ft/ft	+1.20D+E
PASS 0.02165	X Flexure (-Z)	0.3663 k-ft/ft	16.920 k-ft/ft	+1.40D
PASS 0.008454	1-way Shear (+X)	0.4440 psi	52.523 psi	+1.40D
PASS 0.008454	1-way Shear (-X)	0.4440 psi	52.523 psi	+1.40D
PASS 0.01833	1-way Shear (+Z)	0.9628 psi	52.523 psi	+1.20D+E
PASS 0.008454	1-way Shear (-Z)	0.4440 psi	52.523 psi	+1.40D
PASS 0.01932	2-way Punching	3.666 psi	189.737 psi	+1.40D



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.70	n/a	0.0	0.7342	0.7342	n/a	n/a	0.272
X-X, +D+0.60W	2.70	n/a	1.226	0.6228	0.8455	n/a	n/a	0.313
X-X, +D+0.450W	2.70	n/a	0.9194	0.6506	0.8177	n/a	n/a	0.303
X-X, +0.60D+0.60W	2.70	n/a	2.043	0.3291	0.5519	n/a	n/a	0.204
X-X, +D+0.70E	2.70	n/a	7.437	0.05849	1.410	n/a	n/a	0.522
X-X, +D+0.5250E	2.70	n/a	5.578	0.2274	1.241	n/a	n/a	0.460
X-X, +0.60D+0.70E	2.70	n/a	12.395	0.0	1.206	n/a	n/a	0.447
Z-Z, D Only	2.70	0.0	n/a	n/a	n/a	0.7342	0.7342	0.272
Z-Z, +D+0.60W	2.70	0.0	n/a	n/a	n/a	0.7342	0.7342	0.272
Z-Z, +D+0.450W	2.70	0.0	n/a	n/a	n/a	0.7342	0.7342	0.272
Z-Z, +0.60D+0.60W	2.70	0.0	n/a	n/a	n/a	0.4405	0.4405	0.163
Z-Z, +D+0.70E	2.70	0.0	n/a	n/a	n/a	0.7342	0.7342	0.272
Z-Z, +D+0.5250E	2.70	0.0	n/a	n/a	n/a	0.7342	0.7342	0.272
Z-Z, +0.60D+0.70E	2.70	0.0	n/a	n/a	n/a	0.4405	0.4405	0.163

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	1.20 k-ft	23.493 k-ft	19.578	OK
X-X, +D+0.450W	0.90 k-ft	23.493 k-ft	26.104	OK
X-X, +0.60D+0.60W	1.20 k-ft	14.096 k-ft	11.747	OK
X-X, +D+0.70E	7.280 k-ft	23.493 k-ft	3.227	OK
X-X, +D+0.5250E	5.460 k-ft	23.493 k-ft	4.303	OK
X-X, +0.60D+0.70E	7.280 k-ft	14.096 k-ft	1.936	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.450W	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.5250E	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31. Satellite Maintenance Wall Pilaster Footing

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
---	---------------	-----------------	-----------------	--------

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.3663	+Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +1.40D	0.3663	-Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +1.20D	0.3140	+Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +1.20D	0.3140	-Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +1.20D+0.50W	0.3531	+Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +1.20D+0.50W	0.2749	-Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +1.20D+W	0.3921	+Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +1.20D+W	0.2359	-Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +0.90D+W	0.3136	+Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +0.90D+W	0.1574	-Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +1.20D+E	0.7222	+Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +1.20D+E	0.08661	-Z	Top	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +0.90D+E	0.6772	+Z	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
X-X, +0.90D+E	0.09486	-Z	Top	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +1.40D	0.3663	-X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +1.40D	0.3663	+X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +1.20D	0.3140	-X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +1.20D	0.3140	+X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +1.20D+0.50W	0.3140	-X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +1.20D+0.50W	0.3140	+X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +1.20D+W	0.3140	-X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +1.20D+W	0.3140	+X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +0.90D+W	0.2355	-X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +0.90D+W	0.2355	+X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +1.20D+E	0.3140	-X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +1.20D+E	0.3140	+X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +0.90D+E	0.2355	-X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK
Z-Z, +0.90D+E	0.2355	+X	Bottom	0.3024	ACI 7.6.1.1	0.350	16.920	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.44 psi	0.44 psi	0.44 psi	52.52 psi	0.01	OK
+1.20D	0.38 psi	0.38 psi	0.38 psi	52.52 psi	0.01	OK
+1.20D+0.50W	0.38 psi	0.38 psi	0.38 psi	52.52 psi	0.01	OK
+1.20D+W	0.38 psi	0.38 psi	0.38 psi	52.52 psi	0.01	OK
+0.90D+W	0.29 psi	0.29 psi	0.29 psi	52.52 psi	0.01	OK
+1.20D+E	0.38 psi	0.38 psi	0.38 psi	52.52 psi	0.01	OK
+0.90D+E	0.29 psi	0.29 psi	0.29 psi	52.52 psi	0.01	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.44 psi	0.44 psi	0.44 psi	52.52 psi	0.01	OK
+1.20D	0.38 psi	0.38 psi	0.38 psi	52.52 psi	0.01	OK
+1.20D+0.50W	0.32 psi	0.44 psi	0.44 psi	52.52 psi	0.01	OK
+1.20D+W	0.27 psi	0.49 psi	0.49 psi	52.52 psi	0.01	OK
+0.90D+W	0.17 psi	0.40 psi	0.40 psi	52.52 psi	0.01	OK
+1.20D+E	0.15 psi	0.96 psi	0.96 psi	52.52 psi	0.02	OK
+0.90D+E	0.12 psi	0.92 psi	0.92 psi	52.52 psi	0.02	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	3.67 psi	189.74psi	0.01932	OK
+1.20D	3.14 psi	189.74psi	0.01656	OK
+1.20D+0.50W	3.14 psi	189.74psi	0.01656	OK
+1.20D+W	3.14 psi	189.74psi	0.01656	OK
+0.90D+W	2.36 psi	189.74psi	0.01242	OK
+1.20D+E	3.16 psi	189.74psi	0.01664	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31. Satelite Maintenance Wall Pilaster Footing

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D+E	2.62 psi	189.74psi	0.01382	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Masonry Shear Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31 Satellite Maintenance Wall Pilaster

Code References

Calculations per TMS 402-16, IBC 2021
Load Combinations Used : ASCE 7-16

General Information

Wall Material	MASONRY	f'm	1.50 ksi	Block Class	
Total Wall Height	9.330 ft	Fy - Rebar	60.0 ksi	Concrete Density	150.0 pcf
Base Wall Length	2.0 ft	Fy - HJR	60.0 ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor		Em	3,120.0 ksi		
Ie: Seismic Import. Factor	1.0	Phi - Shear	0.80	Phi : Axial & Flexure	0.90

Wall Data

Bottom

Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	2.0 ft
Effective Length 'd'	20.0 in
Nominal Block Thickness	8 in
Solid Grout?	Partial Groute

Reinforcing in Field of Wall

Vertical Bar Size #	5
Vertical Bar Spacing	16 in
Horiz. joint reinf. area (HJR)	0.55 in
HJR Spacing	24 in
Bond beam reinf. area	0.4 in
Spacing of bond beams	8 in

In each chord cell:

Vertical rebar size #	5
# Chord Cells @ Each End	1.0

Masonry Shear Wall

Project File: 24-130-00_ontario sports park.ec6

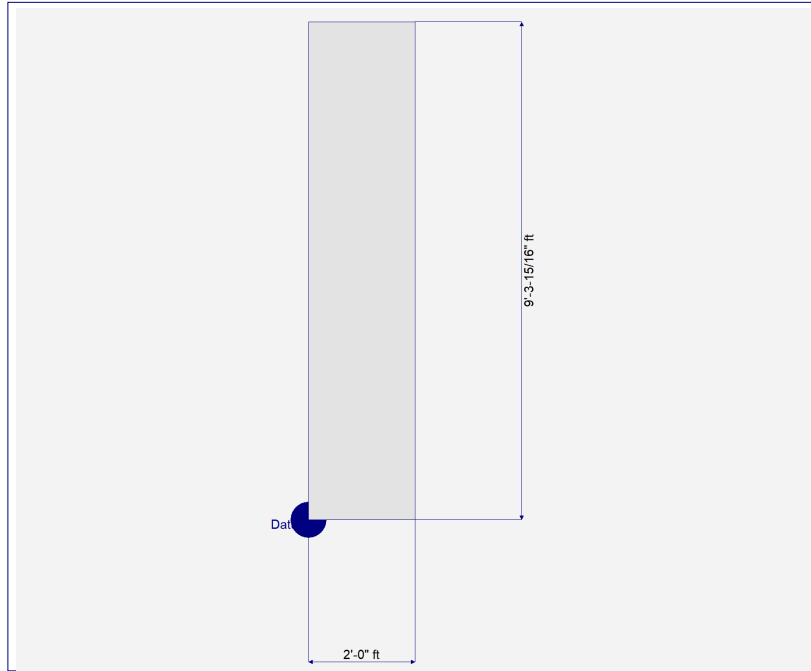
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31 Satellite Maintenance Wall Pilaster

Wall Sketch



Applied Concentrated Lateral Loads

Load "Y" Location (ft)	Load Magnitude (kips)					
	Dead Load	Roof Live Load	Floor Live Load	Wind Load	Seismic Load	Earth Load
5.165	0.0	0.0	0.0	0.50	0.9330	0.0

SHEAR ANALYSIS

Bottom Level

Special Boundary	
Elements Req'd?	Not Req'd
Vu : Story Shear	0.9330 k
for Load Combination	+1.20D+E
Anv	168.0 in ²
Controlling Mu/(Vud)	1.00
Vn Masonry	15.117 k
Vn Steel	42.0 k
Vn Masonry + Vn Steel	57.117 k
Vn Max	19.520 k
Phi Vn	15.616 k
Ratio: Vu/PhiVn (controlling)	0.05975
Vertical As >= Av/3	OK
Vertical Bar Spacing <= 96"	OK

1/4 seismic base shear applied to single panel of pilaster

Masonry Shear Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31 Satellite Maintenance Wall Pilaster

AXIAL ANALYSIS

Bottom Level

H / d Ratio	5.60
Pu	1.907 k
for Load Combination	+1.40D
Phi Pn	+1.40D k
Ratio: Pu/PhiPn (controlling)	0.009562

BENDING ANALYSIS

Bottom Level

"a" : Flexural compression	2.03 in
Length of defined chord zone is >= the "a" dimension of the masonry (the compression zone)	OK
"d" : Eff depth to tension reinf	20.0
As-flex < As-max ?	.310 <= 1.351
Mu	4.819 k
for Load Combination	+1.20D+E
Phi Mn	26.482 k
Ratio: Mu/PhiMn (controlling)	0.1820

Force Summary

Load Combination Wall Level	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Vu (k)	Mu (k)	Pu (k)			Left	Right
+1.40D Wall Level : 1			1.907				
+1.20D Wall Level : 1			1.635				
+1.20D+0.50W Wall Level : 1	0.250	1.291	1.635	0.790	1.266		
+1.20D+W Wall Level : 1	0.500	2.583	1.635	1.580	0.633	0.569	0.569
+0.90D+W Wall Level : 1	0.500	2.583	1.226	2.107	0.475	0.814	0.814
+1.20D+E Wall Level : 1	0.933	4.819	1.635	2.948	0.339	1.911	1.911
+0.90D+E Wall Level : 1	0.933	4.819	1.226	3.931	0.254	2.156	2.156

Satellite Maintenance Walls – Pilaster with Light Pole Above, (Landscape Detail 1/L-2.25))

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, (C_s)

$I_e = 1.0$, (Risk Category II)

$R = 1.25$

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)}, \text{ (ASCE 7 - 16, 12.8 - 2)}, \quad C_s = \frac{1.349}{\left(\frac{1.25}{1.0}\right)} = 1.08$$

$$C_{s-\text{Min}} = 0.044S_{DS}I_e, \text{ (ASCE 7 - 16, 12.8 - 5)}, \quad C_{s-\text{Min}} = (0.044(1.08)(1)) = 0.05$$

Therefore Use $C_s = 1.08$

Seismic Base Shear, Pilaster (V)

Seismic Weight, (W)

2'-0" square pilaster w/solid grouted 8" x 8" x 16" CMU and hollow center = 415 lbs per linear foot (vertical)

$$V = C_s W, \text{ (ASCE 7 - 16, 12.8 - 1)}$$

$$V = \text{Seismic Base Shear} = (1.08)(415 \text{ lbs per linear foot})(8.33 \text{ ft}) = 3,733.5 \text{ lbs}$$

$$\text{Applied Moment to footing, (seismic)} = (3,733.5 \text{ lbs})(8.33 \text{ ft}/3) = 10.4 \text{ ft-kips}$$

Seismic Base Shear, Light Standard Above (V)

Seismic Weight, (W)

Light Pole = 800 lbs Light Pole Arm = 15 lbs Light Weight = 55 lbs Total Weight = 870 lbs

$$V = C_s W, \text{ (ASCE 7 - 16, 12.8 - 1)}$$

$$V = \text{Seismic Base Shear} = (1.08)(870 \text{ lbs}) = 939.6 \text{ lbs}$$

$$\text{Applied Moment to footing, (seismic)} = (939.6 \text{ lbs})(8 \text{ ft}/3 + 8 \text{ ft}) = 10.0 \text{ ft-kips}$$

Total Seismic OT Moment = 20.4 ft-kips

Wind Load, Pilaster (ASCE 7-22)

$$\text{Wind Load} = 30 \text{ psf} \times 2 \times 8.33 \text{ ft} = 500 \text{ lbs}$$

$$\text{Applied Moment to footing, (wind)} = (500 \text{ lbs})(8.33 \text{ ft}/2) = 2,082.5 \text{ ft-lbs} = 2.0 \text{ ft-kips}$$

Wind Load, Pilaster, Light Standard Above (ASCE 7-22)

$$\text{Wind Load} = 30 \text{ psf} \times 1 \times 8 \text{ ft} = 240 \text{ lbs}$$

$$\text{Applied Moment to footing, (wind)} = (240 \text{ lbs})(8 \text{ ft}/2 + 8 \text{ ft}) = 2,880 \text{ ft-lbs} = 2.9 \text{ ft-kips}$$

Total Seismic Wind Moment = 4.9 ft-kips

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31a. Satellite Maintenance Wall Pilaster Footing with Light Above

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	Yes
Use Pedestal wt for stability, mom & shear	:	Yes

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	1.50 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.0 ft

Increases based on footing plan dimension

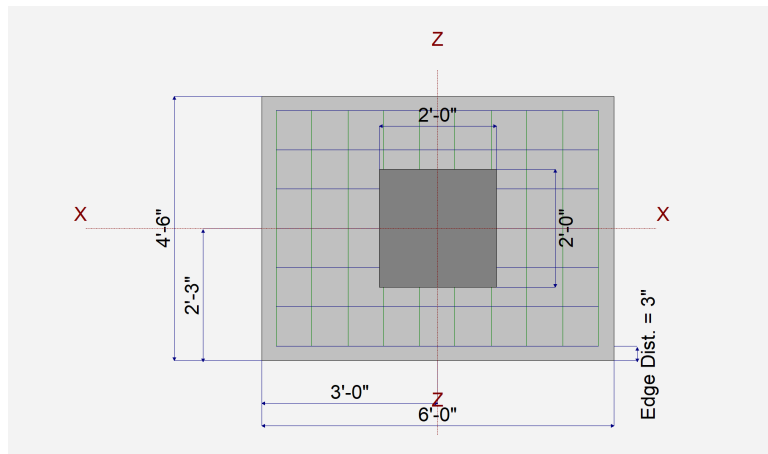
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	6.0 ft
Length parallel to Z-Z Axis	=	4.5 ft
Footing Thickness	=	14.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	24.0 in
pz : parallel to Z-Z Axis	=	24.0 in
Height	=	96.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	7
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	10
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

Bars along Z-Z Axis

# Bars required within zone	=	85.7 %
# Bars required on each side of zone	=	14.3 %



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	3.90					k
OB : Overburden	=						ksf
M-xx	=				4.90	20.40	k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31a. Satellite Maintenance Wall Pilaster Footing with Light Above

DESIGN SUMMARY

Design OK

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS 0.5348	Soil Bearing	1.658 ksf	3.10 ksf	+0.60D+0.70E about X-X axis
PASS 1.330	Overturning - X-X	14.280 k-ft	18.989 k-ft	+0.60D+0.70E
PASS n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS 0.05758	Z Flexure (+X)	0.8683 k-ft/ft	15.080 k-ft/ft	+1.40D
PASS 0.05758	Z Flexure (-X)	0.8683 k-ft/ft	15.080 k-ft/ft	+1.40D
PASS 0.07427	X Flexure (+Z)	1.198 k-ft/ft	16.132 k-ft/ft	+0.90D+E
PASS 0.02103	X Flexure (-Z)	0.3392 k-ft/ft	16.132 k-ft/ft	+1.40D
PASS 0.07034	1-way Shear (+X)	3.552 psi	50.50 psi	+1.40D
PASS 0.07034	1-way Shear (-X)	3.552 psi	50.50 psi	+1.40D
PASS 0.08460	1-way Shear (+Z)	4.372 psi	51.675 psi	+0.90D+E
PASS 0.02005	1-way Shear (-Z)	1.036 psi	51.675 psi	+1.40D
PASS 0.02780	2-way Punching	5.274 psi	189.737 psi	+1.40D



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	3.10	n/a	0.0	0.5210	0.5210	n/a	n/a	0.168
X-X, +D+0.60W	3.10	n/a	2.508	0.3772	0.6647	n/a	n/a	0.214
X-X, +D+0.450W	3.10	n/a	1.881	0.4132	0.6288	n/a	n/a	0.203
X-X, +0.60D+0.60W	3.10	n/a	4.180	0.1688	0.4563	n/a	n/a	0.147
X-X, +D+0.70E	3.10	n/a	12.183	0.0	1.258	n/a	n/a	0.406
X-X, +D+0.5250E	3.10	n/a	9.137	0.0	1.045	n/a	n/a	0.337
X-X, +0.60D+0.70E	3.10	n/a	20.305	0.0	1.658	n/a	n/a	0.535
Z-Z, D Only	3.10	0.0	n/a	n/a	n/a	0.5210	0.5210	0.168
Z-Z, +D+0.60W	3.10	0.0	n/a	n/a	n/a	0.5210	0.5210	0.168
Z-Z, +D+0.450W	3.10	0.0	n/a	n/a	n/a	0.5210	0.5210	0.168
Z-Z, +0.60D+0.60W	3.10	0.0	n/a	n/a	n/a	0.3126	0.3126	0.101
Z-Z, +D+0.70E	3.10	0.0	n/a	n/a	n/a	0.5210	0.5210	0.168
Z-Z, +D+0.5250E	3.10	0.0	n/a	n/a	n/a	0.5210	0.5210	0.168
Z-Z, +0.60D+0.70E	3.10	0.0	n/a	n/a	n/a	0.3126	0.3126	0.101

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	2.940 k-ft	31.648 k-ft	10.765	OK
X-X, +D+0.450W	2.205 k-ft	31.648 k-ft	14.353	OK
X-X, +0.60D+0.60W	2.940 k-ft	18.989 k-ft	6.459	OK
X-X, +D+0.70E	14.280 k-ft	31.648 k-ft	2.216	OK
X-X, +D+0.5250E	10.710 k-ft	31.648 k-ft	2.955	OK
X-X, +0.60D+0.70E	14.280 k-ft	18.989 k-ft	1.330	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.450W	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.5250E	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31a. Satellite Maintenance Wall Pilaster Footing with Light Above

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
---	---------------	-----------------	-----------------	--------

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in ²	Gvrn. As in ²	Actual As in ²	Phi*Mn k-ft	Status
X-X, +1.40D	0.3392	+Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +1.40D	0.3392	-Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +1.20D	0.2907	+Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +1.20D	0.2907	-Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +1.20D+0.50W	0.3677	+Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +1.20D+0.50W	0.2137	-Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +1.20D+W	0.4447	+Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +1.20D+W	0.1367	-Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +0.90D+W	0.3720	+Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +0.90D+W	0.06404	-Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +1.20D+E	1.021	+Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +1.20D+E	0.1976	-Z	Top	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +0.90D+E	1.198	+Z	Bottom	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
X-X, +0.90D+E	0.1482	-Z	Top	0.3024	ACI 7.6.1.1	0.3333	16.132	OK
Z-Z, +1.40D	0.8683	-X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +1.40D	0.8683	+X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +1.20D	0.7442	-X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +1.20D	0.7442	+X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +1.20D+0.50W	0.7442	-X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +1.20D+0.50W	0.7442	+X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +1.20D+W	0.7442	-X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +1.20D+W	0.7442	+X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +0.90D+W	0.5582	-X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +0.90D+W	0.5582	+X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +1.20D+E	0.7442	-X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +1.20D+E	0.7442	+X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +0.90D+E	0.5582	-X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK
Z-Z, +0.90D+E	0.5582	+X	Bottom	0.3024	ACI 7.6.1.1	0.3111	15.080	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.55 psi	3.55 psi	3.55 psi	50.50 psi	0.07	OK
+1.20D	3.05 psi	3.05 psi	3.05 psi	50.50 psi	0.06	OK
+1.20D+0.50W	3.05 psi	3.05 psi	3.05 psi	50.50 psi	0.06	OK
+1.20D+W	3.05 psi	3.05 psi	3.05 psi	50.50 psi	0.06	OK
+0.90D+W	2.28 psi	2.28 psi	2.28 psi	50.50 psi	0.05	OK
+1.20D+E	3.05 psi	3.05 psi	3.05 psi	50.50 psi	0.06	OK
+0.90D+E	2.28 psi	2.28 psi	2.28 psi	50.50 psi	0.05	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.04 psi	1.04 psi	1.04 psi	51.68 psi	0.02	OK
+1.20D	0.89 psi	0.89 psi	0.89 psi	51.68 psi	0.02	OK
+1.20D+0.50W	0.62 psi	1.16 psi	1.16 psi	51.68 psi	0.02	OK
+1.20D+W	0.35 psi	1.43 psi	1.43 psi	51.68 psi	0.03	OK
+0.90D+W	0.13 psi	1.20 psi	1.20 psi	51.68 psi	0.02	OK
+1.20D+E	0.60 psi	3.48 psi	3.48 psi	51.68 psi	0.07	OK
+0.90D+E	0.45 psi	4.37 psi	4.37 psi	51.68 psi	0.08	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	5.27 psi	189.74psi	0.0278	OK
+1.20D	4.52 psi	189.74psi	0.02382	OK
+1.20D+0.50W	4.52 psi	189.74psi	0.02382	OK
+1.20D+W	4.52 psi	189.74psi	0.02382	OK
+0.90D+W	3.39 psi	189.74psi	0.01787	OK
+1.20D+E	5.00 psi	189.74psi	0.02636	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31a. Satellite Maintenance Wall Pilaster Footing with Light Above

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D+E	4.60 psi	189.74psi	0.02425	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Masonry Shear Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31. Satellite Maintenance Wall Pilaster with Light

Code References

Calculations per TMS 402-16, IBC 2021
Load Combinations Used : ASCE 7-16

General Information

Wall Material	MASONRY	f'm	1.50 ksi	Block Class	
Total Wall Height	9.330 ft	Fy - Rebar	60.0 ksi	Concrete Density	150.0 pcf
Base Wall Length	2.0 ft	Fy - HJR	60.0 ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor		Em	3,120.0 ksi		
Ie: Seismic Import. Factor	1.0	Phi - Shear	0.80	Phi : Axial & Flexure	0.90

Wall Data

Bottom

Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	2.0 ft
Effective Length 'd'	20.0 in
Nominal Block Thickness	8 in
Solid Grout?	Partial Groute

Reinforcing in Field of Wall

Vertical Bar Size #	5
Vertical Bar Spacing	16 in
Horiz. joint reinf. area (HJR)	0.55 in
HJR Spacing	24 in
Bond beam reinf. area	0.4 in
Spacing of bond beams	8 in

In each chord cell:

Vertical rebar size #	5
# Chord Cells @ Each End	1.0

Masonry Shear Wall

Project File: 24-130-00_ontario sports park.ec6

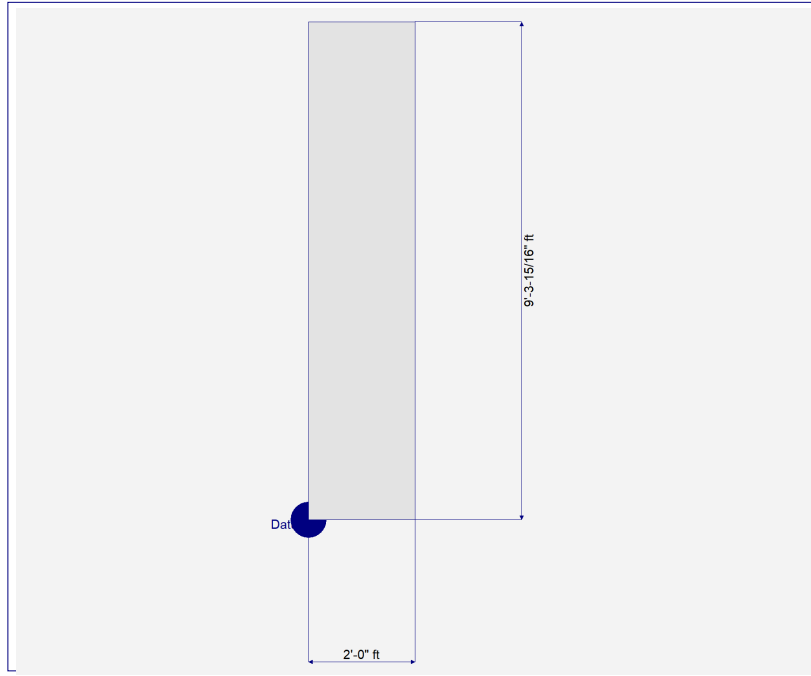
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31. Satellite Maintenance Wall Pilaster with Light

Wall Sketch



Applied Concentrated Lateral Loads

Load "Y" Location (ft)	Load Magnitude (kips)					
	Dead Load	Roof Live Load	Floor Live Load	Wind Load	Seismic Load	Earth Load
5.165	0.0	0.0	0.0	0.50	0.9330	0.0
9.330	0.0	0.0	0.0	0.240	0.9390	0.0

SHEAR ANALYSIS

Bottom Level

Special Boundary	
Elements Req'd?	Not Req'd
Vu : Story Shear	1.872 k
for Load Combination	+1.20D+E
Anv	168.0 in ²
Controlling Mu/(Vud)	1.00
Vn Masonry	15.117 k
Vn Steel	42.0 k
Vn Masonry + Vn Steel	57.117 k
Vn Max	19.520 k
Phi Vn	15.616 k
Ratio: Vu/PhiVn (controlling)	0.1199
Vertical As >= Av/3	OK
Vertical Bar Spacing <= 96"	OK

Masonry Shear Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 31. Satellite Maintenance Wall Pilaster with Light

AXIAL ANALYSIS

Bottom Level

H / d Ratio	5.60
Pu	1.907 k
for Load Combination	+1.40D
Phi Pn	+1.40D k
Ratio: Pu/PhiPn (controlling)	0.009562

BENDING ANALYSIS

Bottom Level

"a" : Flexural compression	2.03 in
Length of defined chord zone is >= the "a" dimension of the masonry (the compression zone)	OK
"d" : Eff depth to tension reinf	20.0
As-flex < As-max ?	.310 <= 1.351
Mu	13.580 k
for Load Combination	+1.20D+E
Phi Mn	26.482 k
Ratio: Mu/PhiMn (controlling)	0.5128

Force Summary

Load Combination Wall Level	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Vu (k)	Mu (k)	Pu (k)			Left	Right
+1.40D Wall Level : 1			1.907				
+1.20D Wall Level : 1			1.635				
+1.20D+0.50W Wall Level : 1	0.370	2.411	1.635	1.475	0.678	0.466	0.466
+1.20D+W Wall Level : 1	0.740	4.822	1.635	2.950	0.339	1.912	1.912
+0.90D+W Wall Level : 1	0.740	4.822	1.226	3.933	0.254	2.157	2.157
+1.20D+E Wall Level : 1	1.872	13.580	1.635	8.308	0.120	7.167	7.167
+0.90D+E Wall Level : 1	1.872	13.580	1.226	11.077	0.090	7.412	7.412

32. Maintenance Yard Swinging Gate (Landscape Detail 1/L-2.26)

Maintenance Yard Gate, (Landscape Details 1/L-2.26)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 8'-0" Tall
- 8'-0" Wide

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% wind loading due to open nature of chain-link fencing

Total Wind Load per Post = 30 psf x 8' x 8' x 0.25 = 480 lbs

Applied Moment due to Wind = 480 lbs x $\frac{8ft}{2}$ = 1,920 ft – lbs

Dead and Live Loading

Total Dead Load per Post = 850 lbs

Applied Moment due to Dead Load = 850 lbs x $\frac{8ft}{2}$ = 3,400 ft – lbs

Total Live Load per Post = 250 lbs

Applied Moment due to Live Load = 250 lbs x 8ft = 2,000 ft – lbs

$M_u = 3,400 \text{ ft} - \text{lbs}$

$V_u = 480 \text{ lbs}$

Enercalc: 3,400/8 = **425 lbs @ 8'**

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 32. Maintenance Yard Swinging Gate Embedment (16') - (1/L-2.26)

Code References

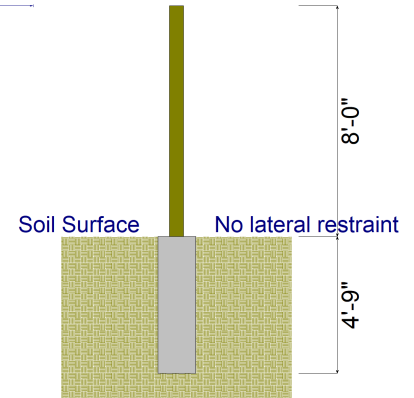
Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Point Load



Controlling Values

Governing Load Combination $D+0.750L+0.450W$
Lateral Load 0.7205 k
Moment 5.764 k-ft

NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 774.95 psf
Allowable 779.19 psf

Minimum Required Depth 4.750 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	0.4250 k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	0.250 k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.240 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.425	3.400	3.88	637.4	638.8	1.000
+D+L	0.675	5.400	4.63	757.4	759.5	1.000
+D+0.750L	0.613	4.900	4.50	730.2	732.3	1.000
+D+0.60W	0.569	4.552	4.38	709.4	712.9	1.000
+D+0.750L+0.450W	0.721	5.764	4.75	774.9	779.2	1.000
+0.60D+0.60W	0.399	3.192	3.75	622.2	624.3	1.000
+0.60D	0.255	2.040	3.25	527.0	529.8	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 32. Maintenance Yard Swinging Gate Caisson (1/L-2.26)

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

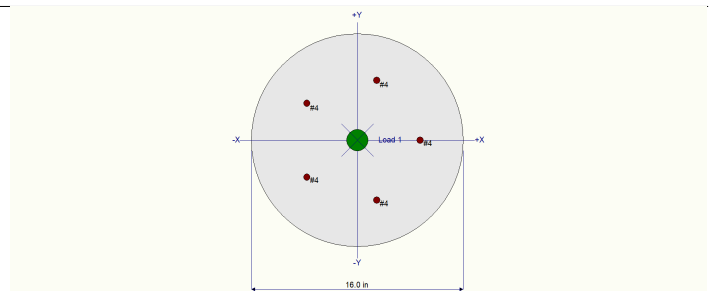
f'c : Concrete 28 day streng	=	3.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
fy - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.20 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	5.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum		
X-X (width) axis :		
Unbraced Length for buckling ABOUT X-X Axis = 5.0 ft, K = 1.0		
Y-Y (depth) axis :		
Unbraced Length for buckling ABOUT Y-Y Axis = 5.0 ft, K = 1.0		

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 5 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 1,047.20 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 5.0 ft above base, D = 1.20 k

BENDING LOADS . . .

Moment acting about X-X axis at 5.0 ft, D = 3.40, L = 2.0, W = 1.920 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+L+W		Maximum SERVICE Load Reactions .			
Location of max.above base	4.966 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
			Top along X-X	0.0 k	Bottom along X-X	0.0 k
Maximum Stress Ratio	0.246 : 1		Maximum SERVICE Load Deflections . .			
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	2.697 k	φ * Pn =	Along Y-Y -0.01231 in at 5.0 ft above base			
Mu-x =	8.0 k-ft	φ * Mn-x =	for load combination : +D+0.750L+0.450W			
Mu-y =	0.2427 k-ft	φ* Mn-y =	Along X-X 0.0in at 0.0 ft above base			
		φ =	for load combination :			
Mu Angle =	2.0 deg					
Mu at Angle =	8.004 k-ft	φMn at Angle =				
Pn & Mn values located at Pu-Mu vector intersection with capacity curve						
Column Capacities . .						
Pnmax : Nominal Max. Compressive Axial Capacit	570.16 k		General Section Information			
Pnmin : Nominal Min. Tension Axial Capacity	k					
φ Pn, max : Usable Compressive Axial Capacity	296.482 k		β =0.850 θ = 0.80			
φ Pn, min : Usable Tension Axial Capacity	k		ρ : % Reinforcing 0.4974 % Rebar % Ok			
			Reinforcing Area 1.0 in^2			
			Concrete Area 201.062 in^2			

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 32. Maintenance Yard Swinging Gate Caisson (1/L-2.26)

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base	Axial Load			Bending Analysis k-ft							Utilization	
	X-X	Y-Y		ft	Pu	ϕ * Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio	
+1.40D	Actual	M2,min	4.97	3.15	24.78	1.000	4.76	1.000	0.28	3.000	4.77	37.81	0.126		
+1.20D+1.60L	Actual	M2,min	4.97	2.70	13.00	1.000	7.28	1.000	0.24	2.000	7.28	33.34	0.218		
+1.20D+0.50L	Actual	M2,min	4.97	2.70	19.94	1.000	5.08	1.000	0.24	3.000	5.09	36.02	0.141		
+1.20D+0.50W	Actual	M2,min	4.97	2.70	19.94	1.000	5.04	1.000	0.24	3.000	5.05	36.02	0.140		
+1.20D+0.50L+W	Actual	M2,min	4.97	2.70	13.00	1.000	7.00	1.000	0.24	2.000	7.00	33.34	0.210		
+1.20D+L+W	Actual	M2,min	4.97	2.70	10.73	1.000	8.00	1.000	0.24	2.000	8.00	32.48	0.246		
+0.90D+W	Actual	M2,min	4.97	2.02	13.00	1.000	4.98	1.000	0.18	2.000	4.98	33.34	0.149		
+0.90D	Actual	M2,min	4.97	2.02	24.78	1.000	3.06	1.000	0.18	3.000	3.07	37.81	0.081		

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only						2.247	-3.400			
+D+L						2.247	-5.400			
+D+0.750L						2.247	-4.900			
+D+0.60W						2.247	-4.552			
+D+0.750L+0.450W						2.247	-5.764			
+0.60D+0.60W						1.348	-3.192			
+0.60D						1.348	-2.040			
L Only							-2.000			
W Only							-1.920			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top
D Only	-3.400		k-ft		k-ft
+D+L	-5.400		k-ft		k-ft
+D+0.750L	-4.900		k-ft		k-ft
+D+0.60W	-4.552		k-ft		k-ft
+D+0.750L+0.450W	-5.764		k-ft		k-ft
+0.60D+0.60W	-3.192		k-ft		k-ft
+0.60D	-2.040		k-ft		k-ft
L Only	-2.000		k-ft		k-ft
W Only	-1.920		k-ft		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000	-0.007	in	5.000
+D+L	0.0000	in	0.000	-0.012	in	5.000
+D+0.750L	0.0000	in	0.000	-0.010	in	5.000
+D+0.60W	0.0000	in	0.000	-0.010	in	5.000
+D+0.750L+0.450W	0.0000	in	0.000	-0.012	in	5.000
+0.60D+0.60W	0.0000	in	0.000	-0.007	in	5.000
+0.60D	0.0000	in	0.000	-0.004	in	5.000
L Only	0.0000	in	0.000	-0.004	in	5.000
W Only	0.0000	in	0.000	-0.004	in	4.966

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 32. Maintenance Yard Swinging Gate Post (1/L-2.26)

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : **HSS4x4x3/16**

Analysis Method : Load Resistance Factor

Steel Stress Grade : A500, Grade B, Fy = 46 ksi, Carbon Steel

Fy : Steel Yield 46.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height

8.0 ft

Top & Bottom Fixity

Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 8.0 ft, K = 1.20

Unbraced Length for buckling ABOUT Y-Y Axis = 8.0 ft, K = 1.20

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 75.360 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 8.0 ft, D = 1.20 k

BENDING LOADS . . .

Gate Load: Moment acting about X-X axis at 8.0 ft, D = 3.40, L = 2.0, W = 1.920 k-ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =

0.6422 : 1

Load Combination

+1.20D+L+W

Location of max.above base

0.0 ft

At maximum location values are . . .

Pu 1.530 k

0.9 * Pn 73.662 k

Mu-x 8.0 k-ft

0.9 * Mn-x : 12.662 k-ft

Mu-y 0.0 k-ft

0.9 * Mn-y : 12.662 k-ft

Maximum Load Reactions . .

Top along X-X 0.0 k

Bottom along X-X 0.0 k

Top along Y-Y 0.0 k

Bottom along Y-Y 0.0 k

Maximum Load Deflections . . .

Along Y-Y -1.758 in at 8.0ft above base
for load combination : +D+0.750L+0.450W

Along X-X 0.0 in at 0.0ft above base
for load combination :

PASS Maximum Shear Stress Ratio

0.0 : 1

Load Combination

0.0

Location of max.above base

0.0 ft

At maximum location values are . . .

Vu : Applied 0.0 k

Vn * Phi : Allowable 0.0 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location						Stress Ratio	Status	Location
+1.40D	0.388	PASS	0.00 ft		1.00	1.00	74.32	74.32	0.000	PASS	0.00 ft
+1.20D+1.60L	0.585	PASS	0.00 ft		1.00	1.00	74.32	74.32	0.000	PASS	0.00 ft
+1.20D+0.50L	0.412	PASS	0.00 ft		1.00	1.00	74.32	74.32	0.000	PASS	0.00 ft
+1.20D+0.50W	0.408	PASS	0.00 ft		1.00	1.00	74.32	74.32	0.000	PASS	0.00 ft
+1.20D+0.50L+W	0.563	PASS	0.00 ft		1.00	1.00	74.32	74.32	0.000	PASS	0.00 ft
+1.20D+L+W	0.642	PASS	0.00 ft		1.00	1.00	74.32	74.32	0.000	PASS	0.00 ft
+0.90D+W	0.401	PASS	0.00 ft		1.00	1.00	74.32	74.32	0.000	PASS	0.00 ft
+0.90D	0.249	PASS	0.00 ft		1.00	1.00	74.32	74.32	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
D Only	1.275				3.400		
+D+L	1.275				5.400		
+D+0.750L	1.275				4.900		
+D+0.60W	1.275				4.552		
+D+0.750L+0.450W	1.275				5.764		
+0.60D+0.60W	0.765				3.192		

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 32. Maintenance Yard Swinging Gate Post (1/L-2.26)

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
+0.60D	0.765				2.040		
L Only					2.000		
W Only					1.920		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	1.275				3.400		
"	Minimum					2.000		
Reaction, X-X Axis Base	Maximum	1.275				3.400		
"	Minimum	1.275				3.400		
Reaction, Y-Y Axis Base	Maximum	1.275				3.400		
"	Minimum	1.275						3.400
Reaction, X-X Axis Top	Maximum	1.275				3.400		
"	Minimum	1.275				3.400		
Reaction, Y-Y Axis Top	Maximum	1.275				3.400		
"	Minimum	1.275				3.400		
Moment, X-X Axis Base	Maximum	1.275	5.764			5.764		
"	Minimum		1.920			1.920		
Moment, Y-Y Axis Base	Maximum	1.275				3.400		
"	Minimum	1.275				3.400		
Moment, X-X Axis Top	Maximum	1.275				3.400		
"	Minimum	1.275				3.400		
Moment, Y-Y Axis Top	Maximum	1.275				3.400		
"	Minimum	1.275				3.400		

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	-1.037 in	8.000 ft
+D+L	0.0000 in	0.000 ft	-1.647 in	8.000 ft
+D+0.750L	0.0000 in	0.000 ft	-1.494 in	8.000 ft
+D+0.60W	0.0000 in	0.000 ft	-1.388 in	8.000 ft
+D+0.750L+0.450W	0.0000 in	0.000 ft	-1.758 in	8.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	-0.974 in	8.000 ft
+0.60D	0.0000 in	0.000 ft	-0.622 in	8.000 ft
L Only	0.0000 in	0.000 ft	-0.610 in	8.000 ft
W Only	0.0000 in	0.000 ft	-0.578 in	7.946 ft

Steel Section Properties : HSS4x4x3/16

Depth	=	4.000 in	I xx	=	6.21 in^4	J	=	10.000 in^4
Design Thick	=	0.174 in	S xx	=	3.10 in^3			
Width	=	4.000 in	R xx	=	1.550 in			
Wall Thick	=	0.187 in	Zx	=	3.670 in^3			
Area	=	2.580 in^2	I yy	=	6.210 in^4	C	=	5.070 in^3
Weight	=	9.420 plf	S yy	=	3.100 in^3			
			R yy	=	1.550 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park.ec6

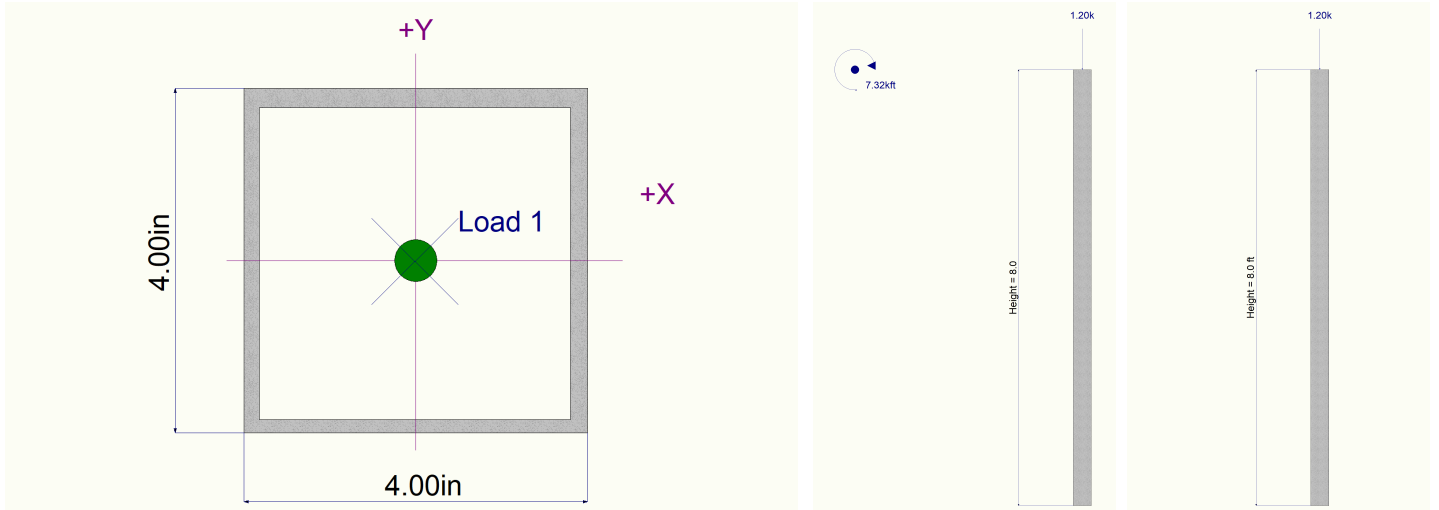
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 33. Maintenance Yard Swinging Gate Post (1/L-2.26)

Sketches



Maintenance Yard Gate, (Landscape Details 1/L-2.26)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 8'-0" Tall
- 12'-0" Wide

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% wind loading due to open nature of chain-link fencing

Total Wind Load per Post = 30 psf x 8' x 12' x 0.25 = 720 lbs

Applied Moment due to Wind = 720 lbs x $\frac{8ft}{2}$ = 2,880 ft – lbs

Dead and Live Loading

Total Dead Load per Post = 1,200 lbs

Applied Moment due to Dead Load = 1,200 lbs x $\frac{12ft}{2}$ = 7,200 ft – lbs

Total Live Load per Post = 250 lbs

Applied Moment due to Live Load = 250 lbs x 12ft = 3,000 ft – lbs

$M_u = 7,200 \text{ ft} - \text{lbs}$

$V_u = 720 \text{ lbs}$

Enercalc: 7,200/8 = **900 lbs @ 8'**

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 32a. Maintenance Yard Swinging Gate Embedment (24') (1/L-2.26)

Code References

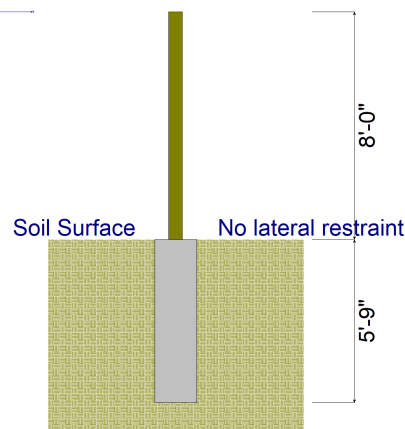
Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 18.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Point Load



Controlling Values

Governing Load Combination $D+0.750L+0.450W$
Lateral Load 1.343 k
Moment 10.746 k-ft

NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 942.04 psf
Allowable 942.44 psf

Minimum Required Depth 5.750 ft

Footing Base Area 1.767 ft²
Maximum Soil Pressure 0.0 ksf

Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	0.90 k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	0.3750 k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.360 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.900	7.200	4.88	808.1	809.5	1.000
+D+L	1.275	10.200	5.63	922.3	924.4	1.000
+D+0.750L	1.181	9.450	5.50	894.7	898.5	1.000
+D+0.60W	1.116	8.928	5.38	877.4	878.1	1.000
+D+0.750L+0.450W	1.343	10.746	5.75	942.0	942.4	1.000
+0.60D+0.60W	0.756	6.048	4.63	757.3	757.5	1.000
+0.60D	0.540	4.320	4.13	667.1	668.2	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 32a. Maintenance Yard Swinging Gate Caisson (24') (1/L-2.26)

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

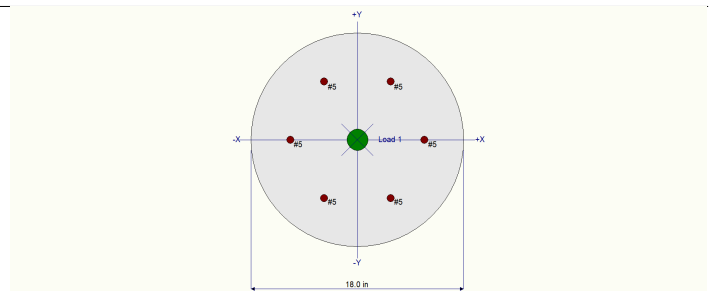
f'_c : Concrete 28 day streng	=	3.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.20 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	6.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum		
X-X (width) axis :		
Unbraced Length for buckling ABOUT X-X Axis = 6.0 ft, K = 1.0		
Y-Y (depth) axis :		
Unbraced Length for buckling ABOUT Y-Y Axis = 6.0 ft, K = 1.0		

Column Cross Section

Column Dimensions : 18.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 6 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 1,590.43 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 6.0 ft above base, D = 1.20 k

BENDING LOADS . . .

Moment acting about X-X axis at 5.0 ft, D = 7.20, L = 3.0, W = 2.880 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+L+W		Maximum SERVICE Load Reactions .			
Location of max.above base	5.960 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.241 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	3.349 k	ϕ * Pn =	14.061 k			
Mu-x =	14.528 k-ft	ϕ * Mn-x =	60.820 k-ft			
Mu-y =	0.3181 k-ft	ϕ * Mn-y =	0.9516 k-ft			
Mu Angle =	1.0 deg	ϕ =	0.90			
Mu at Angle =	14.532 k-ft	ϕMn at Angle =	60.335 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .				Maximum SERVICE Load Deflections . .		
Pnmax : Nominal Max. Compressive Axial Capacity	755.75 k		Along Y-Y	-0.02010 in	at	6.0 ft above base
Pnmin : Nominal Min. Tension Axial Capacity	k		for load combination : +D+0.750L+0.450W			
ϕ Pn, max : Usable Compressive Axial Capacity	392.992 k		Along X-X	0.0in	at	0.0 ft above base
ϕ Pn, min : Usable Tension Axial Capacity	k		for load combination :			
				General Section Information		
				β =0.850 θ = 0.80		
				ρ : % Reinforcing 0.7309 % Rebar % Ok		
				Reinforcing Area 1.860 in^2		
				Concrete Area 254.469 in^2		

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 32a. Maintenance Yard Swinging Gate Caisson (24') (1/L-2.26)

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base	Axial Load			Bending Analysis k-ft							Utilization	
	X-X	Y-Y		ft	Pu	ϕ	* Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δMu	ϕ Mn	Ratio
+1.40D	Actual	M2,min	5.96		3.91		26.64	1.001	10.09	1.000	0.37	2.000	10.09	65.82	0.153
+1.20D+1.60L	Actual	M2,min	5.96		3.35		14.06	1.001	13.45	1.000	0.32	1.000	13.45	60.34	0.223
+1.20D+0.50L	Actual	M2,min	5.96		3.35		20.10	1.001	10.15	1.000	0.32	2.000	10.15	62.99	0.161
+1.20D+0.50W	Actual	M2,min	5.96		3.35		20.10	1.001	10.09	1.000	0.32	2.000	10.09	62.99	0.160
+1.20D+0.50L+W	Actual	M2,min	5.96		3.35		16.82	1.001	13.03	1.000	0.32	1.000	13.03	61.56	0.212
+1.20D+L+W	Actual	M2,min	5.96		3.35		14.06	1.001	14.53	1.000	0.32	1.000	14.53	60.34	0.241
+0.90D+W	Actual	M2,min	5.96		2.51		16.82	1.000	9.36	1.000	0.24	1.000	9.37	61.56	0.152
+0.90D	Actual	M2,min	5.96		2.51		26.64	1.000	6.48	1.000	0.24	2.000	6.49	65.82	0.099

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only						2.790	-7.200			
+D+L						2.790	-10.200			
+D+0.750L						2.790	-9.450			
+D+0.60W						2.790	-8.928			
+D+0.750L+0.450W						2.790	-10.746			
+0.60D+0.60W						1.674	-6.048			
+0.60D						1.674	-4.320			
L Only							-3.000			
W Only							-2.880			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top
D Only	-7.200		k-ft		k-ft
+D+L	-10.200		k-ft		k-ft
+D+0.750L	-9.450		k-ft		k-ft
+D+0.60W	-8.928		k-ft		k-ft
+D+0.750L+0.450W	-10.746		k-ft		k-ft
+0.60D+0.60W	-6.048		k-ft		k-ft
+0.60D	-4.320		k-ft		k-ft
L Only	-3.000		k-ft		k-ft
W Only	-2.880		k-ft		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000	-0.013	in	6.000
+D+L	0.0000	in	0.000	-0.019	in	6.000
+D+0.750L	0.0000	in	0.000	-0.018	in	6.000
+D+0.60W	0.0000	in	0.000	-0.017	in	6.000
+D+0.750L+0.450W	0.0000	in	0.000	-0.020	in	6.000
+0.60D+0.60W	0.0000	in	0.000	-0.011	in	6.000
+0.60D	0.0000	in	0.000	-0.008	in	6.000
L Only	0.0000	in	0.000	-0.006	in	6.000
W Only	0.0000	in	0.000	-0.005	in	5.960

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 32a. Maintenance Yard Swinging Gate Post (24') (1/L-2.26)

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : **HSS4x4x5/16**

Analysis Method : Load Resistance Factor

Steel Stress Grade : A500, Grade B, Fy = 46 ksi, Carbon Steel

Fy : Steel Yield 46.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height

8.0 ft

Top & Bottom Fixity

Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 8.0 ft, K = 1.20

Unbraced Length for buckling ABOUT Y-Y Axis = 8.0 ft, K = 1.20

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 118.640 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 8.0 ft, D = 1.20 k

BENDING LOADS . . .

Gate Load: Moment acting about X-X axis at 8.0 ft, D = 7.20, L = 3.0, W = 2.880 k-ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =

0.7599 : 1

Load Combination

+1.20D+L+W

Location of max.above base

0.0 ft

At maximum location values are . . .

Pu

1.582 k

0.9 * Pn

113.541 k

Mu-x

14.520 k-ft

0.9 * Mn-x :

19.286 k-ft

Mu-y

0.0 k-ft

0.9 * Mn-y :

19.286 k-ft

Maximum Load Reactions . .

Top along X-X

0.0 k

Bottom along X-X

0.0 k

Top along Y-Y

0.0 k

Bottom along Y-Y

0.0 k

Maximum Load Deflections . . .

Along Y-Y -2.227 in at 8.0ft above base
for load combination : +D+0.750L+0.450W

Along X-X 0.0 in at 0.0ft above base
for load combination :

PASS Maximum Shear Stress Ratio

0.0 : 1

Load Combination

0.0

Location of max.above base

0.0 ft

At maximum location values are . . .

Vu : Applied

0.0 k

Vn * Phi : Allowable

0.0 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location
+1.40D	0.531	PASS	7.36 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+1.20D+1.60L	0.704	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+1.20D+0.50L	0.533	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+1.20D+0.50W	0.530	PASS	7.36 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+1.20D+0.50L+W	0.682	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+1.20D+L+W	0.760	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+0.90D+W	0.491	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+0.90D	0.341	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
	@ Base		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	1.319							7.200			
+D+L	1.319							10.200			
+D+0.750L	1.319							9.450			
+D+0.60W	1.319							8.928			
+D+0.750L+0.450W	1.319							10.746			
+0.60D+0.60W	0.791							6.048			

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 32a. Maintenance Yard Swinging Gate Post (24') (1/L-2.26)

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
+0.60D	0.791				4.320		
L Only					3.000		
W Only					2.880		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	1.319				7.200		
"	Minimum					3.000		
Reaction, X-X Axis Base	Maximum	1.319				7.200		
"	Minimum	1.319				7.200		
Reaction, Y-Y Axis Base	Maximum	1.319				7.200		
"	Minimum	1.319						7.200
Reaction, X-X Axis Top	Maximum	1.319				7.200		
"	Minimum	1.319				7.200		
Reaction, Y-Y Axis Top	Maximum	1.319				7.200		
"	Minimum	1.319				7.200		
Moment, X-X Axis Base	Maximum	1.319	10.746			10.746		
"	Minimum		2.880			2.880		
Moment, Y-Y Axis Base	Maximum	1.319				7.200		
"	Minimum	1.319				7.200		
Moment, X-X Axis Top	Maximum	1.319				7.200		
"	Minimum	1.319				7.200		
Moment, Y-Y Axis Top	Maximum	1.319				7.200		
"	Minimum	1.319				7.200		

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	-1.492 in	8.000 ft
+D+L	0.0000 in	0.000 ft	-2.114 in	8.000 ft
+D+0.750L	0.0000 in	0.000 ft	-1.958 in	8.000 ft
+D+0.60W	0.0000 in	0.000 ft	-1.850 in	8.000 ft
+D+0.750L+0.450W	0.0000 in	0.000 ft	-2.227 in	8.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	-1.253 in	8.000 ft
+0.60D	0.0000 in	0.000 ft	-0.895 in	8.000 ft
L Only	0.0000 in	0.000 ft	-0.622 in	8.000 ft
W Only	0.0000 in	0.000 ft	-0.589 in	7.946 ft

Steel Section Properties : HSS4x4x5/16

Depth	=	4.000 in	I xx	=	9.14 in^4	J	=	15.300 in^4
Design Thick	=	0.291 in	S xx	=	4.57 in^3			
Width	=	4.000 in	R xx	=	1.490 in			
Wall Thick	=	0.313 in	Zx	=	5.590 in^3			
Area	=	4.100 in^2	I yy	=	9.140 in^4	C	=	7.910 in^3
Weight	=	14.830 plf	S yy	=	4.570 in^3			
			R yy	=	1.490 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park.ec6

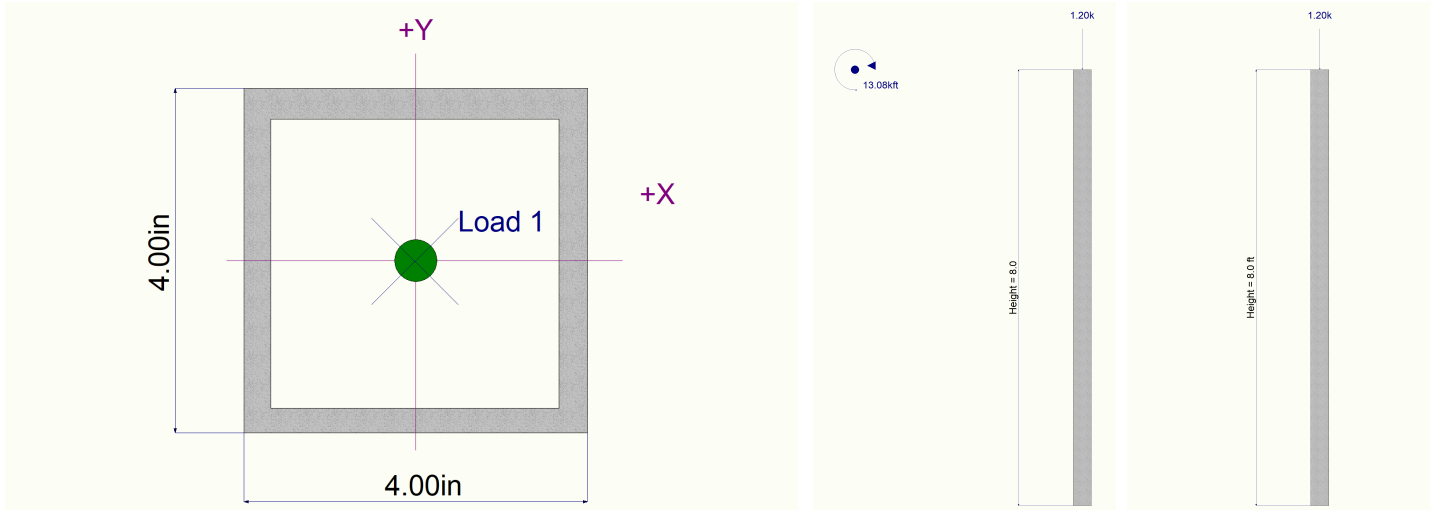
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 32a. Maintenance Yard Swinging Gate Post (24') (1/L-2.26)

Sketches



33. Maintenance Yard Rolling Gate (Landscape Detail 1/L-2.27)

Maintenance Yard Rolling Gate, (Landscape Detail 1/L-2.27)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 8'-0" Tall
- 20'-0" Wide

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% wind loading due to open nature of chain-link fencing

Total Wind Load per Post = $30 \text{ psf} \times 8' \times 20' \times 0.25 = 1,200 \text{ lbs}$

Applied Moment due to Wind = $1,200 \text{ lbs} \times \frac{8 \text{ ft}}{2} = 4,800 \text{ ft} - \text{lbs}$

$M_u = 4,800 \text{ ft} - \text{lbs}$

$V_u = 1,200 \text{ lbs}$

Enercalc: $4,800/8 = \mathbf{600 \text{ lbs @ } 8'}$

Dead Load Moment, Hanging Gate

Assume max 1,000# hanging weight per post @ max 6" from post center line

Applied Moment due to Dead Loading = $500 \text{ ft} - \text{lbs}$

Enercalc: $500/8 = \mathbf{62.5 \text{ lbs @ } 8'}$

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 33. Maintenance Yard Sliding Gate Embedment (1/L-2.27)

Code References

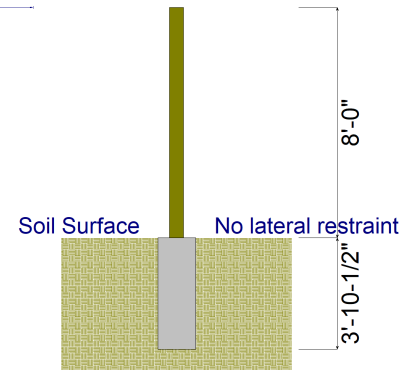
Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 16.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Point Load



Controlling Values

Governing Load Combination D+0.60W
Lateral Load 0.4225 k
Moment 3.380 k-ft

NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 634.48 psf
Allowable 638.27 psf

Minimum Required Depth 3.875 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	0.06250 k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.60 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.063	0.500	2.00	317.7	319.4	1.000
+D+0.60W	0.423	3.380	3.88	634.5	638.3	1.000
+D+0.450W	0.333	2.660	3.63	580.5	584.3	1.000
+0.60D+0.60W	0.398	3.180	3.75	622.2	622.9	1.000
+0.60D	0.038	0.300	1.63	265.3	266.7	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 33. Maintenance Yard Sliding Gate Caisson (1/L-2.27)

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

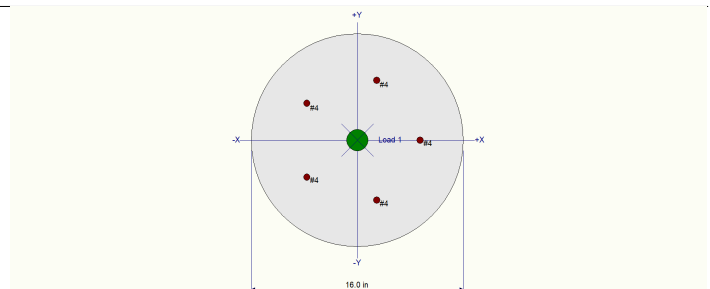
f'c : Concrete 28 day streng	=	3.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
fy - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.20 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	4.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum:		
X-X (width) axis :		
Unbraced Length for buckling ABOUT X-X Axis = 4.0 ft, K = 1.0		
Y-Y (depth) axis :		
Unbraced Length for buckling ABOUT Y-Y Axis = 4.0 ft, K = 1.0		

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 5 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 837.76 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 4.0 ft above base, D = 1.20 k

BENDING LOADS . . .

Moment acting about X-X axis at 5.0 ft, D = 0.50, W = 4.80 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W		Maximum SERVICE Load Reactions .			
Location of max.above base	3.973 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
			Top along X-X	0.0 k	Bottom along X-X	0.0 k
Maximum Stress Ratio	0.162 : 1		Maximum SERVICE Load Deflections . .			
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	1.834 k	φ * Pn =	10.729 k	Maximum SERVICE Load Deflections . .		
Mu-x =	5.251 k-ft	φ * Mn-x =	32.774 k-ft			
Mu-y =	0.1651 k-ft	φ* Mn-y =	1.893 k-ft	Along Y-Y	-0.006563 in at	4.0 ft above base
		φ =	0.90	for load combination : W Only		
Mu Angle =	2.0 deg			Along X-X	0.0in at	0.0 ft above base
Mu at Angle =	5.254 k-ft	φMn at Angle =	32.482 k-ft	for load combination :		
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .						
Pnmax : Nominal Max. Compressive Axial Capacit	570.16 k		General Section Information			
Pnmin : Nominal Min. Tension Axial Capacity	k					
φ Pn, max : Usable Compressive Axial Capacity	296.482 k		ρ : % Reinforcing	0.4974 %	Rebar % Ok	β =0.850 θ = 0.80
φ Pn, min : Usable Tension Axial Capacity	k		Reinforcing Area	1.0 in^2		
			Concrete Area	201.062 in^2		

$\beta = 0.850$ $\theta = 0.80$

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 33. Maintenance Yard Sliding Gate Caisson (1/L-2.27)

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft								Utilization	
	X-X	Y-Y		Pu	ϕ * Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio		
+1.40D	Actual	M2,min	3.97	2.85	196.90	1.000	0.70	1.000	0.26	20.000	0.75	51.62	0.014		
+1.20D	Actual	M2,min	3.97	2.45	196.90	1.000	0.60	1.000	0.22	20.000	0.64	51.62	0.012		
+1.20D+0.50W	Actual	M2,min	3.97	2.45	33.68	1.000	3.00	1.000	0.22	4.000	3.01	41.10	0.073		
+1.20D+W	Actual	M2,min	3.97	2.45	15.70	1.000	5.40	1.000	0.22	2.000	5.41	34.37	0.157		
+0.90D+W	Actual	M2,min	3.97	1.83	10.73	1.000	5.25	1.000	0.17	2.000	5.25	32.48	0.162		
+0.90D	Actual	M2,min	3.97	1.83	196.90	1.000	0.45	1.000	0.17	20.000	0.48	51.62	0.009		

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		
D Only						2.038	-0.500			
+D+0.60W						2.038	-3.380			
+D+0.450W						2.038	-2.660			
+0.60D+0.60W						1.223	-3.180			
+0.60D						1.223	-0.300			
W Only							-4.800			

Maximum Moment Reactions

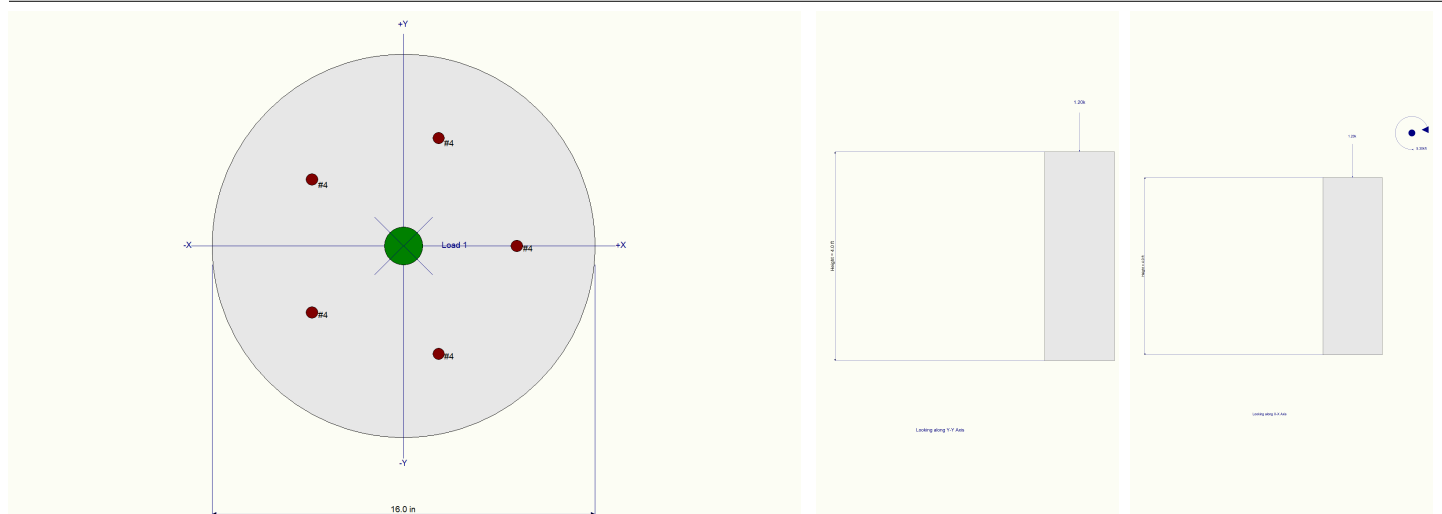
Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis		
	@ Base	@ Top		@ Base	@ Top	
D Only	-0.500		k-ft			k-ft
+D+0.60W	-3.380		k-ft			k-ft
+D+0.450W	-2.660		k-ft			k-ft
+0.60D+0.60W	-3.180		k-ft			k-ft
+0.60D	-0.300		k-ft			k-ft
W Only	-4.800		k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	-0.001	in	4.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.005	in	4.000 ft
+D+0.450W	0.0000	in	0.000 ft	-0.004	in	4.000 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.004	in	4.000 ft
+0.60D	0.0000	in	0.000 ft	-0.000	in	4.000 ft
W Only	0.0000	in	0.000 ft	-0.006	in	3.973 ft

Sketches



Interaction Diagrams

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 33. Maintenance Yard Sliding Gate Post (1/L-2.26)

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : **HSS4x4x3/16**

Analysis Method : Load Resistance Factor

Steel Stress Grade : A500, Grade B, Fy = 46 ksi, Carbon Steel

Fy : Steel Yield 46.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 8.0 ft

Top & Bottom Fixity Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 8.0 ft, K = 1.20

Unbraced Length for buckling ABOUT Y-Y Axis = 8.0 ft, K = 1.20

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 75.360 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 8.0 ft, D = 1.20 k

BENDING LOADS . . .

Gate Load: Lat. Point Load at 8.0 ft creating Mx-x, D = 0.06250, L = 0.250, W = 0.60 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =

0.5948 : 1

Load Combination

+1.20D+L+W

Location of max.above base

0.0 ft

At maximum location values are . . .

Pu 1.530 k

0.9 * Pn 73.662 k

Mu-x -7.40 k-ft

0.9 * Mn-x : 12.662 k-ft

Mu-y 0.0 k-ft

0.9 * Mn-y : 12.662 k-ft

Maximum Load Reactions . .

Top along X-X 0.0 k

Bottom along X-X 0.0 k

Top along Y-Y 0.0 k

Bottom along Y-Y 0.60 k

Maximum Load Deflections . . .

Along Y-Y 0.9776 in at 8.0ft above base
for load combination : W Only

Along X-X 0.0 in at 0.0ft above base
for load combination :

PASS Maximum Shear Stress Ratio

0.03692 : 1

Load Combination

+1.20D+L+W

Location of max.above base

0.0 ft

At maximum location values are . . .

Vu : Applied 0.9250 k

Vn * Phi : Allowable 25.054 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location
+1.40D	0.067	PASS	0.00 ft	1.67	1.00	74.32	74.32	0.003	PASS	0.00 ft
+1.20D+1.60L	0.311	PASS	0.00 ft	1.67	1.00	74.32	74.32	0.019	PASS	0.00 ft
+1.20D+0.50L	0.137	PASS	0.00 ft	1.67	1.00	74.32	74.32	0.008	PASS	0.00 ft
+1.20D+0.50W	0.247	PASS	0.00 ft	1.67	1.00	74.32	74.32	0.015	PASS	0.00 ft
+1.20D+0.50L+W	0.516	PASS	0.00 ft	1.67	1.00	74.32	74.32	0.032	PASS	0.00 ft
+1.20D+L+W	0.595	PASS	0.00 ft	1.67	1.00	74.32	74.32	0.037	PASS	0.00 ft
+0.90D+W	0.422	PASS	0.00 ft	1.67	1.00	74.32	74.32	0.026	PASS	0.00 ft
+0.90D	0.043	PASS	0.00 ft	1.67	1.00	74.32	74.32	0.002	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
	@ Base		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	1.275					0.063		-0.500			
+D+L	1.275					0.313		-2.500			
+D+0.750L	1.275					0.250		-2.000			
+D+0.60W	1.275					0.423		-3.380			
+D+0.750L+0.450W	1.275					0.520		-4.160			
+0.60D+0.60W	0.765					0.398		-3.180			

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 33. Maintenance Yard Sliding Gate Post (1/L-2.26)

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
+0.60D	0.765			0.038	-0.300		
L Only				0.250	-2.000		
W Only				0.600	-4.800		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	1.275			0.063	-0.500		
"	Minimum				0.250	-2.000		
Reaction, X-X Axis Base	Maximum	1.275			0.063	-0.500		
"	Minimum	1.275			0.063	-0.500		
Reaction, Y-Y Axis Base	Maximum				0.600	-4.800		
"	Minimum	0.765			0.038			-0.300
Reaction, X-X Axis Top	Maximum	1.275			0.063	-0.500		
"	Minimum	1.275			0.063	-0.500		
Reaction, Y-Y Axis Top	Maximum	1.275			0.063	-0.500		
"	Minimum	1.275			0.063	-0.500		
Moment, X-X Axis Base	Maximum	0.765	-0.300		0.038	-0.300		
"	Minimum		-4.800		0.600	-4.800		
Moment, Y-Y Axis Base	Maximum	1.275			0.063	-0.500		
"	Minimum	1.275			0.063	-0.500		
Moment, X-X Axis Top	Maximum	1.275			0.063	-0.500		
"	Minimum	1.275			0.063	-0.500		
Moment, Y-Y Axis Top	Maximum	1.275			0.063	-0.500		
"	Minimum	1.275			0.063	-0.500		

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.102 in	8.000 ft
+D+L	0.0000 in	0.000 ft	0.509 in	8.000 ft
+D+0.750L	0.0000 in	0.000 ft	0.407 in	8.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.688 in	8.000 ft
+D+0.750L+0.450W	0.0000 in	0.000 ft	0.847 in	8.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.648 in	8.000 ft
+0.60D	0.0000 in	0.000 ft	0.061 in	8.000 ft
L Only	0.0000 in	0.000 ft	0.407 in	8.000 ft
W Only	0.0000 in	0.000 ft	0.968 in	7.946 ft

Steel Section Properties : HSS4x4x3/16

Depth	=	4.000 in	I xx	=	6.21 in^4	J	=	10.000 in^4
Design Thick	=	0.174 in	S xx	=	3.10 in^3			
Width	=	4.000 in	R xx	=	1.550 in			
Wall Thick	=	0.187 in	Zx	=	3.670 in^3			
Area	=	2.580 in^2	I yy	=	6.210 in^4	C	=	5.070 in^3
Weight	=	9.420 plf	S yy	=	3.100 in^3			
			R yy	=	1.550 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park.ec6

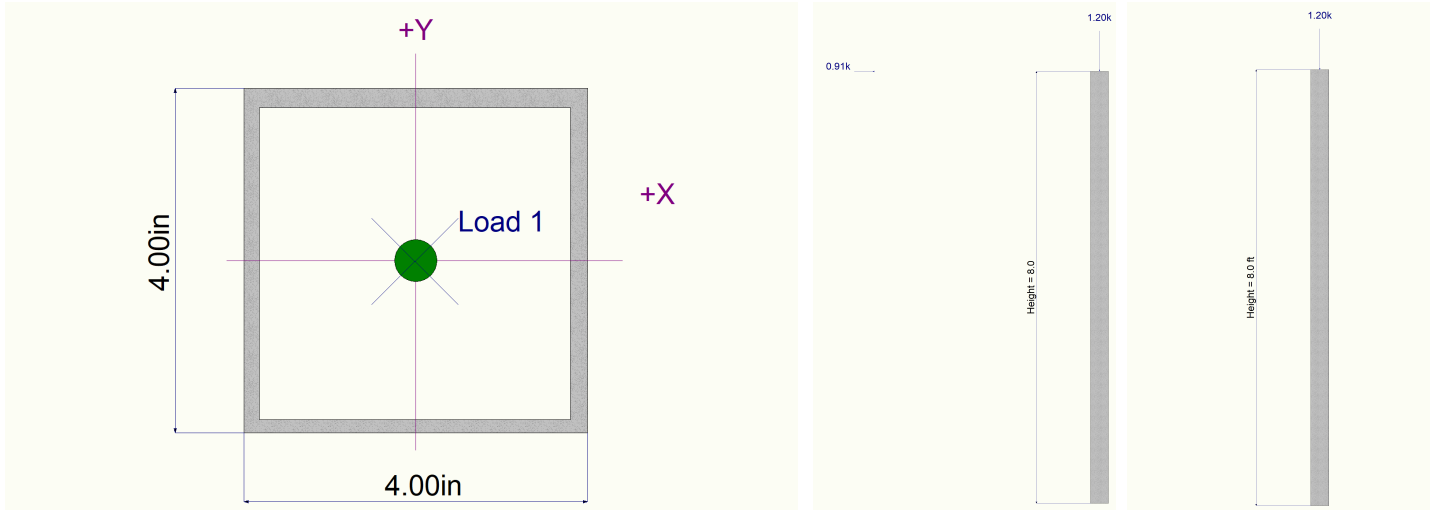
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 33. Maintenance Yard Sliding Gate Post (1/L-2.26)

Sketches



34. Main Entry Swinging Gate (Landscape Detail (Landscape Detail 1/L-2.29))

Main Entry Swinging Gate, (Landscape Details 1/L-2.29)

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 8'-0" Tall
- 12'-0" Wide

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% wind loading due to open nature of chain-link fencing

Total Wind Load per Post = 30 psf x 8' x 12' x 0.25 = 720 lbs

Applied Moment due to Wind = 720 lbs x $\frac{8ft}{2}$ = 2,880 ft – lbs

Dead and Live Loading

Total Dead Load per Post = 1,200 lbs

Applied Moment due to Dead Load = 1,200 lbs x $\frac{12ft}{2}$ = 7,200 ft – lbs

Total Live Load per Post = 250 lbs

Applied Moment due to Live Load = 250 lbs x 12ft = 3,000 ft – lbs

$M_u = 7,200 \text{ ft} - \text{lbs}$

$V_u = 720 \text{ lbs}$

Enercalc: 7,200/8 = **900 lbs @ 8'**

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 34. Main Entry Swinging Gate Post Embedment, (1, L-2.29)

Code References

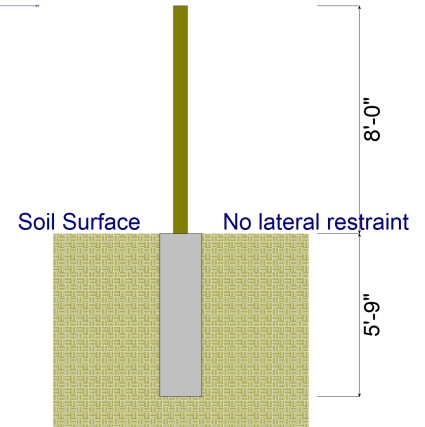
Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 18.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Point Load



Controlling Values

Governing Load Combination $D+0.750L+0.450W$
Lateral Load 1.343 k
Moment 10.746 k-ft
NO Ground Surface Restraint
Pressures at 1/3 Depth
Actual **942.04** psf
Allowable **942.44** psf

Minimum Required Depth 5.750 ft

Footing Base Area 1.767 ft²
Maximum Soil Pressure 0.0 ksf

Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	0.90 k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	0.3750 k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.360 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	8.0 ft	TOP of Load above ground surface	8.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.900	7.200	4.88	808.1	809.5	1.000
+D+L	1.275	10.200	5.63	922.3	924.4	1.000
+D+0.750L	1.181	9.450	5.50	894.7	898.5	1.000
+D+0.60W	1.116	8.928	5.38	877.4	878.1	1.000
+D+0.750L+0.450W	1.343	10.746	5.75	942.0	942.4	1.000
+0.60D+0.60W	0.756	6.048	4.63	757.3	757.5	1.000
+0.60D	0.540	4.320	4.13	667.1	668.2	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 34. Main Entry Swinging Gate Post CIDH Caisson, (1-L-2.29)

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

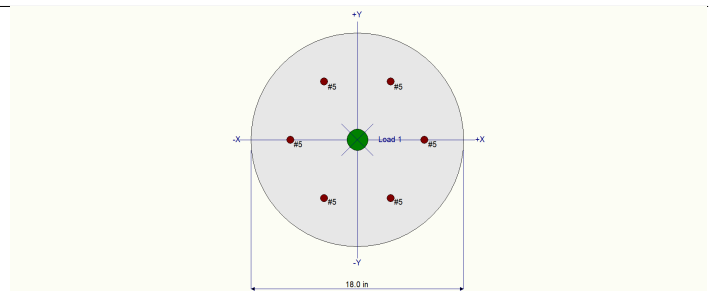
f'_c : Concrete 28 day streng = 4.0 ksi
E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.850
 f_y - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 0.20 %
Max. Reinf. = 8.0 %
Seismic Design Category = D

Overall Column Height = 6.0 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along colum
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 18.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 6 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 1,590.43 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 6.0 ft above base, D = 0.50 k

BENDING LOADS . . .

Moment acting about X-X axis at 4.375 ft, D = 7.20, L = 3.0, W = 2.880 k-ft

DESIGN SUMMARY

Load Combination +1.20D+L+W
Location of max. above base 5.960 ft

Maximum Stress Ratio

Ratio = $(P_u^2 + M_u^2)^{.5} / (\Phi P_n^2 + \Phi M_n^2)^{.5}$

P_u = 2.509 k $\Phi * P_n$ = 10.847 k

M_u-x = 14.520 k-ft $\Phi * M_n-x$ = 62.984 k-ft

M_u-y = 0.2383 k-ft $\Phi * M_n-y$ = 1.068 k-ft

M_u Angle = 1.0 deg Φ = 0.90

M_u at Angle = 14.522 k-ft ΦM_n at Angle = 61.982 k-ft

P_n & M_n values located at P_u - M_u vector intersection with capacity curve

Column Capacities . .

P_{nmax} : Nominal Max. Compressive Axial Capacity 970.47 k

P_{nmin} : Nominal Min. Tension Axial Capacity k

ΦP_n , max : Usable Compressive Axial Capacity 504.64 k

ΦP_n , min : Usable Tension Axial Capacity k

Maximum SERVICE Load Reactions .

Top along Y-Y 0.0 k Bottom along Y-Y 0.0 k

Top along X-X 0.0 k Bottom along X-X 0.0 k

Maximum SERVICE Load Deflections . .

Along Y-Y -0.01914 in at 6.0 ft above base
for load combination : +D+0.750L+0.450W

Along X-X 0.0 in at 0.0 ft above base
for load combination :

General Section Information

β = 0.850 θ = 0.80
 ρ : % Reinforcing 0.7309 % Rebar % Ok
Reinforcing Area 1.860 in²
Concrete Area 254.469 in²

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 34. Main Entry Swinging Gate Post CIDH Caisson, (1-L-2.29)

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio
+1.40D	Actual	M2,min	5.96	2.93	18.62	1.000	10.08	1.000	0.28	2.000	10.08	65.63		0.154
+1.20D+1.60L	Actual	M2,min	5.96	2.51	10.85	1.000	13.44	1.000	0.24	1.000	13.44	61.98		0.217
+1.20D+0.50L	Actual	M2,min	5.96	2.51	15.11	1.000	10.14	1.000	0.24	1.000	10.14	63.99		0.159
+1.20D+0.50W	Actual	M2,min	5.96	2.51	15.11	1.000	10.08	1.000	0.24	1.000	10.08	63.99		0.158
+1.20D+L	Actual	M2,min	5.96	2.51	15.11	1.000	11.64	1.000	0.24	1.000	11.64	63.99		0.182
+1.20D+0.50L+W	Actual	M2,min	5.96	2.51	10.85	1.000	13.02	1.000	0.24	1.000	13.02	61.98		0.210
+1.20D+L+W	Actual	M2,min	5.96	2.51	10.85	1.000	14.52	1.000	0.24	1.000	14.52	61.98		0.234
+0.90D+W	Actual	M2,min	5.96	1.88	10.85	1.000	9.36	1.000	0.18	1.000	9.36	61.98		0.151
+0.90D	Actual	M2,min	5.96	1.88	18.62	1.000	6.48	1.000	0.18	2.000	6.48	65.63		0.099

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k		Y-Y Axis Reaction k		Axial Reaction k	Mx - End Moments k-ft		My - End Moments k-ft	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					2.090	-7.200			
+D+L					2.090	-10.200			
+D+0.750L					2.090	-9.450			
+D+0.60W					2.090	-8.928			
+D+0.750L+0.450W					2.090	-10.746			
+0.60D+0.60W					1.254	-6.048			
+0.60D					1.254	-4.320			
L Only						-3.000			
W Only						-2.880			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis k-ft		Moment About Y-Y Axis k-ft	
	@ Base	@ Top	@ Base	@ Top
D Only	-7.200			
+D+L	-10.200			
+D+0.750L	-9.450			
+D+0.60W	-8.928			
+D+0.750L+0.450W	-10.746			
+0.60D+0.60W	-6.048			
+0.60D	-4.320			
L Only	-3.000			
W Only	-2.880			

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	-0.013	in	6.000 ft
+D+L	0.0000	in	0.000 ft	-0.018	in	6.000 ft
+D+0.750L	0.0000	in	0.000 ft	-0.017	in	6.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.016	in	6.000 ft
+D+0.750L+0.450W	0.0000	in	0.000 ft	-0.019	in	6.000 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.011	in	6.000 ft
+0.60D	0.0000	in	0.000 ft	-0.008	in	6.000 ft
L Only	0.0000	in	0.000 ft	-0.005	in	6.000 ft
W Only	0.0000	in	0.000 ft	-0.005	in	5.960 ft

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 34. Main Entry Swinging Gate Post Check, (1/L-2.29)

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : **HSS4x4x5/16**

Analysis Method : Load Resistance Factor

Steel Stress Grade : A500, Grade B, Fy = 46 ksi, Carbon Steel

Fy : Steel Yield 46.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height

8.0 ft

Top & Bottom Fixity

Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 8.0 ft, K = 1.20

Unbraced Length for buckling ABOUT Y-Y Axis = 8.0 ft, K = 1.20

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 118.640 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 8.0 ft, D = 1.50 k

BENDING LOADS . . .

Gate Load: Moment acting about X-X axis at 8.0 ft, D = 7.20, L = 3.0, W = 2.880 k-ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =

0.7615 : 1

Load Combination

+1.20D+L+W

Location of max.above base

0.0 ft

At maximum location values are . . .

Pu

1.942 k

0.9 * Pn

113.541 k

Mu-x

14.520 k-ft

0.9 * Mn-x :

19.286 k-ft

Mu-y

0.0 k-ft

0.9 * Mn-y :

19.286 k-ft

Maximum Load Reactions . .

Top along X-X

0.0 k

Bottom along X-X

0.0 k

Top along Y-Y

0.0 k

Bottom along Y-Y

0.0 k

Maximum Load Deflections . . .

Along Y-Y -2.227 in at 8.0ft above base
for load combination : +D+0.750L+0.450W

Along X-X 0.0 in at 0.0ft above base
for load combination :

PASS Maximum Shear Stress Ratio

0.0 : 1

Load Combination

0.0

Location of max.above base

0.0 ft

At maximum location values are . . .

Vu : Applied

0.0 k

Vn * Phi : Allowable

0.0 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location
+1.40D	0.533	PASS	7.36 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+1.20D+1.60L	0.705	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+1.20D+0.50L	0.534	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+1.20D+0.50W	0.531	PASS	7.36 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+1.20D+0.50L+W	0.684	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+1.20D+L+W	0.761	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+0.90D+W	0.492	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft
+0.90D	0.342	PASS	0.00 ft	1.00	1.00	77.32	77.32	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
D Only	1.619				7.200		
+D+L	1.619				10.200		
+D+0.750L	1.619				9.450		
+D+0.60W	1.619				8.928		
+D+0.750L+0.450W	1.619				10.746		
+0.60D+0.60W	0.971				6.048		

Steel Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 34. Main Entry Swinging Gate Post Check, (1/L-2.29)

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
+0.60D	0.971				4.320		
L Only					3.000		
W Only					2.880		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	1.619				7.200		
"	Minimum					3.000		
Reaction, X-X Axis Base	Maximum	1.619				7.200		
"	Minimum	1.619				7.200		
Reaction, Y-Y Axis Base	Maximum	1.619				7.200		
"	Minimum	1.619						7.200
Reaction, X-X Axis Top	Maximum	1.619				7.200		
"	Minimum	1.619				7.200		
Reaction, Y-Y Axis Top	Maximum	1.619				7.200		
"	Minimum	1.619				7.200		
Moment, X-X Axis Base	Maximum	1.619	10.746			10.746		
"	Minimum		2.880			2.880		
Moment, Y-Y Axis Base	Maximum	1.619				7.200		
"	Minimum	1.619				7.200		
Moment, X-X Axis Top	Maximum	1.619				7.200		
"	Minimum	1.619				7.200		
Moment, Y-Y Axis Top	Maximum	1.619				7.200		
"	Minimum	1.619				7.200		

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	-1.492 in	8.000 ft
+D+L	0.0000 in	0.000 ft	-2.114 in	8.000 ft
+D+0.750L	0.0000 in	0.000 ft	-1.958 in	8.000 ft
+D+0.60W	0.0000 in	0.000 ft	-1.850 in	8.000 ft
+D+0.750L+0.450W	0.0000 in	0.000 ft	-2.227 in	8.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	-1.253 in	8.000 ft
+0.60D	0.0000 in	0.000 ft	-0.895 in	8.000 ft
L Only	0.0000 in	0.000 ft	-0.622 in	8.000 ft
W Only	0.0000 in	0.000 ft	-0.589 in	7.946 ft

Steel Section Properties : HSS4x4x5/16

Depth	=	4.000 in	I xx	=	9.14 in^4	J	=	15.300 in^4
Design Thick	=	0.291 in	S xx	=	4.57 in^3			
Width	=	4.000 in	R xx	=	1.490 in			
Wall Thick	=	0.313 in	Zx	=	5.590 in^3			
Area	=	4.100 in^2	I yy	=	9.140 in^4	C	=	7.910 in^3
Weight	=	14.830 plf	S yy	=	4.570 in^3			
			R yy	=	1.490 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park.ec6

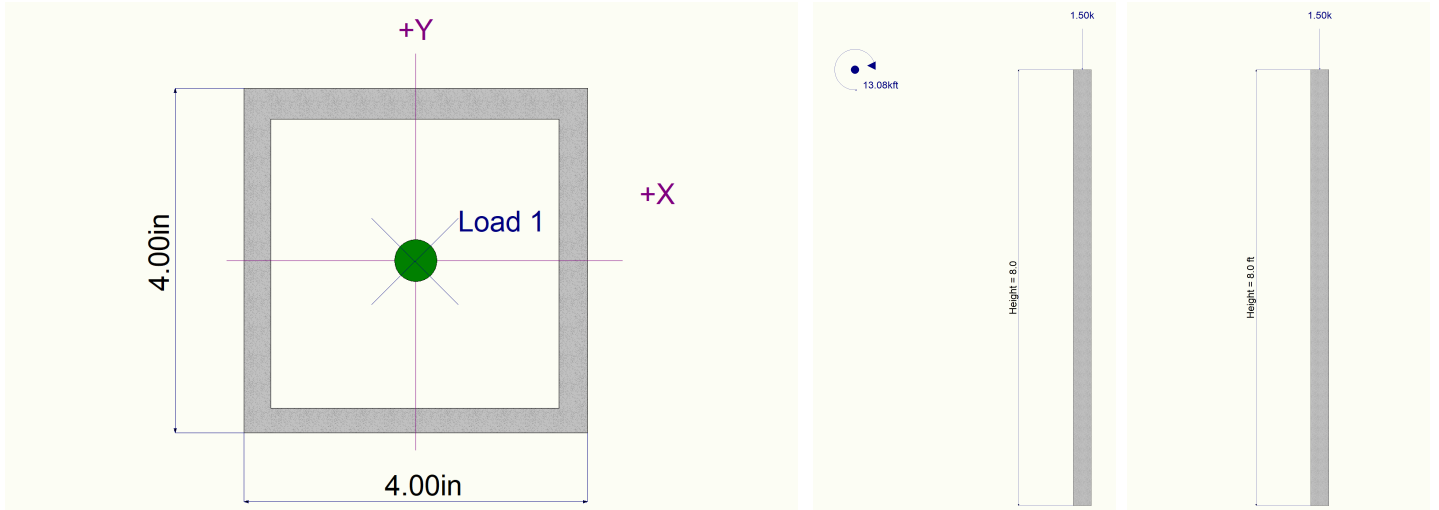
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 34. Main Entry Swinging Gate Post Check, (1/L-2.29)

Sketches



35. Main Entry Gate Pilaster (Landscape Detail 1/L-2.29)

Main Gate Pilaster (Landscape Detail (Landscape Detail 1/L-2.29))

A01 Gateway Identity Sign

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Pilaster 4 Walls: 4 walls \times 81 psf \times 4ft \times 11.5 ft = 14.9 kips + 600lbs (precast elements) = 15.5 kips
- Signboard. = 24#/ft \times (48.3' + 2 \times 6') = 1.45 kips

$W = 15.5 + 1.45 = 17$ kips

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 17 \text{ kips} = 18.4 \text{ kips}$

Feature	Seismic Weight (kips)	Height to Feature (ft)	Seismic Base Shear (kips)	OT Moment (k-ft)
Sign Structure	1.45	14'	1.6	22.4
Pedestal	15.5	5.25'	16.7	87.7
Total (per column)	17		18.4	110.1

Applied Moment, (seismic) = 110.1 k-ft, 55 k-ft per pedestal

Wind Load, (ASCE 7-22)

Total Wind Load = 30psf \times 48.3' \times 2' \times 0.5 + 30psf \times 10.3' \times 4' \times 2 = 3.921 kips

Applied Moment, (wind) = 1.5 kips \times 15' + 2.5 kips \times 5.3' = 35.75 k-ft, 18 k-ft per pedestal

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 35. Main Entry Gate Pilaster Footing

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	Yes
Use Pedestal wt for stability, mom & shear	:	Yes

Soil Design Values

Allowable Soil Bearing	=	4.665 ksf
Soil Density	=	125.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	1.50 ft
Allow press. increase per foot of depth when footing base is below	=	0.0 ksf

Increases based on footing plan dimension

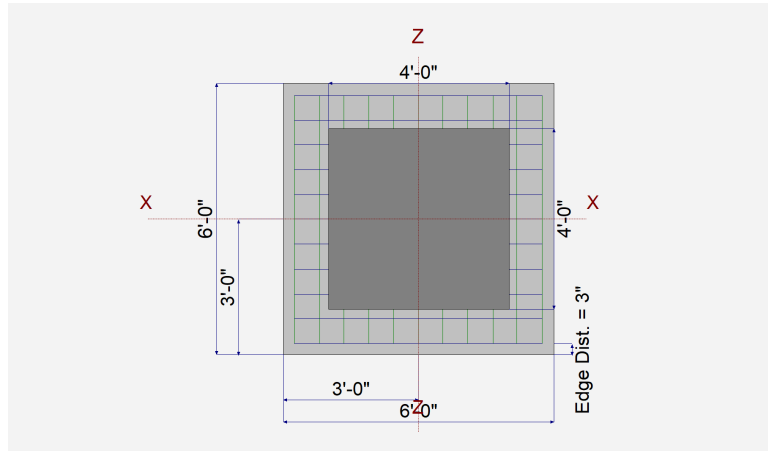
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.0 ksf
	=	0.0 ft

Dimensions

Width parallel to X-X Axis	=	6.0 ft
Length parallel to Z-Z Axis	=	6.0 ft
Footing Thickness	=	16.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	48.0 in
pz : parallel to Z-Z Axis	=	48.0 in
Height	=	2.50 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



Reinforcing

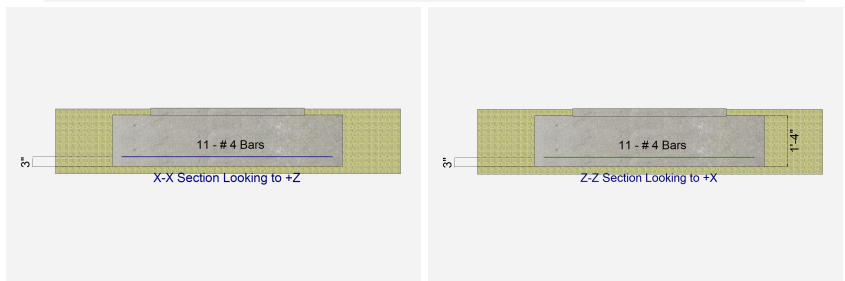
Bars parallel to X-X Axis	=	11
Number of Bars	=	# 4

Bars parallel to Z-Z Axis	=	11
Number of Bars	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	16.225						k
OB : Overburden	=							ksf
M-xx	=				18.0	55.0		k-ft
M-zz	=							k-ft
V-x	=							k
V-z	=				0.0	0.0		k

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 35. Main Entry Gate Pilaster Footing

DESIGN SUMMARY

Design N.G.

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9944	Soil Bearing	4.639 ksf	4.665 ksf	+0.60D+0.70E about X-X axis
FAIL	1.126	Overturning - X-X	38.50 k-ft	43.353 k-ft	+0.60D+0.70E
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.01515	Z Flexure (+X)	0.3183 k-ft/ft	21.005 k-ft/ft	+1.40D
PASS	0.01515	Z Flexure (-X)	0.3183 k-ft/ft	21.005 k-ft/ft	+1.40D
PASS	0.08950	X Flexure (+Z)	1.880 k-ft/ft	21.005 k-ft/ft	+0.90D+E
PASS	0.01515	X Flexure (-Z)	0.3183 k-ft/ft	21.005 k-ft/ft	+1.40D
PASS	n/a	1-way Shear (+X)	0.0 psi	50.454 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	50.454 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	50.454 psi	n/a
PASS	n/a	2-way Punching	3.733 psi	50.454 psi	+0.90D+E

Seismic load,
therefore FS
> 1.1, OK



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	4.665	n/a	0.0	0.6690	0.6690	n/a	n/a	0.143
X-X, +D+0.60W	4.665	n/a	5.381	0.3720	0.9660	n/a	n/a	0.207
X-X, +D+0.450W	4.665	n/a	4.036	0.4463	0.8918	n/a	n/a	0.191
X-X, +0.60D+0.60W	4.665	n/a	8.968	0.1044	0.6984	n/a	n/a	0.150
X-X, +D+0.70E	4.665	n/a	19.182	0.0	1.896	n/a	n/a	0.406
X-X, +D+0.5250E	4.665	n/a	14.387	0.0	1.478	n/a	n/a	0.317
X-X, +0.60D+0.70E	4.665	n/a	31.970	0.0	4.639	n/a	n/a	0.994
Z-Z, D Only	4.665	0.0	n/a	n/a	n/a	0.6690	0.6690	0.143
Z-Z, +D+0.60W	4.665	0.0	n/a	n/a	n/a	0.6690	0.6690	0.143
Z-Z, +D+0.450W	4.665	0.0	n/a	n/a	n/a	0.6690	0.6690	0.143
Z-Z, +0.60D+0.60W	4.665	0.0	n/a	n/a	n/a	0.4014	0.4014	0.086
Z-Z, +D+0.70E	4.665	0.0	n/a	n/a	n/a	0.6690	0.6690	0.143
Z-Z, +D+0.5250E	4.665	0.0	n/a	n/a	n/a	0.6690	0.6690	0.143
Z-Z, +0.60D+0.70E	4.665	0.0	n/a	n/a	n/a	0.4014	0.4014	0.086

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	10.80 k-ft	72.255 k-ft	6.690	OK
X-X, +D+0.450W	8.10 k-ft	72.255 k-ft	8.920	OK
X-X, +0.60D+0.60W	10.80 k-ft	43.353 k-ft	4.014	OK
X-X, +D+0.70E	38.50 k-ft	72.255 k-ft	1.877	OK
X-X, +D+0.5250E	28.875 k-ft	72.255 k-ft	2.502	OK
X-X, +0.60D+0.70E	38.50 k-ft	43.353 k-ft	1.126	No Good!
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.450W	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.5250E	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 35. Main Entry Gate Pilaster Footing

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.3183	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +1.40D	0.3183	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +1.20D	0.2728	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +1.20D	0.2728	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +1.20D+0.50W	0.3839	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +1.20D+0.50W	0.1618	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +1.20D+W	0.4949	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +1.20D+W	0.05070	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +0.90D+W	0.4267	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +0.90D+W	0.01750	-Z	Top	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +1.20D+E	1.186	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +1.20D+E	0.1284	-Z	Top	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +0.90D+E	1.880	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
X-X, +0.90D+E	0.09634	-Z	Top	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +1.40D	0.3183	-X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +1.40D	0.3183	+X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +1.20D	0.2728	-X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +1.20D	0.2728	+X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +1.20D+0.50W	0.2728	-X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +1.20D+0.50W	0.2728	+X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +1.20D+W	0.2728	-X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +1.20D+W	0.2728	+X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +0.90D+W	0.2046	-X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +0.90D+W	0.2046	+X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +1.20D+E	0.2728	-X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +1.20D+E	0.2728	+X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +0.90D+E	0.2046	-X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK
Z-Z, +0.90D+E	0.2046	+X	Bottom	0.3456	ACI 7.6.1.1	0.3667	21.005	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	50.45 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	2.13 psi	189.74psi	0.01121	OK
+1.20D	1.82 psi	189.74psi	0.009612	OK
+1.20D+0.50W	1.82 psi	189.74psi	0.009612	OK
+1.20D+W	1.82 psi	189.74psi	0.009612	OK
+0.90D+W	1.37 psi	189.74psi	0.007209	OK
+1.20D+E	2.67 psi	189.74psi	0.01407	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

General Footing

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 35. Main Entry Gate Pilaster Footing

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D+E	3.73 psi	189.74psi	0.01967	OK

Masonry Slender Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 35. Main Entry Gate Pilaster Wall

Code References

Calculations per TMS 402-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Calculations per TMS 402-16, IBC 2021

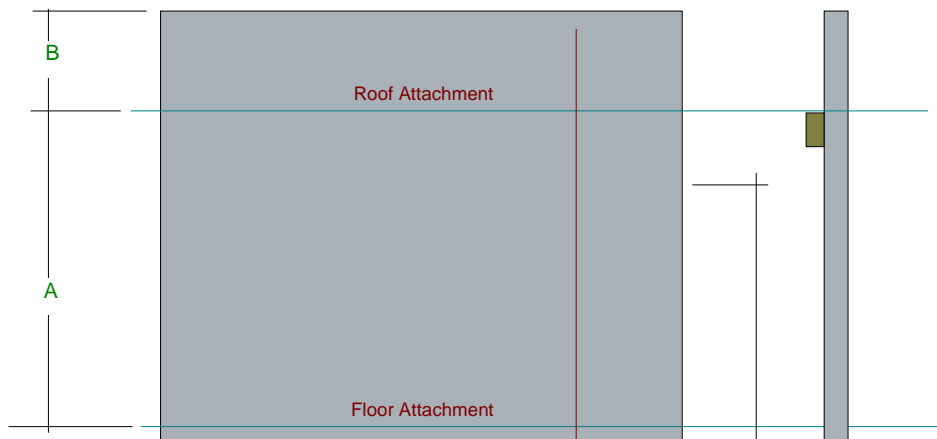
Construction Type : Grouted Hollow Concrete Masonry

F'm	=	1.50 ksi	Nom. Wall Thickness	8 in	Temp Diff across thickness	=	deg F
Fy - Yield	=	60.0 ksi	Actual Thickness	7.625 in	Min Allow Out-of-plane Defl Ra	=	0.0
Fr - Rupture	=	61.0 psi	Rebar "d" distance	3.8125 in	Minimum Vertical Steel %	=	0.0020
Em = f'm *	=	900.0	Lower Level Rebar . . .				
Max % of ρ bal.	=	0.007131	Bar Size	# 4			
Grout Density	=	140 pcf	Bar Spacing	16 in			
Block Weight		Medium Weight					
Wall Weight	=	81.0 psf					
Wall is Solid Grouted							

One-Story Wall Dimensions

A Clear Height	=	8.0 ft
B Parapet height	=	ft

Wall Support Condition Top Free, Bottom Fix



Vertical Loads

Vertical Concentrated Loads . . . (Applied to full "Strip Width")

Beam Load #1	Eccentricity	in	DL : Dead	Lr : Roof Live	Lf : Floor Live	S : Snow	W : Wind
	Dist. from Base	8.0 ft	0.250				k

Lateral Loads

Wind Loads :

Full area WIND load 30.0 psf

Seismic Loads :

Wall Weight Seismic Load Input Method : ASCE seismic factors entered

SDS Value per ASCE 12.11.1 $S_{DS} * I = 1.349$

$F_p = \text{Wall Wt.} * 0.5396 = 43.708 \text{ psf}$

Masonry Slender Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 35. Main Entry Gate Pilaster Wall

DESIGN SUMMARY

Results reported for "Strip Width" of 12.0 in

Governing Load Combination . . .		Actual Values . . .		Allowable Values . . .	
PASS	Moment Capacity Check	Maximum Bending Stress Ratio0.6014			
	+0.90D+E	Max Mu	-1.415 k-ft	Phi * Mn	2.353 k-ft
PASS	Service Deflection Check	Actual Defl. Ratio L/	416	Allowable Defl. Ratio	150.0
	E Only	Max. Deflection	0.4613 in	/2 for Cantilever	
PASS	Axial Load Check	Max Pu / Ag	11.768 psi	Max. Allow. Defl.	1.280 in
	+1.20D+E	Location	0.1333 ft	0.2 * f'm	300.0 psi
	Reinforcing Limit Check				
		Actual As/bd	0.003279	Max Allow As/bd	0.007131
		Maximum Reactions for Load Combination...			
		Top Horizontal			0.0 k
		Base Horizontal	E Only		0.3497 k
		Vertical Reaction	+D+0.450W		0.8980 k

Design Maximum Combinations - Moments

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load		Mcr k-ft	Mu k-ft	Moment Values			As in ²	As Ratio	0.6 * rho bal	Bar 'd'
	Pu k	0.2*f'm*b*t k			Phi	Phi Mn k-ft					
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000	0.0000	0.00
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000	0.0000	0.00
+1.20D+0.50W at 0.00 to 0.27	1.078	27.468	0.59	0.48	0.90	2.42	0.150	0.0033	0.0067	0.0067	0.00
+1.20D+W at 0.00 to 0.27	1.078	27.468	0.59	0.97	0.90	2.42	0.150	0.0033	0.0067	0.0067	0.00
+0.90D+W at 0.00 to 0.27	0.808	27.468	0.59	0.97	0.90	2.35	0.150	0.0033	0.0068	0.0068	0.00
+1.20D+E at 0.00 to 0.27	1.077	27.468	0.59	1.42	0.90	2.42	0.150	0.0033	0.0067	0.0067	0.00
+0.90D+E at 0.00 to 0.27	0.808	27.468	0.59	1.41	0.90	2.35	0.150	0.0033	0.0068	0.0068	0.00

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Moment Values		I gross in ⁴	Stiffness		Deflections	
		Mcr k-ft	Mactual k-ft		I cracked in ⁴	I effective in ⁴	Deflection in	Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+D+0.60W at 7.73 to 8.00	0.022	0.59	0.00	443.30	28.95	443.300	0.026	7,361.3
+D+0.450W at 7.73 to 8.00	0.022	0.59	0.00	443.30	28.95	443.300	0.020	9,815.1
+0.60D+0.60W at 7.73 to 8.00	0.013	0.59	0.00	443.30	28.93	443.300	0.026	7,369.0
+D+0.70E at 7.73 to 8.00	0.022	0.59	0.00	443.30	28.96	443.300	0.179	1,070.4
+D+0.5250E at 7.73 to 8.00	0.022	0.59	0.00	443.30	28.95	443.300	0.061	3,168.7
+0.60D+0.70E at 7.73 to 8.00	0.013	0.59	0.00	443.30	28.93	443.300	0.181	1,059.5
W Only at 7.73 to 8.00	0.000	0.59	0.00	443.30	28.90	443.300	0.173	1,111.8
E Only at 7.73 to 8.00	0.002	0.59	0.00	443.30	28.91	443.300	0.461	416.2

Reactions - Vertical & Horizontal

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
D Only	0.0 k	0.00 k	0.898 k
+D+0.60W	0.1 k	0.00 k	0.898 k
+D+0.450W	0.1 k	0.00 k	0.898 k
+0.60D+0.60W	0.1 k	0.00 k	0.539 k
+D+0.70E	0.2 k	0.00 k	0.898 k
+D+0.5250E	0.2 k	0.00 k	0.898 k
+0.60D+0.70E	0.2 k	0.00 k	0.539 k
W Only	0.2 k	0.00 k	0.000 k



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Masonry Slender Wall

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 35. Main Entry Gate Pilaster Wall

E Only

0.3 k

0.00 k

0.000 k

36. Stage Canopy (Landscape Detail 2/L-2.34)

Shade Structures, **LOADING PROVIDED BY Birdair**, Landscape Drawings L-2.32-L-2.34

Preliminary column sizes at grade:

1. Family Canopy = 24" x 24" column with baseplates likely to be 32" x 32" x 2" with qty (16) 2" anchors
2. Large Baseball = 14" x 14" column with baseplates likely to be 22" x 22" x 1.5" with qty (8) 2" anchors
3. Small Baseball = 10" x 10" column with baseplates likely to be 16" x 16" x 1.5" with qty (8) 1.5" anchors
4. Soccer Canopy = 14" x 14" column with baseplates likely to be 22" x 22" x 1.5" with qty (8) 2" anchors
5. Stage Canopy = 24" x 24" column with baseplates likely to be 32" x 32" x 2" with qty (16) 2" anchors

The column sizes are based on preliminary engineering and have a slim chance of being modified after award and final engineering.

Load cad Descriptions:

- 1) Prestress + Dead load
- 2) Uniform Live Load = 30 psf
- 3) Uniform Wind Uplift Case = 12psf uplift
- 4) Wind X Case A – 12psf x Cp
- 5) Wind X Case B – 12psf x Cp
- 6) Wind Y Case A – 12psf x Cp
- 7) Wind Y Case B – 12psf x Cp
- 8) Wind XY Case A – 12psf x Cp
- 9) Wind XY Case B – 12psf x Cp

- Seismic loading: the structure is lightweight, therefore seismic will not be a governing load case and has not been evaluated.
- Sign convention: positive forces are defined to be in the direction of the x-y axis shown on the reaction node map with z acting up and out of the page. A positive "z" force means the foundation is seeing uplift.
- The effects of membrane prestress and dead load are included in all load cases.
- The forces tabulated are unfactored working loads.
- The loads tabulated represent forces that are applied to the building or foundation at that location.

Stage Canopy - **LOADING PROVIDED BY Birdair**

Node	Load Case	Reaction Forces, lbs			Resultant lbs	Reaction Moments, ft-lbs		
		Vx	Vy	P		Mx	My	T
1	1	-12,613.00	0.01	-25,830.00	28,745.03	-139,700.00	-47,620.00	-528.20
	2	-28,160.00	0.00	-45,721.00	53,697.26	-272,000.00	-99,490.00	-4,984.00
	3	7,594.80	-1,164.70	-2,651.30	8,128.15	30,870.00	37,710.00	-1,911.00
	4	-6,690.30	-306.62	-18,873.00	20,026.09	-88,900.00	-23,620.00	-831.40
	5	11,764.00	-1,446.50	1,980.50	12,016.92	65,430.00	56,200.00	-2,198.00
	6	-23,279.00	3,540.80	-39,775.00	46,222.29	-455,000.00	-83,110.00	-3,251.00
	7	-6,251.00	2,957.80	-18,866.00	20,093.52	-306,000.00	-21,150.00	921.20
	8	-11,657.00	-2,277.60	-27,950.00	30,368.99	-1,054.00	-35,890.00	-708.10
	9	6,452.20	-3,446.10	-7,095.50	10,190.81	153,600.00	40,110.00	-1,544.00
2	1	12,613.00	-0.01	-25,830.00	28,745.03	-139,700.00	47,620.00	528.60
	2	28,160.00	0.00	-45,721.00	53,697.26	-272,000.00	99,490.00	4,985.00
	3	-7,594.80	-1,164.70	-2,651.30	8,128.15	30,870.00	-37,710.00	1,911.00
	4	6,690.30	-306.61	-18,873.00	20,026.09	-88,920.00	23,610.00	831.20
	5	-11,764.00	-1,446.50	1,980.30	12,016.89	65,420.00	-56,200.00	2,198.00
	6	23,279.00	3,540.80	-39,775.00	46,222.29	-455,100.00	83,110.00	3,250.00
	7	6,251.00	2,957.80	-18,866.00	20,093.52	-306,000.00	21,140.00	-921.40
	8	11,530.00	-1,013.70	-21,440.00	24,364.77	-45,010.00	48,320.00	3,366.00
	9	-6,332.00	-2,169.00	-609.46	6,720.88	109,500.00	-25,470.00	5,031.00
		28,160	3,541	45,721	53,697	455,100	99,490	5,031

Node 1 & 2			
P	V	Mx	My
45,721	28,160	272,000	99,490
39,775	23,279	455,100	83,110
45,721	28,160	272,000	99,490



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: Stage Shade Canopy Foundation
Location:
Design name: Ontario Sports Park - Stage Shade Canopy

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19
Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place
Material: F1554 Grade 36
Diameter (inch): 2.000
Effective Embedment depth, h_{ef} (inch): 8.000
Anchor category: -
Anchor ductility: Yes
 h_{min} (inch): 10.75
 C_{min} (inch): 2.30
 S_{min} (inch): 8.00

Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Uncracked
Compressive strength, f'_c (psi): 4500
 $\Psi_{c,v}$: 1.4
Reinforcement condition: A tension, A shear
Supplemental edge reinforcement: Yes
Reinforcement provided at corners: Yes
Ignore concrete breakout in tension: Yes
Ignore concrete breakout in shear: Yes
Ignore 6d_o requirement: Yes
Build-up grout pad: Yes

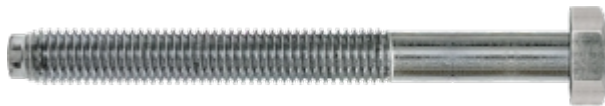
Base Plate

Diameter x Thickness (inch): 40.00 x 2.50
Yield stress: 36000 psi

Profile type/size: 20X12X5/8

Recommended Anchor

Anchor Name: Heavy Hex Bolt - 2"Ø Heavy Hex Bolt, F1554 Gr. 36





Anchor Designer™ for Concrete Software

Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

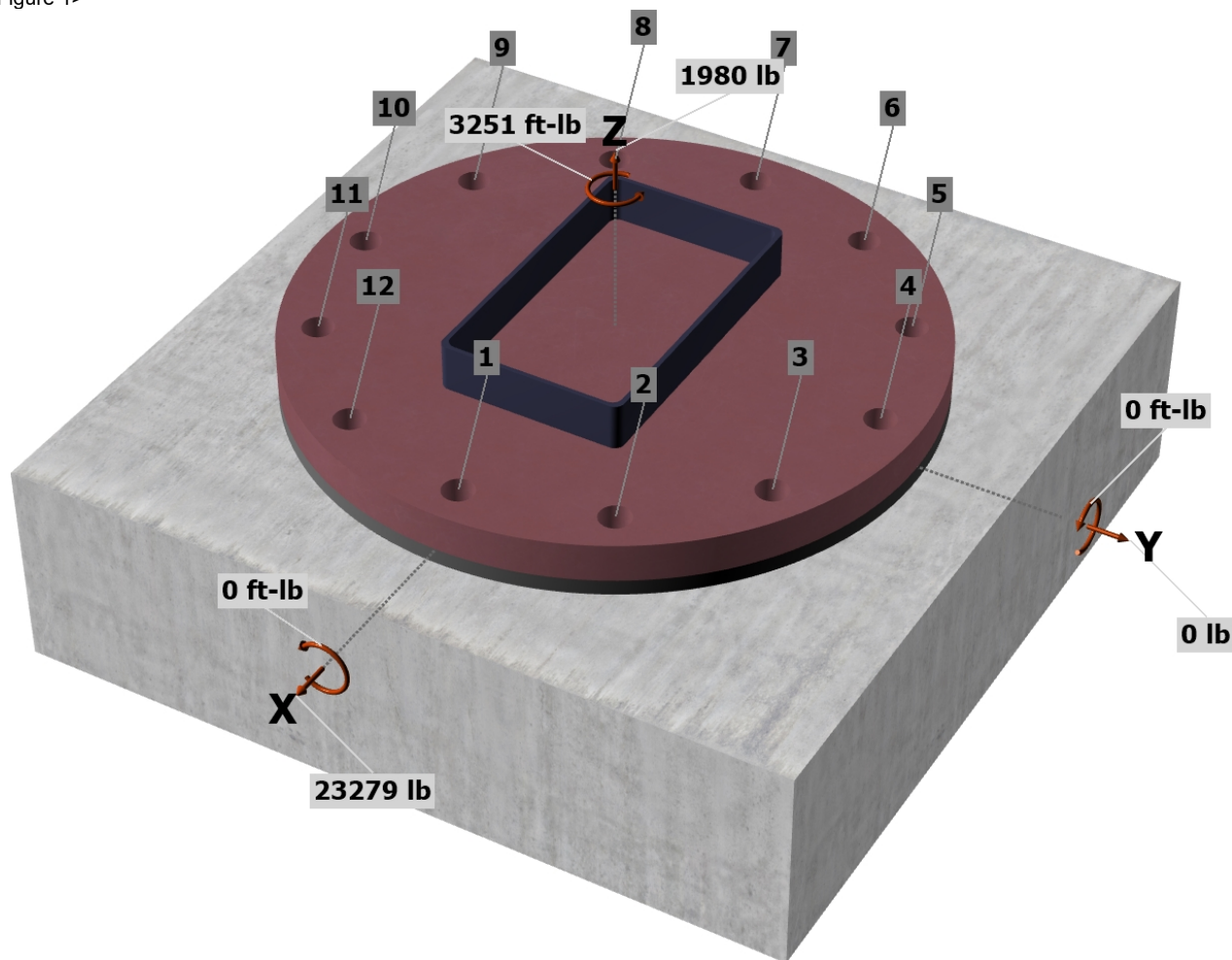
Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 1980
 V_{uax} [lb]: 23279
 V_{uay} [lb]: 0
 M_{ux} [ft-lb]: 0
 M_{uy} [ft-lb]: 0
 M_{uz} [ft-lb]: 3251

<Figure 1>



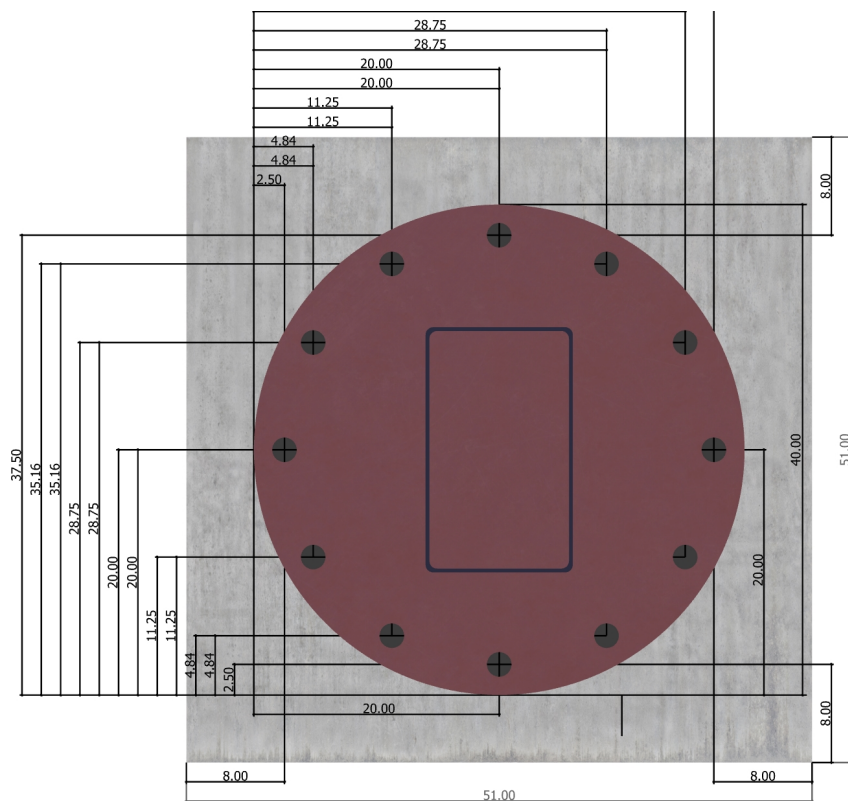
Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	165.0	1939.9	185.7	1948.8
2	165.0	1847.1	160.9	1854.1
3	165.0	1779.0	92.9	1781.5
4	165.0	1754.2	0.0	1754.2
5	165.0	1779.0	-92.9	1781.5
6	165.0	1847.1	-160.9	1854.1
7	165.0	1939.9	-185.7	1948.8
8	165.0	2032.8	-160.9	2039.1
9	165.0	2100.8	-92.9	2102.8
10	165.0	2125.6	0.0	2125.6
11	165.0	2100.8	92.9	2102.8
12	165.0	2032.8	160.9	2039.1
Sum	1980.0	23279.0	0.0	23332.4

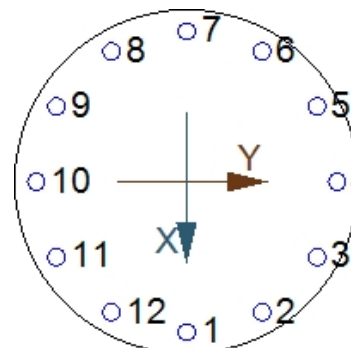


Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1980
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.84
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
145000	0.75	108750

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \psi_{c,p} N_p = \phi \psi_{c,p} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\psi_{c,p}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	5.32	4500	0.70	187548



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
87000	0.8	0.65	45240

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cp} = \phi K_{cp} N_{cb} = \phi K_{cp} (A_{Nc} / A_{Nco}) \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1a)

K_{cp}	A_{Nc} (in ²)	A_{Nco} (in ²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	166.58	576.00	0.900	1.250	1.000	36429	0.70	16594

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.8)

Tension	Factored Load, N _{ua} (lb)	Design Strength, ϕN _n (lb)	Ratio	Status	
Steel	165	108750	0.00	Pass (Governs)	
Pullout	165	187548	0.00	Pass	
Shear	Factored Load, V _{ua} (lb)	Design Strength, ϕV _n (lb)	Ratio	Status	
Steel	2126	45240	0.05	Pass	
Pryout	2126	16594	0.13	Pass (Governs)	
Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Utilization Ratio	Permissible	Status
Sec. R17.8	0.00	0.03	3.3%	1.0	Pass

2"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel

36000 psi

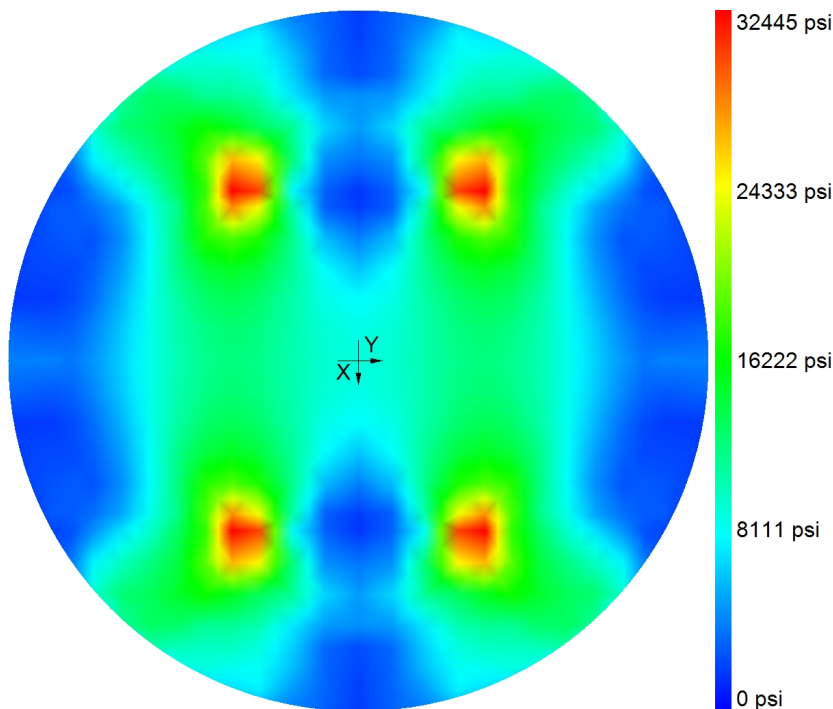
Maximum stress

32445 psi

Calculated plate thickness

0.205 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{ top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{ top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{ top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

12. Warnings

- For irregular anchor patterns, the designer must consider sizing of base plate holes to ensure shear loads are distributed to anchors as designed.
- Minimum spacing and edge distance requirement of 6da per ACI 318 Table 17.9.2(a) for torqued cast-in-place anchor is waived per designer option.\n
- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	8
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	36162	17640	0	0	195580	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	104150	60240	0	0	602840	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	76717	43320	0	0	439640	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	50884	26770	0	0	395140	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	116492	66620	0	0	894640	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	76717	43320	0	0	439640	0	-	-	-
U = 0.9D + 1.0W	63022	34640	0	0	580730	0	-	-	-

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: Stage Shade Canopy Foundation
Location:
Design name: Ontario Sports Park - Stage Shade Canopy

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19
Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place
Material: F1554 Grade 36
Diameter (inch): 2.000
Effective Embedment depth, h_{ef} (inch): 8.000
Anchor category: -
Anchor ductility: Yes
 h_{min} (inch): 10.75
 C_{min} (inch): 2.30
 S_{min} (inch): 8.00

Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Uncracked
Compressive strength, f'_c (psi): 4500
Reinforcement condition: A tension, A shear
Supplemental edge reinforcement: No
Reinforcement provided at corners: Yes
Ignore concrete breakout in tension: Yes
Ignore concrete breakout in shear: Yes
Ignore ϕ requirement: Yes
Build-up grout pad: Yes

Base Plate

Diameter x Thickness (inch): 40.00 x 2.50
Yield stress: 36000 psi

Profile type/size: 20X12X5/8

Recommended Anchor

Anchor Name: Heavy Hex Bolt - 2"Ø Heavy Hex Bolt, F1554 Gr. 36





Anchor Designer™ for Concrete Software

Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: -39775

V_{uax} [lb]: 0

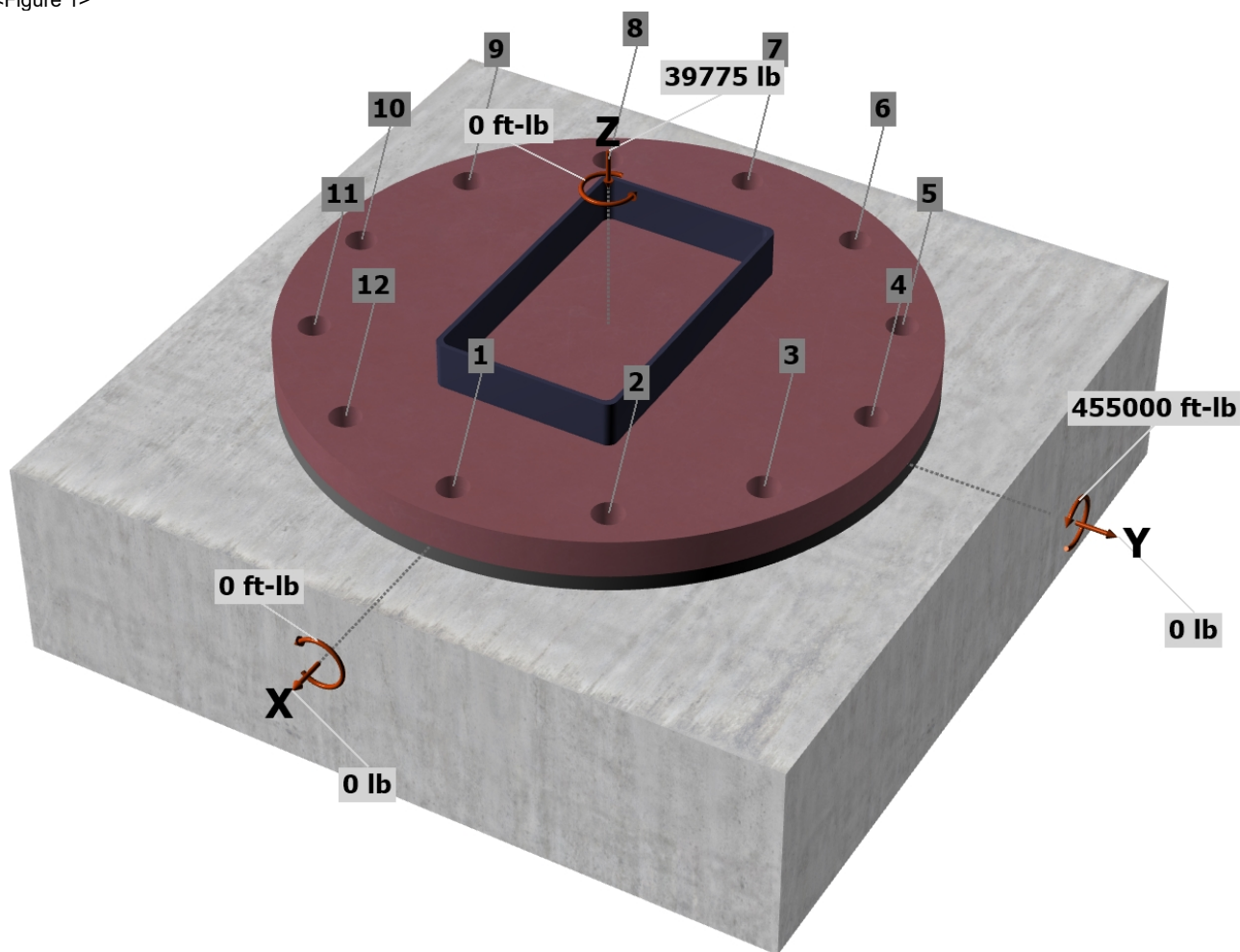
V_{uay} [lb]: 0

M_{ux} [ft-lb]: 0

M_{uy} [ft-lb]: 455000

M_{uz} [ft-lb]: 0

<Figure 1>



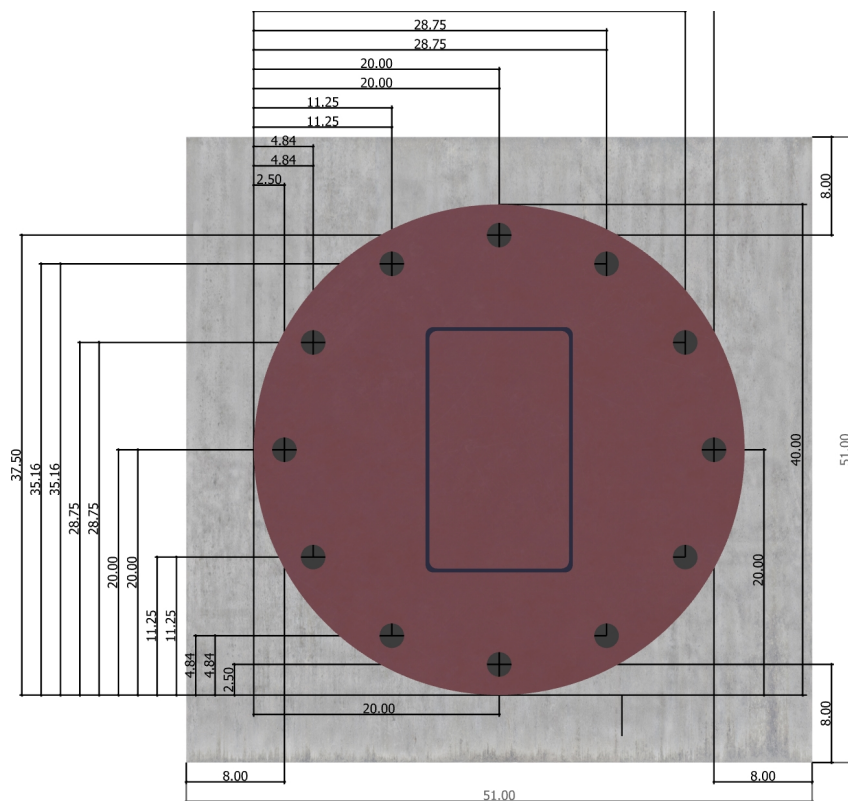
Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0
4	10049.6	0.0	0.0	0.0
5	25599.9	0.0	0.0	0.0
6	36991.7	0.0	0.0	0.0
7	41150.3	0.0	0.0	0.0
8	36991.7	0.0	0.0	0.0
9	25599.9	0.0	0.0	0.0
10	10049.6	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0
Sum	186432.6	0.0	0.0	0.0

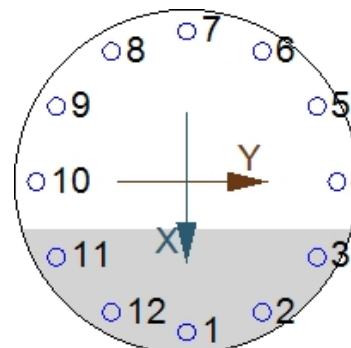


Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Maximum concrete compression strain (‰): 0.31
Maximum concrete compression stress (psi): 1345
Resultant tension force (lb): 186433
Resultant compression force (lb): 226208
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 2.95

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
145000	0.75	108750

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \psi_{c,p} N_p = \phi \psi_{c,p} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\psi_{c,p}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	5.32	4500	0.70	187548



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	41150	108750	0.38	Pass (Governs)
Pullout	41150	187548	0.22	Pass

2"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel

36000 psi

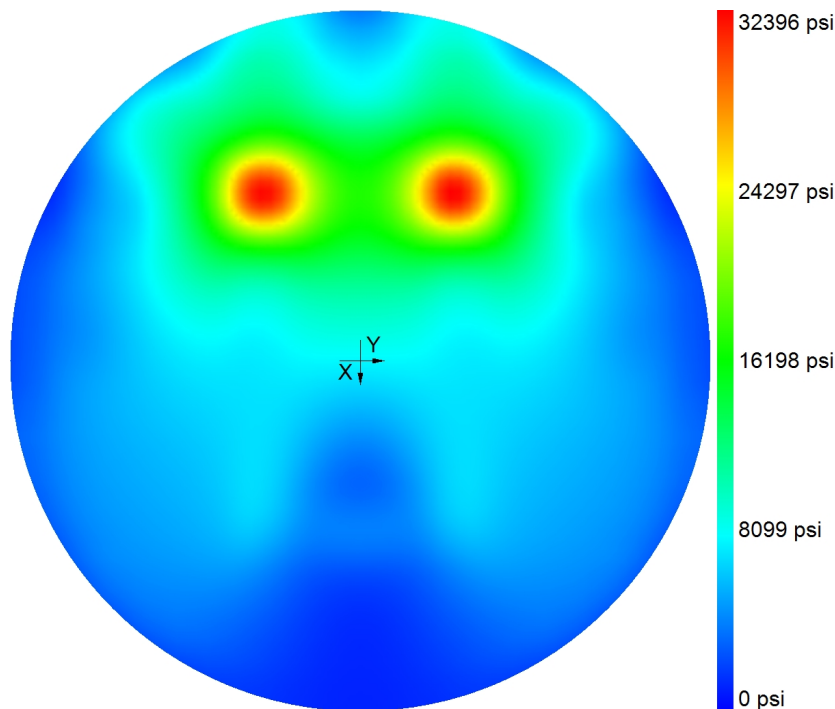
Maximum stress

32396 psi

Calculated plate thickness

2.608 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{ top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{ top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{ top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Table 17.9.2(a) for torqued cast-in-place anchor is waived per designer option.\n
- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	8
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	36162	17640	0	0	195580	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	104150	60240	0	0	602840	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	76717	43320	0	0	439640	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	50884	26770	0	0	395140	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	116492	66620	0	0	894640	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	76717	43320	0	0	439640	0	-	-	-
U = 0.9D + 1.0W	63022	34640	0	0	580730	0	-	-	-

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 36. Stage Shade Structure Post Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 48.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination $D+0.750L_r+0.450W$
Lateral Load 54.775 k
Moment 547.75 k-ft

NO Ground Surface Restraint

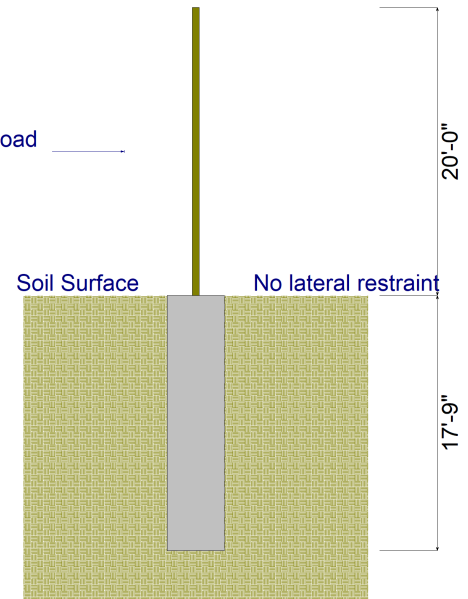
Pressures at 1/3 Depth

Actual 2,937.50 psf
Allowable 2,941.07 psf

Minimum Required Depth 17.750 ft

Footing Base Area 12.566 ft²
Maximum Soil Pressure 5.690 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	13.90 k		k/ft	25.80 k
Lr : Roof Live	27.20 k		k/ft	45.70 k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	45.50 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	10.0 ft	TOP of Load above ground surface	20.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	13.900	139.000	10.13	1,677.5	1,681.0	1.000
+D+Lr	41.100	411.000	15.75	2,606.1	2,608.5	1.000
+D+0.750Lr	34.300	343.000	14.63	2,419.7	2,419.7	1.000
+D+0.60W	41.200	412.000	15.75	2,608.5	2,611.3	1.000
+D+0.750Lr+0.450W	54.775	547.750	17.75	2,937.5	2,941.1	1.000
+D+0.450W	34.375	343.750	14.63	2,419.7	2,423.4	1.000
+0.60D+0.60W	35.640	356.400	14.88	2,456.0	2,459.8	1.000
+0.60D	8.340	83.400	8.38	1,372.4	1,375.2	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 36. Stage Shade Structure CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

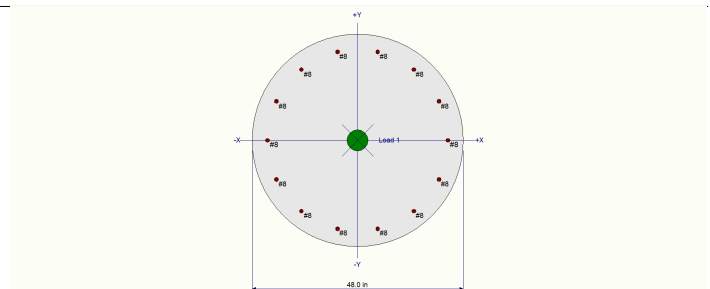
f'_c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	18.750 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 48.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 14 - #8 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 35,342.9 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 18.750 ft above base, D = 25.80, LR = 45.70 k

BENDING LOADS . . .

Moment X: Moment acting about Y-Y axis at 18.750 ft, D = 139.70, LR = 272.0, W = 455.0 k-ft

Moment Y: Moment acting about Y-Y axis at 18.750 ft, D = 47.620, LR = 99.50, W = 83.10 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+1.60Lr+0.50W		Maximum SERVICE Load Reactions .			
Location of max.above base	18.624 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.887 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	146.492 k	ϕ * Pn =	169.681 k			
Mu-x =	24.904 k-ft	ϕ * Mn-x =	22.113 k-ft			
Mu-y =	-1,088.23 k-ft	ϕ * Mn-y =	1,244.92 k-ft			
Mu Angle =	89.0 deg	ϕ =	0.90			
Mu at Angle =	1,088.52 k-ft	ϕMn at Angle =	1,226.63 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .			General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacity	6,778.49 k		ρ : % Reinforcing		0.6112 %	Rebar % Ok
Pnmin : Nominal Min. Tension Axial Capacity	k		Reinforcing Area		11.060 in^2	
ϕ Pn, max : Usable Compressive Axial Capacity	3,524.82 k		Concrete Area		1,809.56 in^2	
ϕ Pn, min : Usable Tension Axial Capacity	k					
			β =		0.850	θ = 0.80

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 36. Stage Shade Structure CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio
+1.40D	M2,min	Actual	18.62	85.60	572.92	1.000	14.55	1.000	-262.25	87.000	262.65	1,734.27		0.151
+1.20D+0.50Lr	M2,min	Actual	18.62	96.22	330.52	1.000	16.36	1.000	-410.53	88.000	410.86	1,440.90		0.285
+1.20D	M2,min	Actual	18.62	73.37	572.92	1.000	12.47	1.000	-224.78	87.000	225.13	1,734.27		0.130
+1.20D+1.60Lr	M2,min	Actual	18.62	146.49	223.33	1.000	24.90	1.000	-819.18	88.000	819.56	1,299.43		0.631
+1.20D+1.60Lr+0.50W	M2,min	Actual	18.62	146.49	169.68	1.000	24.90	1.000	-1,088.23	89.000	1,088.52	1,226.63		0.887
+1.20D+0.50W	M2,min	Actual	18.62	73.37	196.70	1.000	12.47	1.000	-493.83	89.000	493.99	1,263.36		0.391
+1.20D+0.50Lr+W	M2,min	Actual	18.62	96.22	115.72	1.000	16.36	1.000	-948.63	89.000	948.78	1,152.50		0.823
+1.20D+W	M2,min	Actual	18.62	73.37	115.72	1.000	12.47	1.000	-762.88	89.000	762.99	1,152.50		0.662
+0.90D+W	M2,min	Actual	18.62	55.03	88.73	1.000	9.35	1.000	-706.69	89.000	706.75	1,115.05		0.634
+0.90D	M2,min	Actual	18.62	55.03	572.92	1.000	9.35	1.000	-168.59	87.000	168.85	1,734.27		0.097

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	
D Only						61.143			-187.320
+D+Lr						106.843			-558.820
+D+0.750Lr						95.418			-465.945
+D+0.60W						61.143			-510.180
+D+0.750Lr+0.450W						95.418			-708.090
+D+0.450W						61.143			-429.465
+0.60D+0.60W						36.686			-435.252
+0.60D						36.686			-112.392
Lr Only						45.700			-371.500
W Only									-538.100

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top
D Only			k-ft	-187.320	k-ft
+D+Lr			k-ft	-558.820	k-ft
+D+0.750Lr			k-ft	-465.945	k-ft
+D+0.60W			k-ft	-510.180	k-ft
+D+0.750Lr+0.450W			k-ft	-708.090	k-ft
+D+0.450W			k-ft	-429.465	k-ft
+0.60D+0.60W			k-ft	-435.252	k-ft
+0.60D			k-ft	-112.392	k-ft
Lr Only			k-ft	-371.500	k-ft
W Only			k-ft	-538.100	k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Max. Y-Y Deflection	
	Distance		Distance	
D Only	-0.0695 in	18.750 ft	0.000 in	0.000 ft
+D+Lr	-0.2073 in	18.750 ft	0.000 in	0.000 ft
+D+0.750Lr	-0.1728 in	18.750 ft	0.000 in	0.000 ft
+D+0.60W	-0.1892 in	18.750 ft	0.000 in	0.000 ft
+D+0.750Lr+0.450W	-0.2626 in	18.750 ft	0.000 in	0.000 ft
+D+0.450W	-0.1593 in	18.750 ft	0.000 in	0.000 ft
+0.60D+0.60W	-0.1614 in	18.750 ft	0.000 in	0.000 ft
+0.60D	-0.0417 in	18.750 ft	0.000 in	0.000 ft
Lr Only	-0.1378 in	18.750 ft	0.000 in	0.000 ft
W Only	-0.1969 in	18.624 ft	0.000 in	0.000 ft

37. Soccer Canopy (Landscape Detail 3/L-2.32)

Shade Structures, **LOADING PROVIDED BY Birdair**, Landscape Drawings L-2.32-L-2.34

Preliminary column sizes at grade:

1. Family Canopy = 24" x 24" column with baseplates likely to be 32" x 32" x 2" with qty (16) 2" anchors
2. Large Baseball = 14" x 14" column with baseplates likely to be 22" x 22" x 1.5" with qty (8) 2" anchors
3. Small Baseball = 10" x 10" column with baseplates likely to be 16" x 16" x 1.5" with qty (8) 1.5" anchors
4. Soccer Canopy = 14" x 14" column with baseplates likely to be 22" x 22" x 1.5" with qty (8) 2" anchors
5. Stage Canopy = 24" x 24" column with baseplates likely to be 32" x 32" x 2" with qty (16) 2" anchors

The column sizes are based on preliminary engineering and have a slim chance of being modified after award and final engineering.

Load cad Descriptions:

- 1) Prestress + Dead load
- 2) Uniform Live Load = 30 psf
- 3) Uniform Wind Uplift Case = 12psf uplift
- 4) Wind X Case A – 12psf x C_p
- 5) Wind X Case B – 12psf x C_p
- 6) Wind Y Case A – 12psf x C_p
- 7) Wind Y Case B – 12psf x C_p
- 8) Wind XY Case A – 12psf x C_p
- 9) Wind XY Case B – 12psf x C_p

- Seismic loading: the structure is lightweight, therefore seismic will not be a governing load case and has not been evaluated.
- Sign convention: positive forces are defined to be in the direction of the x-y axis shown on the reaction node map with z acting up and out of the page. A positive "z" force means the foundation is seeing uplift.
- The effects of membrane prestress and dead load are included in all load cases.
- The forces tabulated are unfactored working loads.
- The loads tabulated represent forces that are applied to the building or foundation at that location.

Soccer Canopy - **LOADING PROVIDED BY Birdair**

Node	Load Case	Reaction Forces, lbs			Resultant lbs	Reaction Moments, ft-lbs		
		Vx	Vy	P		Mx	My	T
1	1	-1,452.20	14.33	-8,371.20	8,496.24	-33,340.00	-4,658.00	-68.94
	2	-4,502.60	232.88	-15,990.00	16,613.48	-83,650.00	-13,960.00	-751.40
	3	2,177.00	-807.55	-737.18	2,436.17	23,900.00	8,340.00	-556.20
	4	-369.14	-211.65	-6,079.60	6,094.47	-16,320.00	-816.00	-212.50
	5	2,904.60	-995.44	786.63	3,169.60	35,520.00	10,980.00	-651.70
	6	-3,392.40	1,278.10	-13,590.00	14,065.21	-115,400.00	-10,420.00	154.50
	7	138.67	1,164.50	-5,613.80	5,734.98	-86,470.00	1,031.00	-926.60
	8	-1,061.20	-584.32	-8,491.30	8,577.28	-2,698.00	-2,477.00	-646.70
	9	2,195.80	-1,327.00	-1,647.40	3,049.00	48,780.00	9,718.00	149.70
2	1	0.00	-28.69	-10,191.00	10,191.04	-32,480.00	0.01	0.00
	2	0.00	-465.79	-23,451.00	23,455.63	-85,730.00	-0.01	0.01
	3	0.00	-562.79	2,978.70	3,031.40	30,300.00	0.00	0.00
	4	0.01	-154.39	-6,234.60	6,236.51	-13,870.00	0.01	-0.03
	5	0.01	-709.29	5,608.80	5,653.47	43,120.00	0.03	-0.04
	6	0.01	644.18	-19,114.00	19,124.85	-123,200.00	0.02	-0.03
	7	0.01	988.43	-5,214.40	5,307.26	-94,210.00	0.02	-0.03
	8	-123.33	-384.67	-9,064.50	9,073.50	-1,770.00	188.80	-589.30
	9	-142.57	-953.42	2,783.00	2,945.24	55,340.00	742.00	1,024.00
3	1	1,452.20	14.33	-8,371.20	8,496.24	-33,340.00	4,658.00	68.94
	2	4,502.50	232.87	-15,990.00	16,613.45	-83,650.00	13,960.00	751.40
	3	-2,177.00	-807.55	-737.19	2,436.17	23,900.00	-8,340.00	556.20
	4	369.13	-211.65	-6,079.50	6,094.37	-16,320.00	815.30	212.40
	5	-2,904.60	-995.44	786.62	3,169.60	35,520.00	-10,980.00	651.70
	6	3,392.40	1,278.10	-13,590.00	14,065.21	-115,400.00	10,420.00	-154.50
	7	-138.68	1,164.50	-5,613.80	5,734.98	-86,470.00	-1,032.00	926.60
	8	1,129.60	-376.68	-6,848.50	6,951.25	-9,406.00	3,947.00	557.80
	9	-1,995.80	-1,178.80	21.77	2,318.03	42,630.00	-6,578.00	916.40
Max Values:		4,502.6	1,327.0	23,451.0	23,455.6	123,200.0	13,960.0	1,024.0

Node 1				Node 2			
P	V	Mx	My	P	V	Mx	My
15,990	4,503	83,650	13,960	23,451	0	85,730	0
13,590	3,392	115,400	10,420	19,114	0	123,200	0
15,990	4,503	83,650	13,960	2,783	143	55,340	742

Node 3			
P	V	Mx	My
15,990	4,503	83,650	13,960
13,590	3,392	115,400	10,420
15,990	4,503	83,650	13,960



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: Soccer Shade Canopy Foundation
Location:
Design name: Ontario Sports Park - Soccer Shade Canopy

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19
Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place
Material: F1554 Grade 36
Diameter (inch): 1.000
Effective Embedment depth, h_{ef} (inch): 8.000
Anchor category: -
Anchor ductility: Yes
 h_{min} (inch): 9.75
 C_{min} (inch): 1.44
 S_{min} (inch): 4.00

Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Uncracked
Compressive strength, f'_c (psi): 4000
 $\Psi_{c,v}$: 1.4
Reinforcement condition: A tension, A shear
Supplemental edge reinforcement: Yes
Reinforcement provided at corners: Yes
Ignore concrete breakout in tension: Yes
Ignore concrete breakout in shear: Yes
Ignore 6d requirement: Yes
Build-up grout pad: Yes

Base Plate

Diameter x Thickness (inch): 26.00 x 1.50
Yield stress: 36000 psi

Profile type/size: 14X14X1/2

Recommended Anchor

Anchor Name: Heavy Hex Bolt - 1"Ø Heavy Hex Bolt, F1554 Gr. 36



Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 5608

V_{uax} [lb]: 4502

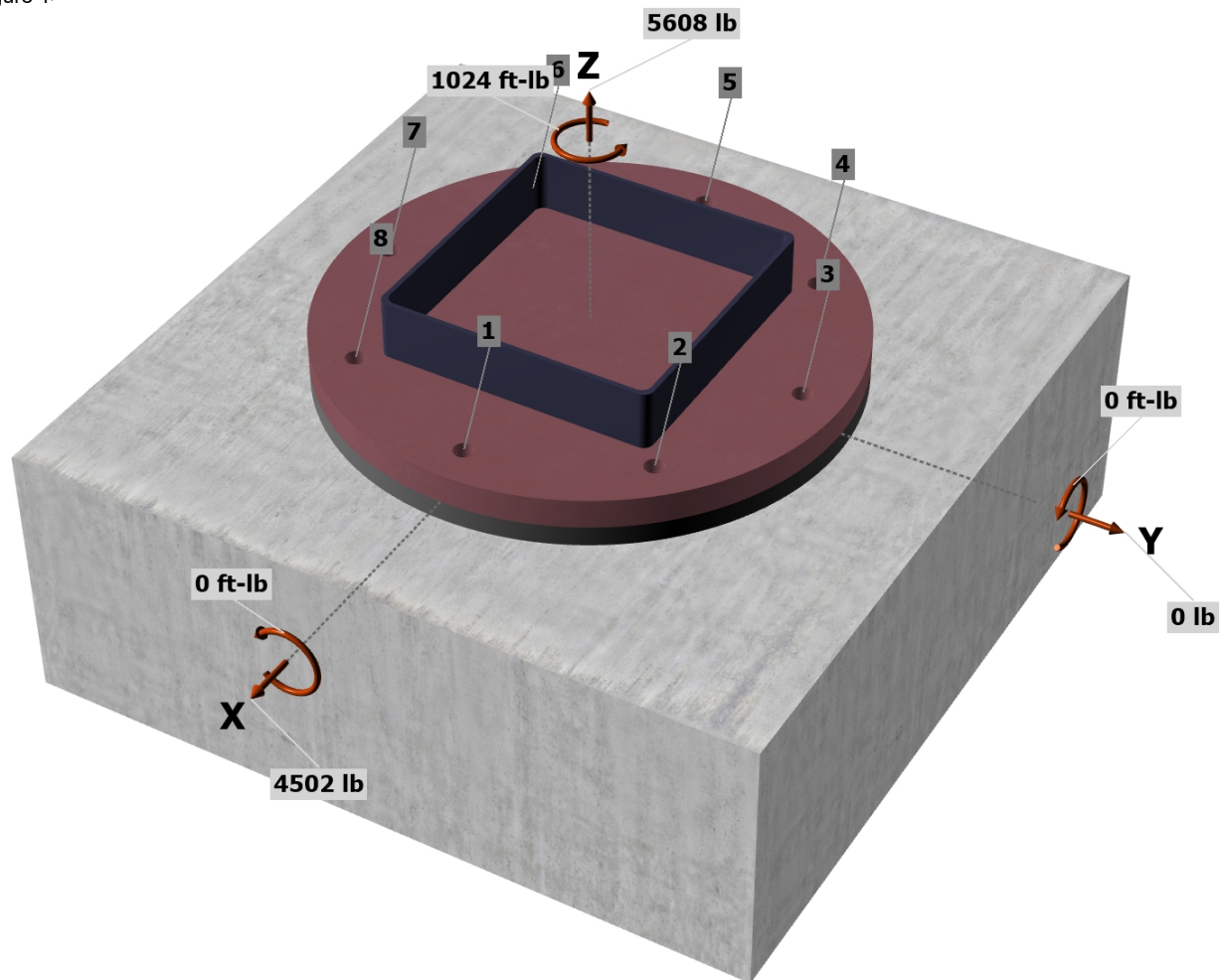
$$V_{uay} [\text{lb}]: \quad 0$$

M_{ux} [ft-lb]: 0

M_{uy} [ft-lb]: 0

M_{uz} [ft-lb]: 1024

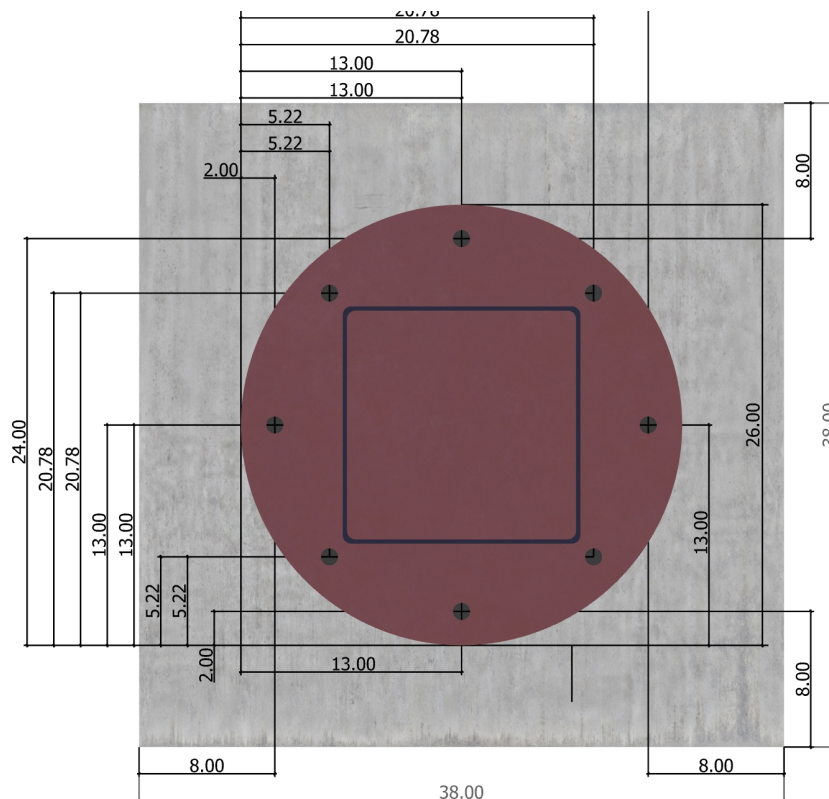
<Figure 1>





Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	701.0	562.8	139.6	579.8
2	701.0	464.0	98.7	474.4
3	701.0	423.2	0.0	423.2
4	701.0	464.0	-98.7	474.4
5	701.0	562.8	-139.6	579.8
6	701.0	661.5	-98.7	668.8
7	701.0	702.3	0.0	702.3
8	701.0	661.5	98.7	668.8
Sum	5608.0	4502.0	0.0	4571.5

Maximum concrete compression strain (‰): 0.00

Maximum concrete compression stress (psi): 0

Resultant tension force (lb): 5608

Resultant compression force (lb): 0

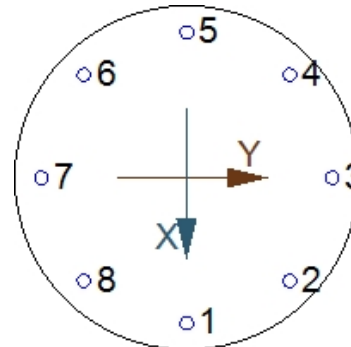
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00

Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00

Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 1.36

Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>





Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
35150	0.75	26363

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \psi_{c,P} N_p = \phi \psi_{c,P} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\psi_{c,P}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	1.50	4000	0.70	47071



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
21090	0.8	0.65	10967

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp} (A_{Nc} / A_{Nco}) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1a)

k_{cp}	A_{Nc} (in ²)	A_{Nco} (in ²)	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	155.61	576.00	0.900	1.250	1.000	34346	0.70	14614

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.8)

Tension	Factored Load, N _{ua} (lb)	Design Strength, ϕN _n (lb)	Ratio	Status	
Steel	701	26363	0.03	Pass (Governs)	
Pullout	701	47071	0.01	Pass	
Shear	Factored Load, V _{ua} (lb)	Design Strength, ϕV _n (lb)	Ratio	Status	
Steel	702	10967	0.06	Pass (Governs)	
Pryout	702	14614	0.05	Pass	
Interaction check	(N _{ua} /ϕN _{ua}) ^{5/3}	(V _{ua} /ϕV _{ua}) ^{5/3}	Utilization Ratio	Permissible	Status
Sec. R17.8	0.00	0.01	1.3%	1.0	Pass

1"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel

36000 psi

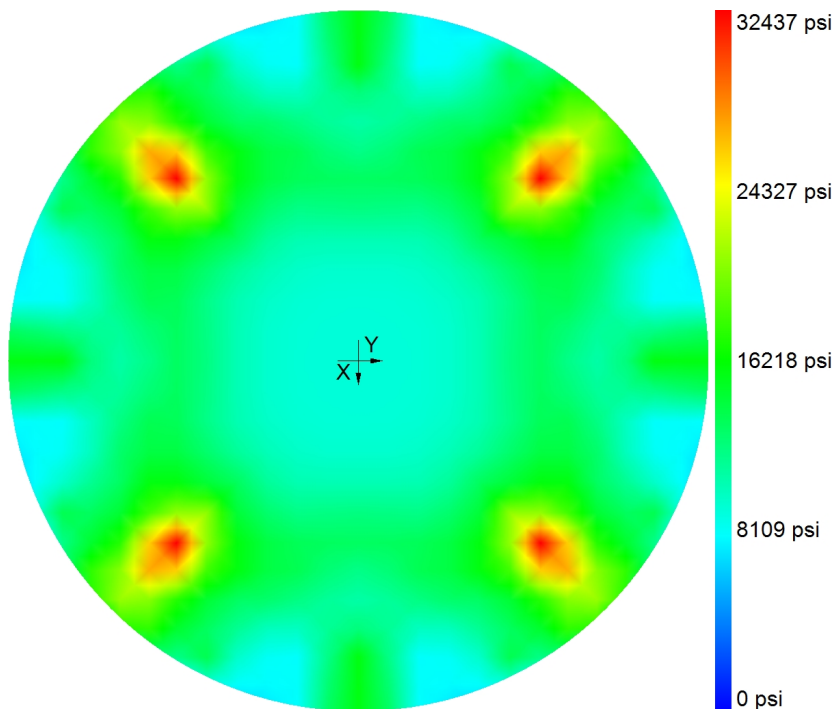
Maximum stress

32437 psi

Calculated plate thickness

0.233 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

12. Warnings

- For irregular anchor patterns, the designer must consider sizing of base plate holes to ensure shear loads are distributed to anchors as designed.
- Minimum spacing and edge distance requirement of 6da per ACI 318 Table 17.9.2(a) for torqued cast-in-place anchor is waived per designer option.
- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	8
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	11760	2030	0	0	46676	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	35664	8940	0	0	173848	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	26070	6240	0	0	123658	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	16875	3435	0	0	97708	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	39660	9630	0	0	239058	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	26070	6240	0	0	123658	0	-	-	-
U = 0.9D + 1.0W	21150	4695	0	0	145406	0	-	-	-

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: Soccer Shade Canopy Foundation
Location:
Design name: Ontario Sports Park - Soccer Shade Canopy

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19
Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place
Material: F1554 Grade 36
Diameter (inch): 1.000
Effective Embedment depth, h_{ef} (inch): 8.000
Anchor category: -
Anchor ductility: Yes
 h_{min} (inch): 9.75
 C_{min} (inch): 1.44
 S_{min} (inch): 4.00

Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Uncracked
Compressive strength, f'_c (psi): 4000
Reinforcement condition: A tension, A shear
Supplemental edge reinforcement: Yes
Reinforcement provided at corners: Yes
Ignore concrete breakout in tension: Yes
Ignore concrete breakout in shear: Yes
Ignore ϕ requirement: Yes
Build-up grout pad: Yes

Base Plate

Diameter x Thickness (inch): 26.00 x 1.50
Yield stress: 36000 psi

Profile type/size: 14X14X1/2

Recommended Anchor

Anchor Name: Heavy Hex Bolt - 1"Ø Heavy Hex Bolt, F1554 Gr. 36





Anchor Designer™ for Concrete Software

Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

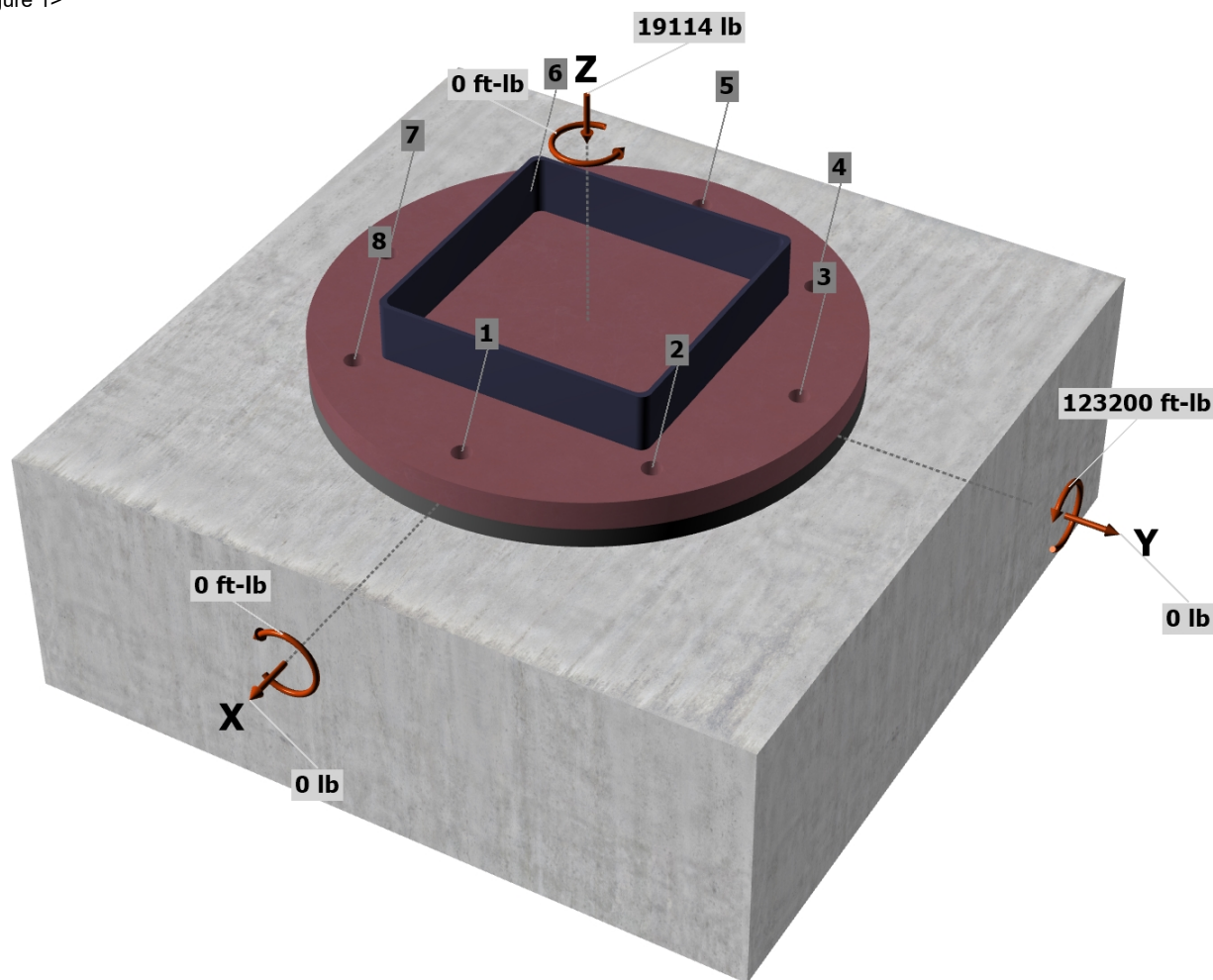
Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: -19114
 V_{uax} [lb]: 0
 V_{uay} [lb]: 0
 M_{ux} [ft-lb]: 0
 M_{uy} [ft-lb]: 123200
 M_{uz} [ft-lb]: 0

<Figure 1>



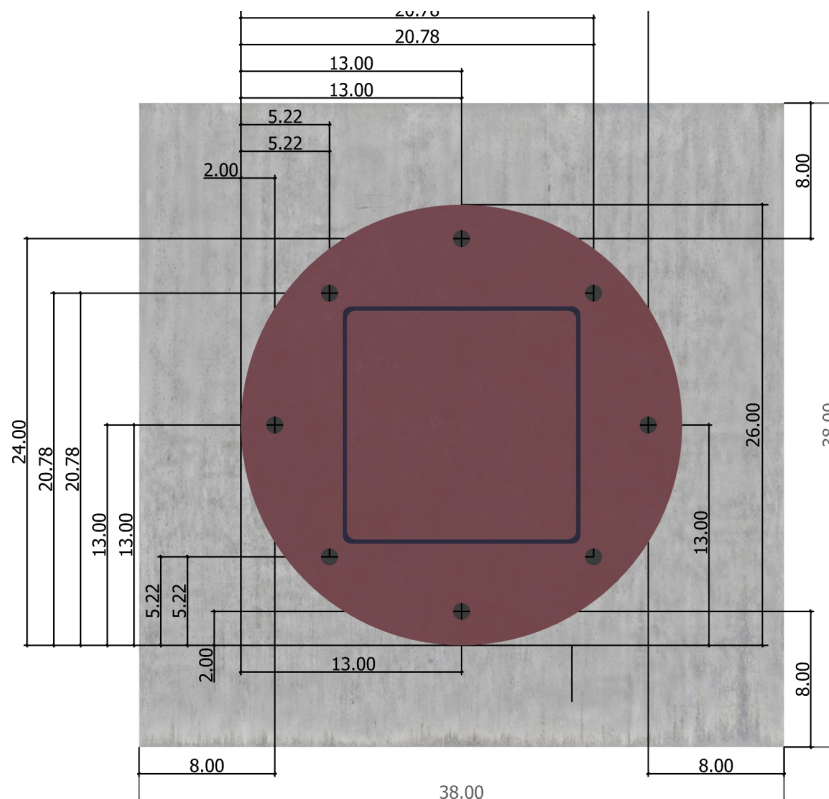
Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>

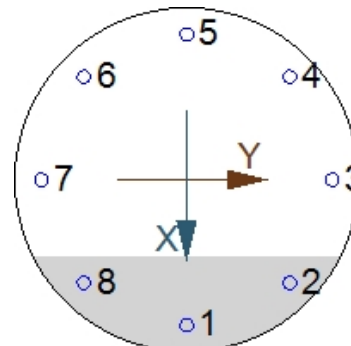


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0
3	7907.3	0.0	0.0	0.0
4	18335.4	0.0	0.0	0.0
5	22651.3	0.0	0.0	0.0
6	18335.4	0.0	0.0	0.0
7	7907.3	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0
Sum	75136.7	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.45
Maximum concrete compression stress (psi): 1952
Resultant tension force (lb): 75137
Resultant compression force (lb): 94251
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 1.80

<Figure 3>





Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
35150	0.75	26363

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \psi_{c,p} N_p = \phi \psi_{c,p} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\psi_{c,p}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	1.50	4000	0.70	47071



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	22651	26363	0.86	Pass (Governs)
Pullout	22651	47071	0.48	Pass

1"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel

36000 psi

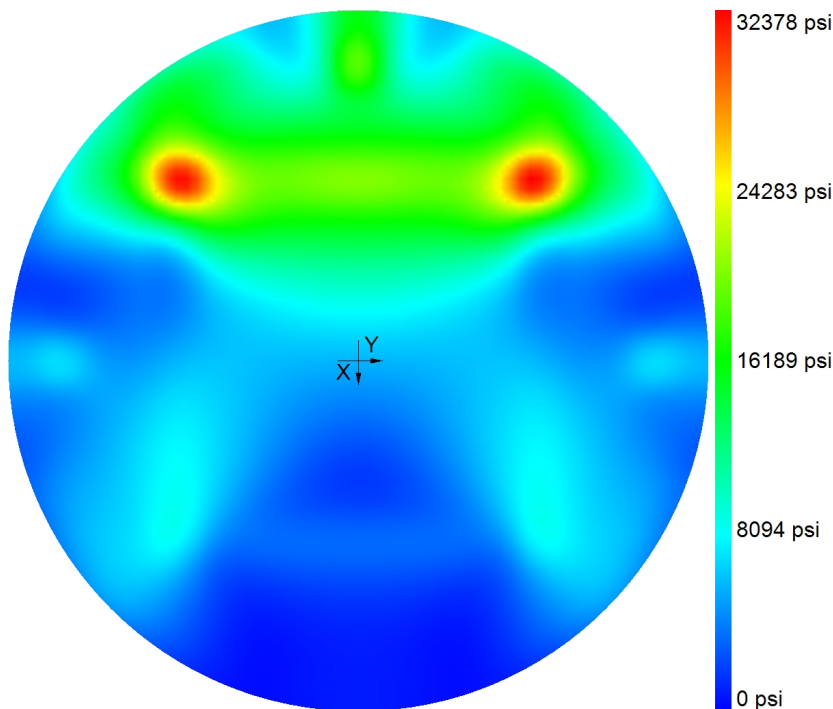
Maximum stress

32378 psi

Calculated plate thickness

1.231 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{ top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{ top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{ top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Table 17.9.2(a) for torqued cast-in-place anchor is waived per designer option.\n
- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	8
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	11760	2030	0	0	46676	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	35664	8940	0	0	173848	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	26070	6240	0	0	123658	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	16875	3435	0	0	97708	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	39660	9630	0	0	239058	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	26070	6240	0	0	123658	0	-	-	-
U = 0.9D + 1.0W	21150	4695	0	0	145406	0	-	-	-

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 37. Soccer Shade Structure Post Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 36.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination $D+0.750L_r+0.450W$
Lateral Load 15.320 k
Moment 153.195 k-ft

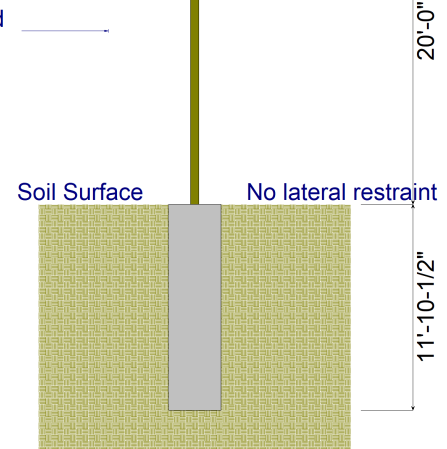
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 1,957.29 psf
Allowable 1,960.40 psf

Minimum Required Depth 11.875 ft

Footing Base Area 7.069 ft²
Maximum Soil Pressure 4.753 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	3.348 k		k/ft	10.20 k
Lr : Roof Live	8.570 k		k/ft	23.40 k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	12.320 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	10.0 ft	TOP of Load above ground surface	20.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	3.348	33.480	6.50	1,077.9	1,081.8	1.000
+D+Lr	11.918	119.180	10.75	1,771.4	1,771.6	1.000
+D+0.750Lr	9.776	97.755	9.88	1,635.7	1,638.4	1.000
+D+0.60W	10.740	107.400	10.25	1,698.2	1,700.5	1.000
+D+0.750Lr+0.450W	15.320	153.195	11.88	1,957.3	1,960.4	1.000
+D+0.450W	8.892	88.920	9.50	1,575.6	1,578.2	1.000
+0.60D+0.60W	9.401	94.008	9.75	1,612.2	1,612.2	1.000
+0.60D	2.009	20.088	5.38	888.2	892.5	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 37. Soccer Shade Structure CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

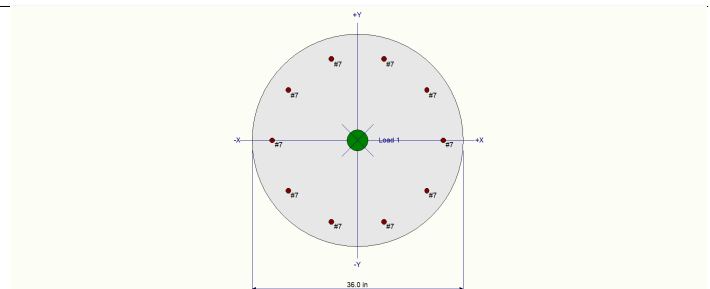
f'_c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	12.750 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column:		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 36.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 10 - #7 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 13,518.7 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 12.750 ft above base, D = 10.20, LR = 23.50, W = 19.0 k

BENDING LOADS . . .

Moment X: Moment acting about X-X axis at 12.750 ft, D = 33.340, LR = 85.730, W = 123.20 k-ft

Moment Y: Moment acting about Y-Y axis at 12.625 ft, D = 32.480, LR = 85.730, W = 10.980 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+1.60Lr+0.50W		Maximum SERVICE Load Reactions .			
Location of max.above base	12.664 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.561 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	75.562 k	φ * Pn =	134.890 k			
Mu-x =	238.776 k-ft	φ * Mn-x =	432.560 k-ft			
Mu-y =	-181.634 k-ft	φ * Mn-y =	326.814 k-ft			
Mu Angle =	37.0 deg	φ =	0.90			
Mu at Angle =	300.008 k-ft	φMn at Angle =	535.0 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .			General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacity	3,800.38 k		ρ : % Reinforcing		0.5895 %	Rebar % Ok
Pnmin : Nominal Min. Tension Axial Capacity	k		Reinforcing Area		6.0 in^2	
φ Pn, max : Usable Compressive Axial Capacity	1,976.20 k		Concrete Area		1,017.88 in^2	
φ Pn, min : Usable Tension Axial Capacity	k					
			β =		0.850	θ = 0.80

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 37. Soccer Shade Structure CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from		Axial Load		Bending Analysis k-ft						Utilization	
	X-X	Y-Y	base	ft	Pu	ϕ * Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio
+1.40D	Actual	Actual	12.66		33.21	390.23	1.000	46.68	1.000	-45.47	44.000	65.16	763.89	0.085
+1.20D+0.50Lr	Actual	Actual	12.66		40.21	209.64	1.000	82.87	1.000	-81.84	45.000	116.47	607.79	0.192
+1.20D	Actual	Actual	12.66		28.46	390.23	1.000	40.01	1.000	-38.98	44.000	55.85	763.89	0.073
+1.20D+1.60Lr	Actual	Actual	12.66		66.06	149.82	1.000	177.18	1.000	-176.14	45.000	249.84	551.87	0.453
+1.20D+1.60Lr+0.50W	Actual	Actual	12.66		75.56	134.89	1.000	238.78	1.000	-181.63	37.000	300.01	535.00	0.561
+1.20D+0.50W	Actual	Actual	12.66		37.96	209.78	1.000	101.61	1.000	-44.47	24.000	110.91	609.38	0.182
+1.20D+0.50Lr+W	Actual	Actual	12.66		59.21	149.87	1.000	206.07	1.000	-92.82	24.000	226.01	553.50	0.408
+1.20D+W	Actual	Actual	12.66		47.46	149.93	1.000	163.21	1.000	-49.96	17.000	170.68	553.63	0.308
+0.90D+W	Actual	Actual	12.66		40.35	134.81	1.000	153.21	1.000	-40.21	15.000	158.40	538.40	0.294
+0.90D	Actual	Actual	12.66		21.35	390.23	1.000	30.01	1.000	-29.23	44.000	41.89	763.89	0.055

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	
D Only						23.719	-33.340		-32.480
+D+Lr						47.219	-119.070		-118.210
+D+0.750Lr						41.344	-97.638		-96.778
+D+0.60W						35.119	-107.260		-39.068
+D+0.750Lr+0.450W						49.894	-153.078		-101.719
+D+0.450W						32.269	-88.780		-37.421
+0.60D+0.60W						25.631	-93.924		-26.076
+0.60D						14.231	-20.004		-19.488
Lr Only						23.500	-85.730		-85.730
W Only						19.000	-123.200		-10.980

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis		
	@ Base	@ Top		@ Base	@ Top	
D Only	-33.340		k-ft	-32.480		k-ft
+D+Lr	-119.070		k-ft	-118.210		k-ft
+D+0.750Lr	-97.638		k-ft	-96.778		k-ft
+D+0.60W	-107.260		k-ft	-39.068		k-ft
+D+0.750Lr+0.450W	-153.078		k-ft	-101.719		k-ft
+D+0.450W	-88.780		k-ft	-37.421		k-ft
+0.60D+0.60W	-93.924		k-ft	-26.076		k-ft
+0.60D	-20.004		k-ft	-19.488		k-ft
Lr Only	-85.730		k-ft	-85.730		k-ft
W Only	-123.200		k-ft	-10.980		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	-0.0176	in	12.750	ft	-0.018	in	12.750	ft
+D+Lr	-0.0641	in	12.750	ft	-0.065	in	12.750	ft
+D+0.750Lr	-0.0525	in	12.750	ft	-0.053	in	12.750	ft
+D+0.60W	-0.0212	in	12.750	ft	-0.058	in	12.750	ft
+D+0.750Lr+0.450W	-0.0551	in	12.750	ft	-0.083	in	12.750	ft
+D+0.450W	-0.0203	in	12.750	ft	-0.048	in	12.750	ft
+0.60D+0.60W	-0.0141	in	12.750	ft	-0.051	in	12.750	ft
+0.60D	-0.0106	in	12.750	ft	-0.011	in	12.750	ft
Lr Only	-0.0465	in	12.750	ft	-0.046	in	12.750	ft
W Only	-0.0059	in	12.664	ft	-0.066	in	12.664	ft

38. Small Baseball Canopy (Landscape Detail 2/L-2.33)

Shade Structures, **LOADING PROVIDED BY Birdair**, Landscape Drawings L-2.32-L-2.34

Preliminary column sizes at grade:

1. Family Canopy = 24" x 24" column with baseplates likely to be 32" x 32" x 2" with qty (16) 2" anchors
2. Large Baseball = 14" x 14" column with baseplates likely to be 22" x 22" x 1.5" with qty (8) 2" anchors
3. Small Baseball = 10" x 10" column with baseplates likely to be 16" x 16" x 1.5" with qty (8) 1.5" anchors
4. Soccer Canopy = 14" x 14" column with baseplates likely to be 22" x 22" x 1.5" with qty (8) 2" anchors
5. Stage Canopy = 24" x 24" column with baseplates likely to be 32" x 32" x 2" with qty (16) 2" anchors

The column sizes are based on preliminary engineering and have a slim chance of being modified after award and final engineering.

Load cad Descriptions:

- 1) Prestress + Dead load
- 2) Uniform Live Load = 30 psf
- 3) Uniform Wind Uplift Case = 12psf uplift
- 4) Wind X Case A – 12psf x Cp
- 5) Wind X Case B – 12psf x Cp
- 6) Wind Y Case A – 12psf x Cp
- 7) Wind Y Case B – 12psf x Cp
- 8) Wind XY Case A – 12psf x Cp
- 9) Wind XY Case B – 12psf x Cp

- Seismic loading: the structure is lightweight, therefore seismic will not be a governing load case and has not been evaluated.
- Sign convention: positive forces are defined to be in the direction of the x-y axis shown on the reaction node map with z acting up and out of the page. A positive "z" force means the foundation is seeing uplift.
- The effects of membrane prestress and dead load are included in all load cases.
- The forces tabulated are unfactored working loads.
- The loads tabulated represent forces that are applied to the building or foundation at that location.

Small Baseball Canopy - LOADING PROVIDED BY Birdair

Node No	Load Case	Reaction Forces, lbs			Resultant lbs	Reaction Moments, ft-lbs		
		Vx	Vy	P		Mx	My	T
1	1	-990.04	-499.66	-6,547.10	6,640.36	6,848.00	6,955.00	-796.00
	2	-1,731.50	-1,809.90	-10,787.00	11,073.99	17,270.00	18,210.00	-1,266.00
	3	1,431.20	1,306.30	-1,164.30	2,260.61	-8,199.00	6,140.00	-259.80
	4	-1,022.20	-1,843.60	-10,035.00	10,254.02	18,240.00	23,960.00	-1,016.00
	5	561.90	-233.00	-5,268.50	5,303.50	4,464.00	18,240.00	1,844.00
	6	-56.80	242.22	-4,812.40	4,818.83	880.70	8,396.00	-467.10
	7	2,013.30	1,920.20	69.55	2,783.05	-12,960.00	6,863.00	-109.30
	8	-748.41	-199.08	-6,542.60	6,588.27	3,882.00	575.80	-842.80
	9	1,058.30	1,293.60	-1,649.90	2,348.53	-8,849.00	-3,016.00	-1,583.00
2	1	-632.18	-1,129.30	-5,315.20	5,470.50	9,020.00	3,414.00	385.20
	2	-2,408.50	-2,347.20	-9,967.30	10,519.38	19,460.00	4,226.00	-2,774.00
	3	2,158.90	2,853.60	-332.28	3,593.65	-12,550.00	2,824.00	-2,878.00
	4	-896.98	-1,772.20	-5,451.40	5,801.98	18,510.00	12,030.00	-1,498.00
	5	796.51	876.89	-1,151.30	1,651.92	1,371.00	7,317.00	995.50
	6	434.80	318.78	-3,875.90	3,913.22	932.50	4,828.00	-554.10
	7	2,851.90	3,736.50	395.13	4,717.09	-18,110.00	3,908.00	-3,407.00
	8	-231.18	-98.82	-4,512.40	4,519.40	3,873.00	-1,072.00	-2,052.00
	9	2,336.70	3,363.90	-279.34	4,105.36	-14,830.00	-1,210.00	-3,609.00
3	1	1,126.70	636.98	-5,315.20	5,470.52	3,376.00	9,034.00	-384.30
	2	2,337.30	2,418.50	-9,967.20	10,519.37	4,143.00	19,480.00	2,777.00
	3	-2,844.50	-2,170.40	-332.25	3,593.36	2,874.00	-12,540.00	2,880.00
	4	1,653.20	1,865.20	-6,094.80	6,584.73	1,643.00	15,120.00	2,583.00
	5	-508.79	-695.36	-1,574.50	1,794.84	3,462.00	935.60	2,672.00
	6	-259.62	-82.57	-5,408.00	5,414.86	-419.90	650.40	1,719.00
	7	-3,787.80	-2,628.20	-1,157.00	4,753.26	-334.80	-18,560.00	3,199.00
	8	-108.15	-273.10	-4,376.50	4,386.35	9,623.00	5,136.00	359.30
	9	-3,381.80	-2,948.90	-14.15	4,486.96	10,120.00	-13,500.00	2,339.00
4	1	495.55	991.94	-6,547.10	6,640.33	6,927.00	6,877.00	798.70
	2	1,802.70	1,738.60	-10,787.00	11,073.93	18,140.00	17,350.00	1,272.00
	3	-1,300.30	-1,437.10	-1,164.30	2,260.89	6,178.00	-8,174.00	266.90
	4	1,923.30	1,225.50	-6,467.90	6,858.18	10,060.00	15,660.00	1,151.00
	5	156.65	-67.40	-1,789.40	1,797.51	1,892.00	2,578.00	2,402.00
	6	-365.16	428.60	-6,392.50	6,417.25	1,646.00	21.38	497.70
	7	-1,907.10	-1,566.50	-1,469.80	2,872.50	-261.80	-13,160.00	877.90
	8	331.29	96.63	-7,054.90	7,063.33	17,710.00	6,169.00	293.10
	9	-1,199.00	-1,576.70	-2,294.10	3,030.92	13,150.00	-7,097.00	-989.40
Max Values:		3,787.8	3,736.5	10,787.0	11,074.0	19,460.0	23,960.0	3,609.0

Node 1				Node 2			
P	V	Mx	My	P	V	Mx	My
10,787	1,732	17,270	18,210	9,967	2,409	19,460	4,226
10,035	1,022	18,240	23,960	9,967	2,409	19,460	4,226
10,035	1,022	18,240	23,960	5,451	897	18,510	12,030

Node 3				Node 4			
P	V	Mx	My	P	V	Mx	My
9,967	2,337	4,143	19,480	10,787	1,803	18,140	17,350
14	3,382	10,120	13,500	10,787	1,803	18,140	17,350
9,967	2,337	4,143	19,480	10,787	1,803	18,140	17,350



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: SoccerShade Canopy Foundation

Comment:

Location:

Design name: Ontario Sports Park - Small Baseball Shade Canopy

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19

Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place

Material: F1554 Grade 36

Diameter (inch): 1.000

Effective Embedment depth, h_{ef} (inch): 8.000

Anchor category: -

Anchor ductility: Yes

h_{min} (inch): 9.75

C_{min} (inch): 1.44

S_{min} (inch): 4.00

Base Material

Concrete: Normal-weight

Concrete thickness, h (inch): 36.00

State: Uncracked

Compressive strength, f'_c (psi): 4000

$\Psi_{c,v}$: 1.4

Reinforcement condition: A tension, A shear

Supplemental edge reinforcement: Yes

Reinforcement provided at corners: Yes

Ignore concrete breakout in tension: Yes

Ignore concrete breakout in shear: Yes

Ignore 6do requirement: Yes

Build-up grout pad: Yes

Base Plate

Diameter x Thickness (inch): 20.00 x 1.00

Yield stress: 36000 psi

Profile type/size: 10X10X1/2

Recommended Anchor

Anchor Name: Heavy Hex Bolt - 1"Ø Heavy Hex Bolt, F1554 Gr. 36





Anchor Designer™ for Concrete Software

Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

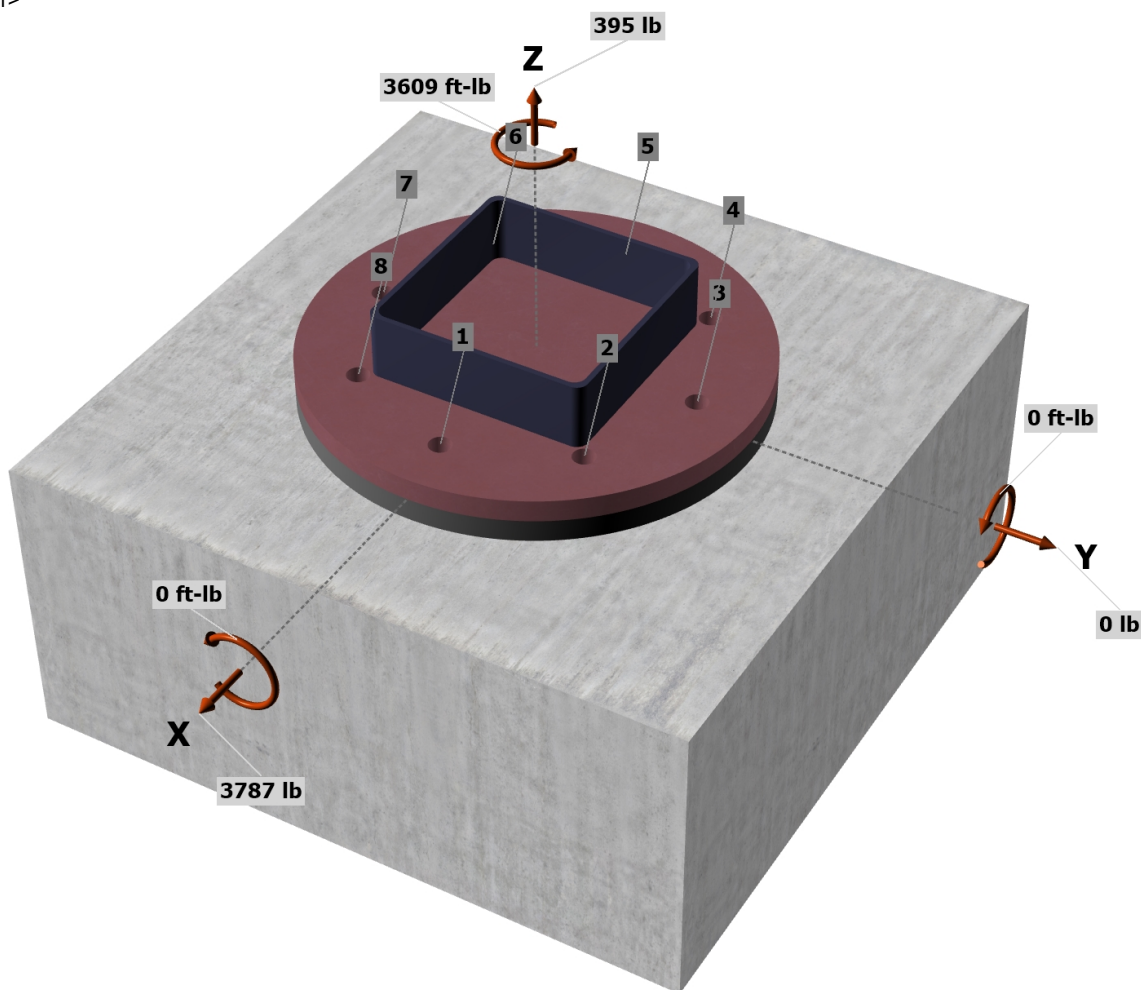
Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 395
 V_{uax} [lb]: 3787
 V_{uay} [lb]: 0
 M_{ux} [ft-lb]: 0
 M_{uy} [ft-lb]: 0
 M_{uz} [ft-lb]: 3609

<Figure 1>



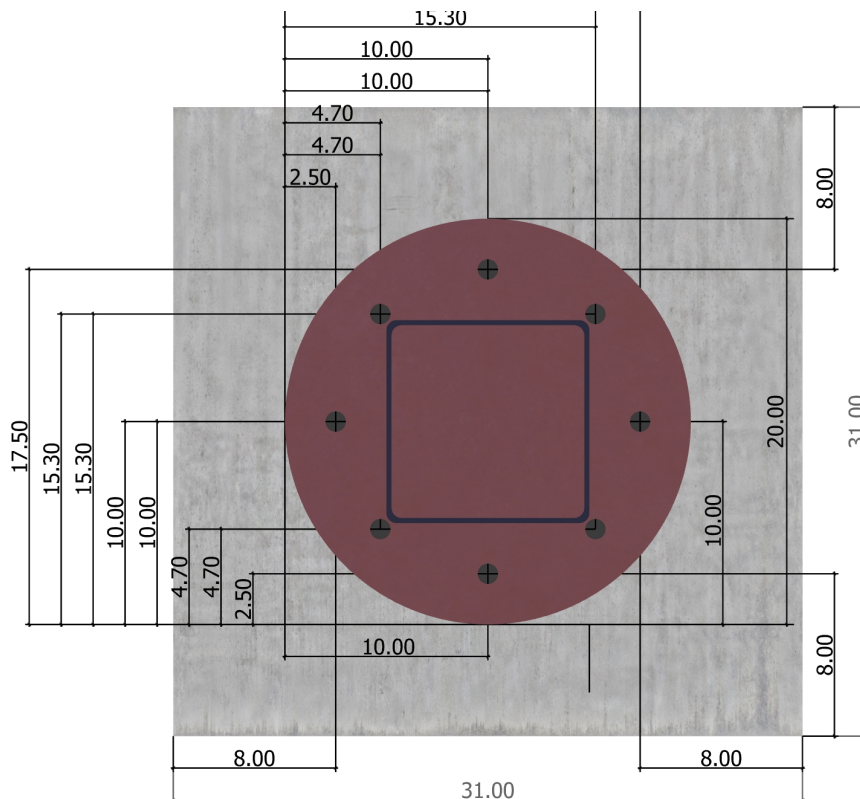
Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	49.4	473.4	722.2	863.5
2	49.4	-37.0	510.4	511.7
3	49.4	-248.9	0.0	248.9
4	49.4	-37.0	-510.4	511.7
5	49.4	473.4	-722.2	863.5
6	49.4	983.7	-510.4	1108.3
7	49.4	1195.6	0.0	1195.6
8	49.4	983.7	510.4	1108.3
Sum	395.0	3787.0	0.0	6411.5

Maximum concrete compression strain (‰): 0.00

Maximum concrete compression stress (psi): 0

Resultant tension force (lb): 395

Resultant compression force (lb): 0

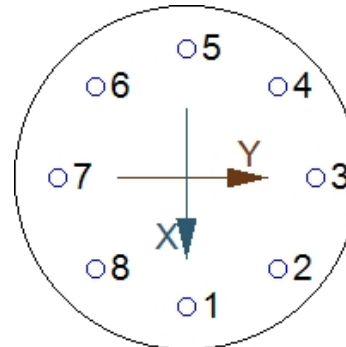
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00

Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00

Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 5.72

Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>





Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
35150	0.75	26363

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \psi_{c,P} N_p = \phi \psi_{c,P} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\psi_{c,P}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	1.50	4000	0.70	47071



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
21090	0.8	0.65	10967

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp} (A_{Nc} / A_{Nco}) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1a)

k_{cp}	A_{Nc} (in ²)	A_{Nco} (in ²)	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	113.41	576.00	0.900	1.250	1.000	34346	0.70	10651

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.8)

Tension	Factored Load, N _{ua} (lb)	Design Strength, ϕN _n (lb)	Ratio	Status	
Steel	49	26363	0.00	Pass (Governs)	
Pullout	49	47071	0.00	Pass	
Shear	Factored Load, V _{ua} (lb)	Design Strength, ϕV _n (lb)	Ratio	Status	
Steel	1196	10967	0.11	Pass	
Pryout	1196	10651	0.11	Pass (Governs)	
Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Utilization Ratio	Permissible	Status
Sec. R17.8	0.00	0.03	2.6%	1.0	Pass

1"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel

36000 psi

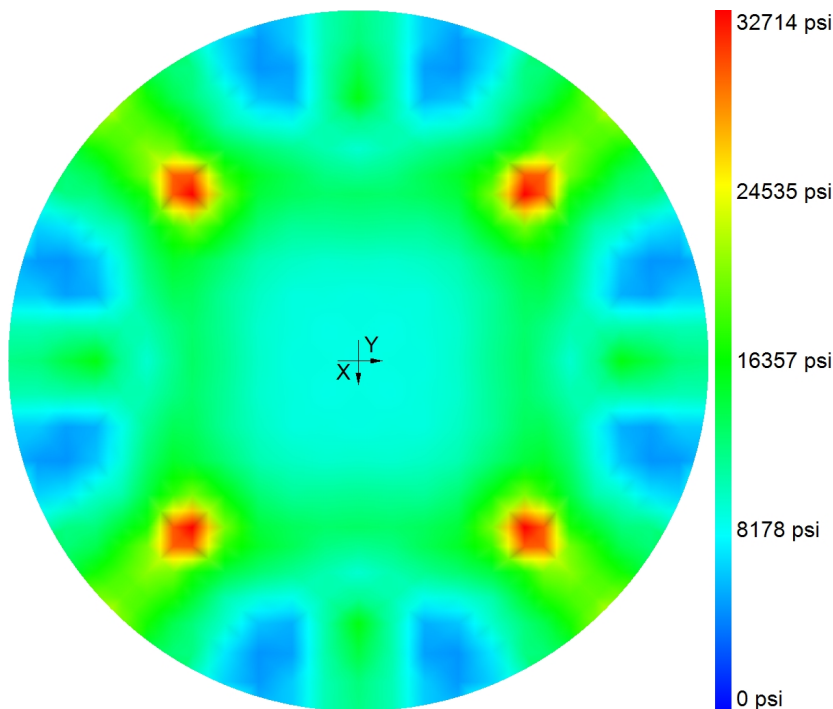
Maximum stress

32714 psi

Calculated plate thickness

0.056 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{ top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{ top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{ top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

12. Warnings

- For irregular anchor patterns, the designer must consider sizing of base plate holes to ensure shear loads are distributed to anchors as designed.
- Minimum spacing and edge distance requirement of 6da per ACI 318 Table 17.9.2(a) for torqued cast-in-place anchor is waived per designer option.\n
- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	8
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	7441	2030	0	0	12628	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	22325	8940	0	0	41960	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	16345	6240	0	0	30284	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	6828	4466	0	0	20079	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	17245	11691	0	0	48794	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	16345	6240	0	0	30284	0	-	-	-
U = 0.9D + 1.0W	5684	6756	0	0	26628	0	-	-	-

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: SoccerShade Canopy Foundation

Comment:

Location:

Design name: Ontario Sports Park - Small Baseball Shade Canopy

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19

Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place

Material: F1554 Grade 36

Diameter (inch): 1.000

Effective Embedment depth, h_{ef} (inch): 8.000

Anchor category: -

Anchor ductility: Yes

h_{min} (inch): 9.75

C_{min} (inch): 1.44

S_{min} (inch): 4.00

Base Material

Concrete: Normal-weight

Concrete thickness, h (inch): 36.00

State: Uncracked

Compressive strength, f'_c (psi): 4000

Reinforcement condition: A tension, A shear

Supplemental edge reinforcement: Yes

Reinforcement provided at corners: Yes

Ignore concrete breakout in tension: Yes

Ignore concrete breakout in shear: Yes

Ignore ϕ requirement: Yes

Build-up grout pad: Yes

Base Plate

Diameter x Thickness (inch): 20.00 x 1.00

Yield stress: 36000 psi

Profile type/size: 10X10X1/2

Recommended Anchor

Anchor Name: Heavy Hex Bolt - 1"Ø Heavy Hex Bolt, F1554 Gr. 36





Anchor Designer™ for Concrete Software

Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

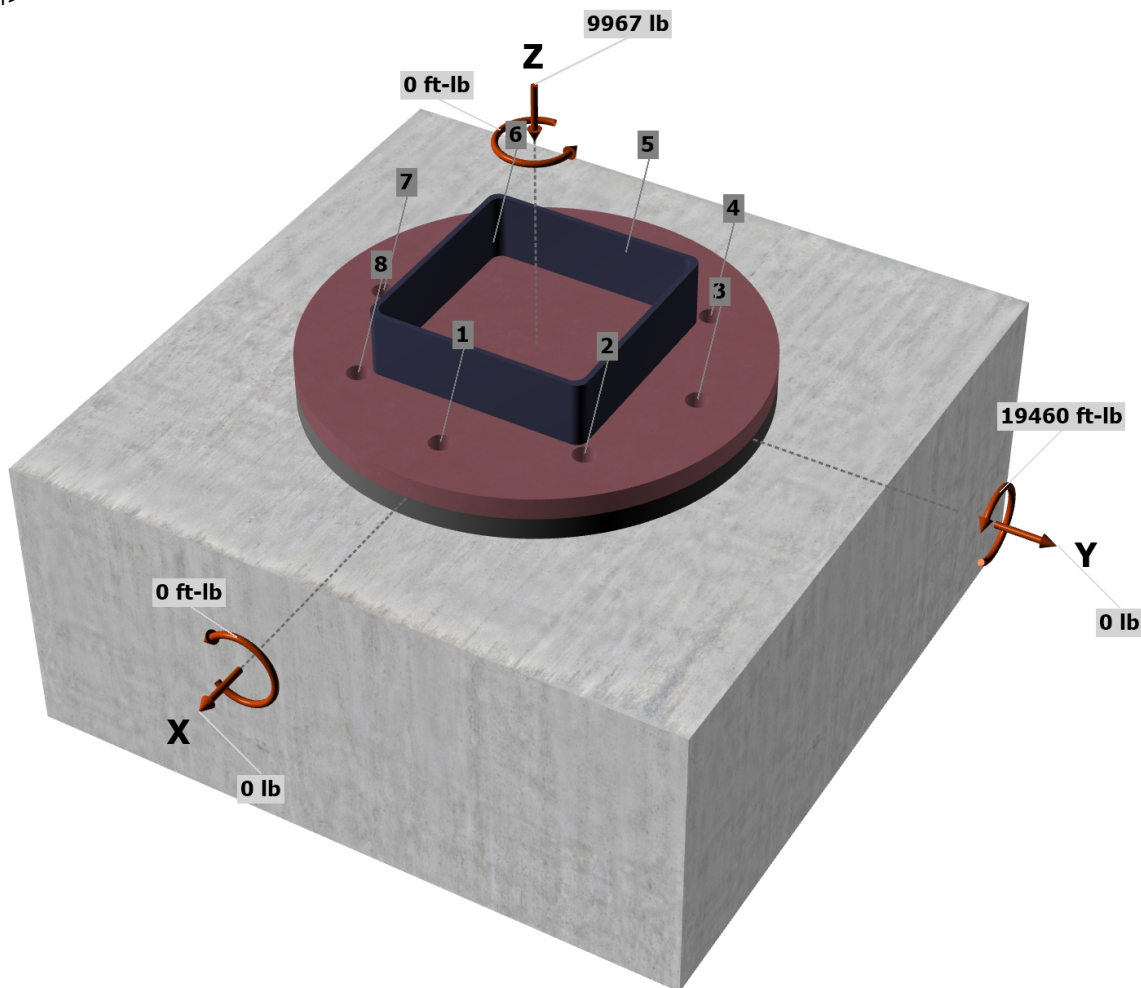
Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: -9967
 V_{uax} [lb]: 0
 V_{uay} [lb]: 0
 M_{ux} [ft-lb]: 0
 M_{uy} [ft-lb]: 19460
 M_{uz} [ft-lb]: 0

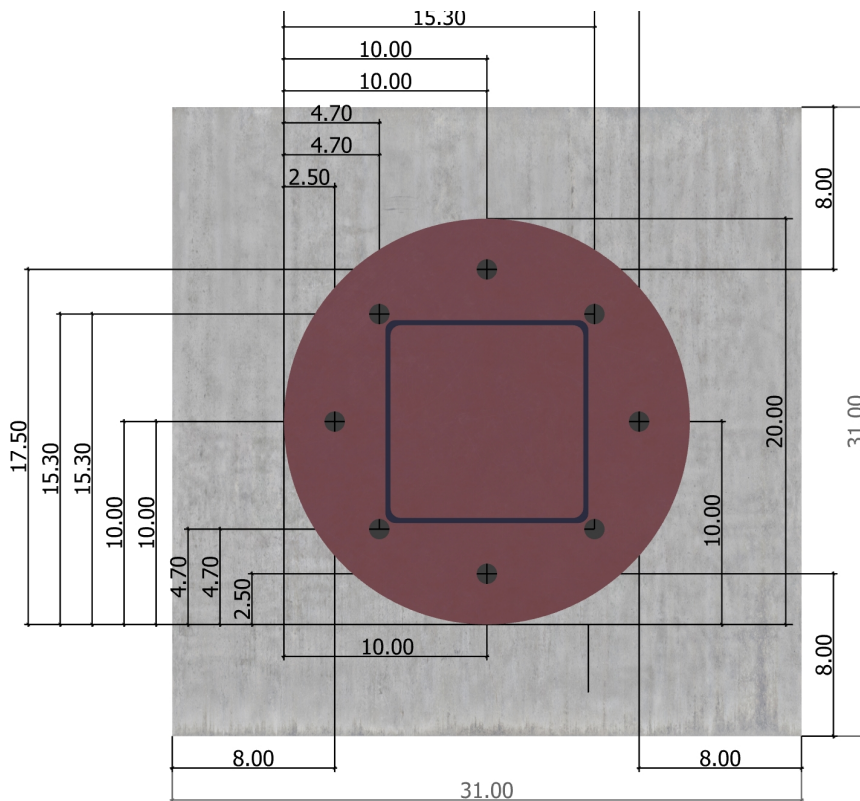
<Figure 1>



Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com

<Figure 2>

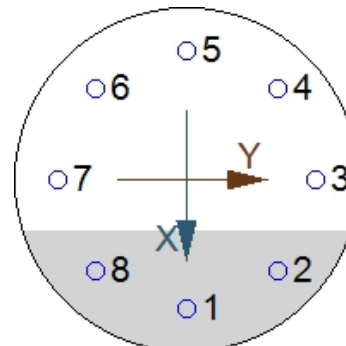


3. Resulting Anchor Forces

Anchor	Tension load, N _{ua} (lb)	Shear load x, V _{uax} (lb)	Shear load y, V _{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0
3	1223.6	0.0	0.0	0.0
4	3367.6	0.0	0.0	0.0
5	4257.5	0.0	0.0	0.0
6	3367.6	0.0	0.0	0.0
7	1223.6	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0
Sum	13439.8	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.13
Maximum concrete compression stress (psi): 579
Resultant tension force (lb): 13440
Resultant compression force (lb): 23407
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 1.41

<Figure 3>





Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
35150	0.75	26363

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \psi_{c,P} N_p = \phi \psi_{c,P} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\psi_{c,P}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	1.50	4000	0.70	47071



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	4258	26363	0.16	Pass (Governs)
Pullout	4258	47071	0.09	Pass

1"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel

36000 psi

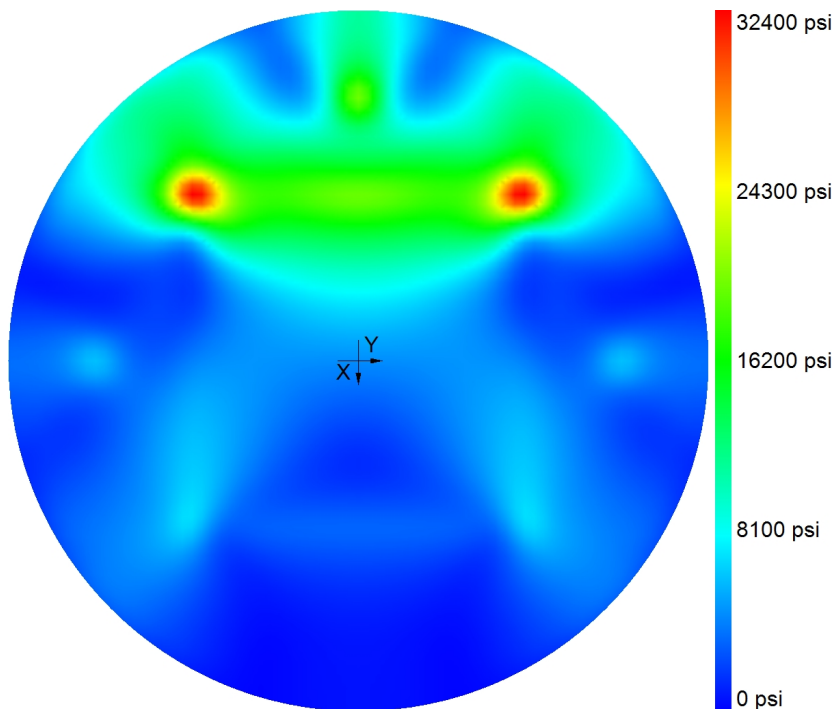
Maximum stress

32400 psi

Calculated plate thickness

0.504 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} \text{ (@ bottom) or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} \text{ (@ top)}$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} \text{ (@bottom) or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} \text{ (@ top)}$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} \text{ (@bottom) or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} \text{ (@ top)}$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Table 17.9.2(a) for torqued cast-in-place anchor is waived per designer option.\n
- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	8
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	7441	2030	0	0	12628	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	22325	8940	0	0	41960	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	16345	6240	0	0	30284	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	6828	4466	0	0	20079	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	17245	11691	0	0	48794	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	16345	6240	0	0	30284	0	-	-	-
U = 0.9D + 1.0W	5684	6756	0	0	26628	0	-	-	-

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 38. Small Baseball Shade Structure Post Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 30.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination $D+0.750Lr+0.450W$
Lateral Load 3.194 k
Moment 31.945 k-ft

NO Ground Surface Restraint

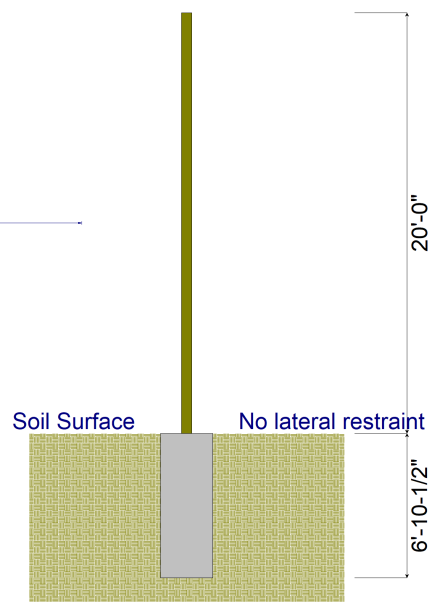
Pressures at 1/3 Depth

Actual 1,136.44 psf
Allowable 1,138.32 psf

Minimum Required Depth 6.875 ft

Footing Base Area 4.909 ft²
Maximum Soil Pressure 3.531 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	0.9020 k		k/ft	6.547 k
Lr : Roof Live	1.946 k		k/ft	10.787 k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	1.851 k		k/ft	0.0 k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	10.0 ft	TOP of Load above ground surface	20.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.902	9.020	4.38	705.5	709.9	1.000
+D+Lr	2.848	28.480	6.63	1,088.8	1,088.9	1.000
+D+0.750Lr	2.362	23.615	6.13	1,013.7	1,014.3	1.000
+D+0.60W	2.013	20.126	5.75	952.8	955.8	1.000
+D+0.750Lr+0.450W	3.194	31.945	6.88	1,136.4	1,138.3	1.000
+D+0.450W	1.735	17.350	5.50	902.6	903.1	1.000
+0.60D+0.60W	1.652	16.518	5.38	885.2	887.2	1.000
+0.60D	0.541	5.412	3.63	585.1	589.2	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 38. Small Baseball Shade Structure CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

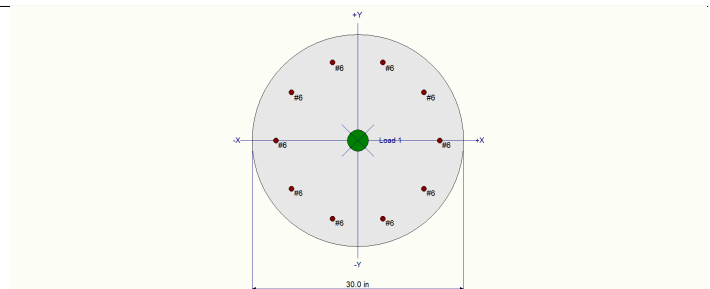
f'_c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	8.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 30.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 10 - #6 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 5,890.49 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 8.0 ft above base, D = 6.547, LR = 10.787 k

BENDING LOADS . . .

Moment X: Moment acting about X-X axis at 8.0 ft, D = 9.020, LR = 19.460, W = 18.510 k-ft

Moment Y: Moment acting about Y-Y axis at 7.50 ft, D = 32.50, LR = 85.70, W = 14.0 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+1.60Lr+0.50W		Maximum SERVICE Load Reactions .			
Location of max.above base	7.946 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.670 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	32.184 k	φ * Pn =	52.292 k			
Mu-x =	51.215 k-ft	φ * Mn-x =	78.132 k-ft			
Mu-y =	-183.120 k-ft	φ * Mn-y =	277.070 k-ft			
Mu Angle =	74.0 deg	φ =	0.90			
Mu at Angle =	190.147 k-ft	φMn at Angle =	283.722 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .			General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacity	2,652.36 k		ρ : % Reinforcing		0.6225 %	Rebar % Ok
Pnmin : Nominal Min. Tension Axial Capacity	k		Reinforcing Area		4.40 in^2	
φ Pn, max : Usable Compressive Axial Capacity	1,379.23 k		Concrete Area		706.86 in^2	
φ Pn, min : Usable Tension Axial Capacity	k					
					β =	0.850
					θ =	0.80

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 38. Small Baseball Shade Structure CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base	Axial Load		Bending Analysis k-ft										Utilization	
	X-X	Y-Y		Pu	ϕ * Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio				
+1.40D	Actual	Actual	7.95	17.41	126.00	1.000	12.63	1.000	-45.50	74.000	47.22	341.78	0.138				
+1.20D+0.50Lr	Actual	Actual	7.95	20.32	73.40	1.000	20.55	1.000	-81.85	76.000	84.39	300.84	0.281				
+1.20D	Actual	Actual	7.95	14.92	126.00	1.000	10.82	1.000	-39.00	74.000	40.47	341.78	0.118				
+1.20D+1.60Lr	Actual	Actual	7.95	32.18	52.33	1.000	41.96	1.000	-176.12	77.000	181.05	284.25	0.637				
+1.20D+1.60Lr+0.50W	Actual	Actual	7.95	32.18	52.29	1.000	51.22	1.000	-183.12	74.000	190.15	283.72	0.670				
+1.20D+0.50W	Actual	Actual	7.95	14.92	94.21	1.000	20.08	1.000	-46.00	66.000	50.19	317.63	0.158				
+1.20D+0.50Lr+W	Actual	Actual	7.95	20.32	52.39	1.000	39.06	1.000	-95.85	68.000	103.50	284.08	0.364				
+1.20D+W	Actual	Actual	7.95	14.92	73.42	1.000	29.33	1.000	-53.00	61.000	60.58	301.96	0.201				
+0.90D+W	Actual	Actual	7.95	11.19	62.74	1.000	26.63	1.000	-43.25	58.000	50.79	292.83	0.173				
+0.90D	Actual	Actual	7.95	11.19	126.00	1.000	8.12	1.000	-29.25	74.000	30.36	341.78	0.089				

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		My - End Moments
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	
D Only						12.437	-9.020		-32.500
+D+Lr						23.224	-28.480		-118.200
+D+0.750Lr						20.528	-23.615		-96.775
+D+0.60W						12.437	-20.126		-40.900
+D+0.750Lr+0.450W						20.528	-31.945		-103.075
+D+0.450W						12.437	-17.350		-38.800
+0.60D+0.60W						7.462	-16.518		-27.900
+0.60D						7.462	-5.412		-19.500
Lr Only						10.787	-19.460		-85.700
W Only							-18.510		-14.000

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis		
	@ Base	@ Top		@ Base	@ Top	
D Only	-9.020		k-ft	-32.500		k-ft
+D+Lr	-28.480		k-ft	-118.200		k-ft
+D+0.750Lr	-23.615		k-ft	-96.775		k-ft
+D+0.60W	-20.126		k-ft	-40.900		k-ft
+D+0.750Lr+0.450W	-31.945		k-ft	-103.075		k-ft
+D+0.450W	-17.350		k-ft	-38.800		k-ft
+0.60D+0.60W	-16.518		k-ft	-27.900		k-ft
+0.60D	-5.412		k-ft	-19.500		k-ft
Lr Only	-19.460		k-ft	-85.700		k-ft
W Only	-18.510		k-ft	-14.000		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	-0.0143	in	8.000	ft	-0.004	in	8.000	ft
+D+Lr	-0.0521	in	8.000	ft	-0.013	in	8.000	ft
+D+0.750Lr	-0.0427	in	8.000	ft	-0.010	in	8.000	ft
+D+0.60W	-0.0180	in	8.000	ft	-0.009	in	8.000	ft
+D+0.750Lr+0.450W	-0.0454	in	8.000	ft	-0.014	in	8.000	ft
+D+0.450W	-0.0171	in	8.000	ft	-0.008	in	8.000	ft
+0.60D+0.60W	-0.0123	in	8.000	ft	-0.007	in	8.000	ft
+0.60D	-0.0086	in	8.000	ft	-0.002	in	8.000	ft
Lr Only	-0.0378	in	8.000	ft	-0.009	in	8.000	ft
W Only	-0.0061	in	7.946	ft	-0.008	in	7.946	ft

39. Family Canopy (Landscape Detail 4/L-2.32)

Shade Structures, LOADING PROVIDED BY Birdair, Landscape Drawings L-2.32-L-2.34

Preliminary column sizes at grade:

1. Family Canopy = 24" x 24" column with baseplates likely to be 32" x 32" x 2" with qty (16) 2" anchors
2. Large Baseball = 14" x 14" column with baseplates likely to be 22" x 22" x 1.5" with qty (8) 2" anchors
3. Small Baseball = 10" x 10" column with baseplates likely to be 16" x 16" x 1.5" with qty (8) 1.5" anchors
4. Soccer Canopy = 14" x 14" column with baseplates likely to be 22" x 22" x 1.5" with qty (8) 2" anchors
5. Stage Canopy = 24" x 24" column with baseplates likely to be 32" x 32" x 2" with qty (16) 2" anchors

The column sizes are based on preliminary engineering and have a slim chance of being modified after award and final engineering.

Load cad Descriptions:

- 1) Prestress + Dead load
- 2) Uniform Live Load = 30 psf
- 3) Uniform Wind Uplift Case = 12psf uplift
- 4) Wind X Case A – 12psf x C_p
- 5) Wind X Case B – 12psf x C_p
- 6) Wind Y Case A – 12psf x C_p
- 7) Wind Y Case B – 12psf x C_p
- 8) Wind XY Case A – 12psf x C_p
- 9) Wind XY Case B – 12psf x C_p

- Seismic loading: the structure is lightweight, therefore seismic will not be a governing load case and has not been evaluated.
- Sign convention: positive forces are defined to be in the direction of the x-y axis shown on the reaction node map with z acting up and out of the page. A positive "z" force means the foundation is seeing uplift.
- The effects of membrane prestress and dead load are included in all load cases.
- The forces tabulated are unfactored working loads.
- The loads tabulated represent forces that are applied to the building or foundation at that location.

Family Canopy - LOADING PROVIDED BY Birdair

Node No	Load Case	Reaction Forces, lbs			Resultant lbs	Reaction Moments, ft-lbs		
		Vx	Vy	P		Mx	My	T
1	1	2,039.40	-758.79	-14,112.00	14,278.78	-73,620.00	9,724.00	148.40
	2	2,667.20	-948.49	-29,741.00	29,875.42	-260,900.00	14,670.00	-2,006.00
	3	2,733.60	-2,662.60	5,660.70	6,826.82	179,100.00	14,970.00	-1,913.00
	4	2,258.80	-1,030.30	-8,533.40	8,887.22	-5,155.00	11,410.00	-545.40
	5	2,807.00	-3,065.90	8,001.90	9,017.17	211,000.00	15,500.00	-2,104.00
	6	2,791.60	453.60	-26,855.00	27,003.52	-396,000.00	15,410.00	-871.70
	7	2,708.90	1,118.80	-10,299.00	10,707.91	-205,800.00	13,630.00	-2,302.00
	8	2,094.80	-2,215.90	-13,775.00	14,108.47	54,890.00	10,790.00	-1,007.00
	9	2,504.50	-4,172.70	2,694.80	5,562.90	270,700.00	14,770.00	332.10
2	1	-284.98	111.82	-10,644.00	10,648.40	-68,030.00	-954.90	-473.00
	2	-527.19	511.61	-28,195.00	28,204.57	-254,800.00	-627.30	-895.80
	3	839.01	-2,666.90	10,714.00	11,072.76	185,000.00	5,520.00	-872.80
	4	51.38	-378.12	-4,628.50	4,644.20	195.10	1,035.00	-604.60
	5	963.62	-3,192.80	13,246.00	13,659.39	217,100.00	6,214.00	-914.90
	6	-596.13	1,901.40	-24,553.00	24,633.73	-390,900.00	-844.00	-998.10
	7	-207.78	2,225.10	-6,140.00	6,534.05	-203,600.00	8.15	-356.50
	8	78.73	-1,324.00	-10,455.00	10,538.79	56,740.00	1,206.00	72.88
	9	1,215.80	-4,135.80	7,388.70	8,554.29	273,900.00	8,068.00	-138.40
3	1	33.94	-129.11	-11,239.00	11,239.79	-62,480.00	322.50	-151.80
	2	129.97	-244.80	-29,372.00	29,373.31	-249,600.00	1,470.00	-163.00
	3	371.77	-2,450.70	11,126.00	11,398.77	192,200.00	2,539.00	-434.30
	4	139.37	-473.31	-4,936.70	4,961.30	6,011.00	1,030.00	-233.50
	5	407.40	-2,936.80	13,777.00	14,092.43	224,700.00	2,764.00	-468.00
	6	119.02	989.90	-25,835.00	25,854.23	-387,000.00	1,471.00	-136.00
	7	97.67	1,875.70	-6,754.40	7,010.69	-199,600.00	915.10	-106.90
	8	60.26	-1,358.00	-9,788.80	9,882.73	57,740.00	651.10	-76.70
	9	423.73	-3,776.10	8,868.30	9,648.07	276,200.00	3,578.00	945.60
4	1	0.00	-198.30	-11,188.00	11,189.76	-61,200.00	0.00	0.00
	2	0.00	-386.59	-29,281.00	29,283.55	-249,700.00	0.00	0.06
	3	0.00	-2,423.70	11,123.00	11,384.00	195,200.00	0.02	-0.09
	4	-0.02	-507.40	-4,903.40	4,929.58	7,638.00	-0.15	-0.02
	5	-0.02	-2,902.60	13,766.00	14,068.68	227,900.00	-0.15	-0.11
	6	-0.02	832.79	-25,729.00	25,742.47	-387,700.00	-0.19	0.10
	7	-0.02	1,831.30	-6,705.60	6,951.17	-199,200.00	-0.19	0.04
	8	-69.81	-1,332.20	-9,309.80	9,404.89	53,050.00	-401.70	261.50
	9	62.84	-3,734.40	9,319.90	10,040.43	273,600.00	1,057.00	1,449.00
5	1	-33.94	-129.11	-11,239.00	11,239.79	-62,480.00	-322.50	151.80
	2	-129.97	-244.80	-29,372.00	29,373.31	-249,600.00	-1,470.00	163.10
	3	-371.78	-2,450.70	11,126.00	11,398.77	192,200.00	-2,539.00	434.10
	4	-139.32	-473.02	-4,936.60	4,961.17	6,010.00	-1,030.00	233.40
	5	-407.35	-2,936.50	13,777.00	14,092.36	224,700.00	-2,764.00	467.80
	6	-118.95	990.22	-25,835.00	25,854.24	-387,000.00	-1,471.00	136.20
	7	-97.61	1,876.00	-6,754.30	7,010.67	-199,600.00	-915.20	107.00
	8	-255.09	-1,211.80	-8,895.90	8,981.68	44,680.00	-1,699.00	476.50
	9	-378.74	-3,721.80	9,785.80	10,476.50	264,000.00	-1,834.00	1,964.00

Node No	Load Case	Reaction Forces, lbs			Resultant lbs	Reaction Moments, ft-lbs		
		Vx	Vy	P		Mx	My	T
6	1	284.98	111.82	-10,644.00	10,648.40	-68,030.00	954.90	473.00
	2	527.20	511.61	-28,195.00	28,204.57	-254,800.00	627.30	895.90
	3	-839.01	-2,666.90	10,714.00	11,072.76	185,000.00	-5,520.00	872.60
	4	-51.33	-378.58	-4,628.70	4,644.44	195.40	-1,035.00	604.50
	5	-963.58	-3,193.20	13,246.00	13,659.49	217,100.00	-6,214.00	914.70
	6	596.17	1,900.90	-24,553.00	24,633.69	-390,900.00	843.90	998.10
	7	207.82	2,224.60	-6,140.20	6,534.07	-203,600.00	-8.26	356.50
	8	-11.73	-1,006.80	-7,545.10	7,611.99	32,340.00	-1,053.00	1,388.00
	9	-635.17	-3,861.40	10,310.00	11,027.69	249,700.00	-3,895.00	2,002.00
7	1	-2,039.40	-758.79	-14,112.00	14,278.78	-73,620.00	-9,724.00	-148.40
	2	-2,667.20	-948.49	-29,741.00	29,875.42	-260,900.00	-14,670.00	2,006.00
	3	-2,733.60	-2,662.60	5,660.70	6,826.82	179,100.00	-14,970.00	1,913.00
	4	-2,258.80	-1,030.10	-8,533.30	8,887.10	-5,155.00	-11,410.00	545.70
	5	-2,807.00	-3,065.70	8,002.00	9,017.19	211,000.00	-15,500.00	2,104.00
	6	-2,791.70	453.84	-26,855.00	27,003.53	-396,000.00	-15,410.00	872.00
	7	-2,709.00	1,119.00	-10,299.00	10,707.95	-205,800.00	-13,630.00	2,302.00
	8	-2,381.20	-1,540.60	-10,758.00	11,125.56	21,600.00	-12,190.00	1,204.00
	9	-2,606.90	-3,536.00	5,697.00	7,194.10	237,400.00	-13,730.00	2,405.00
Max Values:		2,807.0	4,172.7	29,741.0	29,875.4	396,000.0	15,500.0	2,405.0

Node 1				Node 2			
P	V	Mx	My	P	V	Mx	My
29,741	2,667	260,900	14,670	28,195	527	254,800	627
26,855	2,792	396,000	15,410	24,553	596	390,900	844
8,002	2,807	211,000	15,500	7,389	1,216	273,900	8,068

Node 3				Node 4			
P	V	Mx	My	P	V	Mx	My
29,372	130	249,600	1,470	29,281	0	249,700	0
25,835	119	387,000	1,471	25,729	0	387,700	0
8,868	424	276,200	3,578	9,320	63	273,600	1,057

Node 5				Node 6			
P	V	Mx	My	P	V	Mx	My
29,372	130	249,600	1,470	28,195	527	254,800	627
25,835	119	387,000	1,471	24,553	596	390,900	844
13,777	407	224,700	2,764	10,310	635	249,700	6,214

Node 7			
P	V	Mx	My
29,741	2,667	260,900	14,670
26,855	2,792	396,000	15,410
8,002	2,807	211,000	15,500



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: Family Shade Canopy Foundation
Location:
Design name: Ontario Sports Park - Family Shade Canopy

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19
Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place
Material: F1554 Grade 36
Diameter (inch): 1.250
Effective Embedment depth, h_{ef} (inch): 8.000
Anchor category: -
Anchor ductility: Yes
 h_{min} (inch): 10.00
 C_{min} (inch): 1.65
 S_{min} (inch): 5.00

Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Uncracked
Compressive strength, f'_c (psi): 4000
 $\Psi_{c,v}$: 1.4
Reinforcement condition: A tension, A shear
Supplemental edge reinforcement: Yes
Reinforcement provided at corners: Yes
Ignore concrete breakout in tension: Yes
Ignore concrete breakout in shear: Yes
Ignore 6d requirement: Yes
Build-up grout pad: Yes

Base Plate

Diameter x Thickness (inch): 40.00 x 2.50
Yield stress: 36000 psi

Profile type/size: 16X16X1/2

Recommended Anchor

Anchor Name: Heavy Hex Bolt - 1 1/4"Ø Heavy Hex Bolt, F1554 Gr. 36





Anchor Designer™ for Concrete Software

Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 11126

V_{uax} [lb]: 2807

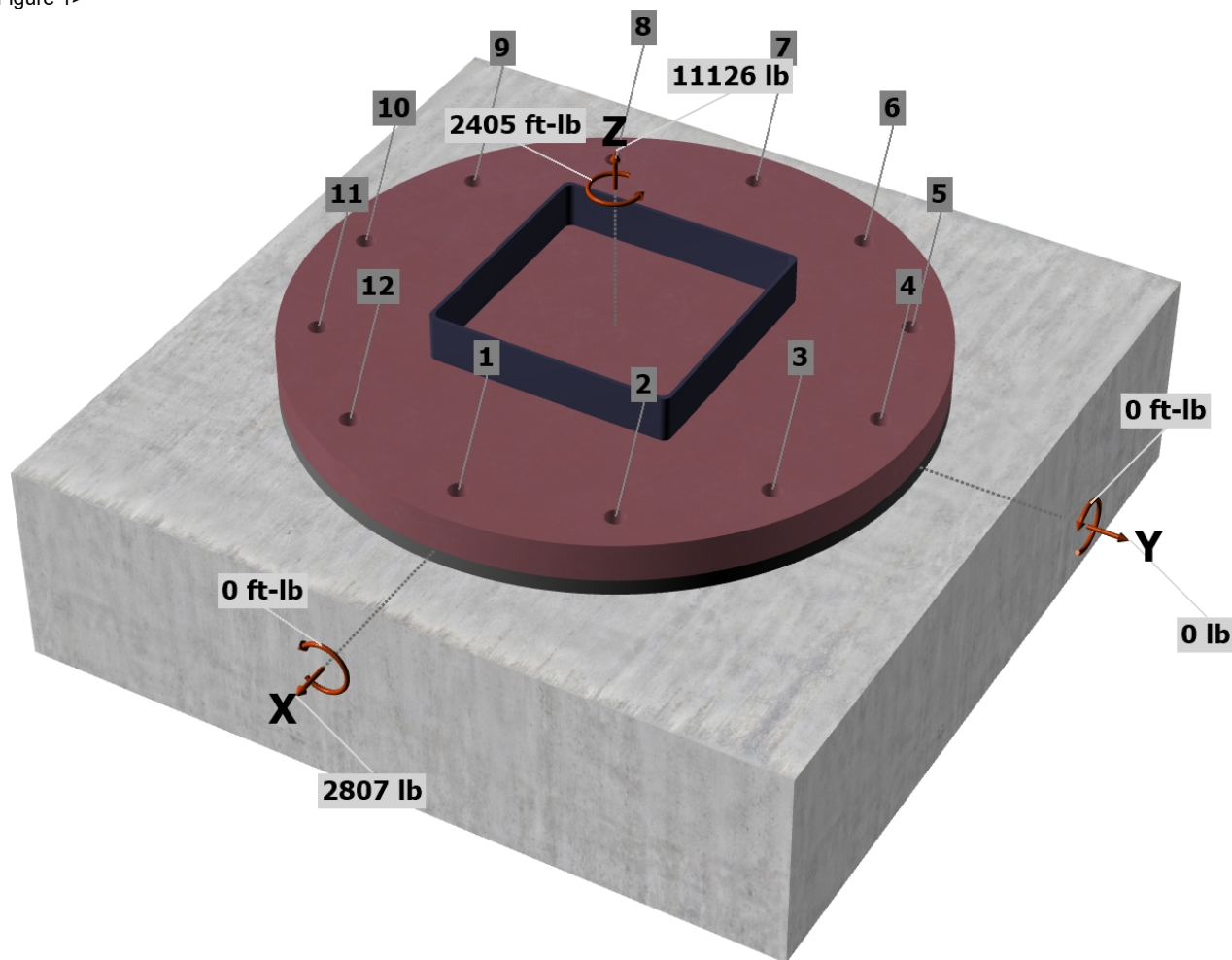
V_{uay} [lb]: 0

M_{ux} [ft-lb]: 0

M_{uy} [ft-lb]: 0

M_{uz} [ft-lb]: 2405

<Figure 1>



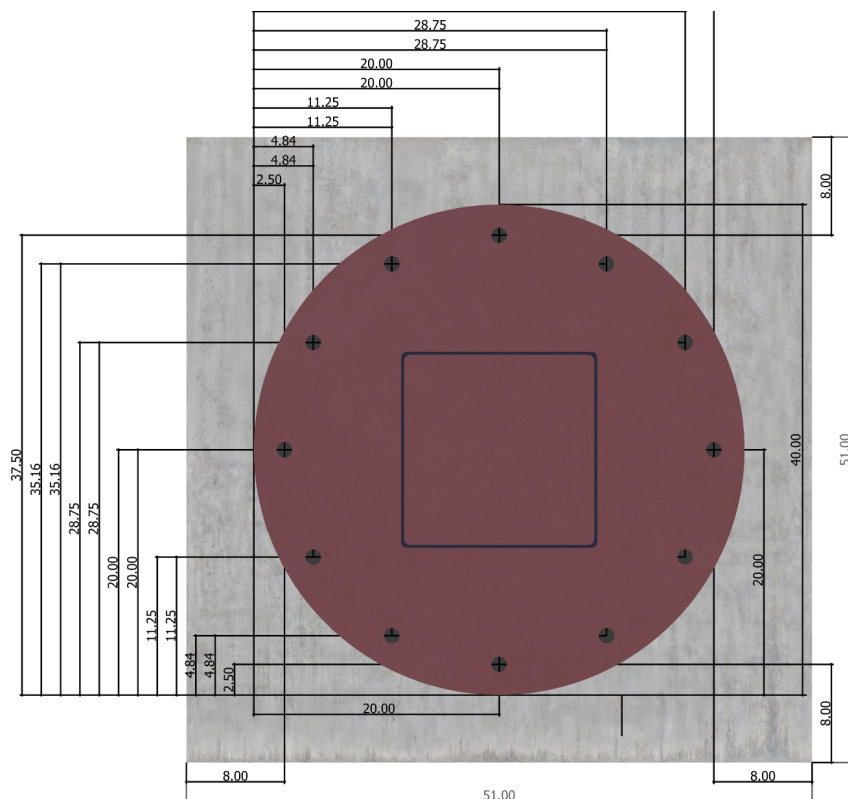
Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	927.2	233.9	137.4	271.3
2	927.2	165.2	119.0	203.6
3	927.2	114.9	68.7	133.9
4	927.2	96.5	0.0	96.5
5	927.2	114.9	-68.7	133.9
6	927.2	165.2	-119.0	203.6
7	927.2	233.9	-137.4	271.3
8	927.2	302.6	-119.0	325.2
9	927.2	352.9	-68.7	359.6
10	927.2	371.3	0.0	371.3
11	927.2	352.9	68.7	359.6
12	927.2	302.6	119.0	325.2
Sum	11126.0	2807.0	0.0	3054.8

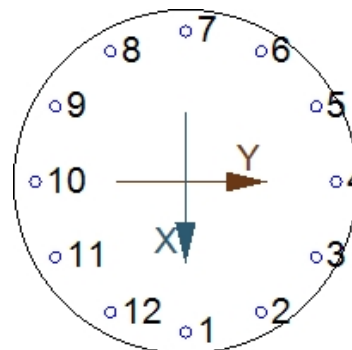


Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 11126
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 5.14
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
56200	0.75	42150

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \psi_{c,p} N_p = \phi \psi_{c,p} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\psi_{c,p}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	2.24	4000	0.70	70152



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
33720	0.8	0.65	17534

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp} (A_{Nc} / A_{Nco}) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1a)

k_{cp}	A_{Nc} (in ²)	A_{Nco} (in ²)	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	166.58	576.00	0.900	1.250	1.000	34346	0.70	15645

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.8)

Tension	Factored Load, N _{ua} (lb)	Design Strength, ϕN _n (lb)	Ratio	Status	
Steel	927	42150	0.02	Pass (Governs)	
Pullout	927	70152	0.01	Pass	
Shear	Factored Load, V _{ua} (lb)	Design Strength, ϕV _n (lb)	Ratio	Status	
Steel	371	17534	0.02	Pass	
Pryout	371	15645	0.02	Pass (Governs)	
Interaction check	(N _{ua} /ϕN _{ua}) ^{5/3}	(V _{ua} /ϕV _{ua}) ^{5/3}	Utilization Ratio	Permissible	Status
Sec. R17.8	0.00	0.00	0.4%	1.0	Pass

1 1/4"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel

36000 psi

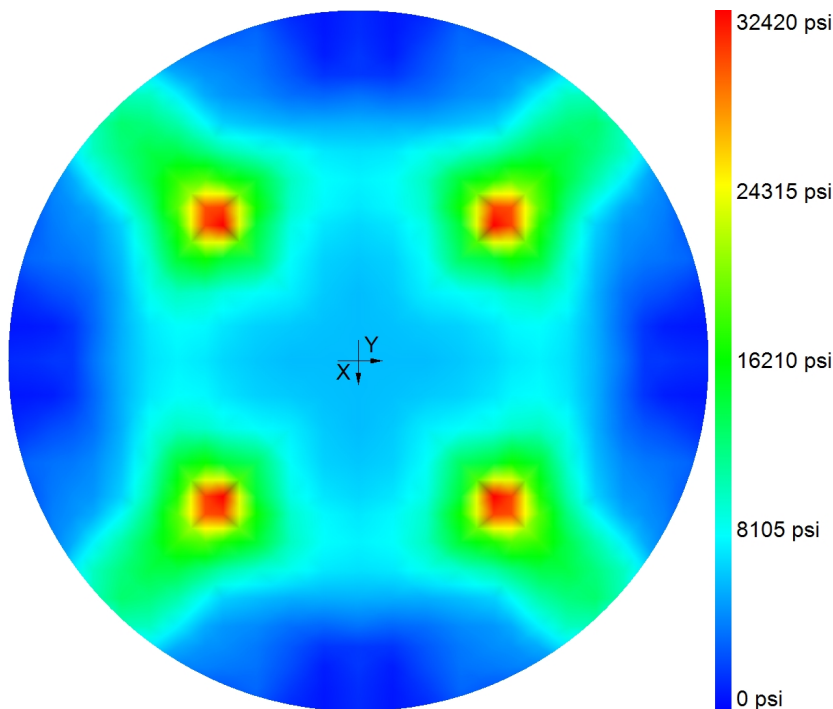
Maximum stress

32420 psi

Calculated plate thickness

0.506 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{ top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{ top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{ top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

12. Warnings

- For irregular anchor patterns, the designer must consider sizing of base plate holes to ensure shear loads are distributed to anchors as designed.
- Minimum spacing and edge distance requirement of 6da per ACI 318 Table 17.9.2(a) for torqued cast-in-place anchor is waived per designer option.\n
- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	8
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	19757	2855	0	0	103068	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	64520	6714	0	0	505784	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	46675	5114	0	0	349244	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	30362	3843	0	0	286344	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	73530	7906	0	0	745244	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	46675	5114	0	0	349244	0	-	-	-
U = 0.9D + 1.0W	39556	4627	0	0	462258	0	-	-	-



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: Family Shade Canopy Foundation
Location:
Design name: Ontario Sports Park - Family Shade Canopy

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19
Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place
Material: F1554 Grade 36
Diameter (inch): 1.250
Effective Embedment depth, h_{ef} (inch): 8.000
Anchor category: -
Anchor ductility: Yes
 h_{min} (inch): 10.00
 C_{min} (inch): 1.65
 S_{min} (inch): 5.00

Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Uncracked
Compressive strength, f'_c (psi): 4000
Reinforcement condition: A tension, A shear
Supplemental edge reinforcement: Yes
Reinforcement provided at corners: Yes
Ignore concrete breakout in tension: Yes
Ignore concrete breakout in shear: Yes
Ignore ϕ_{do} requirement: Yes
Build-up grout pad: Yes

Base Plate

Diameter x Thickness (inch): 40.00 x 2.50
Yield stress: 36000 psi

Profile type/size: 16X16X1/2

Recommended Anchor

Anchor Name: Heavy Hex Bolt - 1 1/4"Ø Heavy Hex Bolt, F1554 Gr. 36





Anchor Designer™ for Concrete Software

Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

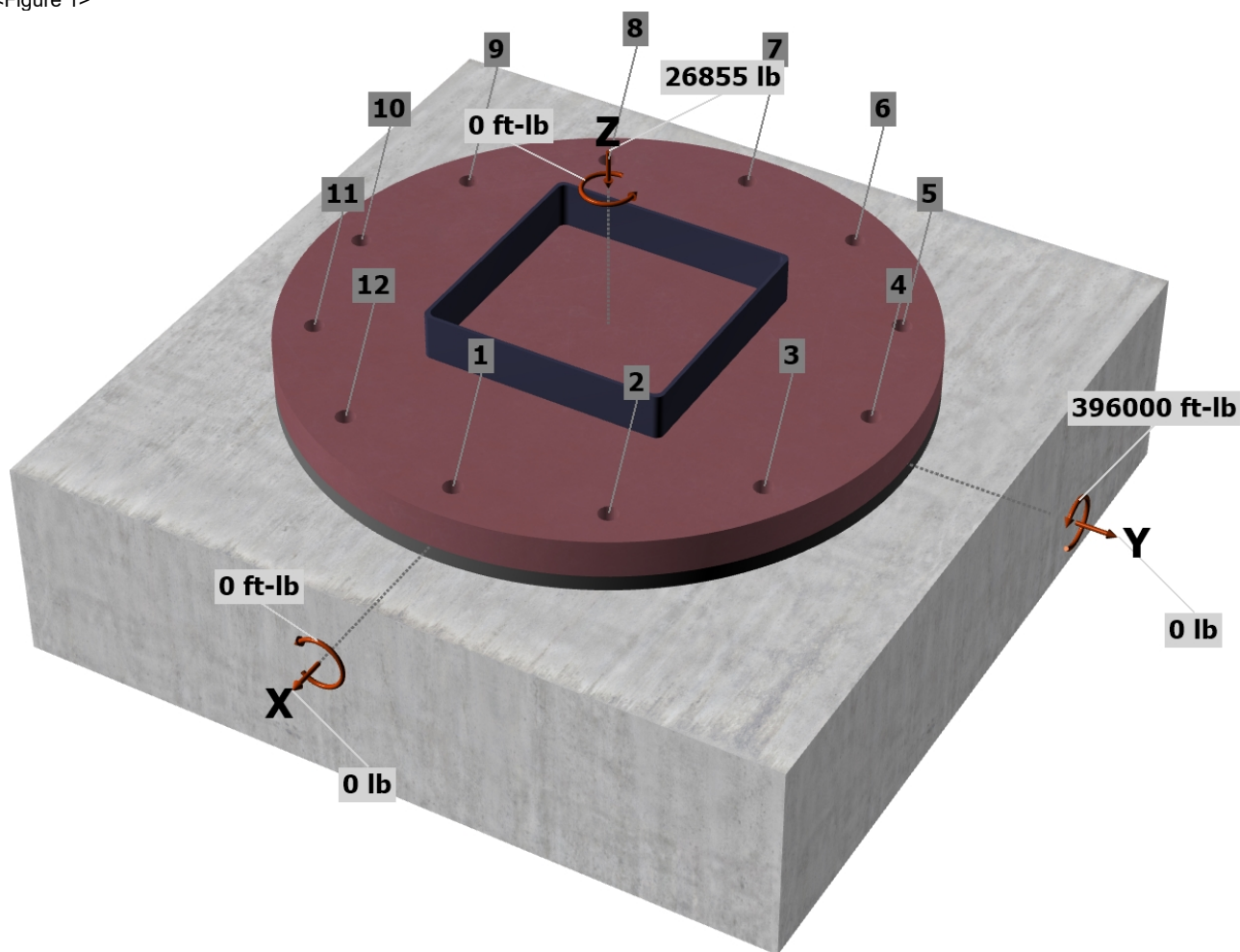
Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: -26855
 V_{uax} [lb]: 0
 V_{uay} [lb]: 0
 M_{ux} [ft-lb]: 0
 M_{uy} [ft-lb]: 396000
 M_{uz} [ft-lb]: 0

<Figure 1>



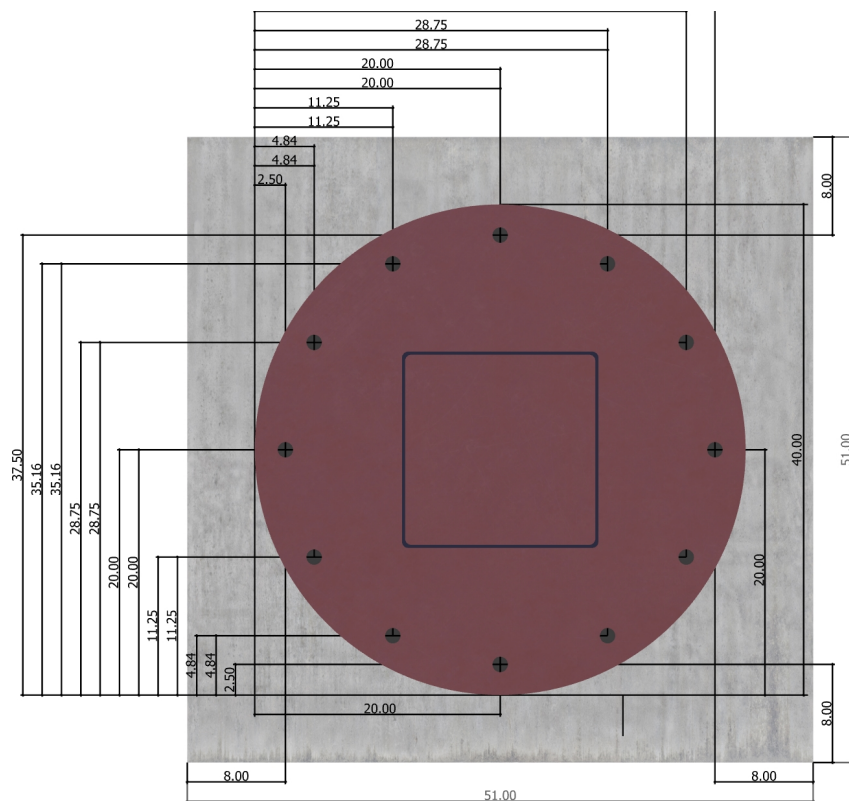
Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0
3	637.4	0.0	0.0	0.0
4	11329.1	0.0	0.0	0.0
5	22020.8	0.0	0.0	0.0
6	29853.2	0.0	0.0	0.0
7	32712.5	0.0	0.0	0.0
8	29853.2	0.0	0.0	0.0
9	22020.8	0.0	0.0	0.0
10	11329.1	0.0	0.0	0.0
11	637.4	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0
Sum	160393.4	0.0	0.0	0.0

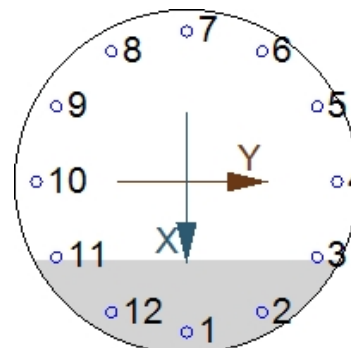


**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Maximum concrete compression strain (‰): 0.39
Maximum concrete compression stress (psi): 1682
Resultant tension force (lb): 160393
Resultant compression force (lb): 187248
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 6.23

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
56200	0.75	42150

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \psi_{c,p} N_p = \phi \psi_{c,p} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\psi_{c,p}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	2.24	4000	0.70	70152



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	32712	42150	0.78	Pass (Governs)
Pullout	32712	70152	0.47	Pass

1 1/4"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel

36000 psi

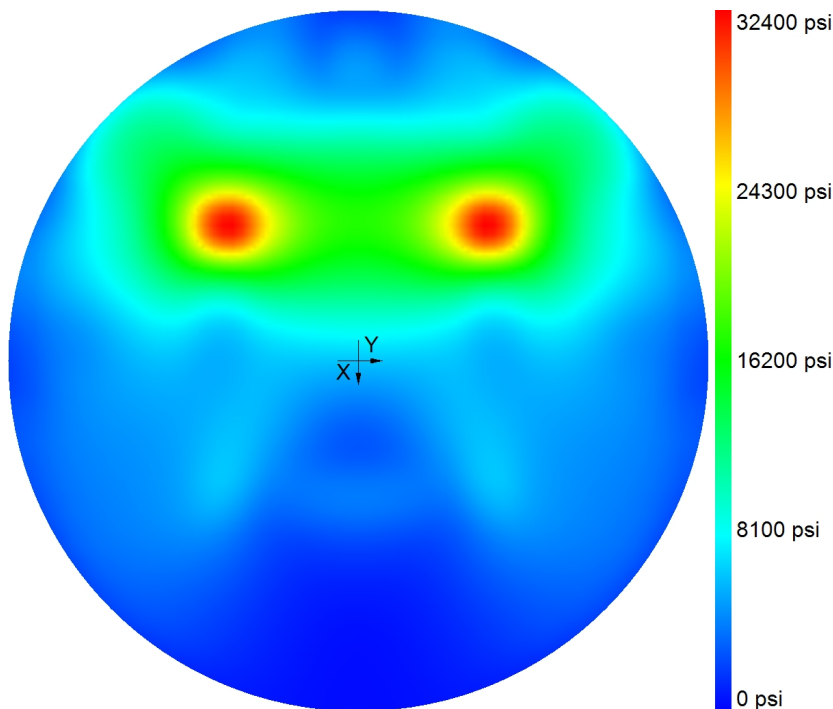
Maximum stress

32400 psi

Calculated plate thickness

2.502 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{ top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{ top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{ top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Table 17.9.2(a) for torqued cast-in-place anchor is waived per designer option.\n
- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	8
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	19757	2855	0	0	103068	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	64520	6714	0	0	505784	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	46675	5114	0	0	349244	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	30362	3843	0	0	286344	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	73530	7906	0	0	745244	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	46675	5114	0	0	349244	0	-	-	-
U = 0.9D + 1.0W	39556	4627	0	0	462258	0	-	-	-

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 39. Family Shade Structure Post Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 48.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination $D+0.750L_r+0.450W$
Lateral Load 44.755 k
Moment 447.550 k-ft

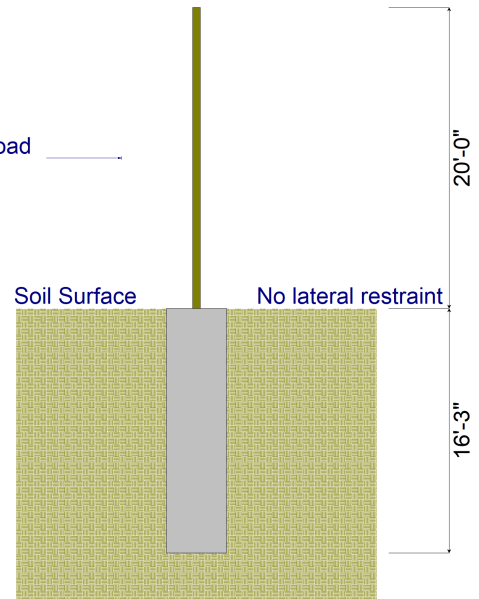
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 2,701.31 psf
Allowable 2,701.61 psf

Minimum Required Depth 16.250 ft

Footing Base Area 12.566 ft²
Maximum Soil Pressure 3.490 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	7.360 k		k/ft	14.112 k
Lr : Roof Live	26.10 k		k/ft	29.740 k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	39.60 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	10.0 ft	TOP of Load above ground surface	20.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	7.360	73.600	7.88	1,306.6	1,310.5	1.000
+D+Lr	33.460	334.600	14.38	2,395.0	2,395.2	1.000
+D+0.750Lr	26.935	269.350	13.25	2,191.3	2,191.8	1.000
+D+0.60W	31.120	311.200	14.00	2,323.7	2,325.7	1.000
+D+0.750Lr+0.450W	44.755	447.550	16.25	2,701.3	2,701.6	1.000
+D+0.450W	25.180	251.800	12.88	2,132.1	2,132.4	1.000
+0.60D+0.60W	28.176	281.760	13.50	2,230.6	2,233.4	1.000
+0.60D	4.416	44.160	6.50	1,075.2	1,076.4	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 39. Family Shade Structure CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

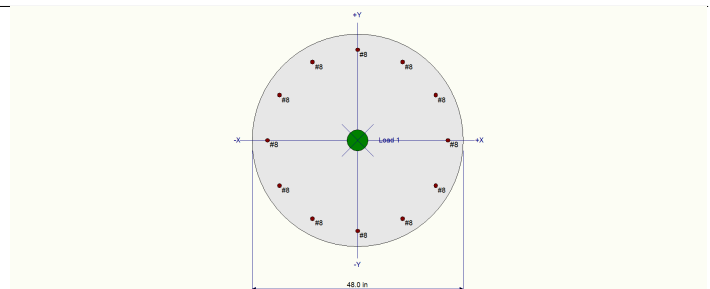
f'_c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	17.250 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along colum:		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 48.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 12 - #8 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 32,515.5 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 17.250 ft above base, D = 14.112, LR = 29.741 k

BENDING LOADS . . .

Moment X: Moment acting about X-X axis at 17.250 ft, D = 73.620, LR = 260.90, W = 396.0 k-ft

Moment Y: Moment acting about Y-Y axis at 17.250 ft, W = 15.50 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+1.60Lr+0.50W		Maximum SERVICE Load Reactions .			
Location of max.above base	17.134 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.643 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	103.539 k	φ * Pn =	157.007 k			
Mu-x =	703.78 k-ft	φ * Mn-x =	1,112.16 k-ft			
Mu-y =	17.602 k-ft	φ* Mn-y =	19.866 k-ft			
Mu Angle =	1.0 deg	φ =	0.90			
Mu at Angle =	704.0 k-ft	φMn at Angle =	1,094.09 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .			Maximum SERVICE Load Deflections . .			
Pnmax : Nominal Max. Compressive Axial Capacity	6,689.06 k		Along Y-Y	-0.1405 in	at 17.250 ft above base	
Pnmin : Nominal Min. Tension Axial Capacity	k		for load combination : +D+0.750Lr+0.450W			
φ Pn, max : Usable Compressive Axial Capacity	3,478.31 k		Along X-X	0.004866in	at 17.250 ft above base	
φ Pn, min : Usable Tension Axial Capacity	k		for load combination : W Only			
			General Section Information			
			β =0.850 θ = 0.80			
			ρ : % Reinforcing	0.5239 %	Rebar % Ok	
			Reinforcing Area	9.480 in^2		
			Concrete Area	1,809.56 in^2		

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 39. Family Shade Structure CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft								Utilization	
	X-X	Y-Y		Pu	ϕ * Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio		
+1.40D	Actual	M2,min	17.13	65.28	1,405.33	1.000	103.07	1.000	11.10	6.000	103.66	2,220.22	0.047		
+1.20D+0.50Lr	Actual	M2,min	17.13	70.82	497.93	1.000	218.79	1.000	12.04	3.000	219.13	1,530.10	0.143		
+1.20D	Actual	M2,min	17.13	55.95	1,405.33	1.000	88.34	1.000	9.51	6.000	88.85	2,220.22	0.040		
+1.20D+1.60Lr	Actual	M2,min	17.13	103.54	261.79	1.000	505.78	1.000	17.60	2.000	506.09	1,233.76	0.410		
+1.20D+1.60Lr+0.50W	Actual	M2,min	17.13	103.54	157.01	1.000	703.78	1.000	17.60	1.000	704.00	1,094.09	0.643		
+1.20D+0.50W	Actual	M2,min	17.13	55.95	235.49	1.000	286.34	1.000	9.51	2.000	286.50	1,199.59	0.239		
+1.20D+0.50Lr+W	Actual	Actual	17.13	70.82	131.08	1.000	614.79	1.000	-15.50	1.000	614.99	1,057.06	0.582		
+1.20D+W	Actual	Actual	17.13	55.95	130.96	1.000	484.34	1.000	-15.50	2.000	484.59	1,056.42	0.459		
+0.90D+W	Actual	Actual	17.13	41.96	78.44	1.000	462.26	1.000	-15.50	2.000	462.52	979.27	0.472		
+0.90D	Actual	M2,min	17.13	41.96	1,405.33	1.000	66.26	1.000	7.13	6.000	66.64	2,220.22	0.030		

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction @ Base	Mx - End Moments k-ft		My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only						46.627	-73.620			
+D+Lr						76.368	-334.520			
+D+0.750Lr						68.933	-269.295			
+D+0.60W						46.627	-311.220		-9.300	
+D+0.750Lr+0.450W						68.933	-447.495		-6.975	
+D+0.450W						46.627	-251.820		-6.975	
+0.60D+0.60W						27.976	-281.772		-9.300	
+0.60D						27.976	-44.172			
Lr Only						29.741	-260.900			
W Only							-396.000		-15.500	

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis		
	@ Base	@ Top		@ Base	@ Top	
D Only	-73.620		k-ft			k-ft
+D+Lr	-334.520		k-ft			k-ft
+D+0.750Lr	-269.295		k-ft			k-ft
+D+0.60W	-311.220		k-ft	-9.300		k-ft
+D+0.750Lr+0.450W	-447.495		k-ft	-6.975		k-ft
+D+0.450W	-251.820		k-ft	-6.975		k-ft
+0.60D+0.60W	-281.772		k-ft	-9.300		k-ft
+0.60D	-44.172		k-ft			k-ft
Lr Only	-260.900		k-ft			k-ft
W Only	-396.000		k-ft	-15.500		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	-0.023	in	17.250	ft
+D+Lr	0.0000	in	0.000	ft	-0.105	in	17.250	ft
+D+0.750Lr	0.0000	in	0.000	ft	-0.085	in	17.250	ft
+D+0.60W	-0.0029	in	17.250	ft	-0.098	in	17.250	ft
+D+0.750Lr+0.450W	-0.0022	in	17.250	ft	-0.140	in	17.250	ft
+D+0.450W	-0.0022	in	17.250	ft	-0.079	in	17.250	ft
+0.60D+0.60W	-0.0029	in	17.250	ft	-0.088	in	17.250	ft
+0.60D	0.0000	in	0.000	ft	-0.014	in	17.250	ft
Lr Only	0.0000	in	0.000	ft	-0.082	in	17.250	ft
W Only	-0.0048	in	17.134	ft	-0.123	in	17.134	ft

40. Large Baseball Canopy (Landscape Detail 3/L-2.33)

Shade Structures, **LOADING PROVIDED BY Birdair**, Landscape Drawings L-2.32-L-2.34

Preliminary column sizes at grade:

1. Family Canopy = 24" x 24" column with baseplates likely to be 32" x 32" x 2" with qty (16) 2" anchors
2. Large Baseball = 14" x 14" column with baseplates likely to be 22" x 22" x 1.5" with qty (8) 2" anchors
3. Small Baseball = 10" x 10" column with baseplates likely to be 16" x 16" x 1.5" with qty (8) 1.5" anchors
4. Soccer Canopy = 14" x 14" column with baseplates likely to be 22" x 22" x 1.5" with qty (8) 2" anchors
5. Stage Canopy = 24" x 24" column with baseplates likely to be 32" x 32" x 2" with qty (16) 2" anchors

The column sizes are based on preliminary engineering and have a slim chance of being modified after award and final engineering.

Load cad Descriptions:

- 1) Prestress + Dead load
- 2) Uniform Live Load = 30 psf
- 3) Uniform Wind Uplift Case = 12psf uplift
- 4) Wind X Case A – 12psf x Cp
- 5) Wind X Case B – 12psf x Cp
- 6) Wind Y Case A – 12psf x Cp
- 7) Wind Y Case B – 12psf x Cp
- 8) Wind XY Case A – 12psf x Cp
- 9) Wind XY Case B – 12psf x Cp

- Seismic loading: the structure is lightweight, therefore seismic will not be a governing load case and has not been evaluated.
- Sign convention: positive forces are defined to be in the direction of the x-y axis shown on the reaction node map with z acting up and out of the page. A positive "z" force means the foundation is seeing uplift.
- The effects of membrane prestress and dead load are included in all load cases.
- The forces tabulated are unfactored working loads.
- The loads tabulated represent forces that are applied to the building or foundation at that location.

Large Baseball Canopy - LOADING PROVIDED BY Birdair

Node No	Load Case	Reaction Forces, lbs			Resultant lbs	Reaction Moments, ft-lbs		
		Vx	Vy	P		Mx	My	T
1	1	-955.03	-68.64	-8,225.90	8,281.44	-19,450.00	8,547.00	719.00
	2	-2,407.40	886.55	-13,547.00	13,787.78	-45,930.00	16,680.00	829.80
	3	1,511.90	-1,961.80	-1,569.70	2,932.31	17,660.00	3,401.00	-778.90
	4	-567.13	410.13	-9,243.40	9,269.86	-35,490.00	23,700.00	-5.33
	5	1,385.50	-1,188.00	-3,324.10	3,792.18	-2,650.00	17,250.00	-1,540.00
	6	-2,545.60	1,896.50	-10,992.00	11,441.19	-48,140.00	11,400.00	515.80
	7	-678.75	224.96	-5,085.40	5,135.43	-15,000.00	4,219.00	207.30
	8	-49.06	-1,816.80	-7,470.70	7,688.60	7,615.00	488.40	445.90
	9	2,152.20	-3,267.10	-1,575.10	4,217.45	39,350.00	-4,256.00	-698.90
2	1	-1,489.10	1,882.60	-5,214.60	5,740.53	-25,620.00	5,712.00	190.90
	2	-3,616.50	3,915.50	-10,383.00	11,671.20	-55,810.00	10,940.00	808.60
	3	2,139.70	-2,574.00	477.62	3,381.11	21,200.00	3,672.00	94.41
	4	-1,420.80	2,021.70	-6,003.80	6,492.42	-39,330.00	18,300.00	-106.60
	5	1,569.30	-1,557.40	-829.38	2,361.37	837.30	15,170.00	-1,343.00
	6	-3,687.80	4,534.10	-5,609.90	8,101.17	-57,320.00	6,728.00	887.70
	7	-775.73	1,146.80	-430.44	1,449.89	-18,290.00	3,352.00	-591.30
	8	63.53	-210.37	-7,133.60	7,136.98	2,543.00	-208.20	-515.30
	9	2,863.90	-3,959.00	-1,954.30	5,262.59	43,770.00	-4,315.00	1,316.00
3	1	-2,456.70	130.69	-7,624.90	8,011.96	-11,260.00	-6,119.00	558.50
	2	-5,790.40	346.73	-15,765.00	16,798.34	-27,720.00	-13,150.00	430.60
	3	1,909.80	518.85	1,890.90	2,737.16	5,755.00	6,658.00	-873.60
	4	-2,328.90	472.78	-9,234.30	9,535.18	-23,360.00	3,833.00	-833.70
	5	1,473.40	319.38	-794.44	1,704.13	-5,260.00	13,710.00	-704.40
	6	-6,726.20	1,340.80	-10,406.00	12,462.92	-32,130.00	-18,790.00	556.90
	7	-2,685.90	1,780.90	-1,802.20	3,692.37	-17,620.00	-7,199.00	333.60
	8	154.18	-270.05	-8,205.10	8,210.99	4,585.00	-2,154.00	1,202.00
	9	3826.8	-362.59	510.01	3877.63	22330	7177	-1329
4	1	-766.52	-231.00	-3,222.30	3,320.26	-8,368.00	-1,974.00	476.60
	2	-2,016.30	-1,194.50	-4,710.40	5,261.19	-17,750.00	-4,993.00	1,078.00
	3	1,164.60	497.62	-1,530.50	1,986.54	4,685.00	4,714.00	-6.00
	4	-20.99	-365.58	-2,651.70	2,676.86	-13,460.00	4,580.00	53.50
	5	1,618.30	362.17	-1,079.80	1,978.90	-1,780.00	10,280.00	-1,397.00
	6	-2,785.50	-1,002.20	-958.90	3,111.74	-21,630.00	-7,616.00	629.70
	7	-1,160.20	-171.70	754.70	1,394.67	-9,997.00	-3,089.00	1,327.00
	8	370.99	142.05	-5,983.20	5,996.37	1,096.00	317.00	1,275.00
	9	2,299.80	847.70	-4,663.70	5,268.56	12,120.00	7,356.00	-201.40
5	1	-3,054.20	-1,713.60	-11,301.00	11,831.19	-6,061.00	-10,420.00	-148.20
	2	-6,248.10	-3,954.30	-22,701.00	23,874.89	-16,650.00	-20,830.00	-293.10
	3	894.81	1,621.70	1,875.20	2,635.71	1,780.00	3,560.00	-55.86
	4	-284.68	-1,772.50	-8,946.70	9,125.03	-6,121.00	3,320.00	-751.90
	5	3,283.70	1,531.60	2,993.10	4,699.69	-1,118.00	16,000.00	-677.40
	6	-5,487.40	-3,698.60	-19,493.00	20,585.63	-29,370.00	-18,100.00	98.70
	7	-2,137.40	-1,774.90	-7,806.80	8,286.43	-14,070.00	-6,982.00	509.80
	8	-3643	-338.3	-10130	10770.46	1975	-14230	-538
	9	-41.54	2,500.80	1,791.10	3,076.32	9,987.00	-1,115.00	-58.60

Node No	Load Case	Reaction Forces, lbs			Resultant lbs	Reaction Moments, ft-lbs		
		Vx	Vy	P		Mx	My	T
6	1	3,054.20	-1,713.60	-11,301.00	11,831.19	-6,062.00	10,420.00	148.20
	2	6,248.20	-3,954.20	-22,701.00	23,874.90	-16,650.00	20,830.00	293.20
	3	-894.83	1,621.70	1,875.20	2,635.72	1,780.00	-3,560.00	55.79
	4	3,264.40	-631.27	-6,761.80	7,535.03	-4,902.00	15,020.00	-424.30
	5	-305.51	2,412.40	5,116.40	5,664.85	1,763.00	2,302.00	-659.10
	6	5,498.90	-3,693.00	-19,485.00	20,580.12	-29,370.00	18,170.00	-107.40
	7	2,149.60	-1,769.00	-7,797.90	8,279.94	-14,080.00	7,057.00	-519.10
	8	1,985.60	-483.42	-9,751.10	9,962.94	-14.24	5,049.00	152.20
	9	-1,470.50	2,272.00	2,212.60	3,495.70	8,713.00	-6,665.00	851.50
7	1	766.50	-231.02	-3,222.30	3,320.26	-8,367.00	1,973.00	-476.60
	2	2,016.20	-1,194.60	-4,710.40	5,261.18	-17,740.00	4,993.00	-1,078.00
	3	-1,164.60	497.61	-1,530.50	1,986.54	4,685.00	-4,714.00	6.02
	4	1,014.40	-407.34	-3,750.40	3,906.46	99.41	6,696.00	-1,186.00
	5	-824.90	153.84	-2,301.50	2,449.70	12,300.00	226.70	-215.70
	6	2,789.70	-1,007.00	-971.43	3,120.92	-21,550.00	7,663.00	-638.60
	7	1164.6	-176.18	741.71	1391.93	-9918	3139	-1338
	8	-474.89	243.50	-3,272.50	3,315.73	-4,427.00	-3,978.00	23.90
	9	-1,940.20	886.24	-1,849.50	2,823.20	7,506.00	-8,448.00	-114.00
8	1	2,456.70	130.72	-7,624.90	8,011.96	-11,260.00	6,119.00	-558.50
	2	5,790.30	346.80	-15,765.00	16,798.30	-27,720.00	13,150.00	-430.40
	3	-1,909.80	518.82	1,890.90	2,737.15	5,755.00	-6,658.00	873.70
	4	1,383.50	34.87	-7,133.20	7,266.21	-43.44	9,049.00	-848.40
	5	-2,426.70	55.92	1,469.10	2,837.30	17,220.00	-1,340.00	706.60
	6	6,733.90	1,348.30	-10,367.00	12,435.35	-32,020.00	18,910.00	-572.20
	7	2,698.20	1,785.20	-1,764.90	3,685.39	-17,480.00	7,347.00	-347.40
	8	458.31	52.77	-4,489.20	4,512.84	-4,712.00	-1,871.00	32.63
	9	-3,399.30	415.81	4,075.10	5,323.02	10,460.00	-12,800.00	1,215.00
9	1	1,489.10	1,882.60	-5,214.60	5,740.53	-25,620.00	-5,713.00	-190.90
	2	3,616.50	3,915.50	-10,383.00	11,671.20	-55,810.00	-10,940.00	-808.60
	3	-2,139.60	-2,574.10	477.61	3,381.12	21,200.00	-3,672.00	-94.35
	4	735.88	763.54	-5,767.40	5,864.08	-6,358.00	2,585.00	234.10
	5	-2,264.20	-3,061.80	-621.86	3,858.49	35,280.00	5,569.00	-1,553.00
	6	3,676.40	4,519.50	-5,562.10	8,054.73	-57,010.00	-6,528.00	-893.70
	7	763.83	1,130.70	-383.11	1,417.28	-17,970.00	-3,153.00	579.20
	8	-60.28	78.24	-3,705.00	3,706.32	-8,617.00	-7,834.00	-155.10
	9	-3,216.70	-3,819.80	1,421.30	5,192.12	32,940.00	-5,404.00	-12.35
10	1	955.00	-68.65	-8,225.90	8,281.44	-19,450.00	-8,547.00	-718.90
	2	2,407.30	886.55	-13,547.00	13,787.76	-45,930.00	-16,680.00	-829.70
	3	-1,511.90	-1,961.80	-1,569.70	2,932.31	17,660.00	-3,401.00	779.00
	4	709.81	-1,029.80	-7,258.90	7,365.86	-403.00	1,660.00	-801.40
	5	-1,536.30	-2,696.60	-1,307.40	3,367.66	32,720.00	6,242.00	391.50
	6	2,543.30	1,888.90	-10,974.00	11,422.13	-47,830.00	-11,150.00	-525.60
	7	675.80	217.34	-5,067.30	5,116.78	-14,700.00	-3,980.00	-214.80
	8	-171.89	-939.03	-5,946.30	6,022.44	-6,120.00	-9,705.00	-112.10
	9	-2,285.60	-2,601.30	29.49	3,462.89	27,030.00	-4,393.00	1,106.00
		6,733.9	4,534.1	22,701.0	23,874.9	57,320.0	23,700.0	1,553.0

Node 1				Node 2			
P	V	Mx	My	P	V	Mx	My
13,547	2,407	45,930	16,680	10,383	3,617	55,810	10,940
10,992	11,441	48,140	11,400	5,610	8,101	57,320	6,728
9,243	567	35,490	23,700	6,004	1,421	39,330	18,300

Node 3				Node 4			
P	V	Mx	My	P	V	Mx	My
15,765	5,790	27,720	13,150	5,983	371	1,096	317
10,406	12,463	32,130	18,790	959	3,112	21,630	7,616
10,406	6,726	32,130	18,790	1,080	1,618	1,780	10,280

Node 5				Node 6			
P	V	Mx	My	P	V	Mx	My
22,701	3,643	1,975	14,230	22,701	1,986	14	5,049
19,493	20,586	29,370	18,100	19,485	20,580	29,370	18,170
2,993	3,284	1,118	20,830	5,116	306	1,763	20,830

Node 7				Node 8			
P	V	Mx	My	P	V	Mx	My
4,710	475	4,427	3,978	15,765	458	4,712	1,871
971	3,121	21,550	7,663	10,367	12,435	32,020	18,910
2,302	825	12,300	8,448	1,469	2,427	17,220	18,910

Node 9				Node 10			
P	V	Mx	My	P	V	Mx	My
10,383	3,617	55,810	10,940	13,547	2,407	45,930	16,680
5,562	8,055	57,010	6,528	10,974	11,422	47,830	11,150
10,383	3,617	55,810	10,940	13,547	2,407	45,930	16,680



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: Large Baseball Shade Canopy Foundation Comment:
Location:
Design name: Ontario Sports Park - Large Baseball Shade Canopy

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19
Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place
Material: F1554 Grade 36
Diameter (inch): 1.000
Effective Embedment depth, h_{ef} (inch): 8.000
Anchor category: -
Anchor ductility: Yes
 h_{min} (inch): 9.75
 C_{min} (inch): 1.44
 S_{min} (inch): 4.00

Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 36.00
State: Uncracked
Compressive strength, f'_c (psi): 4000
 $\Psi_{c,v}$: 1.4
Reinforcement condition: A tension, A shear
Supplemental edge reinforcement: Yes
Reinforcement provided at corners: Yes
Ignore concrete breakout in tension: Yes
Ignore concrete breakout in shear: Yes
Ignore 6do requirement: Yes
Build-up grout pad: Yes

Base Plate

Diameter x Thickness (inch): 26.00 x 1.50
Yield stress: 36000 psi

Profile type/size: 14X14X1/2

Recommended Anchor

Anchor Name: Heavy Hex Bolt - 1"Ø Heavy Hex Bolt, F1554 Gr. 36





Anchor Designer™ for Concrete Software

Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

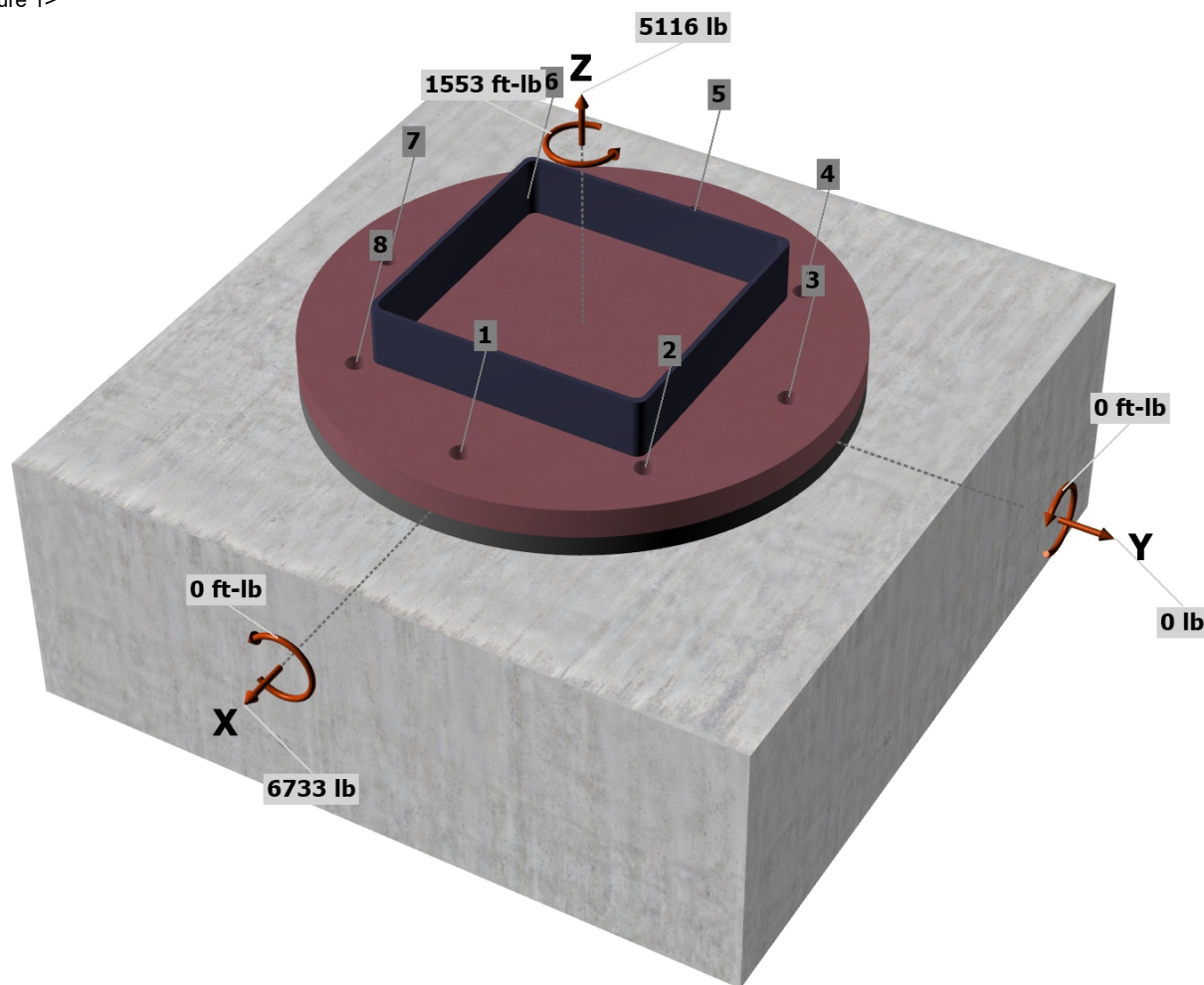
Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 5116
 V_{uax} [lb]: 6733
 V_{uay} [lb]: 0
 M_{ux} [ft-lb]: 0
 M_{uy} [ft-lb]: 0
 M_{uz} [ft-lb]: 1553

<Figure 1>



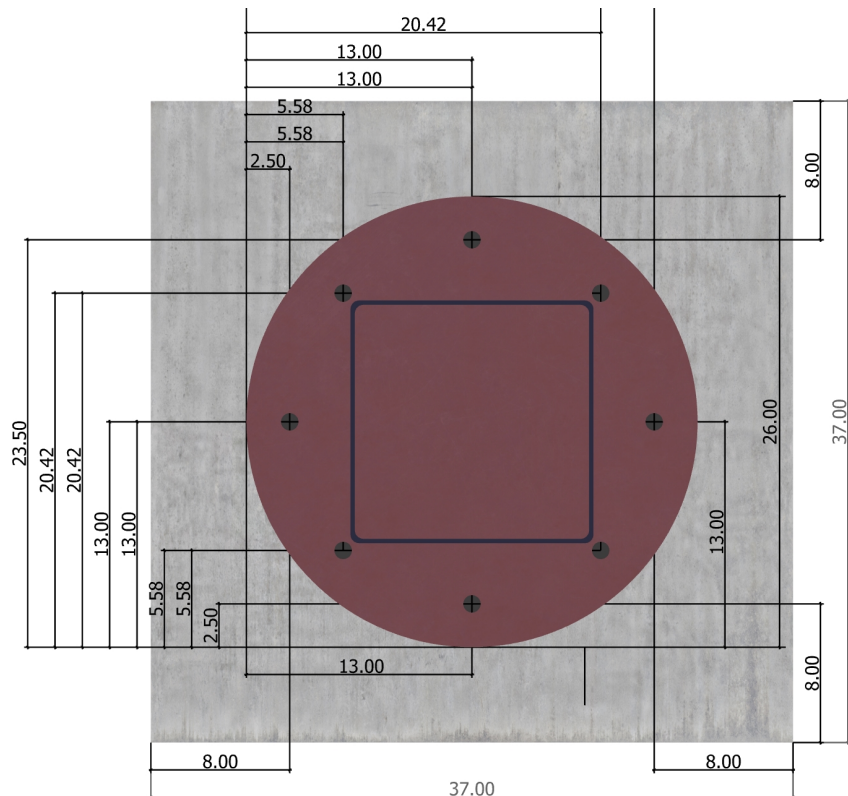
Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>

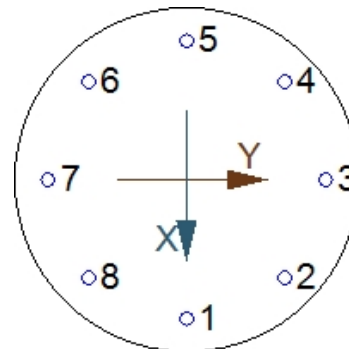


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	639.5	841.6	222.0	870.4
2	639.5	684.8	156.9	702.5
3	639.5	619.6	0.0	619.6
4	639.5	684.8	-156.9	702.5
5	639.5	841.6	-222.0	870.4
6	639.5	998.5	-156.9	1010.7
7	639.5	1063.6	0.0	1063.6
8	639.5	998.5	156.9	1010.7
Sum	5116.0	6733.0	0.0	6850.5

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5116
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 1.38
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>





Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
35150	0.75	26363

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \psi_{c,P} N_p = \phi \psi_{c,P} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\psi_{c,P}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	1.50	4000	0.70	47071



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
21090	0.8	0.65	10967

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp} (A_{Nc} / A_{Nco}) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1a)

k_{cp}	A_{Nc} (in ²)	A_{Nco} (in ²)	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	149.24	576.00	0.900	1.250	1.000	34346	0.70	14016

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.8)

Tension	Factored Load, N _{ua} (lb)	Design Strength, ϕN _n (lb)	Ratio	Status	
Steel	640	26363	0.02	Pass (Governs)	
Pullout	640	47071	0.01	Pass	
Shear	Factored Load, V _{ua} (lb)	Design Strength, ϕV _n (lb)	Ratio	Status	
Steel	1064	10967	0.10	Pass (Governs)	
Pryout	1064	14016	0.08	Pass	
Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Utilization Ratio	Permissible	Status
Sec. R17.8	0.00	0.02	2.3%	1.0	Pass

1"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel

36000 psi

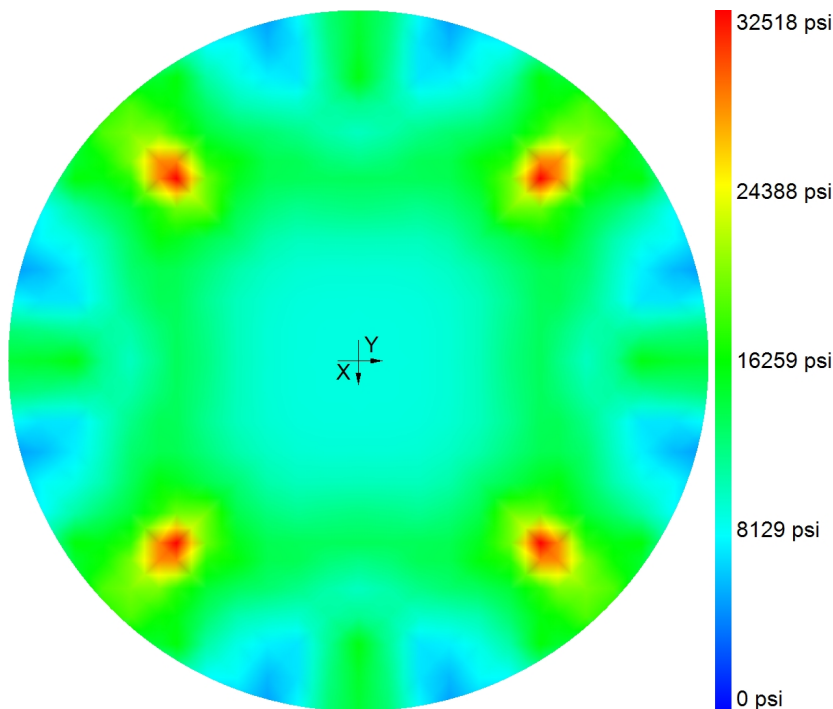
Maximum stress

32518 psi

Calculated plate thickness

0.211 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{ top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{ top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{ top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

12. Warnings

- For irregular anchor patterns, the designer must consider sizing of base plate holes to ensure shear loads are distributed to anchors as designed.
- Minimum spacing and edge distance requirement of 6da per ACI 318 Table 17.9.2(a) for torqued cast-in-place anchor is waived per designer option.
- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	8
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	7301	2085	0	0	35868	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	22871	7572	0	0	120040	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	16641	5403	0	0	86554	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	8096	4568	0	0	59249	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	20317	10965	0	0	143564	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	16641	5403	0	0	86554	0	-	-	-
U = 0.9D + 1.0W	8370	6902	0	0	80068	0	-	-	-

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: Large Baseball Shade Canopy Foundation

Comment:

Location:

Design name: Ontario Sports Park - Large Baseball Shade Canopy

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19

Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place

Material: F1554 Grade 36

Diameter (inch): 1.000

Effective Embedment depth, h_{ef} (inch): 8.000

Anchor category: -

Anchor ductility: Yes

h_{min} (inch): 9.75

C_{min} (inch): 1.44

S_{min} (inch): 4.00

Base Material

Concrete: Normal-weight

Concrete thickness, h (inch): 36.00

State: Uncracked

Compressive strength, f'_c (psi): 4000

Reinforcement condition: A tension, A shear

Supplemental edge reinforcement: Yes

Reinforcement provided at corners: Yes

Ignore concrete breakout in tension: Yes

Ignore concrete breakout in shear: Yes

Ignore ϕ requirement: Yes

Build-up grout pad: Yes

Base Plate

Diameter x Thickness (inch): 26.00 x 1.50

Yield stress: 36000 psi

Profile type/size: 14X14X1/2

Recommended Anchor

Anchor Name: Heavy Hex Bolt - 1"Ø Heavy Hex Bolt, F1554 Gr. 36





Anchor Designer™ for Concrete Software

Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

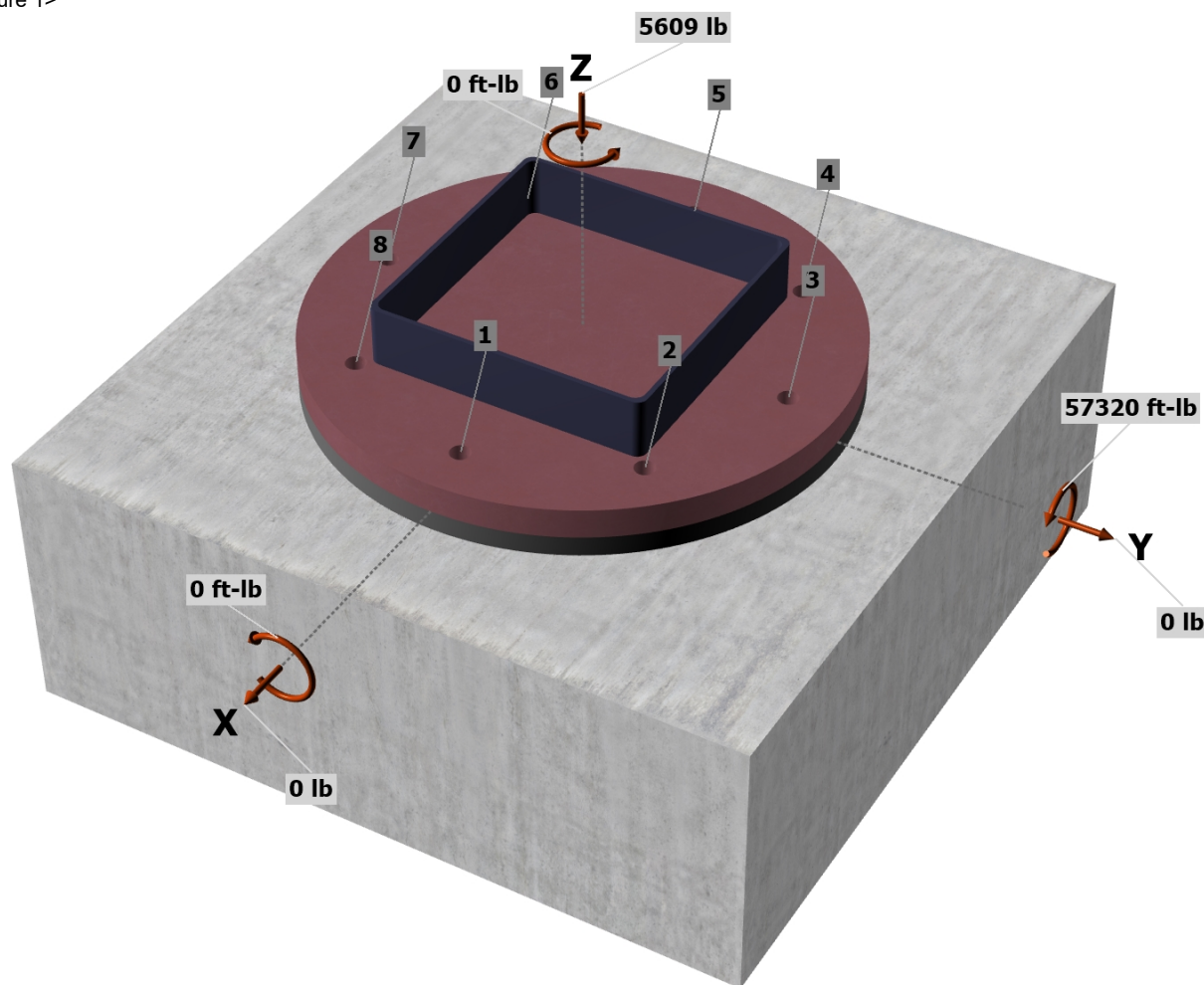
Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: -5609
 V_{uax} [lb]: 0
 V_{uay} [lb]: 0
 M_{ux} [ft-lb]: 0
 M_{uy} [ft-lb]: 57320
 M_{uz} [ft-lb]: 0

<Figure 1>



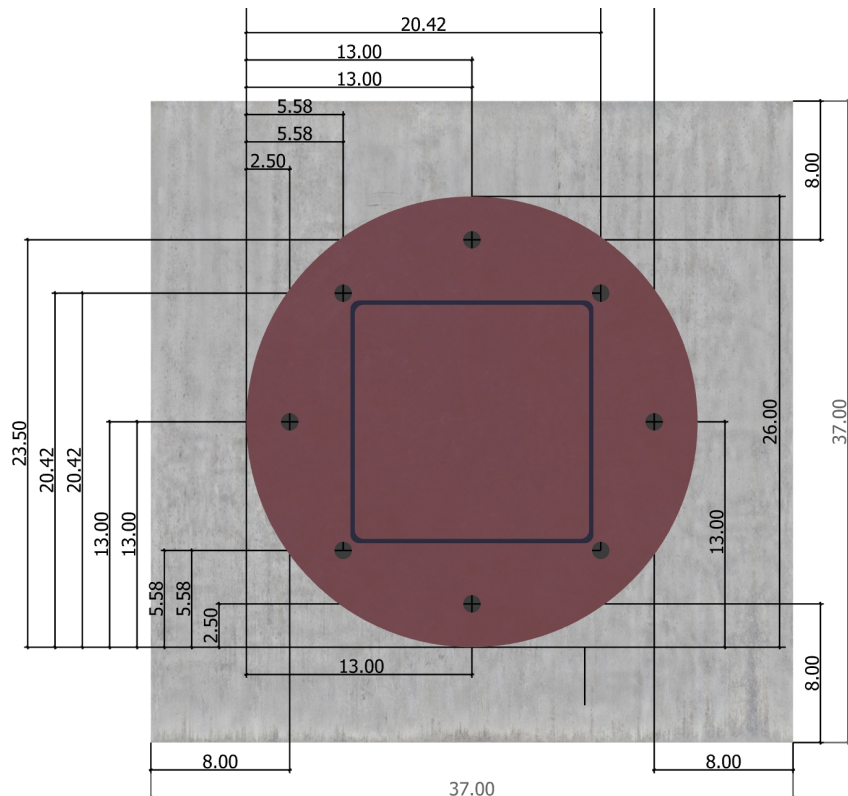
Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>

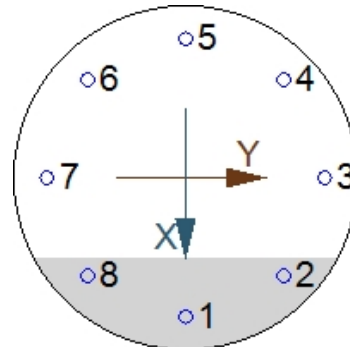


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0
3	4112.2	0.0	0.0	0.0
4	9075.1	0.0	0.0	0.0
5	11135.1	0.0	0.0	0.0
6	9075.1	0.0	0.0	0.0
7	4112.2	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0
Sum	37509.7	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.22
Maximum concrete compression stress (psi): 940
Resultant tension force (lb): 37510
Resultant compression force (lb): 43119
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 1.64

<Figure 3>





Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
35150	0.75	26363

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$$\phi N_{pn} = \phi \psi_{c,P} N_p = \phi \psi_{c,P} 8 A_{brg} f'_c \text{ (Sec. 17.5.1.2, Eq. 17.6.3.1 \& 17.6.3.2.2a)}$$

$\psi_{c,P}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	1.50	4000	0.70	47071



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	11135	26363	0.42	Pass (Governs)
Pullout	11135	47071	0.24	Pass

1"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel

36000 psi

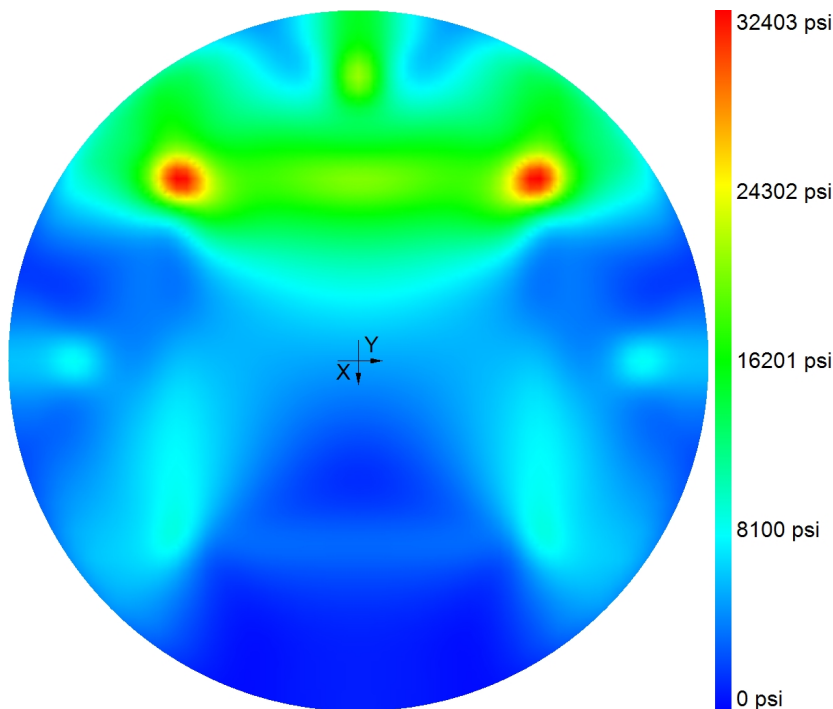
Maximum stress

32403 psi

Calculated plate thickness

0.821 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{ top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{ top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{ top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Table 17.9.2(a) for torqued cast-in-place anchor is waived per designer option.\n
- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	8
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	7301	2085	0	0	35868	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	22871	7572	0	0	120040	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	16641	5403	0	0	86554	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	8096	4568	0	0	59249	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	20317	10965	0	0	143564	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	16641	5403	0	0	86554	0	-	-	-
U = 0.9D + 1.0W	8370	6902	0	0	80068	0	-	-	-

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 40. Large Baseball Shade Structure Post Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 36.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination $D+0.750L_r+0.450W$
Lateral Load 9.327 k
Moment 93.272 k-ft

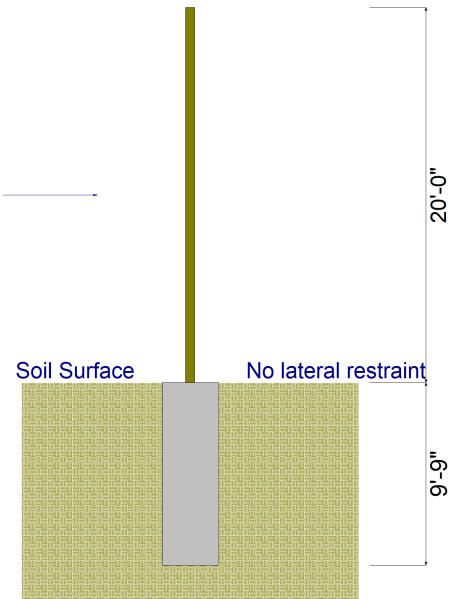
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual 1,606.97 psf
Allowable 1,607.35 psf

Minimum Required Depth 9.750 ft

Footing Base Area 7.069 ft²
Maximum Soil Pressure 4.810 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	2.562 k		k/ft	11.301 k
Lr : Roof Live	5.581 k		k/ft	22.701 k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	5.732 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	10.0 ft	TOP of Load above ground surface	20.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	2.562	25.620	5.88	974.8	977.0	1.000
+D+Lr	8.143	81.430	9.25	1,520.9	1,525.1	1.000
+D+0.750Lr	6.748	67.478	8.50	1,414.1	1,416.1	1.000
+D+0.60W	6.001	60.012	8.13	1,351.1	1,352.8	1.000
+D+0.750Lr+0.450W	9.327	93.272	9.75	1,607.0	1,607.3	1.000
+D+0.450W	5.141	51.414	7.75	1,272.9	1,273.9	1.000
+0.60D+0.60W	4.976	49.764	7.63	1,256.4	1,258.3	1.000
+0.60D	1.537	15.372	4.88	804.4	807.4	1.000

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 40. Lage Baseball Shade Structure CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

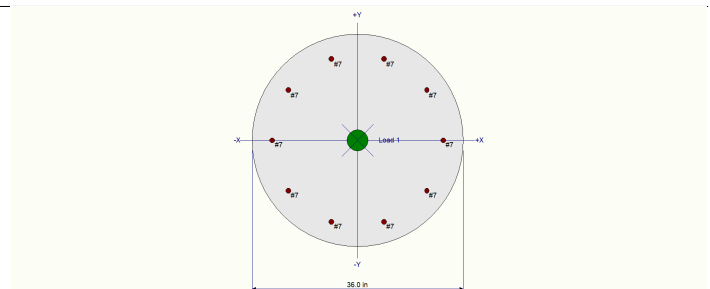
f'_c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	D

Overall Column Height	=	10.750 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 36.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 10 - #7 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 11,398.1 lbs * Dead Load Factor

AXIAL LOADS . . .

Dead Load: Axial Load at 10.750 ft above base, D = 11.30, LR = 22.70, W = 19.50 k

BENDING LOADS . . .

Moment X: Moment acting about X-X axis at 10.750 ft, D = 25.620, LR = 55.810, W = 57.320 k-ft

Moment Y: Moment acting about Y-Y axis at 10.375 ft, D = 8.547, LR = 16.680, W = 23.70 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+1.60Lr+0.50W		Maximum SERVICE Load Reactions .			
Location of max.above base	10.678 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.219 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	73.308 k	φ * Pn =	330.085 k			
Mu-x =	148.70 k-ft	φ * Mn-x =	684.31 k-ft			
Mu-y =	-48.794 k-ft	φ * Mn-y =	222.344 k-ft			
Mu Angle =	18.0 deg	φ =	0.90			
Mu at Angle =	156.501 k-ft	φMn at Angle =	713.27 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .			Maximum SERVICE Load Deflections . .			
Pnmax : Nominal Max. Compressive Axial Capacity	3,800.38 k		Along Y-Y	-0.03594 in	at 10.750 ft above base	
Pnmin : Nominal Min. Tension Axial Capacity	k		for load combination : +D+0.750Lr+0.450W			
φ Pn, max : Usable Compressive Axial Capacity	1,976.20 k		Along X-X	0.01221 in	at 10.750 ft above base	
φ Pn, min : Usable Tension Axial Capacity	k		for load combination : +D+0.750Lr+0.450W			
			General Section Information			
					β =	0.850
					θ =	0.80
			ρ : % Reinforcing	0.5895 %	Rebar % Ok	
			Reinforcing Area	6.0 in^2		
			Concrete Area	1,017.88 in^2		

Concrete Column

Project File: 24-130-00_ontario sports park.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: 40. Lage Baseball Shade Structure CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base	Axial Load			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		ft	Pu	ϕ	* Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio
+1.40D	Actual	Actual	10.68	31.78	783.16	1.000	35.87	1.000	-11.97	18.000	37.81	926.84	0.041	
+1.20D+0.50Lr	Actual	Actual	10.68	38.59	555.96	1.000	58.65	1.000	-18.60	18.000	61.53	881.85	0.070	
+1.20D	Actual	Actual	10.68	27.24	783.16	1.000	30.74	1.000	-10.26	18.000	32.41	926.84	0.035	
+1.20D+1.60Lr	Actual	Actual	10.68	63.56	375.26	1.000	120.04	1.000	-36.94	17.000	125.60	749.06	0.168	
+1.20D+1.60Lr+0.50W	Actual	Actual	10.68	73.31	330.08	1.000	148.70	1.000	-48.79	18.000	156.50	713.27	0.219	
+1.20D+0.50W	Actual	Actual	10.68	36.99	480.61	1.000	59.40	1.000	-22.11	20.000	63.38	828.75	0.076	
+1.20D+0.50Lr+W	Actual	Actual	10.68	58.09	345.18	1.000	115.97	1.000	-42.30	20.000	123.44	725.46	0.170	
+1.20D+W	Actual	Actual	10.68	46.74	375.34	1.000	88.06	1.000	-33.96	21.000	94.38	749.40	0.126	
+0.90D+W	Actual	Actual	10.68	39.93	330.12	1.000	80.38	1.000	-31.39	21.000	86.29	713.65	0.121	
+0.90D	Actual	Actual	10.68	20.43	783.16	1.000	23.06	1.000	-7.69	18.000	24.31	926.84	0.026	

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		k-ft	My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
D Only						22.698	-25.620			-8.547	
+D+Lr						45.398	-81.430			-25.227	
+D+0.750Lr						39.723	-67.478			-21.057	
+D+0.60W						34.398	-60.012			-22.767	
+D+0.750Lr+0.450W						48.498	-93.272			-31.722	
+D+0.450W						31.473	-51.414			-19.212	
+0.60D+0.60W						25.319	-49.764			-19.348	
+0.60D						13.619	-15.372			-5.128	
Lr Only						22.700	-55.810			-16.680	
W Only						19.500	-57.320			-23.700	

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis		
	@ Base	@ Top		@ Base	@ Top	
D Only	-25.620		k-ft	-8.547		k-ft
+D+Lr	-81.430		k-ft	-25.227		k-ft
+D+0.750Lr	-67.478		k-ft	-21.057		k-ft
+D+0.60W	-60.012		k-ft	-22.767		k-ft
+D+0.750Lr+0.450W	-93.272		k-ft	-31.722		k-ft
+D+0.450W	-51.414		k-ft	-19.212		k-ft
+0.60D+0.60W	-49.764		k-ft	-19.348		k-ft
+0.60D	-15.372		k-ft	-5.128		k-ft
Lr Only	-55.810		k-ft	-16.680		k-ft
W Only	-57.320		k-ft	-23.700		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	-0.0033	in	10.750	ft	-0.010	in	10.750	ft
+D+Lr	-0.0097	in	10.750	ft	-0.031	in	10.750	ft
+D+0.750Lr	-0.0081	in	10.750	ft	-0.026	in	10.750	ft
+D+0.60W	-0.0088	in	10.750	ft	-0.023	in	10.750	ft
+D+0.750Lr+0.450W	-0.0122	in	10.750	ft	-0.036	in	10.750	ft
+D+0.450W	-0.0074	in	10.750	ft	-0.020	in	10.750	ft
+0.60D+0.60W	-0.0074	in	10.750	ft	-0.019	in	10.750	ft
+0.60D	-0.0020	in	10.750	ft	-0.006	in	10.750	ft
Lr Only	-0.0064	in	10.750	ft	-0.022	in	10.750	ft
W Only	-0.0090	in	10.678	ft	-0.022	in	10.678	ft

43. M01, Monument Identity 1 – Sign, (W-02)

Identify Sign Foundations

M01 Monument Identity Sign / Signage Drawing W-02

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $10\text{psf} \times 11 \times 20.25 + 10\text{psf} \times 6.25 \times 7 + 150\text{pcf} \times 2.5 \times 7 \times 2 = 7,915 \text{ lbs}$

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 7,915 \text{ lbs} = 8,548 \text{ lbs}$

Feature	Seismic Weight (lbs)	Height to Feature (ft)	Seismic Base Shear (lbs)	OT Moment (k-ft)
Display Board	2,227.5	19.25'	2,406	46.3
Illuminated Cabinet	437.5	5.5'	472.5	2.6
Concrete Pedestal	5,250	1.75'	5,670	9.9
Total (per column)	7,915 (2,638.3)		8,548.5	58.8

Applied Moment to each footing, (seismic) = $58.8 \text{ k-ft}/2 = 29.4 \text{ k-ft}$, (Middle Post)

Wind Load, (ASCE 7-22)

Wind Load (Monitor) = $30\text{psf} \times 11' \times 20' = 6,600 \text{ lbs}$

Wind Load (Base) = $30\text{psf} \times 9' \times 9.5' = 2,565 \text{ lbs}$

Applied Moment, (wind) = $(6,600 \text{ lbs})(19.5') + (2,565 \text{ lbs})(4.75') = 140,883 \text{ ft-lbs}$, = 140.9 ft-kips

Mid Post: $140.9 \text{ ft-kips}/2 = 70.4 \text{ ft-kips}$

(Wind Controls)

Column Wind Load:

Mid: $70.4 \text{ ft-kips} / 14.75 \text{ ft} = 4.86 \text{ kips @ } 14.75 \text{ ft}$

$4.86 \text{ kips}/29 \text{ ft} = 0.167 \text{ kips (plf)}$

Column Seismic Load:

Mid: $29.4 \text{ ft-kips} / 14.75 \text{ ft} = 1.99 \text{ kips @ } 14.75 \text{ ft}$

$1.99 \text{ kips}/29 \text{ ft} = 0.069 \text{ kips (plf)}$

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M01 Post Embedment - Mid Column

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 24.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination **+0.60W**
Lateral Load 2.916 k
Moment 43.011 k-ft

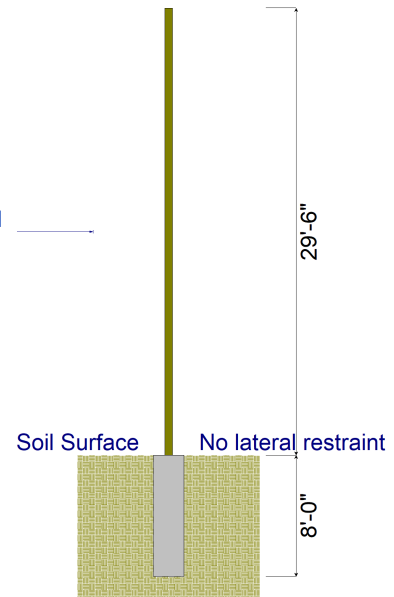
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual **1,313.62** psf
Allowable **1,314.95** psf

Minimum Required Depth 8.0 ft

Footing Base Area 3.142 ft²
Maximum Soil Pressure 0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	4.860 k		k/ft	k
E : Earthquake	1.990 k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	14.750 ft	TOP of Load above ground surface	29.50 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	2.916	43.011	8.00	1,313.6	1,315.0	1.000
+0.450W	2.187	32.258	7.13	1,179.6	1,181.5	1.000
E Only * 0.70	1.393	20.547	6.13	997.1	1,001.4	1.000
E Only * 0.5250	1.045	15.410	5.50	898.9	900.8	1.000

Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M01 CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

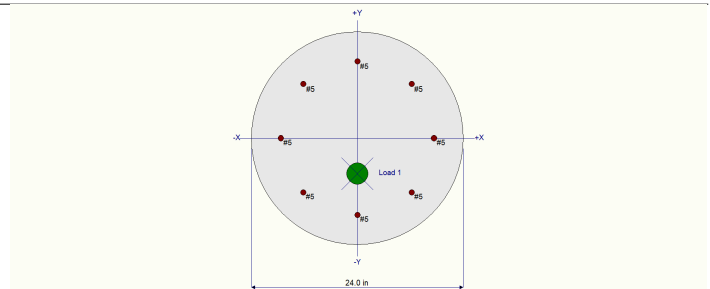
f'_c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	A

Overall Column Height	=	8.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 24.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 8 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 3,769.91 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 8.0 ft above base, $Y_{ecc} = -4.0$ in, $D = 43.80$ k

BENDING LOADS . . .

Moment acting about X-X axis at 8.0 ft, $W = 70.40$, $E = 29.40$ k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W		Maximum SERVICE Load Reactions .			
Location of max.above base	7.946 ft		Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Maximum Stress Ratio	0.520 : 1		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5						
Pu =	42.813 k	φ * Pn =	80.734 k			
Mu-x =	83.540 k-ft	φ * Mn-x =	162.938 k-ft			
Mu-y =	4.709 k-ft	φ* Mn-y =	8.503 k-ft			
Mu Angle =	3.0 deg	φ =	0.90			
Mu at Angle =	83.673 k-ft	φMn at Angle =	161.068 k-ft			
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>						
Column Capacities . .			General Section Information			
Pnmax : Nominal Max. Compressive Axial Capacity	1,678.49 k		ρ : % Reinforcing	0.5482 %	Rebar % Ok	β = 0.850 θ = 0.80
Pnmin : Nominal Min. Tension Axial Capacity	k		Reinforcing Area	2.480 in^2		
φ Pn, max : Usable Compressive Axial Capacity	872.82 k		Concrete Area	452.389 in^2		
φ Pn, min : Usable Tension Axial Capacity	k					

Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M01 CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k			Bending Analysis k-ft						Utilization	
	X-X	Y-Y		Pu	ϕ	* Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio
+1.40D	Actual	M2,min	7.95	66.60	673.68	1.000	20.44	1.000	7.33	20.000	21.71	220.08		0.099
+1.20D	Actual	M2,min	7.95	57.08	673.68	1.000	17.52	1.000	6.28	20.000	18.61	220.08		0.085
+1.20D+0.50W	Actual	M2,min	7.95	57.08	272.23	1.000	52.72	1.000	6.28	7.000	53.09	252.91		0.210
+1.20D+W	Actual	M2,min	7.95	57.08	120.35	1.000	87.92	1.000	6.28	4.000	88.14	185.22		0.476
+0.90D+W	Actual	M2,min	7.95	42.81	80.73	1.000	83.54	1.000	4.71	3.000	83.67	161.07		0.520
+1.20D+E	Actual	M2,min	7.95	57.08	306.06	1.000	46.92	1.000	6.28	8.000	47.34	254.12		0.186
+0.90D+E	Actual	M2,min	7.95	42.81	251.48	1.000	42.54	1.000	4.71	6.000	42.80	251.27		0.170

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		k-ft	My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
D Only						47.570	-14.600				
+D+0.60W						47.570	-56.840				
+D+0.450W						47.570	-46.280				
+0.60D+0.60W						28.542	-51.000				
+D+0.70E						47.570	-35.180				
+D+0.5250E						47.570	-30.035				
+0.60D+0.70E						28.542	-29.340				
W Only							-70.400				
E Only							-29.400				

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top
D Only	-14.600		k-ft		k-ft
+D+0.60W	-56.840		k-ft		k-ft
+D+0.450W	-46.280		k-ft		k-ft
+0.60D+0.60W	-51.000		k-ft		k-ft
+D+0.70E	-35.180		k-ft		k-ft
+D+0.5250E	-30.035		k-ft		k-ft
+0.60D+0.70E	-29.340		k-ft		k-ft
W Only	-70.400		k-ft		k-ft
E Only	-29.400		k-ft		k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance	Max. Y-Y Deflection		Distance
D Only	0.0000	in	0.000 ft	-0.016	in	8.000 ft
+D+0.60W	0.0000	in	0.000 ft	-0.061	in	8.000 ft
+D+0.450W	0.0000	in	0.000 ft	-0.050	in	8.000 ft
+0.60D+0.60W	0.0000	in	0.000 ft	-0.055	in	8.000 ft
+D+0.70E	0.0000	in	0.000 ft	-0.038	in	8.000 ft
+D+0.5250E	0.0000	in	0.000 ft	-0.032	in	8.000 ft
+0.60D+0.70E	0.0000	in	0.000 ft	-0.032	in	8.000 ft
W Only	0.0000	in	0.000 ft	-0.076	in	8.000 ft
E Only	0.0000	in	0.000 ft	-0.031	in	7.946 ft

Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

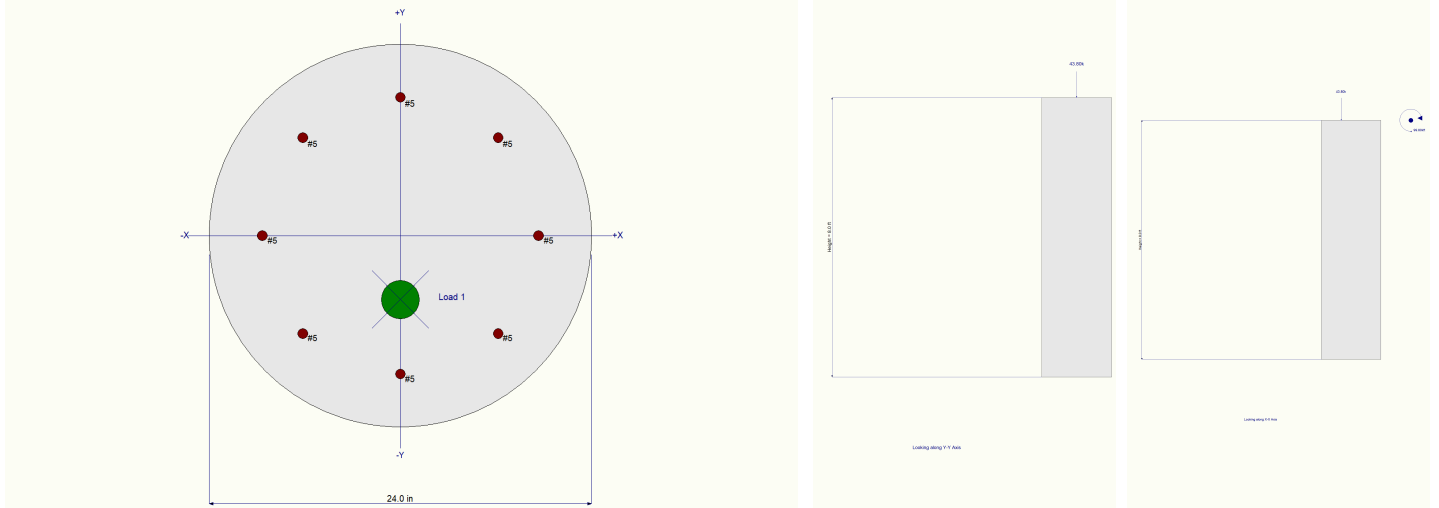
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

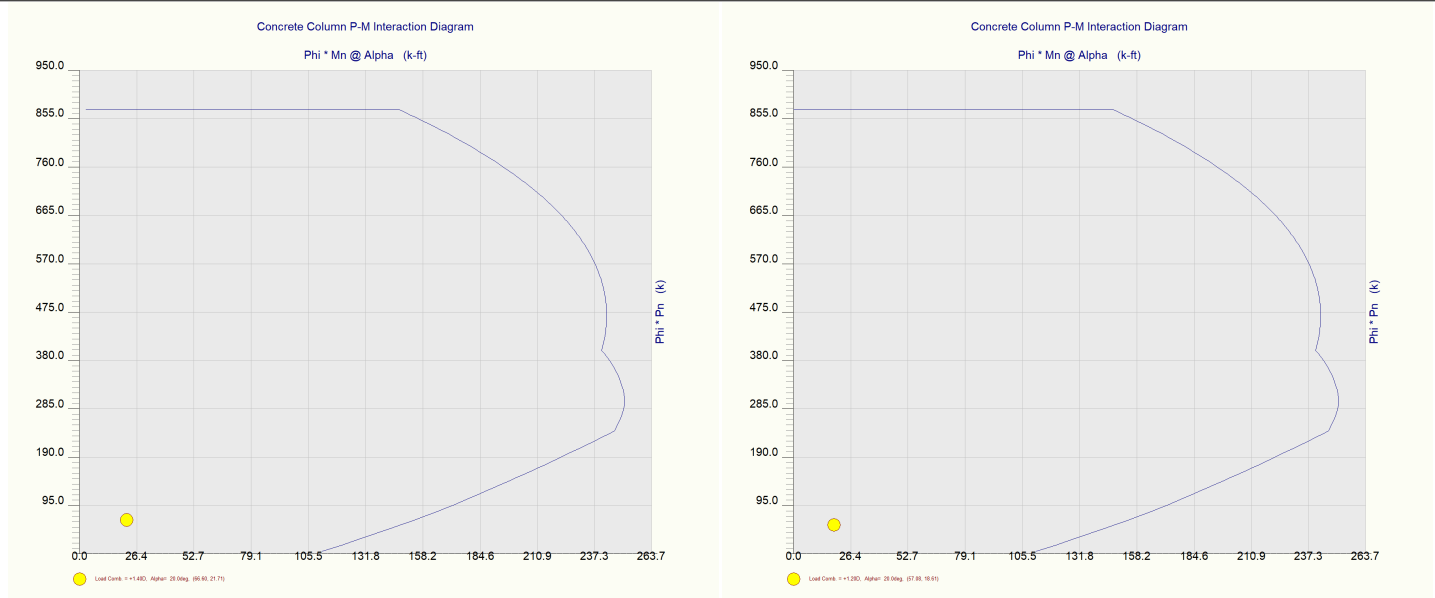
(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M01 CIDH Caisson

Sketches



Interaction Diagrams



Concrete Column

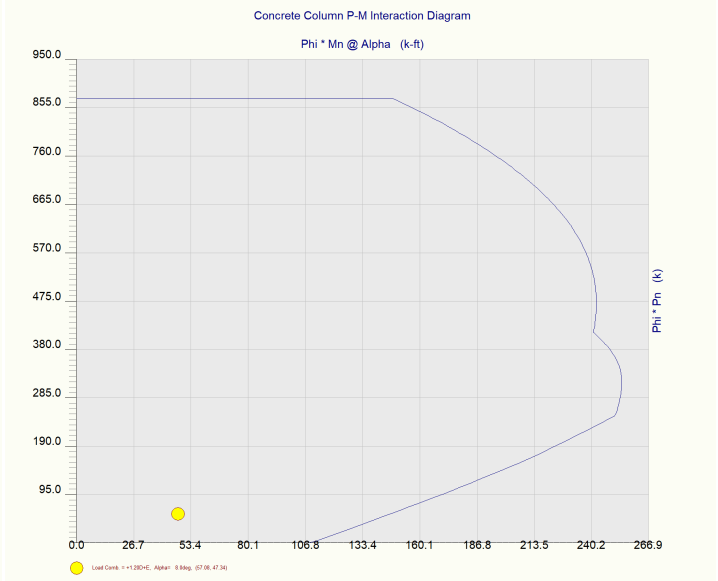
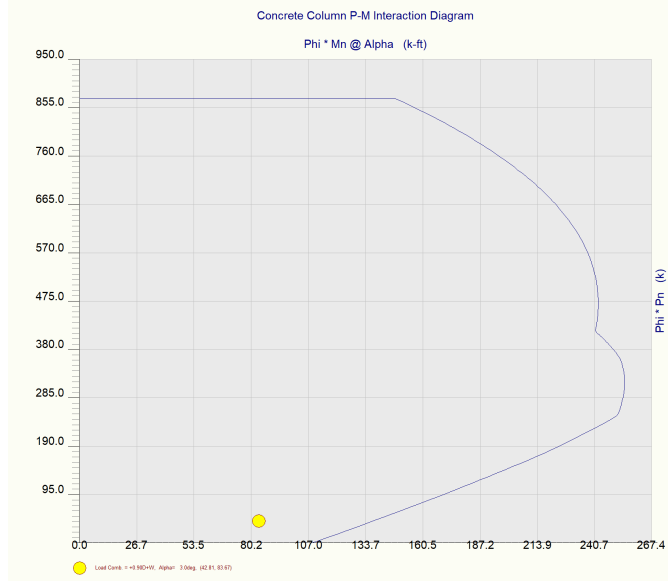
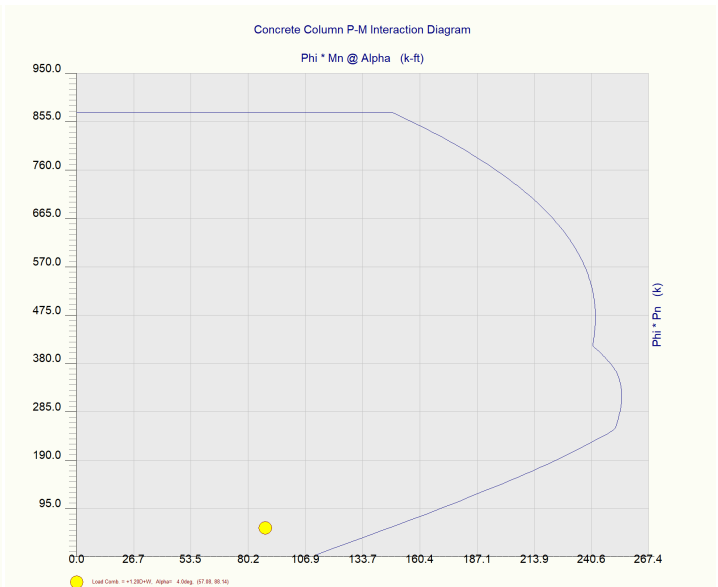
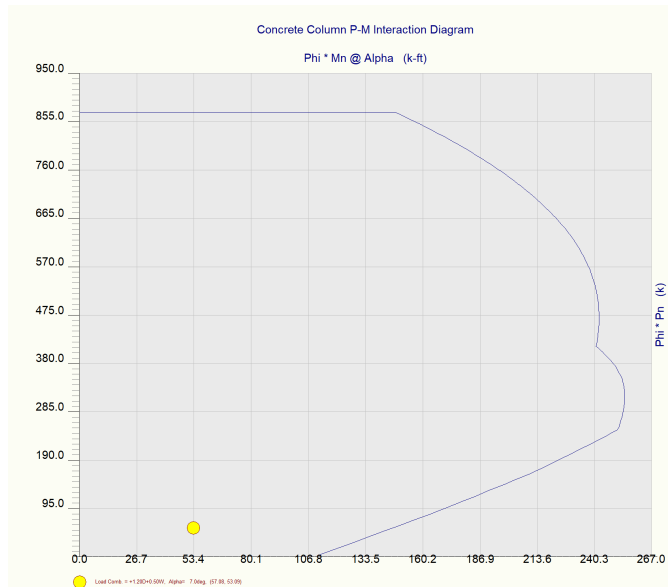
Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M01 CIDH Caisson



Concrete Column

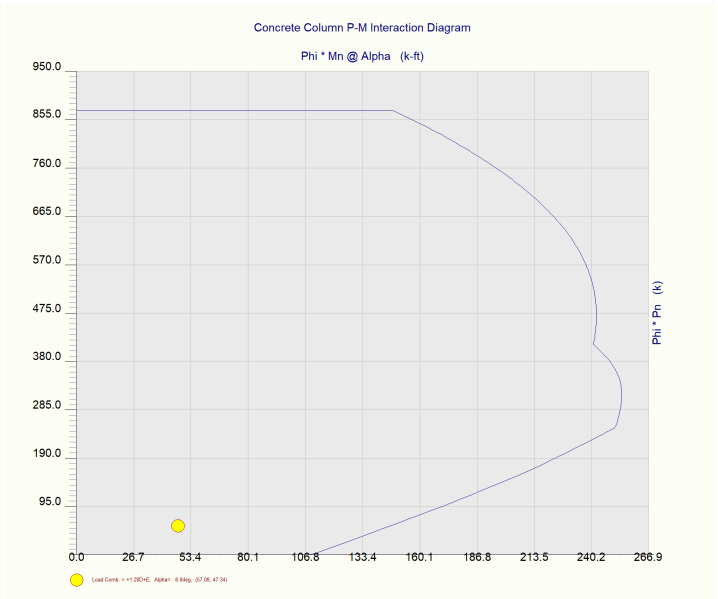
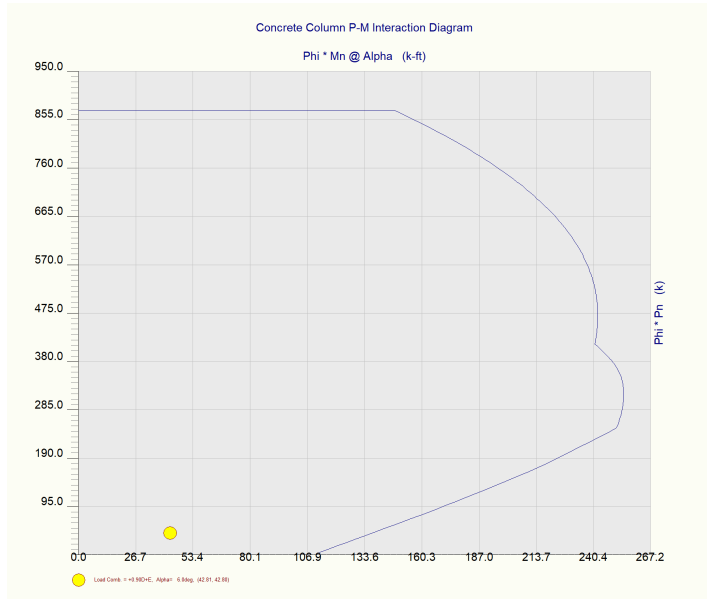
Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M01 CIDH Caisson



Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M01 Monument Identity Sign - Mid Col - HSS8x8x3/8

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : **HSS8x8x3/8**

Analysis Method : Load Resistance Factor

Steel Stress Grade : A500, Grade B, Fy = 46 ksi, Carbon Steel

Fy : Steel Yield 46.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 29.0 ft

Top & Bottom Fixity Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 10 ft, K = 2.1

Unbraced Length for buckling ABOUT Y-Y Axis = 10 ft, K = 2.1

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 1,093.01 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 29.0 ft, Xecc = 4.0 in, D = 2.70 k

BENDING LOADS . . .

Wind: Lat. Point Load at 14.750 ft creating Mx-x, W = 4.860, E = 2.0 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7256** : 1
Load Combination +1.20D+W
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu 4.552 k
0.9 * Pn 276.047 k
Mu-x -71.685 k-ft
0.9 * Mn-x : 101.430 k-ft
Mu-y -1.080 k-ft
0.9 * Mn-y : 101.430 k-ft

Maximum Load Reactions . .
Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 4.860 k

Maximum Load Deflections . . .
Along Y-Y 7.556 in at 29.0ft above base
for load combination :W Only
Along X-X 0.2240 in at 29.0ft above base
for load combination :D Only

PASS Maximum Shear Stress Ratio = **0.04838** : 1
Load Combination +1.20D+W
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 4.860 k
Vn * Phi : Allowable 100.461 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios			
	Stress Ratio	Status	Location						Stress Ratio	Status	Location	
+1.40D	0.022	PASS	22.77 ft		3.00	1.00	81.29	81.29	0.000	PASS	0.00 ft	
+1.20D	0.019	PASS	0.00 ft		3.00	1.00	81.29	81.29	0.000	PASS	0.00 ft	
+1.20D+0.50W	0.372	PASS	0.00 ft		3.00	1.00	81.29	81.29	0.024	PASS	0.00 ft	
+1.20D+W	0.726	PASS	0.00 ft		3.00	1.00	81.29	81.29	0.048	PASS	0.00 ft	
+0.90D+W	0.721	PASS	0.00 ft		3.00	1.00	81.29	81.29	0.048	PASS	0.00 ft	
+1.20D+E	0.310	PASS	0.00 ft		3.00	1.00	81.29	81.29	0.020	PASS	0.00 ft	
+0.90D+E	0.305	PASS	0.00 ft		3.00	1.00	81.29	81.29	0.020	PASS	0.00 ft	

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
	@ Base		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	3.793									-0.900	
+D+0.60W	3.793					2.916		-43.011		-0.900	
+D+0.450W	3.793					2.187		-32.258		-0.900	
+0.60D+0.60W	2.276					2.916		-43.011		-0.540	
+D+0.70E	3.793					1.400		-20.650		-0.900	
+D+0.5250E	3.793					1.050		-15.488		-0.900	
+0.60D+0.70E	2.276					1.400		-20.650		-0.540	

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M01 Monument Identity Sign - Mid Col - HSS8x8x3/8

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
W Only				4.860	-71.685		
E Only				2.000	-29.500		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	3.793						-0.900
"	Minimum				4.860	-71.685		
Reaction, X-X Axis Base	Maximum	3.793						-0.900
"	Minimum	3.793						-0.900
Reaction, Y-Y Axis Base	Maximum				4.860	-71.685		
"	Minimum	3.793				-0.900		
Reaction, X-X Axis Top	Maximum	3.793						-0.900
"	Minimum	3.793						-0.900
Reaction, Y-Y Axis Top	Maximum	3.793						-0.900
"	Minimum	3.793						-0.900
Moment, X-X Axis Base	Maximum	3.793						-0.900
"	Minimum		-71.685		4.860	-71.685		
Moment, Y-Y Axis Base	Maximum				4.860			
"	Minimum	3.793						-0.900
Moment, X-X Axis Top	Maximum	3.793						-0.900
"	Minimum	3.793						-0.900
Moment, Y-Y Axis Top	Maximum	3.793						-0.900
"	Minimum	3.793						-0.900

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.2240 in	29.000 ft	0.000 in	0.000 ft
+D+0.60W	0.2240 in	29.000 ft	4.534 in	29.000 ft
+D+0.450W	0.2240 in	29.000 ft	3.400 in	29.000 ft
+0.60D+0.60W	0.1344 in	29.000 ft	4.534 in	29.000 ft
+D+0.70E	0.2240 in	29.000 ft	2.177 in	29.000 ft
+D+0.5250E	0.2240 in	29.000 ft	1.632 in	29.000 ft
+0.60D+0.70E	0.1344 in	29.000 ft	2.177 in	29.000 ft
W Only	0.0000 in	0.000 ft	7.556 in	29.000 ft
E Only	0.0000 in	0.000 ft	3.084 in	28.805 ft

Steel Section Properties : HSS8x8x3/8

Depth	=	8.000 in	I xx	=	100.00 in^4	J	=	160.000 in^4
Design Thick	=	0.349 in	S xx	=	24.90 in^3			
Width	=	8.000 in	R xx	=	3.100 in			
Wall Thick	=	0.375 in	Zx	=	29.400 in^3			
Area	=	10.400 in^2	I yy	=	100.000 in^4	C	=	40.700 in^3
Weight	=	37.690 plf	S yy	=	24.900 in^3			
			R yy	=	3.100 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

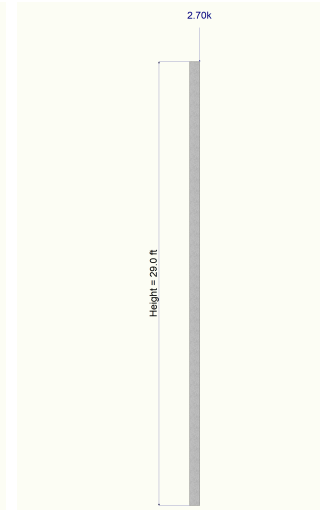
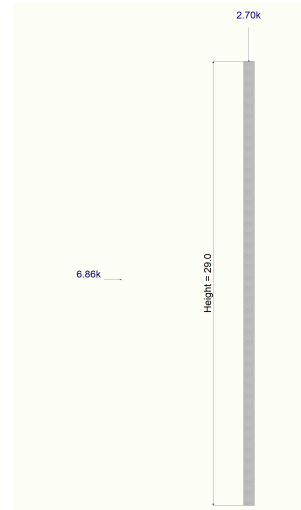
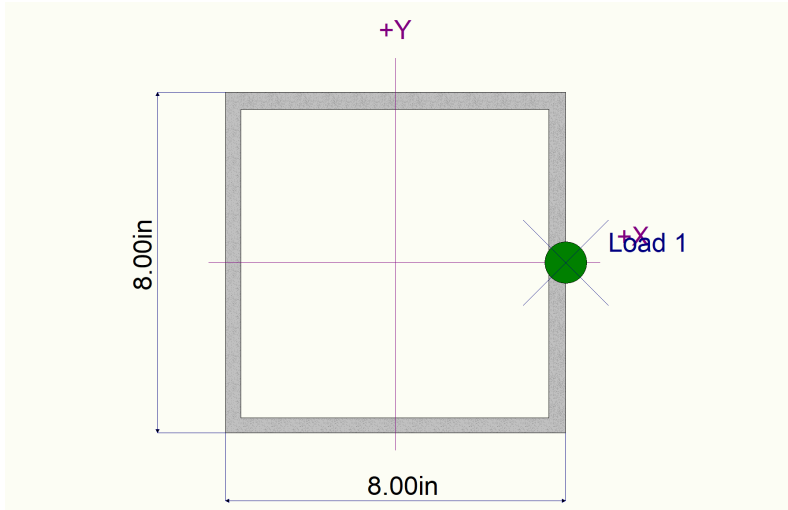
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M01 Monument Identity Sign - Mid Col - HSS8x8x3/8

Sketches



44. M02, Monument Identity 2 – Sign, (W-02)

M02 Monument Identity Sign / Signage Drawing W-02

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $10\text{psf} \times 29' \times 8.9' + 150\text{pcf} \times 5' \times 29' \times 2' = 43.8$ kips

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 43.8 = 47.3$ kips

Feature	Seismic Weight (kips)	Height to Feature (ft)	Seismic Base Shear (kips)	OT Moment (k-ft)
Display Board	2.6	9.71'	2.65	25.73
Concrete Pedestal	43.5	2.5'	46.98	117.45
Total (per column)	43.8 (8.8)		47.20	143.2 (28.6)

Applied Moment to each footing, (seismic) = $143.2 \text{ k-ft} / 5 = 28.6 \text{ k-ft}$

Wind Load, (ASCE 7-22)

Wind Load (Monitor) = $30\text{psf} \times 29' \times 8.9' = 7,612.5\text{lbs}$

Wind Load (Base) = $30\text{psf} \times 29' \times 5' = 4,350\text{lbs}$

Applied Moment, (wind) = $(7,612.5 \text{ lbs})(9.375\text{ft}) + (4,350\text{lbs})(2.5\text{ft}) = 82,242 \text{ ft-lbs} = 82.3 \text{ ft-kips}$ (over full width)

Mid Post: $82.3 \text{ ft-kips} / 5 = 16.4 \text{ ft-kips}$

(Seismic Controls)

Column Wind Load:

Mid: $16.4 \text{ ft-kips} / 7 \text{ ft} = 2.35 \text{ kips @ } 7 \text{ ft}$

$2.35 \text{ kips} / 13.75 \text{ ft} = 0.171 \text{ kips (plf)}$

Column Seismic Load:

Mid: $28.6 \text{ ft-kips} / 7\text{ft} = 4.09 \text{ kips @ } 7 \text{ ft}$

$4.09 \text{ kips} / 13.75 \text{ ft} = 0.30 \text{ kips (plf)}$

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park-signs.ec6

LIC#: KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M02 Post Embedment - Mid Column

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape Circular
Pole Footing Diameter 24.0 in
Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface
Allow Passive 500.0 pcf
Max Passive 5,000.0 pcf

Controlling Values

Governing Load Combination **D+0.70E**
Lateral Load 2.863 k
Moment 20.041 k-ft

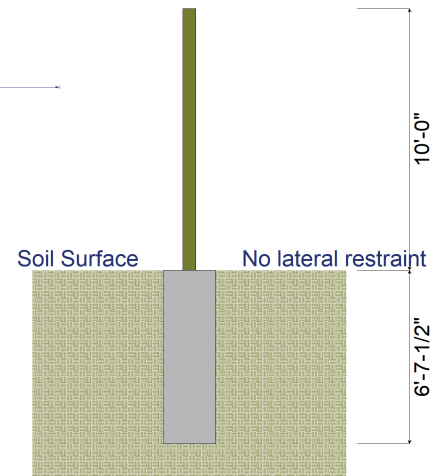
NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual **1,096.25 psf**
Allowable **1,098.71 psf**

Minimum Required Depth 6.625 ft

Footing Base Area 3.142 ft²
Maximum Soil Pressure 2.801 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (kl)		Vertical Load (k)
D : Dead Load	k		k/ft	8.80 k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	2.350 k		k/ft	k
E : Earthquake	4.090 k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	7.0 ft	TOP of Load above ground surface	10.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
D Only	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.60W	1.410	9.870	5.13	833.2	833.5	1.000
+D+0.450W	1.058	7.403	4.50	744.6	747.9	1.000
+0.60D+0.60W	1.410	9.870	5.13	833.2	833.5	1.000
+D+0.70E	2.863	20.041	6.63	1,096.2	1,098.7	1.000
+D+0.5250E	2.147	15.031	6.00	978.8	981.8	1.000
+0.60D+0.70E	2.863	20.041	6.63	1,096.2	1,098.7	1.000

Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M02 CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

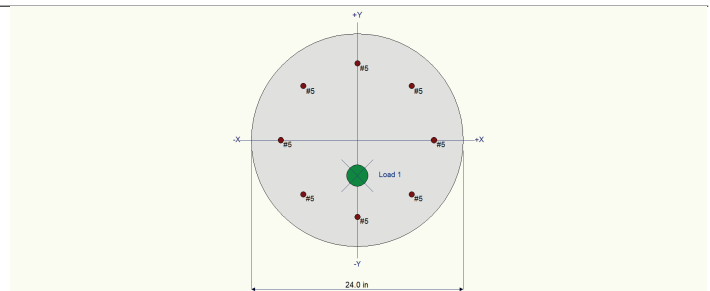
f'_c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
f_y - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	A

Overall Column Height	=	7.0 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column		
X-X (width) axis :	Fully braced against buckling ABOUT Y-Y Axis	
Y-Y (depth) axis :	Fully braced against buckling ABOUT Y-Y Axis	

Column Cross Section

Column Dimensions : 24.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 8 - #5 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 3,298.67 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 7.0 ft above base, Yecc = -4.0in, D = 8.80 k

BENDING LOADS . . .

Lat. Point Load at 7.0 ft creating My-y, W = 2.350, E = 4.090 k

DESIGN SUMMARY

Load Combination	+0.90D+E	Maximum SERVICE Load Reactions .		
Location of max.above base	6.953 ft	Top along Y-Y	0.0 k	Bottom along Y-Y 4.090 k
Maximum Stress Ratio	0.199 : 1	Top along X-X	0.0 k	Bottom along X-X 0.0 k
Ratio = $(P_u^2 + M_u^2)^{.5} / (\Phi P_n^2 + \Phi M_n^2)^{.5}$				
P_u =	10.889 k	$\Phi * P_n$ =	54.342 k	Maximum SERVICE Load Deflections . .
M_u -x =	2.640 k-ft	$\Phi * M_n$ -x =	13.273 k-ft	Along Y-Y -0.002426 in at 7.0 ft above base
M_u -y =	-28.630 k-ft	$\Phi * M_n$ -y =	146.028 k-ft	for load combination : D Only
M_u Angle =	85.0 deg	Φ =	0.90	Along X-X 0.01581 in at 7.0 ft above base
M_u at Angle =	28.751 k-ft	ΦM_n at Angle =	144.441 k-ft	for load combination : E Only
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>				
Column Capacities . .		General Section Information		
Pnmax : Nominal Max. Compressive Axial Capacit	1,678.49 k	ρ : % Reinforcing	0.5482 %	Rebar % Ok $\beta = 0.850$ $\theta = 0.80$
Pnmin : Nominal Min. Tension Axial Capacity	k	Reinforcing Area	2.480 in ²	
ΦP_n , max : Usable Compressive Axial Capacity	872.82 k	Concrete Area	452.389 in ²	
ΦP_n , min : Usable Tension Axial Capacity	k			

Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M02 CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft								Utilization	
	X-X	Y-Y		Pu	ϕ * Pn	δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio		
+1.40D	Actual	M2,min	6.95	16.94	749.93	1.000	4.11	1.000	1.86	24.000	4.51	198.68	0.023		
+1.20D	Actual	M2,min	6.95	14.52	749.93	1.000	3.52	1.000	1.60	24.000	3.87	198.68	0.019		
+1.20D+0.50W	Actual	Actual	6.95	14.52	390.83	1.000	3.52	1.000	-8.23	67.000	8.95	241.22	0.037		
+1.20D+W	Actual	Actual	6.95	14.52	193.12	1.000	3.52	1.000	-16.45	78.000	16.82	224.02	0.075		
+0.90D+W	Actual	Actual	6.95	10.89	120.49	1.000	2.64	1.000	-16.45	81.000	16.66	185.48	0.090		
+1.20D+E	Actual	Actual	6.95	14.52	80.71	1.000	3.52	1.000	-28.63	83.000	28.85	161.26	0.179		
+0.90D+E	Actual	Actual	6.95	10.89	54.34	1.000	2.64	1.000	-28.63	85.000	28.75	144.44	0.199		

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		k-ft	My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
D Only						12.099	-2.933				
+D+0.60W		1.410				12.099	-2.933			-9.870	
+D+0.450W		1.058				12.099	-2.933			-7.403	
+0.60D+0.60W		1.410				7.259	-1.760			-9.870	
+D+0.70E		2.863				12.099	-2.933			-20.041	
+D+0.5250E		2.147				12.099	-2.933			-15.031	
+0.60D+0.70E		2.863				7.259	-1.760			-20.041	
W Only		2.350								-16.450	
E Only		4.090								-28.630	

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis			Moment About Y-Y Axis	
	@ Base	@ Top		@ Base	@ Top
D Only	-2.933		k-ft		k-ft
+D+0.60W	-2.933		k-ft	-9.870	k-ft
+D+0.450W	-2.933		k-ft	-7.403	k-ft
+0.60D+0.60W	-1.760		k-ft	-9.870	k-ft
+D+0.70E	-2.933		k-ft	-20.041	k-ft
+D+0.5250E	-2.933		k-ft	-15.031	k-ft
+0.60D+0.70E	-1.760		k-ft	-20.041	k-ft
W Only			k-ft	-16.450	k-ft
E Only			k-ft	-28.630	k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	-0.002	in	7.000	ft
+D+0.60W	-0.0055	in	7.000	ft	-0.002	in	7.000	ft
+D+0.450W	-0.0041	in	7.000	ft	-0.002	in	7.000	ft
+0.60D+0.60W	-0.0055	in	7.000	ft	-0.001	in	7.000	ft
+D+0.70E	-0.0111	in	7.000	ft	-0.002	in	7.000	ft
+D+0.5250E	-0.0083	in	7.000	ft	-0.002	in	7.000	ft
+0.60D+0.70E	-0.0111	in	7.000	ft	-0.001	in	7.000	ft
W Only	-0.0091	in	7.000	ft	0.000	in	0.000	ft
E Only	-0.0157	in	6.953	ft	0.000	in	0.000	ft

Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

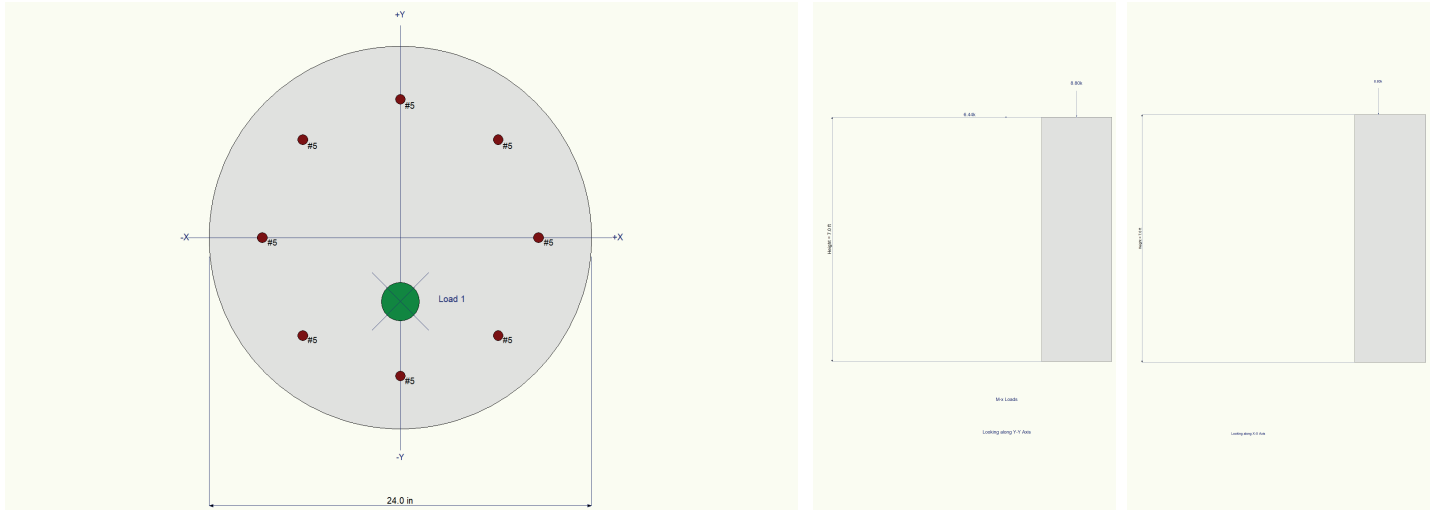
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

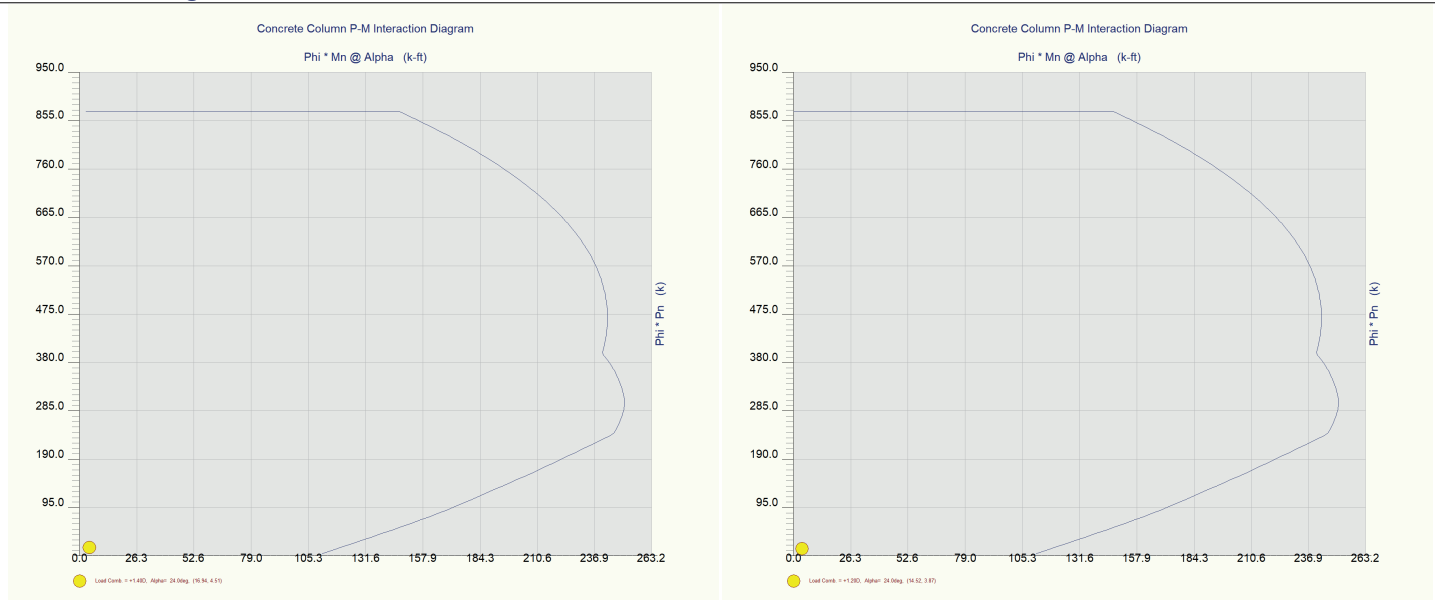
(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M02 CIDH Caisson

Sketches



Interaction Diagrams



Concrete Column

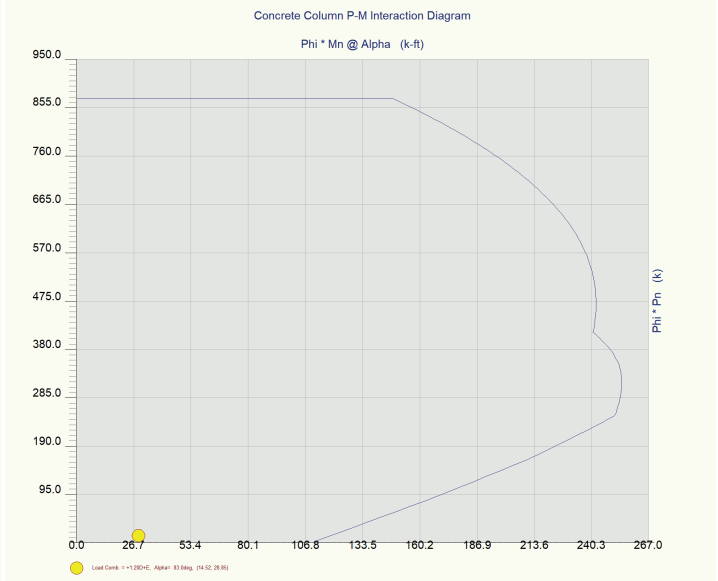
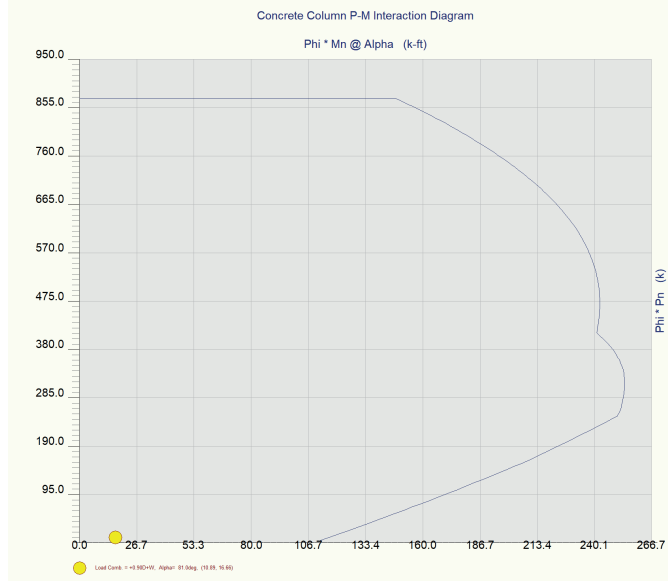
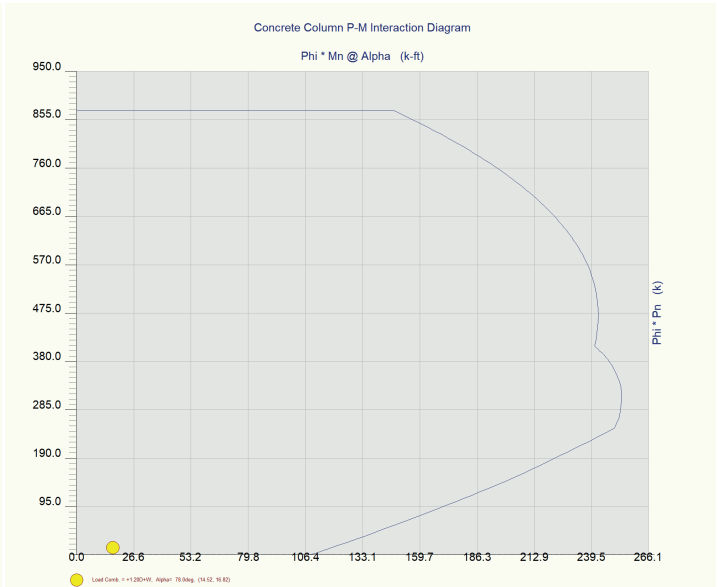
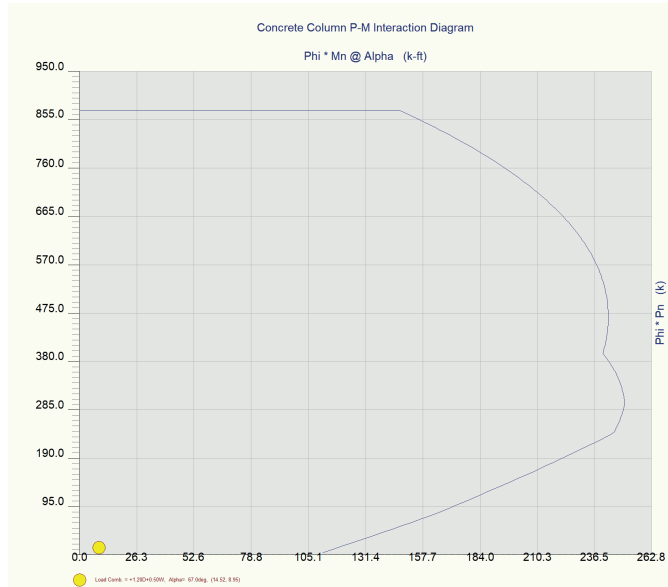
Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M02 CIDH Caisson



Concrete Column

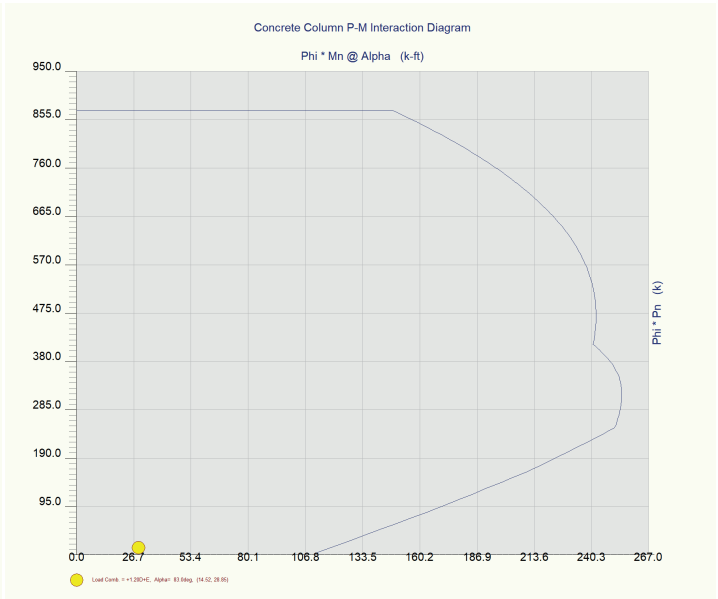
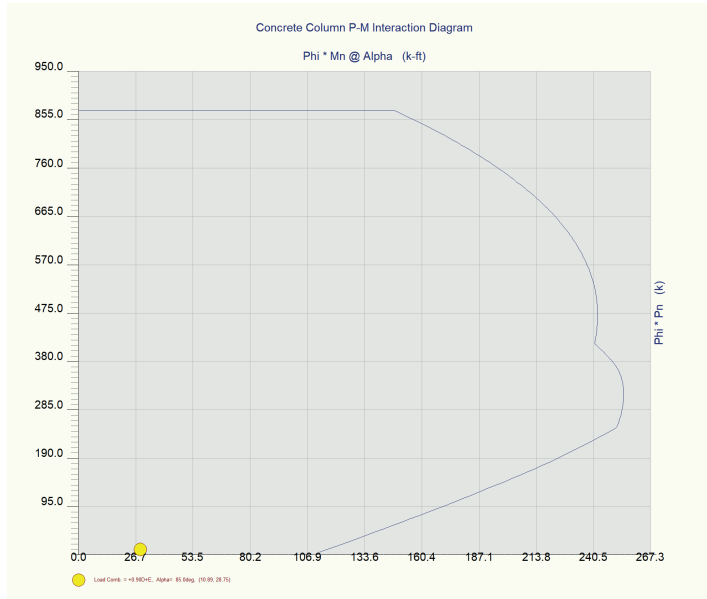
Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M02 CIDH Caisson



Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M02 Monument Identity Sign - Mid - HSS6x6x3/8

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : **HSS6x6x3/8**

Analysis Method : Load Resistance Factor

Steel Stress Grade : A500, Grade B, Fy = 46 ksi, Carbon Steel

Fy : Steel Yield 46.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 13.75 ft

Top & Bottom Fixity Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 13.75 ft, K = 2.1

Unbraced Length for buckling ABOUT Y-Y Axis = 10 ft, K = 2.1

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 377.850 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 13.750 ft, D = 8.80 k

BENDING LOADS . . .

Lat. Point Load at 7.0 ft creating Mx-x, W = 2.350, E = 4.090 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5995** : 1
Load Combination +1.20D+E
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu 11.013 k
0.9 * Pn 74.143 k
Mu-x -28.630 k-ft
0.9 * Mn-x : 54.510 k-ft
Mu-y 0.0 k-ft
0.9 * Mn-y : 54.510 k-ft

Maximum Load Reactions . .
Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 4.090 k

Maximum Load Deflections . . .
Along Y-Y 1.719 in at 13.750ft above base
for load combination : E Only
Along X-X 0.0 in at 0.0ft above base
for load combination :

PASS Maximum Shear Stress Ratio = **0.05715** : 1
Load Combination +1.20D+E
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 4.090 k
Vn * Phi : Allowable 71.564 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location						Stress Ratio	Status	Location
+1.40D	0.173	PASS	0.00 ft		3.00	1.00	151.97	110.53	0.000	PASS	0.00 ft
+1.20D	0.149	PASS	0.00 ft		3.00	1.00	151.97	110.53	0.000	PASS	0.00 ft
+1.20D+0.50W	0.225	PASS	0.00 ft		3.00	1.00	151.97	110.53	0.016	PASS	0.00 ft
+1.20D+W	0.376	PASS	0.00 ft		3.00	1.00	151.97	110.53	0.033	PASS	0.00 ft
+0.90D+W	0.357	PASS	0.00 ft		3.00	1.00	151.97	110.53	0.033	PASS	0.00 ft
+1.20D+E	0.599	PASS	0.00 ft		3.00	1.00	151.97	110.53	0.057	PASS	0.00 ft
+0.90D+E	0.581	PASS	0.00 ft		3.00	1.00	151.97	110.53	0.057	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
	@ Base		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	9.178										
+D+0.60W	9.178					1.410		-9.870			
+D+0.450W	9.178					1.058		-7.403			
+0.60D+0.60W	5.507					1.410		-9.870			
+D+0.70E	9.178					2.863		-20.041			
+D+0.5250E	9.178					2.147		-15.031			
+0.60D+0.70E	5.507					2.863		-20.041			



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M02 Monument Identity Sign - Mid - HSS6x6x3/8

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
W Only				2.350	-16.450		
E Only				4.090	-28.630		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	9.178						
"	Minimum				2.350	-16.450		
Reaction, X-X Axis Base	Maximum	9.178						
"	Minimum	9.178						
Reaction, Y-Y Axis Base	Maximum				4.090	-28.630		
"	Minimum	9.178						
Reaction, X-X Axis Top	Maximum	9.178						
"	Minimum	9.178						
Reaction, Y-Y Axis Top	Maximum	9.178						
"	Minimum	9.178						
Moment, X-X Axis Base	Maximum	9.178						
"	Minimum		-28.630		4.090	-28.630		
Moment, Y-Y Axis Base	Maximum	9.178						
"	Minimum	9.178						
Moment, X-X Axis Top	Maximum	9.178						
"	Minimum	9.178						
Moment, Y-Y Axis Top	Maximum	9.178						
"	Minimum	9.178						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.593 in	13.750 ft
+D+0.450W	0.0000 in	0.000 ft	0.444 in	13.750 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.593 in	13.750 ft
+D+0.70E	0.0000 in	0.000 ft	1.203 in	13.750 ft
+D+0.5250E	0.0000 in	0.000 ft	0.902 in	13.750 ft
+0.60D+0.70E	0.0000 in	0.000 ft	1.203 in	13.750 ft
W Only	0.0000 in	0.000 ft	0.988 in	13.750 ft
E Only	0.0000 in	0.000 ft	1.705 in	13.658 ft

Steel Section Properties : HSS6x6x3/8

Depth	=	6.000 in	I xx	=	39.50 in^4	J	=	64.600 in^4
Design Thick	=	0.349 in	S xx	=	13.20 in^3			
Width	=	6.000 in	R xx	=	2.280 in			
Wall Thick	=	0.375 in	Zx	=	15.800 in^3			
Area	=	7.580 in^2	I yy	=	39.500 in^4	C	=	22.100 in^3
Weight	=	27.480 plf	S yy	=	13.200 in^3			
			R yy	=	2.280 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

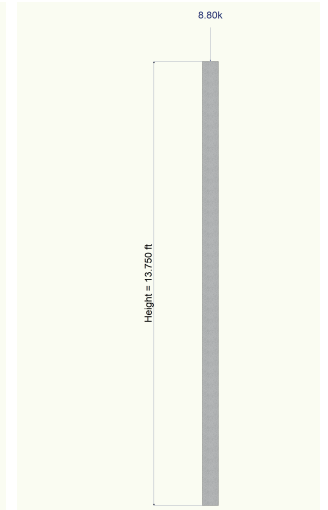
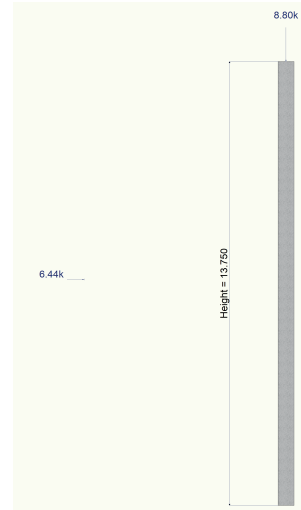
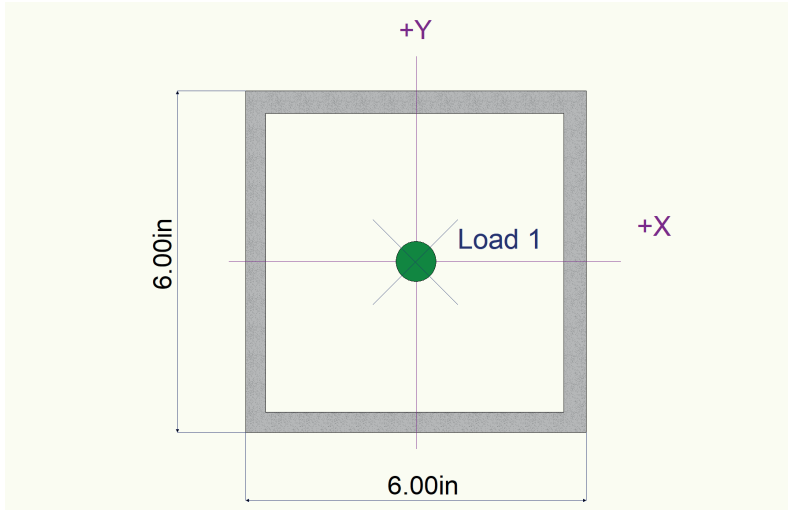
LIC# : KW-06015733, Build:20.25.02.04

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: M02 Monument Identity Sign - Mid - HSS6x6x3/8

Sketches



45. A01 Gateway Identity Archway, (W-03)

45. Gateway Arch
- A. Loading
 - B. Wind Loading
 - C. Pilaster Wall + Foundation Design
 - D. FEA Model Definition Sketches
 - E. Envelope Member Forces
 - F. Envelope Reactions
 - G. Envelope Code Check
 - H. Baseplate + Anchor Bolts
-

A01 Gateway Identity Sign

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Pilaster 4 Walls: 4 walls x 81 psf x 4ft x 11.5 ft = 14.9 kips + 600lbs (precast elements) = 15.5 kips
- Signboard. = 24#/ft x (48.3' + 2 x 6') = 1.45 kips

$W = 15.5 + 1.45 = 17$ kips

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 17 \text{ kips} = 18.4 \text{ kips}$

Feature	Seismic Weight (kips)	Height to Feature (ft)	Seismic Base Shear (kips)	OT Moment (k-ft)
Sign Structure	1.45	14'	1.6	22.4
Pedestal	15.5	5.25'	16.7	87.7
Total (per column)	17		18.4	110.1

Applied Moment, (seismic) = 110.1 k-ft, 55 k-ft per pedestal

Wind Load, (ASCE 7-22)

Total Wind Load = 30psf x 48.3' x 2' * 0.5 + 30psf x 10.3' x 4' x 2 = 3.921 kips

Applied Moment, (wind) = 1.5 kips x 15' + 2.5 kips x 5.3' = 35.75 k-ft, 18 k-ft per pedestal

(Seismic Controls)

Arch Loading

Sign Load = 2.2 kips applied along 14 ft of top chord at front face and along 8 top chord ties -> 0.1 kips/ft load

Total Wind Load = 30psf x 48.3' x 2' * 0.5 + 30psf x 4' x 2' x 2 x 0.5 = 1,689 lbs, applied along front face of top and bottom chords and front face of exposed posts -> 1,689 lbs/68 nodes = 0.025 kips/node. Load is reversable.

Total Seismic Load = 1.08 x 8.9 kips = 9612 lbs,

Y-Dir: applied 100 nodes = 0.096 kips per node

X-Dir: applied 200 nodes = 0.048 kips per node

45. Gateway Arch
- A. Loading
 - B. Wind Loading**
 - C. Pilaster Wall + Foundation Design
 - D. FEA Model Definition Sketches
 - E. Envelope Member Forces
 - F. Envelope Reactions
 - G. Envelope Code Check
 - H. Baseplate + Anchor Bolts
-

Wind Load (ASCE 7-22) - Chapter 29, Solid Free-Standing Wall

Improvement: General Wind Loading

Velocity Pressure $q_z = 0.00256 K_z K_{zt} K_d K_e V^2$ (lb/ft²); V in mi/h (26.10-1)

Risk Category	II	(table 1.5-1)
Basic Wind Speed (V)	110	(figure 26.5-1B)

Wind Load Parameters

K_d	0.85	(table 26.6-1)
Exposure Category	C	(section 26.7)
K_{zt}	1	(section 26.8) - Assume no speed-up
K_z	0.85	(table 26.10-1)
K_e	1	(section 26.9)
G	0.85	(section 26.11.1) - Rigid Structure
q_z	22.38016	(equation 26.10-1)

Wind Load on Wall Face $F = q_h G C_f A_s$ (Eqn. 29.3-1)

A_s	1	Unit Area of Loading, ft ²
C_f	1.55	(Force Coefficient, Figure 29.3-1)
Total Wind Load	29.5	psf

Use Wind Load:	30.0	psf
----------------	-------------	-----

45. Gateway Arch
- A. Loading
 - B. Wind Loading
 - C. Pilaster Wall + Foundation Design**
 - D. FEA Model Definition Sketches
 - E. Envelope Member Forces
 - F. Envelope Reactions
 - G. Envelope Code Check
 - H. Baseplate + Anchor Bolts
-

Masonry Slender Wall

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A01, A02 Gateway Identity Pilaster Wall - CMU

Code References

Calculations per TMS 402-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 ($L \leq 100$ psf)

General Information

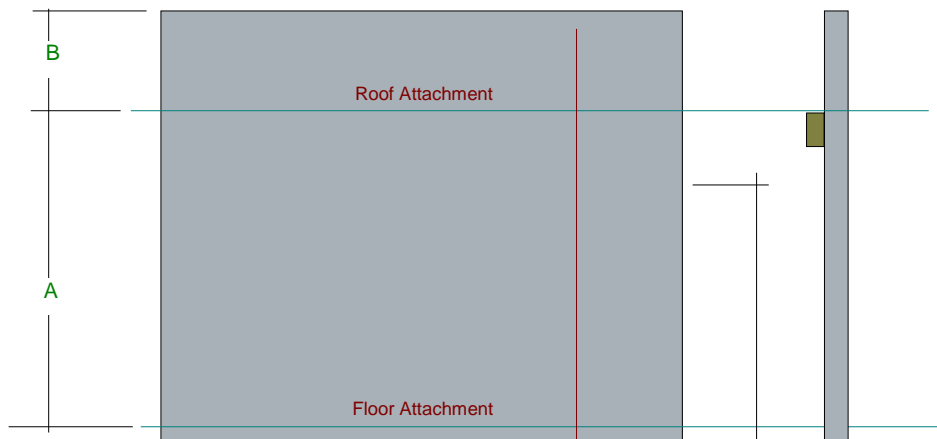
Calculations per TMS 402-16, IBC 2021

Construction Type : Grouted Hollow Concrete Masonry

F'm	=	1.50 ksi	Nom. Wall Thickness	8 in	Temp Diff across thickness	=	deg F
Fy - Yield	=	60.0 ksi	Actual Thickness	7.625 in	Min Allow Out-of-plane Defl R_e	=	0.0
Fr - Rupture	=	61.0 psi	Rebar "d" distance	3.8125 in	Minimum Vertical Steel %	=	0.0020
Em = f'm *	=	900.0	Lower Level Rebar . . .				
Max % of ρ bal.	=	0.007129	Bar Size	# 4			
Grout Density	=	140 pcf	Bar Spacing	16 in			
Block Weight		Medium Weight					
Wall Weight	=	81.0 psf					
Wall is Solid Grouted							

One-Story Wall Dimensions

A Clear Height	=	10.250 ft
B Parapet height	=	ft
Wall Support Condition Top Free, Bottom Fix		



Vertical Loads

Vertical Concentrated Loads (Applied to full "Strip Width")

Beam Load #1	Eccentricity in	DL : Dead	Lr : Roof Live	Lf : Floor Live	S : Snow	W : Wind
	Dist. from Base	2.0				k
	11.50 ft					

Lateral Loads

Wind Loads :

Full area WIND load 30.0 psf

Seismic Loads :

Wall Weight Seismic Load Input Method : ASCE seismic factors entered

SDS Value per ASCE 12.11.1 $S_{DS} * I = 1.080$

$F_p = \text{Wall Wt.} * 0.4320 = 34.992 \text{ psf}$

Masonry Slender Wall

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A01, A02 Gateway Identity Pilaster Wall - CMU

DESIGN SUMMARY

Results reported for "Strip Width" of 12.0 in

Governing Load Combination . . .		Actual Values . . .		Allowable Values . . .	
PASS	Moment Capacity Check +0.90D+E	Maximum Bending Stress Ratio0.7451			
		Max Mu	-2.061 k-ft	Phi * Mn	2.767 k-ft
PASS	Service Deflection Check E Only	Actual Defl. Ratio L/	193	Allowable Defl. Ratio	150.0
		Max. Deflection	1.277 in	/2 for Cantilever	
PASS	Axial Load Check +1.20D+E	Max Pu / Ag	37.090 psi	Max. Allow. Defl.	1.640 in
		Location	0.1708 ft	0.2 * f'm	300.0 psi
	Reinforcing Limit Check				
		Actual As/bd	0.003279	Max Allow As/bd	0.007129
		Maximum Reactions for Load Combination...			
		Top Horizontal	0.0		0.0 k
		Base Horizontal	E Only		358.668 k
		Vertical Reaction	+D+0.70E		2.830 k

Design Maximum Combinations - Moments

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load		Mcr k-ft	Mu k-ft	Moment Values			As in ²	As Ratio	0.6 * rho bal	Bar 'd'
	Pu k	0.2*f'm*b*t k			Phi	Phi Mn k-ft					
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000	0.00	
	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.0000	0.0000	0.00	
+1.20D+0.50W at 0.00 to 0.34	3.396	27.468	0.59	0.82	0.90	2.96	0.150	0.0033	0.0059	0.00	
+1.20D+W at 0.00 to 0.34	3.396	27.468	0.59	1.81	0.90	2.96	0.150	0.0033	0.0059	0.00	
+0.90D+W at 0.00 to 0.34	2.547	27.468	0.59	1.74	0.90	2.77	0.150	0.0033	0.0062	0.00	
+1.20D+E at 0.00 to 0.34	3.396	27.468	0.59	2.15	0.90	2.96	0.150	0.0033	0.0059	0.00	
+0.90D+E at 0.00 to 0.34	2.547	27.468	0.59	2.06	0.90	2.77	0.150	0.0033	0.0062	0.00	

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Moment Values		I gross in ⁴	Stiffness		Deflections	
		Mcr k-ft	Mactual k-ft		I cracked in ⁴	I effective in ⁴	Deflection in	Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
+D+0.60W at 9.91 to 10.25	0.028	0.59	0.00	443.30	28.97	443.300	0.284	866.4
+D+0.450W at 9.91 to 10.25	0.028	0.59	0.00	443.30	28.97	443.300	0.089	2,757.3
+0.60D+0.60W at 9.91 to 10.25	0.017	0.59	0.00	443.30	28.94	443.300	0.277	887.6
+D+0.70E at 9.91 to 10.25	0.029	0.59	0.00	443.30	28.97	443.300	0.688	357.5
+D+0.5250E at 9.91 to 10.25	0.028	0.59	0.00	443.30	28.97	443.300	0.303	810.6
+0.60D+0.70E at 9.91 to 10.25	0.018	0.59	0.00	443.30	28.95	443.300	0.660	372.8
W Only at 9.91 to 10.25	0.002	0.59	0.00	443.30	28.91	443.300	0.965	255.0
E Only at 9.91 to 10.25	0.003	0.59	0.00	443.30	28.91	443.300	1.277	192.6

Reactions - Vertical & Horizontal

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
D Only	0.0 k	0.00 k	2.830 k
+D+0.60W	0.2 k	0.00 k	2.830 k
+D+0.450W	0.1 k	0.00 k	2.830 k
+0.60D+0.60W	0.2 k	0.00 k	1.698 k
+D+0.70E	0.3 k	0.00 k	2.830 k
+D+0.5250E	0.2 k	0.00 k	2.830 k
+0.60D+0.70E	0.3 k	0.00 k	1.698 k
W Only	0.3 k	0.00 k	0.000 k



GMU Engineers and Geologists
30336 Esperanza

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Printed: 4 MAR 2025, 4:22PM

Masonry Slender Wall

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A01, A02 Gateway Identity Pilaster Wall - CMU

E Only

0.4 k

0.00 k

0.000 k

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC#: KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A01, A02 Gateway Identity Footing

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	Yes
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	Yes
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	2.0 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.0 ft

Increases based on footing plan dimension

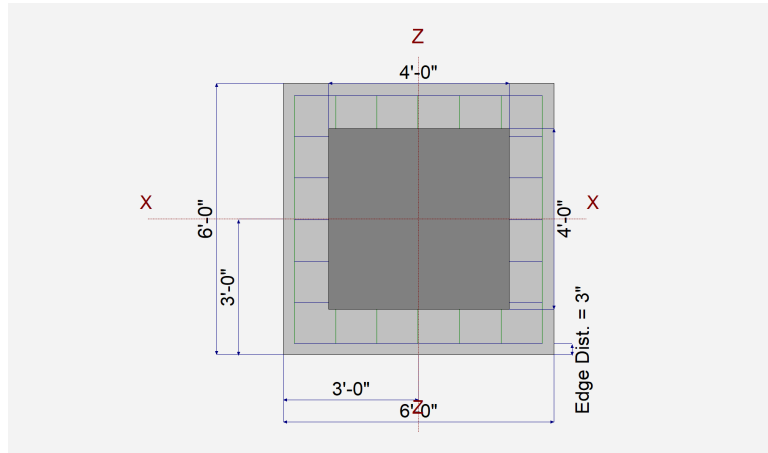
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	6.0 ft
Length parallel to Z-Z Axis	=	6.0 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	48.0 in
pz : parallel to Z-Z Axis	=	48.0 in
Height	=	136.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



Reinforcing

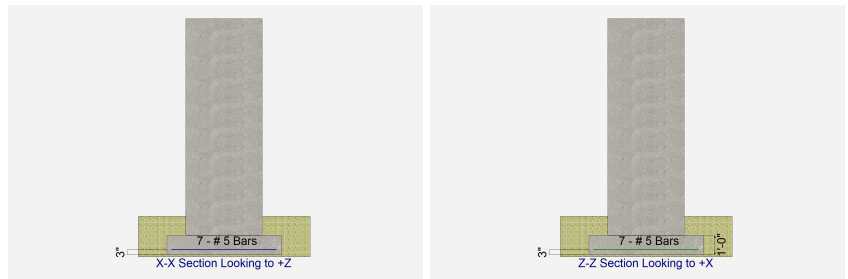
Bars parallel to X-X Axis	=	7.0
Number of Bars	=	# 5
Reinforcing Bar Size	=	# 5

Bars parallel to Z-Z Axis	=	7.0
Number of Bars	=	# 5
Reinforcing Bar Size	=	# 5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	17.0					k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=				18.0	55.0	k-ft
V-x	=						k
V-z	=						k

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC#: KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A01, A02 Gateway Identity Footing

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.7375	Soil Bearing	2.467 ksf	3.345 ksf	+D+0.70E about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.142	Overturning - Z-Z	38.50 k-ft	43.956 k-ft	+0.60D+0.70E
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.09642	Z Flexure (+X)	1.371 k-ft/ft	14.215 k-ft/ft	+1.20D+E
PASS	0.05679	Z Flexure (-X)	0.8073 k-ft/ft	14.215 k-ft/ft	+1.40D
PASS	0.05679	X Flexure (+Z)	0.8073 k-ft/ft	14.215 k-ft/ft	+1.40D
PASS	0.05679	X Flexure (-Z)	0.8073 k-ft/ft	14.215 k-ft/ft	+1.40D
PASS	0.1116	1-way Shear (+X)	6.336 psi	56.773 psi	+1.20D+E
PASS	0.06322	1-way Shear (-X)	3.589 psi	56.773 psi	+1.40D
PASS	0.06322	1-way Shear (+Z)	3.589 psi	56.773 psi	+1.40D
PASS	0.06322	1-way Shear (-Z)	3.589 psi	56.773 psi	+1.40D
PASS	0.06009	2-way Punching	10.201 psi	169.764 psi	+1.40D



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	3.345	n/a	0.0	1.409	1.409	n/a	n/a	0.421
X-X, +D+0.60W	3.345	n/a	0.0	1.409	1.409	n/a	n/a	0.421
X-X, +D+0.450W	3.345	n/a	0.0	1.409	1.409	n/a	n/a	0.421
X-X, +0.60D+0.60W	3.345	n/a	0.0	0.8452	0.8452	n/a	n/a	0.253
X-X, +D+0.70E	3.345	n/a	0.0	1.409	1.409	n/a	n/a	0.421
X-X, +D+0.5250E	3.345	n/a	0.0	1.409	1.409	n/a	n/a	0.421
X-X, +0.60D+0.70E	3.345	n/a	0.0	0.8452	0.8452	n/a	n/a	0.253
Z-Z, D Only	3.345	0.0	n/a	n/a	n/a	1.409	1.409	0.421
Z-Z, +D+0.60W	3.345	2.556	n/a	n/a	n/a	1.112	1.706	0.510
Z-Z, +D+0.450W	3.345	1.917	n/a	n/a	n/a	1.186	1.631	0.488
Z-Z, +0.60D+0.60W	3.345	4.259	n/a	n/a	n/a	0.5482	1.142	0.341
Z-Z, +D+0.70E	3.345	9.110	n/a	n/a	n/a	0.350	2.467	0.738
Z-Z, +D+0.5250E	3.345	6.833	n/a	n/a	n/a	0.6146	2.203	0.659
Z-Z, +0.60D+0.70E	3.345	15.183	n/a	n/a	n/a	0.0	1.938	0.579

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	None	0.0 k-ft	Infinity	OK
X-X, +D+0.5250E	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	10.80 k-ft	73.260 k-ft	6.783	OK
Z-Z, +D+0.450W	8.10 k-ft	73.260 k-ft	9.044	OK
Z-Z, +0.60D+0.60W	10.80 k-ft	43.956 k-ft	4.070	OK
Z-Z, +D+0.70E	38.50 k-ft	73.260 k-ft	1.903	OK
Z-Z, +D+0.5250E	28.875 k-ft	73.260 k-ft	2.537	OK
Z-Z, +0.60D+0.70E	38.50 k-ft	43.956 k-ft	1.142	OK

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A01, A02 Gateway Identity Footing

Sliding Stability

All units k

Force Application Axis
Load Combination...

Sliding Force

Resisting Force

Stability Ratio

Status

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.8073	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +1.40D	0.8073	-Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +1.20D	0.6919	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +1.20D	0.6919	-Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +1.20D+0.50W	0.6919	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +1.20D+0.50W	0.6919	-Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +1.20D+W	0.6919	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +1.20D+W	0.6919	-Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +0.90D+W	0.5190	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +0.90D+W	0.5190	-Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +1.20D+E	0.6919	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +1.20D+E	0.6919	-Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +0.90D+E	0.5190	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
X-X, +0.90D+E	0.5190	-Z	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +1.40D	0.8073	-X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +1.40D	0.8073	+X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +1.20D	0.6919	-X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +1.20D	0.6919	+X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +1.20D+0.50W	0.5809	-X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +1.20D+0.50W	0.8030	+X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +1.20D+W	0.4698	-X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +1.20D+W	0.9141	+X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +0.90D+W	0.2969	-X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +0.90D+W	0.7411	+X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +1.20D+E	0.01329	-X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +1.20D+E	1.371	+X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +0.90D+E	0.1097	-X	Top	0.2592	ACI 7.6.1.1	0.3617	14.215	OK
Z-Z, +0.90D+E	1.210	+X	Bottom	0.2592	ACI 7.6.1.1	0.3617	14.215	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.59 psi	3.59 psi	3.59 psi	56.77 psi	0.06	OK
+1.20D	3.08 psi	3.08 psi	3.08 psi	56.77 psi	0.05	OK
+1.20D+0.50W	2.54 psi	3.61 psi	3.61 psi	56.77 psi	0.06	OK
+1.20D+W	2.01 psi	4.14 psi	4.14 psi	56.77 psi	0.07	OK
+0.90D+W	1.24 psi	3.37 psi	3.37 psi	56.77 psi	0.06	OK
+1.20D+E	0.18 psi	6.34 psi	6.34 psi	56.77 psi	0.11	OK
+0.90D+E	0.51 psi	5.63 psi	5.63 psi	56.77 psi	0.10	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.59 psi	3.59 psi	3.59 psi	56.77 psi	0.06	OK
+1.20D	3.08 psi	3.08 psi	3.08 psi	56.77 psi	0.05	OK
+1.20D+0.50W	3.08 psi	3.08 psi	3.08 psi	56.77 psi	0.05	OK
+1.20D+W	3.08 psi	3.08 psi	3.08 psi	56.77 psi	0.05	OK
+0.90D+W	2.31 psi	2.31 psi	2.31 psi	56.77 psi	0.04	OK
+1.20D+E	3.08 psi	3.08 psi	3.08 psi	56.77 psi	0.05	OK
+0.90D+E	2.31 psi	2.31 psi	2.31 psi	56.77 psi	0.04	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	10.20 psi	169.76psi	0.06009	OK
+1.20D	8.74 psi	169.76psi	0.05151	OK
+1.20D+0.50W	8.74 psi	169.76psi	0.05151	OK
+1.20D+W	8.74 psi	169.76psi	0.05151	OK
+0.90D+W	6.56 psi	169.76psi	0.03863	OK
+1.20D+E	8.74 psi	169.76psi	0.05151	OK



GMU Engineers and Geologists
30336 Esperanza

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Printed: 4 MAR 2025, 4:22PM

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

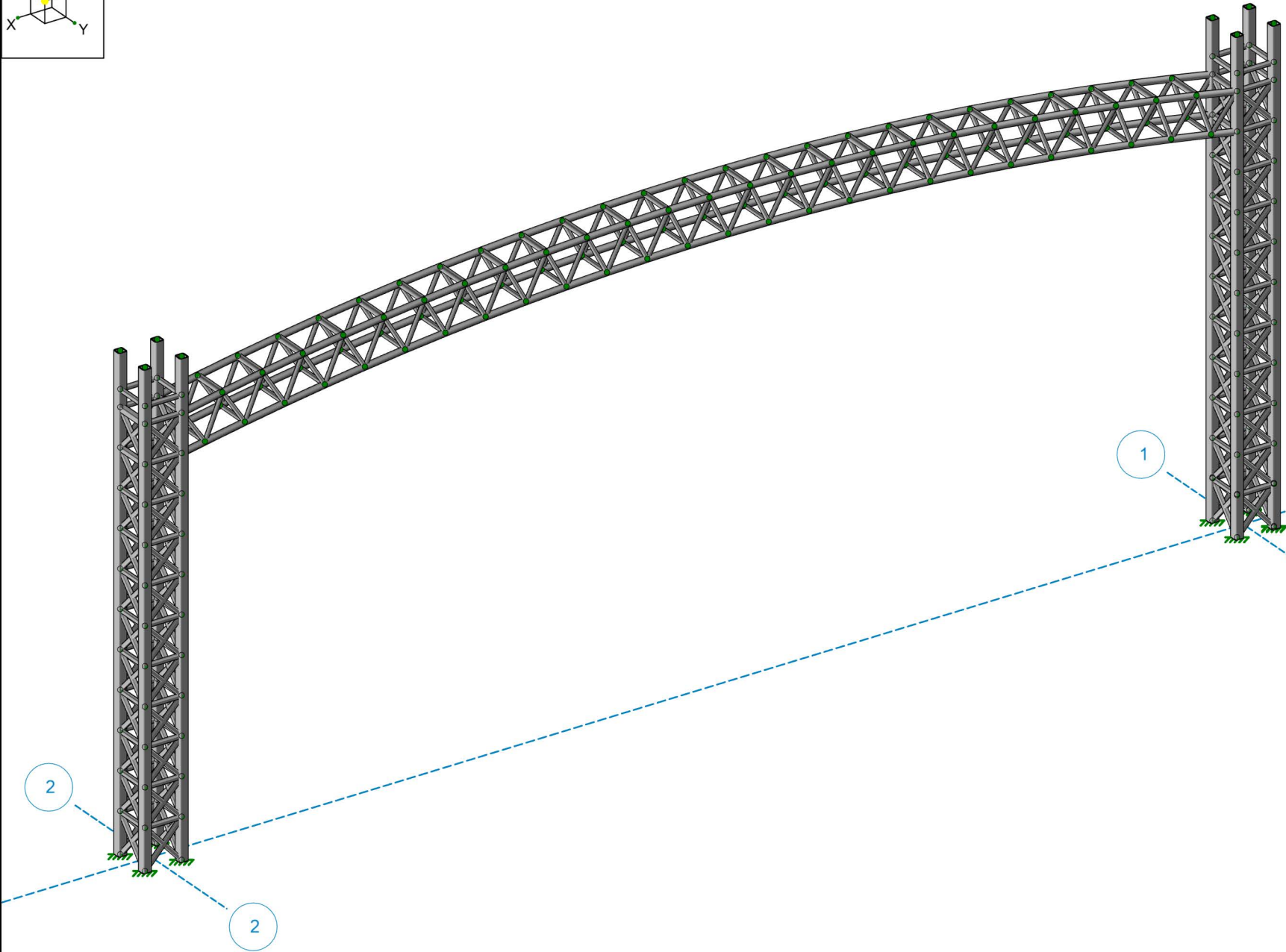
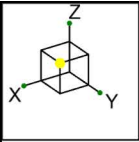
DESCRIPTION: A01, A02 Gateway Identity Footing

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D+E	6.74 psi	169.76psi	0.03972	OK

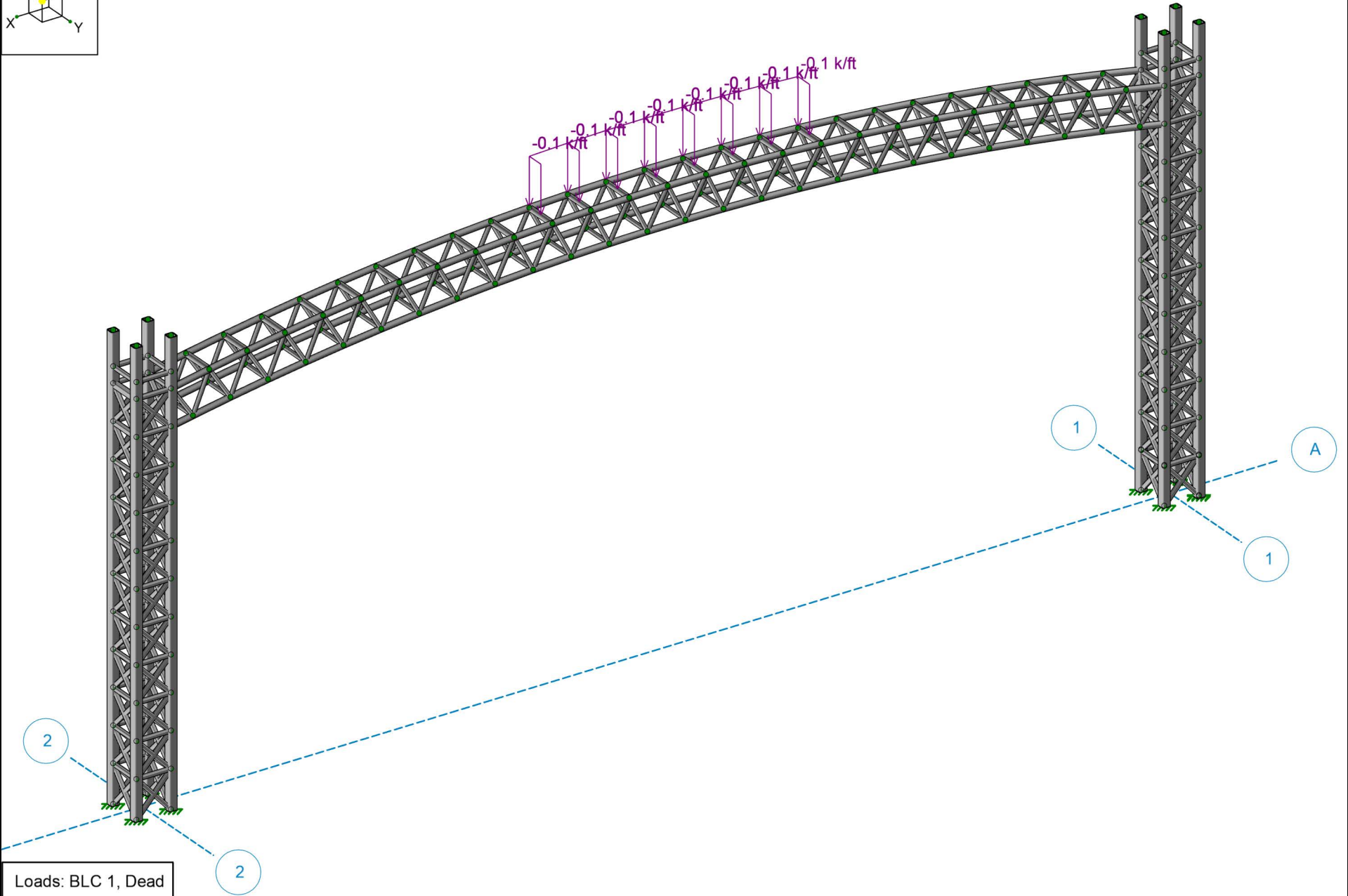
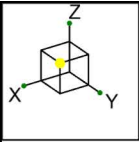
45. Gateway Arch
- A. Loading
 - B. Wind Loading
 - C. Pilaster Wall + Foundation Design
 - D. FEA Model Definition Sketches**
 - E. Envelope Member Forces
 - F. Envelope Reactions
 - G. Envelope Code Check
 - H. Baseplate + Anchor Bolts
-



GMU Geotechnical
sbolin
24-130-00

Gateway Identity Arch

SK-1
Mar 31, 2025 at 03:49 PM
Gateway Identity Arch_rev2.r3d



Loads: BLC 1, Dead



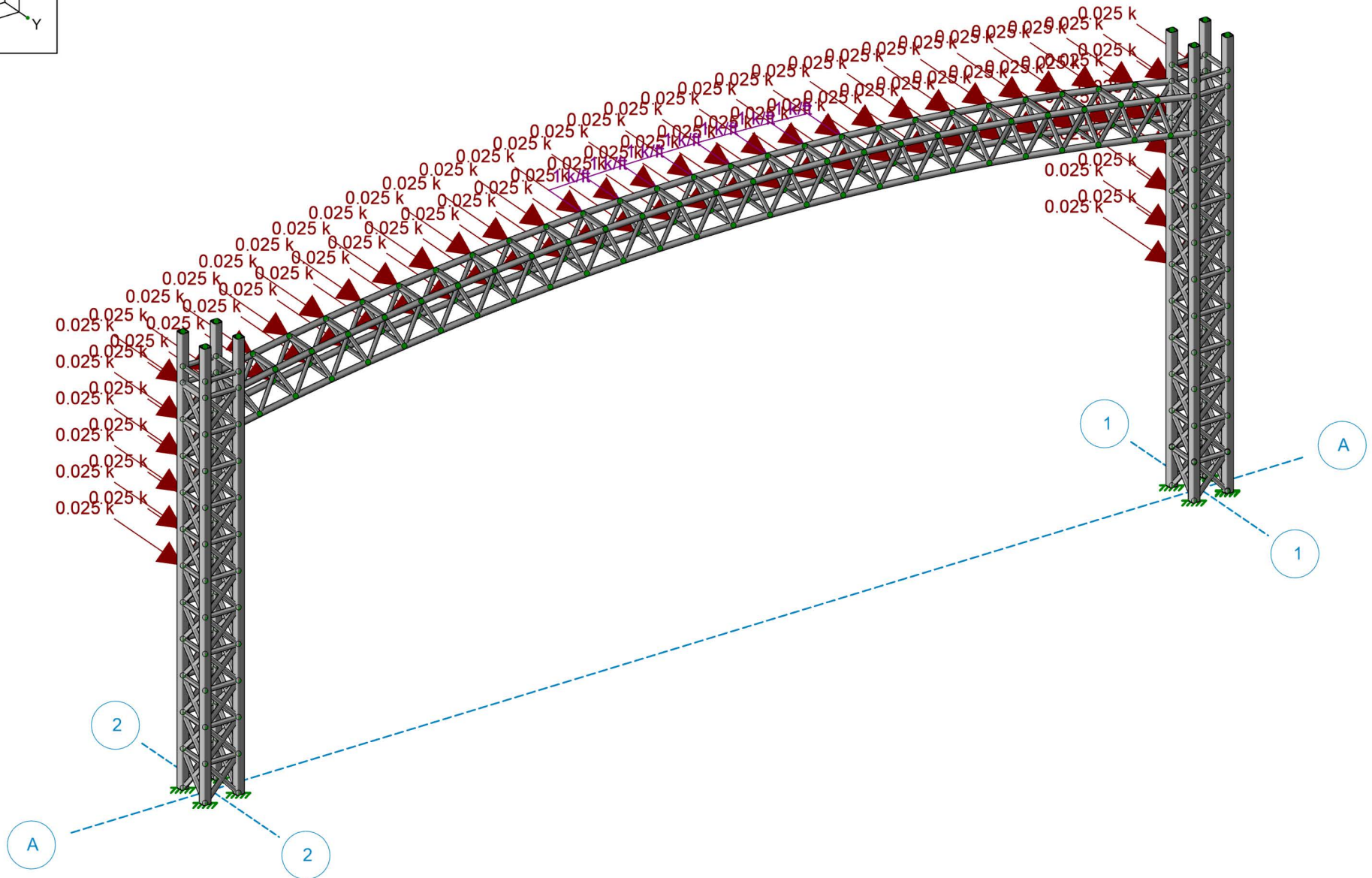
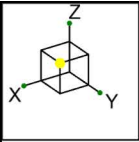
GMU Geotechnical
sbolin
24-130-00

Gateway Identity Arch

SK-2

Mar 31, 2025 at 03:50 PM

Gateway Identity Arch_rev2.r3d



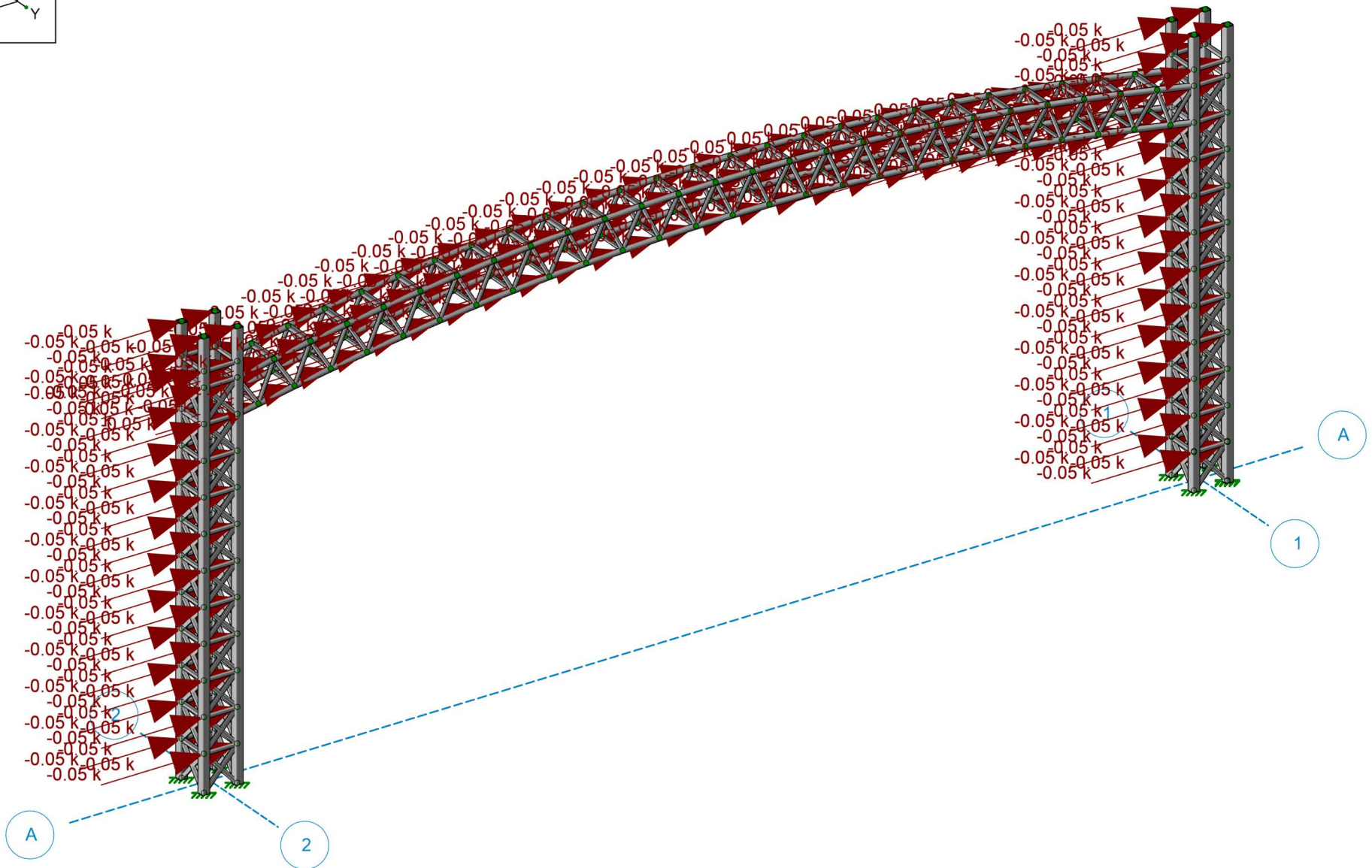
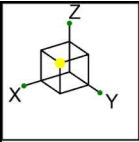
Loads: BLC 6, Wind-y



GMU Geotechnical
sbolin
24-130-00

Gateway Identity Arch

SK-3
Mar 31, 2025 at 03:51 PM
Gateway Identity Arch_rev2.r3d



Loads: BLC 3, EQ-x



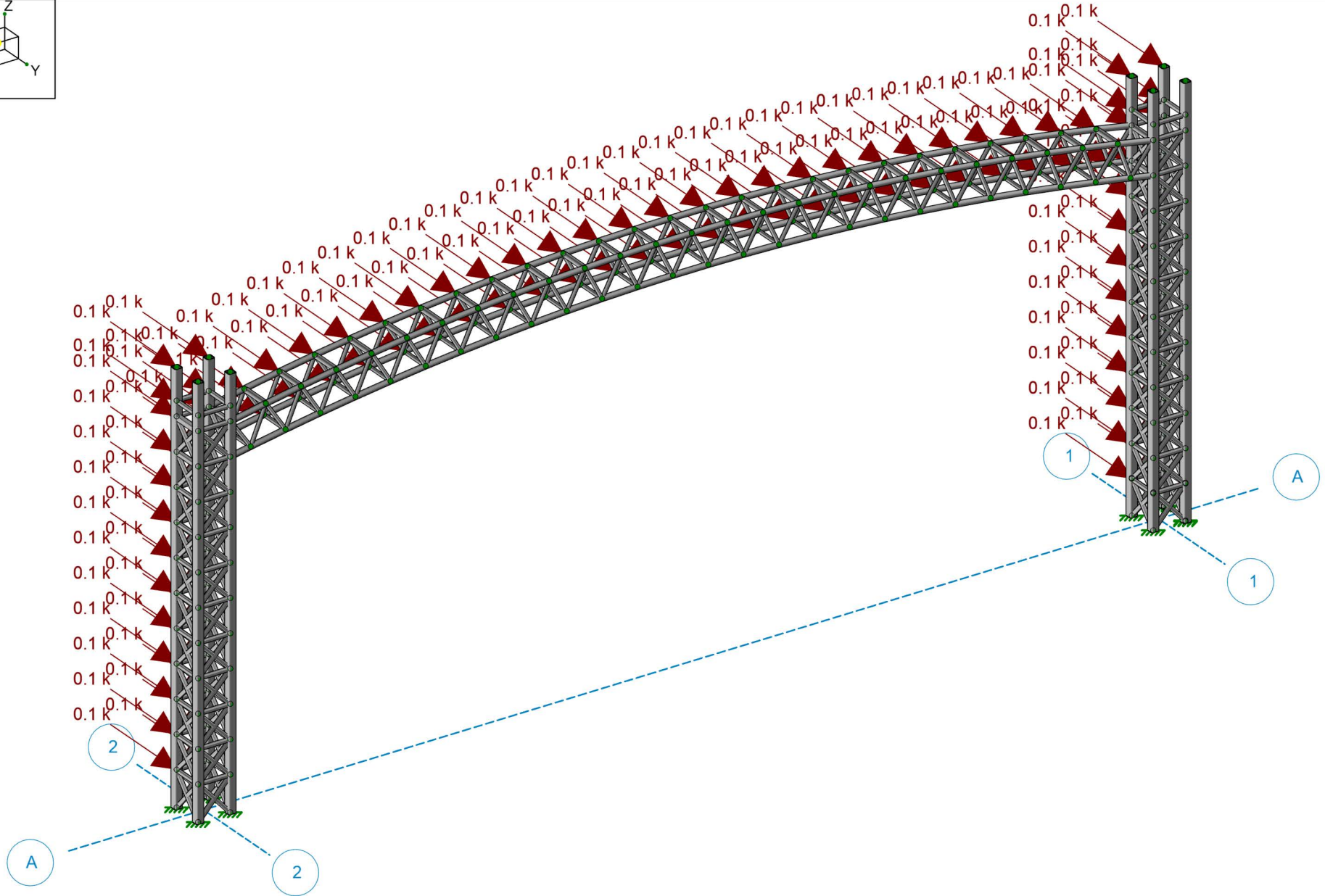
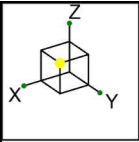
GMU Geotechnical
sbolin
24-130-00

Gateway Identity Arch

SK-4

Mar 31, 2025 at 03:52 PM

Gateway Identity Arch_rev2.r3d



Loads: BLC 4, EQ-y



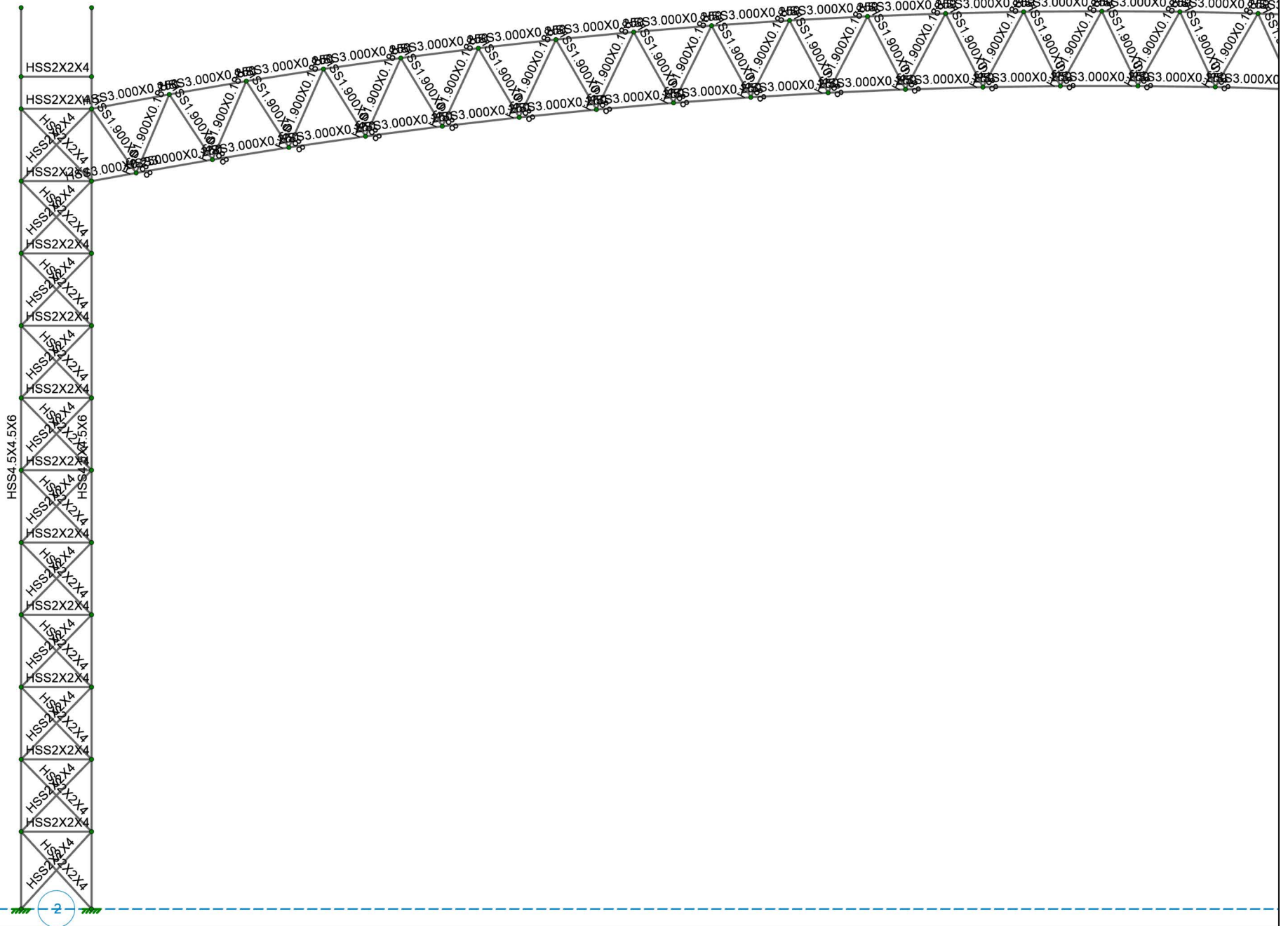
GMU Geotechnical
sbohin
24-130-00

Gateway Identity Arch

SK-5

Mar 31, 2025 at 03:52 PM

Gateway Identity Arch_rev2.r3d



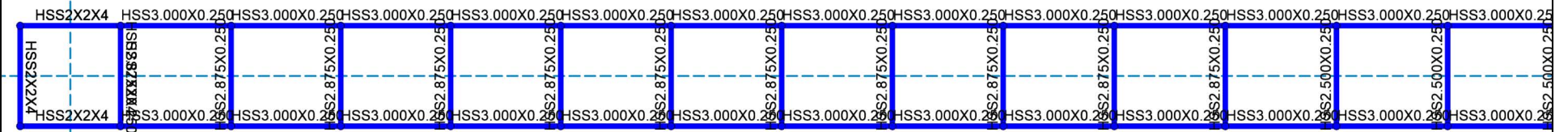
GMU Geotechnical
sbolin
24-130-00

Gateway Identity Arch

SK-7
Mar 31, 2025 at 03:57 PM
Gateway Identity Arch_rev2.r3d



1



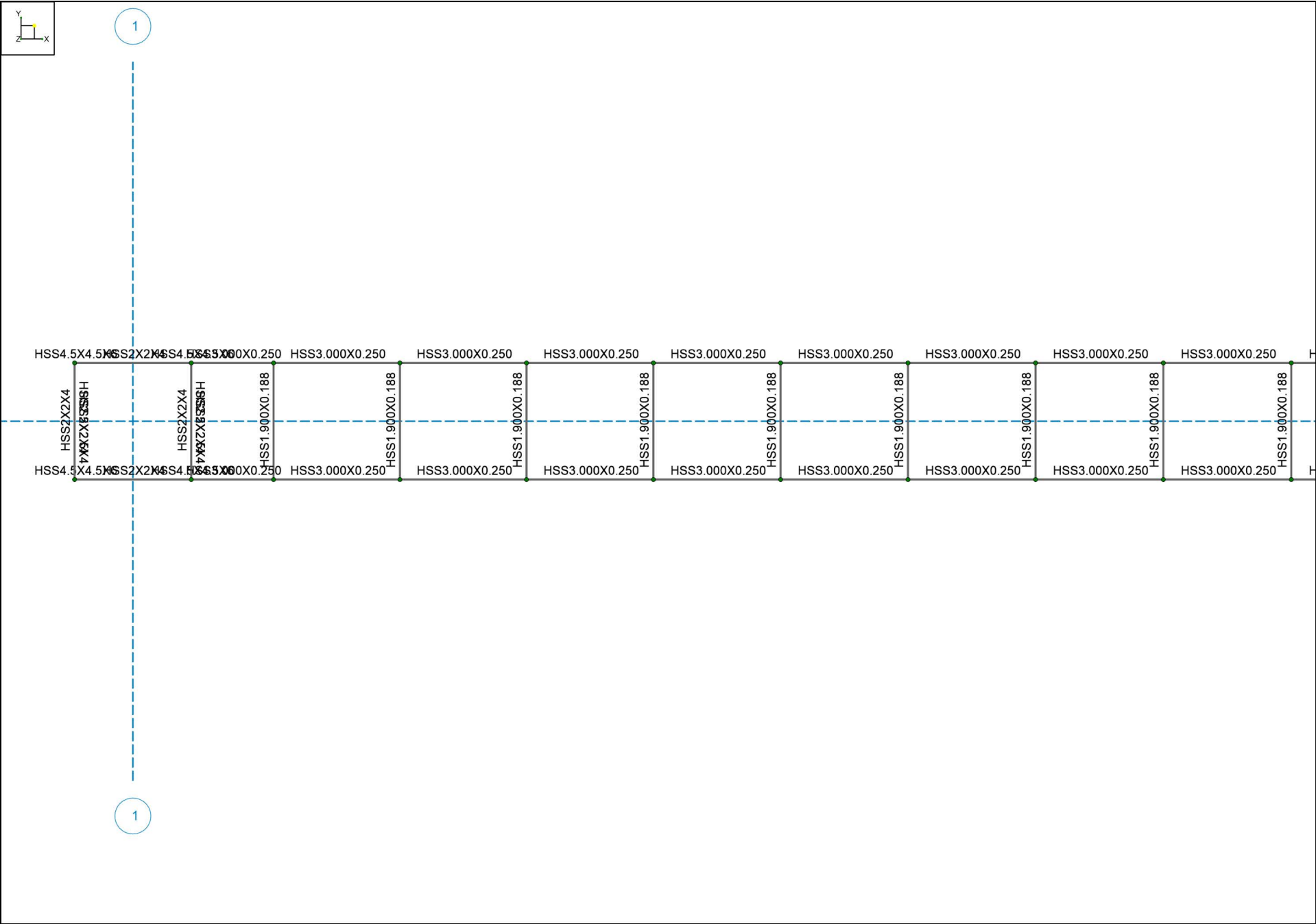
1



GMU Geotechnical
sbolin
24-130-00

Gateway Identity Arch

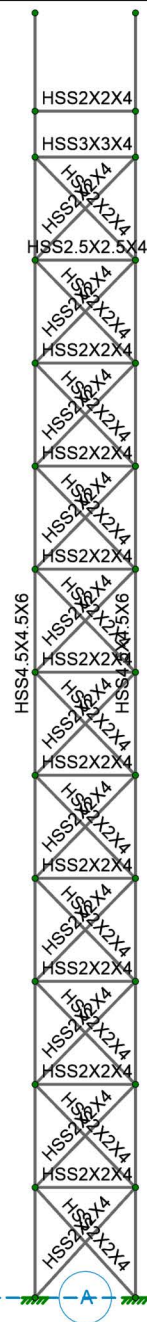
SK-8
Mar 31, 2025 at 04:10 PM
Gateway Identity Arch_rev2.r3d

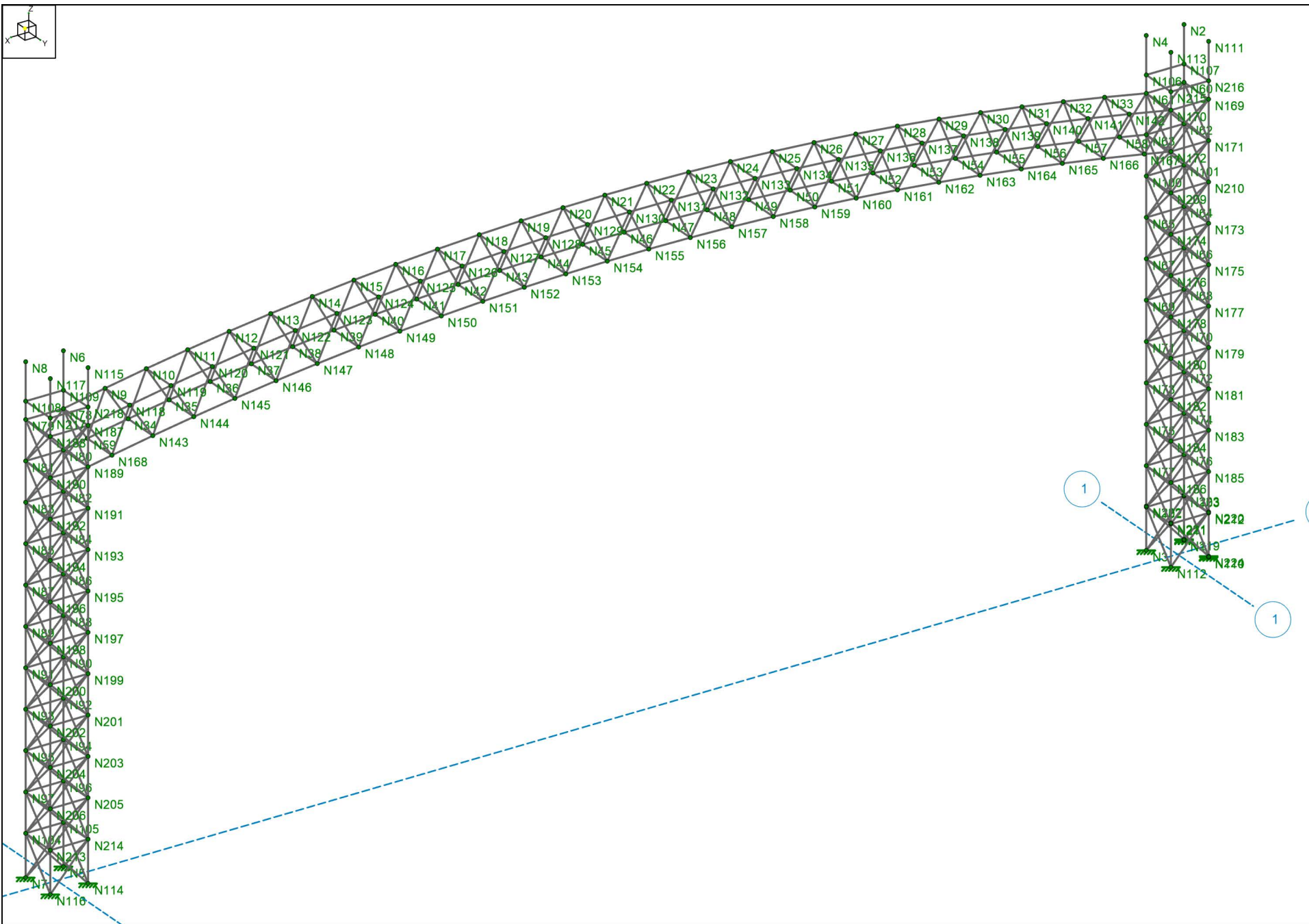


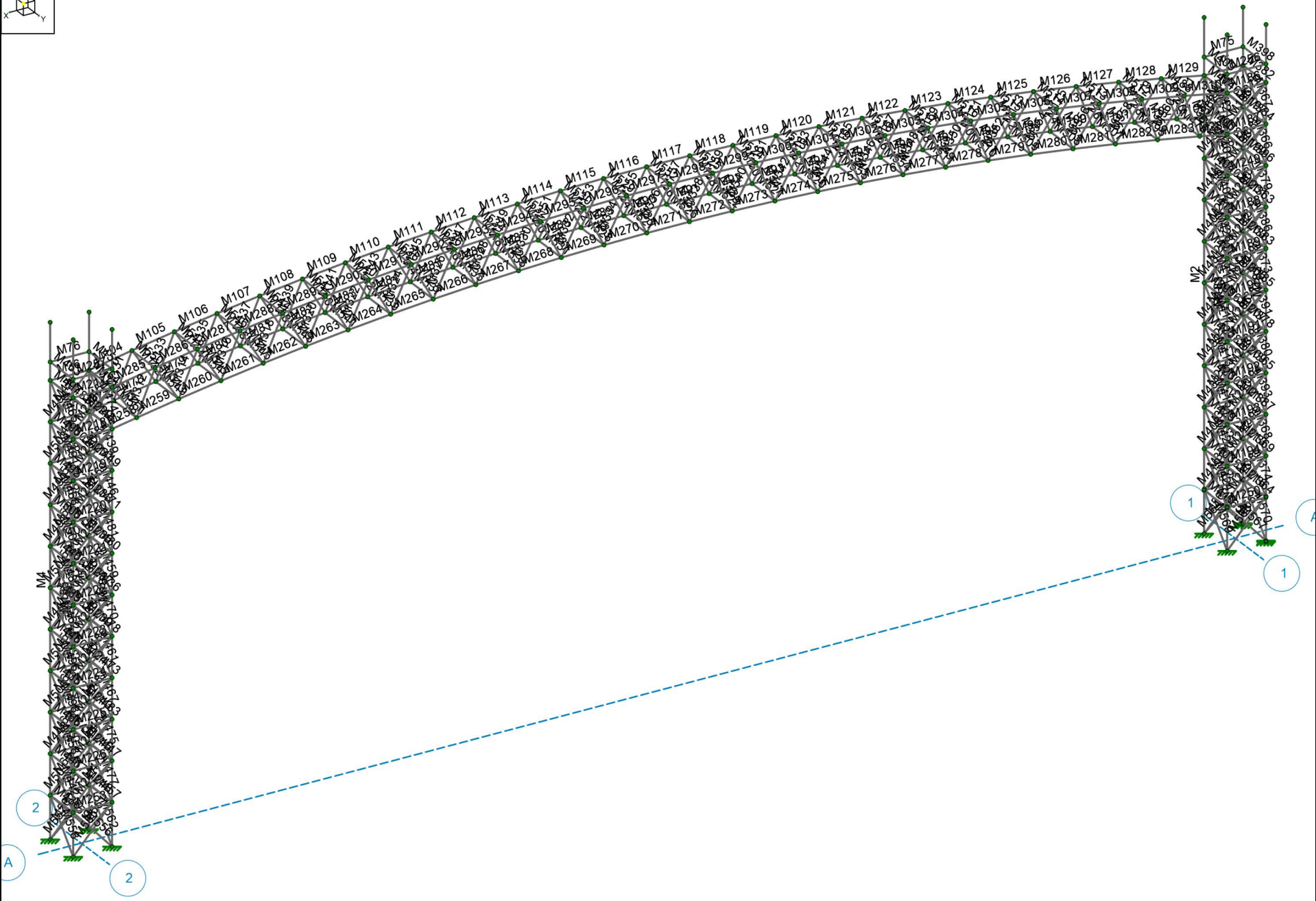
GMU Geotechnical
sbolin
24-130-00


Gateway Identity Arch

SK-9
Mar 31, 2025 at 04:12 PM
Gateway Identity Arch_rev2.r3d







	GMU Geotechnical	Gateway Identity Arch	SK-12
	sbolin		Mar 31, 2025 at 04:20 PM
	24-130-00		Gateway Identity Arch_rev2.r3d

45. Gateway Arch
- A. Loading
 - B. Wind Loading
 - C. Pilaster Wall + Foundation Design
 - D. FEA Model Definition Sketches
 - E. Envelope Member Forces**
 - F. Envelope Reactions
 - G. Envelope Code Check
 - H. Baseplate + Anchor Bolts
-

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
1	M01	max	44.439	0.912	1.659	1.856
2	M01	min	-35.518	-0.947	-1.419	-2.331
3	M02	max	38.194	1.719	2.448	3.003
4	M02	min	-41.82	-1.723	-1.654	-1.762
5	M03	max	35.41	1.559	1.599	1.651
6	M03	min	-39.336	-1.553	-2.393	-2.925
7	M04	max	42.336	0.847	1.385	2.306
8	M04	min	-33.226	-0.896	-1.624	-1.82
9	M05	max	-0.349	0.597	0.149	0.113
10	M05	min	-3.175	-0.596	0.031	-0.121
11	M06	max	8.542	0.68	0.168	0.13
12	M06	min	-4.525	-0.697	-0.089	-0.135
13	M07	max	1.648	0.326	0.233	0.214
14	M07	min	-1.982	-0.341	-0.273	-0.22
15	M08	max	1.945	0.192	0.221	0.207
16	M08	min	-2.142	-0.202	-0.261	-0.208
17	M09	max	2.381	0.098	0.214	0.201
18	M09	min	-2.618	-0.104	-0.254	-0.202
19	M10	max	2.784	0.041	0.211	0.199
20	M10	min	-3.035	-0.044	-0.251	-0.2
21	M11	max	3.188	0.011	0.21	0.198
22	M11	min	-3.455	-0.012	-0.25	-0.2
23	M12	max	3.553	0.005	0.211	0.198
24	M12	min	-3.833	-0.007	-0.251	-0.2
25	M13	max	4.098	0.008	0.211	0.201
26	M13	min	-4.402	-0.012	-0.251	-0.199
27	M15	max	5.256	0.198	0.055	0.068
28	M15	min	0.803	-0.194	-0.029	-0.046
29	M16	max	-0.421	0.26	0.022	0.032
30	M16	min	-5.202	-0.264	-0.006	-0.037
31	M17	max	7.309	0.188	0.044	0.064
32	M17	min	-6.998	-0.182	-0.052	-0.088
33	M18	max	12.948	0.235	0.039	0.045
34	M18	min	-11.067	-0.241	-0.005	-0.054
35	M19	max	8.025	0.14	0.035	0.035
36	M19	min	-9.466	-0.134	-0.035	-0.039
37	M20	max	11.713	0.154	0.083	0.118
38	M20	min	-10.022	-0.159	-0.105	-0.115
39	M21	max	6.974	0.09	0.032	0.041
40	M21	min	-8.295	-0.085	-0.04	-0.039
41	M22	max	11.194	0.091	0.075	0.09
42	M22	min	-9.582	-0.095	-0.086	-0.098
43	M23	max	6.267	0.051	0.025	0.031
44	M23	min	-7.532	-0.048	-0.031	-0.029
45	M24	max	11.12	0.048	0.079	0.099
46	M24	min	-9.486	-0.051	-0.092	-0.102
47	M25	max	5.774	0.024	0.019	0.025
48	M25	min	-7.024	-0.023	-0.025	-0.021
49	M26	max	11.193	0.021	0.083	0.104

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
50	M26	min	-9.562	-0.022	-0.096	-0.106
51	M27	max	5.396	0.01	0.014	0.021
52	M27	min	-6.636	-0.009	-0.02	-0.014
53	M28	max	11.414	0.006	0.088	0.11
54	M28	min	-9.771	-0.006	-0.101	-0.112
55	M29	max	5.074	0.003	0.011	0.024
56	M29	min	-6.307	-0.002	-0.017	-0.013
57	M30	max	11.712	0.002	0.093	0.117
58	M30	min	-10.052	-0.002	-0.106	-0.118
59	M31	max	4.81	0.003	0.013	0.027
60	M31	min	-6.042	-0.002	-0.019	-0.015
61	M32	max	12.006	0.002	0.096	0.122
62	M32	min	-10.329	-0.003	-0.11	-0.121
63	M34	max	4.641	0.009	0.021	0.03
64	M34	min	-5.89	-0.006	-0.027	-0.021
65	M35	max	12.323	0.006	0.114	0.141
66	M35	min	-10.62	-0.009	-0.129	-0.146
67	M36	max	-0.3	0.641	-0.029	0.11
68	M36	min	-3.118	-0.64	-0.146	-0.118
69	M37	max	8.317	0.685	0.085	0.126
70	M37	min	-4.39	-0.668	-0.163	-0.13
71	M38	max	1.176	0.498	0.31	0.261
72	M38	min	-1.367	-0.483	-0.259	-0.234
73	M39	max	1.553	0.331	0.269	0.211
74	M39	min	-1.877	-0.317	-0.229	-0.217
75	M40	max	1.825	0.197	0.257	0.204
76	M40	min	-2.015	-0.187	-0.217	-0.205
77	M41	max	2.232	0.102	0.25	0.198
78	M41	min	-2.462	-0.096	-0.21	-0.199
79	M42	max	2.607	0.042	0.247	0.196
80	M42	min	-2.851	-0.039	-0.208	-0.197
81	M43	max	2.983	0.01	0.247	0.195
82	M43	min	-3.242	-0.008	-0.207	-0.197
83	M44	max	3.331	0.007	0.247	0.196
84	M44	min	-3.603	-0.005	-0.207	-0.197
85	M45	max	3.798	0.012	0.246	0.196
86	M45	min	-4.093	-0.008	-0.206	-0.195
87	M47	max	-0.441	0.261	0.005	0.036
88	M47	min	-5.032	-0.265	-0.021	-0.03
89	M48	max	5.16	0.21	0.031	0.049
90	M48	min	0.676	-0.207	-0.056	-0.069
91	M49	max	12.621	0.227	0.005	0.053
92	M49	min	-10.765	-0.233	-0.038	-0.045
93	M50	max	7.168	0.186	0.051	0.087
94	M50	min	-6.885	-0.181	-0.043	-0.063
95	M51	max	11.46	0.15	0.103	0.113
96	M51	min	-9.783	-0.154	-0.081	-0.114
97	M52	max	7.913	0.137	0.036	0.04
98	M52	min	-9.35	-0.132	-0.035	-0.036

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
99	M53	max	10.954	0.089	0.084	0.095
100	M53	min	-9.354	-0.093	-0.072	-0.088
101	M54	max	6.907	0.088	0.04	0.04
102	M54	min	-8.228	-0.084	-0.033	-0.042
103	M55	max	10.873	0.047	0.089	0.099
104	M55	min	-9.25	-0.049	-0.076	-0.096
105	M56	max	6.232	0.049	0.032	0.03
106	M56	min	-7.499	-0.047	-0.026	-0.033
107	M57	max	10.933	0.02	0.093	0.103
108	M57	min	-9.312	-0.021	-0.08	-0.101
109	M58	max	5.764	0.024	0.026	0.022
110	M58	min	-7.016	-0.022	-0.02	-0.027
111	M59	max	11.138	0.005	0.098	0.108
112	M59	min	-9.505	-0.006	-0.085	-0.107
113	M60	max	5.409	0.009	0.021	0.016
114	M60	min	-6.651	-0.008	-0.015	-0.021
115	M61	max	11.419	0.002	0.103	0.113
116	M61	min	-9.77	-0.002	-0.089	-0.113
117	M62	max	5.114	0.002	0.017	0.013
118	M62	min	-6.35	-0.001	-0.011	-0.024
119	M63	max	11.696	0.004	0.106	0.116
120	M63	min	-10.031	-0.004	-0.093	-0.118
121	M64	max	4.858	0.003	0.019	0.015
122	M64	min	-6.089	-0.002	-0.013	-0.027
123	M66	max	12.115	0.005	0.124	0.142
124	M66	min	-10.406	-0.008	-0.109	-0.135
125	M67	max	4.809	0.008	0.025	0.019
126	M67	min	-6.075	-0.005	-0.02	-0.03
127	M68	max	1.23	0.496	0.264	0.266
128	M68	min	-1.432	-0.511	-0.316	-0.238
129	M69	max	4.623	0.014	0.223	0.204
130	M69	min	-4.956	-0.022	-0.267	-0.22
131	M72	max	4.379	0.022	0.275	0.213
132	M72	min	-4.708	-0.014	-0.23	-0.225
133	M75	max	-0.081	0.361	0.115	0.099
134	M75	min	-0.843	-0.353	0.04	-0.083
135	M76	max	-0.071	0.375	-0.04	0.097
136	M76	min	-0.829	-0.381	-0.113	-0.078
137	M77	max	26.12	1.216	0.509	1.191
138	M77	min	-14.214	-0.75	-0.586	-1.117
139	M78	max	19.786	0.051	0.511	0.872
140	M78	min	-10.004	-0.035	-0.548	-0.831
141	M79	max	12.896	0.156	0.399	0.482
142	M79	min	-5.362	-0.101	-0.444	-0.438
143	M80	max	7.306	0.133	0.31	0.308
144	M80	min	-1.39	-0.09	-0.358	-0.332
145	M81	max	5.871	0.135	0.262	0.278
146	M81	min	-1.907	-0.092	-0.315	-0.325
147	M82	max	7.579	0.131	0.246	0.279

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
148	M82	min	-5.788	-0.091	-0.302	-0.33
149	M83	max	11.202	0.127	0.252	0.299
150	M83	min	-11.038	-0.088	-0.31	-0.353
151	M84	max	14.851	0.122	0.276	0.338
152	M84	min	-16.279	-0.084	-0.335	-0.394
153	M85	max	18.438	0.114	0.315	0.4
154	M85	min	-21.335	-0.079	-0.373	-0.456
155	M86	max	21.849	0.106	0.364	0.49
156	M86	min	-26.153	-0.07	-0.417	-0.546
157	M87	max	24.96	0.095	0.396	0.602
158	M87	min	-30.651	-0.059	-0.443	-0.654
159	M88	max	27.669	0.079	0.386	0.721
160	M88	min	-34.47	-0.055	-0.42	-0.765
161	M89	max	29.668	0.051	0.256	0.721
162	M89	min	-37.155	-0.038	-0.276	-0.754
163	M90	max	30.617	0.02	0.086	0.614
164	M90	min	-38.404	-0.016	-0.092	-0.634
165	M91	max	30.415	0.018	0.094	0.598
166	M91	min	-38.124	-0.025	-0.084	-0.621
167	M92	max	29.091	0.04	0.255	0.659
168	M92	min	-36.342	-0.056	-0.231	-0.696
169	M93	max	26.84	0.049	0.349	0.648
170	M93	min	-33.244	-0.076	-0.31	-0.696
171	M94	max	23.899	0.061	0.424	0.611
172	M94	min	-29.03	-0.099	-0.373	-0.667
173	M95	max	20.45	0.073	0.427	0.507
174	M95	min	-24.015	-0.113	-0.368	-0.566
175	M96	max	16.658	0.082	0.391	0.412
176	M96	min	-18.626	-0.121	-0.33	-0.472
177	M97	max	12.688	0.087	0.36	0.352
178	M97	min	-12.967	-0.129	-0.298	-0.41
179	M98	max	8.797	0.092	0.347	0.322
180	M98	min	-7.306	-0.135	-0.286	-0.377
181	M99	max	5.765	0.095	0.356	0.315
182	M99	min	-1.988	-0.141	-0.298	-0.367
183	M100	max	7.269	0.094	0.397	0.339
184	M100	min	-1.418	-0.141	-0.344	-0.371
185	M101	max	12.604	0.107	0.484	0.516
186	M101	min	-5.038	-0.166	-0.434	-0.467
187	M102	max	19.97	0.043	0.592	0.914
188	M102	min	-10.029	-0.061	-0.55	-0.869
189	M103	max	26.749	0.67	0.619	1.273
190	M103	min	-14.561	-1.082	-0.542	-1.192
191	M104	max	-0.329	0.43	2.712	3.109
192	M104	min	-8.216	-0.262	-2.659	-3.164
193	M105	max	0.498	0.268	2.766	2.574
194	M105	min	-6.786	-0.221	-2.716	-2.619
195	M106	max	1.235	0.307	2.853	2.55
196	M106	min	-5.392	-0.243	-2.798	-2.6

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
197	M107	max	1.883	0.314	2.9	2.621
198	M107	min	-4.047	-0.253	-2.839	-2.602
199	M108	max	4.673	0.315	2.91	2.661
200	M108	min	-4.825	-0.254	-2.844	-2.604
201	M109	max	8.108	0.308	2.894	2.674
202	M109	min	-6.611	-0.25	-2.824	-2.614
203	M110	max	11.67	0.295	2.857	2.668
204	M110	min	-8.597	-0.238	-2.786	-2.607
205	M111	max	15.296	0.277	2.801	2.645
206	M111	min	-10.742	-0.222	-2.731	-2.585
207	M112	max	18.983	0.252	2.738	2.622
208	M112	min	-13.017	-0.198	-2.67	-2.565
209	M113	max	22.762	0.218	2.627	2.557
210	M113	min	-15.429	-0.178	-2.565	-2.504
211	M114	max	26.495	0.264	3.049	1.931
212	M114	min	-17.931	-0.238	-3	-1.982
213	M115	max	28.534	0.207	2.258	1.47
214	M115	min	-19.076	-0.181	-2.225	-1.444
215	M116	max	29.743	0.159	1.502	0.889
216	M116	min	-19.788	-0.148	-1.487	-0.882
217	M117	max	30.083	0.133	1.031	0.721
218	M117	min	-20.007	-0.138	-1.035	-0.723
219	M118	max	29.547	0.16	1.758	1.065
220	M118	min	-19.715	-0.175	-1.78	-1.049
221	M119	max	28.222	0.209	2.542	1.559
222	M119	min	-19.015	-0.245	-2.582	-1.53
223	M120	max	25.209	0.269	3.314	2.341
224	M120	min	-17.015	-0.305	-3.371	-2.294
225	M121	max	21.296	0.196	2.836	2.814
226	M121	min	-14.48	-0.241	-2.904	-2.756
227	M122	max	17.254	0.218	2.924	2.845
228	M122	min	-11.983	-0.278	-2.997	-2.782
229	M123	max	13.31	0.24	2.976	2.856
230	M123	min	-9.637	-0.3	-3.051	-2.791
231	M124	max	9.444	0.254	3.021	2.865
232	M124	min	-7.452	-0.317	-3.095	-2.801
233	M125	max	5.666	0.262	3.043	2.853
234	M125	min	-5.456	-0.326	-3.115	-2.791
235	M126	max	2.297	0.263	3.04	2.811
236	M126	min	-3.958	-0.328	-3.106	-2.784
237	M127	max	1.292	0.255	2.997	2.728
238	M127	min	-5.266	-0.324	-3.058	-2.784
239	M128	max	0.506	0.233	2.912	2.758
240	M128	min	-6.727	-0.282	-2.967	-2.808
241	M129	max	-0.374	0.293	2.859	3.36
242	M129	min	-8.235	-0.471	-2.917	-3.42
243	M130	max	3.152	0.022	0.127	0.124
244	M130	min	-4.934	-0.035	-0.123	-0.115
245	M131	max	6.817	0.059	0.142	0.193

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
246	M131	min	-4.28	-0.097	-0.143	-0.198
247	M132	max	3.777	0.028	0.069	0.109
248	M132	min	-6.035	-0.063	-0.07	-0.103
249	M133	max	6.515	0.034	0.174	0.205
250	M133	min	-4.027	-0.058	-0.171	-0.214
251	M134	max	3.545	0.033	0.076	0.119
252	M134	min	-5.636	-0.063	-0.079	-0.115
253	M135	max	6.113	0.028	0.156	0.188
254	M135	min	-3.798	-0.053	-0.153	-0.199
255	M136	max	3.413	0.037	0.099	0.143
256	M136	min	-5.41	-0.064	-0.103	-0.138
257	M137	max	5.753	0.019	0.137	0.175
258	M137	min	-3.597	-0.042	-0.134	-0.186
259	M138	max	3.292	0.042	0.117	0.159
260	M138	min	-5.186	-0.067	-0.12	-0.154
261	M139	max	5.437	0.012	0.123	0.166
262	M139	min	-3.428	-0.034	-0.121	-0.177
263	M140	max	3.18	0.048	0.128	0.168
264	M140	min	-4.979	-0.071	-0.131	-0.162
265	M141	max	5.137	0.005	0.112	0.157
266	M141	min	-3.262	-0.026	-0.11	-0.168
267	M142	max	3.056	0.054	0.137	0.173
268	M142	min	-4.774	-0.075	-0.138	-0.165
269	M143	max	4.833	-0.001	0.103	0.147
270	M143	min	-3.077	-0.019	-0.102	-0.157
271	M144	max	2.897	0.06	0.144	0.174
272	M144	min	-4.544	-0.08	-0.144	-0.166
273	M145	max	4.515	-0.003	0.095	0.135
274	M145	min	-2.858	-0.018	-0.095	-0.145
275	M146	max	2.694	0.066	0.149	0.173
276	M146	min	-4.285	-0.084	-0.148	-0.165
277	M147	max	4.154	0.002	0.091	0.127
278	M147	min	-2.581	-0.021	-0.092	-0.135
279	M148	max	2.395	0.071	0.145	0.165
280	M148	min	-3.963	-0.087	-0.142	-0.156
281	M149	max	3.718	0.01	0.1	0.129
282	M149	min	-2.182	-0.031	-0.101	-0.136
283	M150	max	2.082	0.072	0.103	0.127
284	M150	min	-3.348	-0.09	-0.101	-0.118
285	M151	max	2.959	0.019	0.114	0.14
286	M151	min	-1.743	-0.033	-0.117	-0.144
287	M152	max	1.595	0.077	0.026	0.04
288	M152	min	-2.406	-0.086	-0.021	-0.034
289	M153	max	1.87	0.032	0.136	0.14
290	M153	min	-1.132	-0.042	-0.139	-0.141
291	M154	max	0.888	0.071	0.064	0.082
292	M154	min	-1.278	-0.075	-0.059	-0.083
293	M155	max	0.619	0.046	0.114	0.124
294	M155	min	-0.325	-0.051	-0.118	-0.129

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
295	M156	max	0.424	0.064	0.101	0.106
296	M156	min	-0.387	-0.062	-0.097	-0.109
297	M157	max	0.501	0.058	0.078	0.102
298	M157	min	-0.636	-0.058	-0.082	-0.105
299	M158	max	1.166	0.055	0.126	0.121
300	M158	min	-0.716	-0.047	-0.122	-0.121
301	M159	max	1.309	0.07	0.027	0.064
302	M159	min	-1.878	-0.065	-0.031	-0.064
303	M160	max	2.324	0.045	0.124	0.134
304	M160	min	-1.436	-0.032	-0.12	-0.135
305	M161	max	1.951	0.075	0.038	0.074
306	M161	min	-2.953	-0.065	-0.042	-0.066
307	M162	max	3.351	0.038	0.151	0.163
308	M162	min	-1.995	-0.021	-0.147	-0.167
309	M163	max	2.439	0.081	0.081	0.123
310	M163	min	-3.909	-0.063	-0.083	-0.115
311	M164	max	4.157	0.031	0.129	0.158
312	M164	min	-2.473	-0.005	-0.128	-0.166
313	M165	max	2.81	0.079	0.141	0.18
314	M165	min	-4.604	-0.062	-0.143	-0.17
315	M166	max	4.604	0.021	0.107	0.143
316	M166	min	-2.872	0.004	-0.106	-0.151
317	M167	max	3.116	0.076	0.153	0.192
318	M167	min	-4.942	-0.057	-0.154	-0.182
319	M168	max	4.965	0.021	0.108	0.148
320	M168	min	-3.139	0.004	-0.108	-0.158
321	M169	max	3.314	0.072	0.15	0.191
322	M169	min	-5.206	-0.052	-0.15	-0.182
323	M170	max	5.283	0.03	0.117	0.16
324	M170	min	-3.347	-0.004	-0.119	-0.17
325	M171	max	3.465	0.068	0.143	0.187
326	M171	min	-5.439	-0.046	-0.141	-0.179
327	M172	max	5.595	0.039	0.129	0.171
328	M172	min	-3.528	-0.013	-0.132	-0.182
329	M173	max	3.596	0.064	0.132	0.179
330	M173	min	-5.668	-0.04	-0.13	-0.171
331	M174	max	5.922	0.05	0.145	0.182
332	M174	min	-3.708	-0.022	-0.149	-0.193
333	M175	max	3.735	0.061	0.116	0.162
334	M175	min	-5.917	-0.035	-0.113	-0.156
335	M176	max	6.294	0.062	0.167	0.197
336	M176	min	-3.92	-0.033	-0.171	-0.209
337	M177	max	3.885	0.06	0.092	0.138
338	M177	min	-6.17	-0.032	-0.089	-0.132
339	M178	max	6.71	0.07	0.189	0.215
340	M178	min	-4.16	-0.041	-0.192	-0.225
341	M179	max	4.144	0.061	0.083	0.126
342	M179	min	-6.611	-0.028	-0.083	-0.119
343	M180	max	6.994	0.114	0.153	0.196

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
344	M180	min	-4.395	-0.07	-0.152	-0.201
345	M181	max	3.581	0.028	0.139	0.138
346	M181	min	-5.609	-0.018	-0.144	-0.129
347	M182	max	44.099	0.981	1.625	1.886
348	M182	min	-35.749	-0.889	-1.441	-2.285
349	M183	max	37.972	1.694	2.314	2.837
350	M183	min	-42.149	-1.753	-1.521	-1.719
351	M184	max	35.209	1.528	1.479	1.61
352	M184	min	-39.632	-1.59	-2.268	-2.772
353	M185	max	42.027	0.927	1.407	2.261
354	M185	min	-33.436	-0.826	-1.592	-1.85
355	M186	max	-0.066	0.595	0.135	0.102
356	M186	min	-2.797	-0.598	0.02	-0.108
357	M187	max	8.064	0.678	0.166	0.129
358	M187	min	-4.849	-0.7	-0.09	-0.132
359	M188	max	1.683	0.322	0.238	0.208
360	M188	min	-1.928	-0.346	-0.265	-0.214
361	M189	max	1.97	0.189	0.225	0.202
362	M189	min	-2.104	-0.205	-0.254	-0.203
363	M190	max	2.408	0.097	0.218	0.196
364	M190	min	-2.578	-0.106	-0.248	-0.197
365	M191	max	2.811	0.04	0.215	0.194
366	M191	min	-2.995	-0.045	-0.245	-0.195
367	M192	max	3.216	0.011	0.214	0.194
368	M192	min	-3.415	-0.012	-0.245	-0.195
369	M193	max	3.58	0.007	0.214	0.194
370	M193	min	-3.793	-0.005	-0.245	-0.196
371	M194	max	4.126	0.012	0.215	0.196
372	M194	min	-4.361	-0.008	-0.246	-0.194
373	M196	max	4.717	0.198	0.054	0.069
374	M196	min	0.425	-0.194	-0.029	-0.046
375	M197	max	-0.193	0.259	0.022	0.033
376	M197	min	-4.86	-0.266	-0.006	-0.035
377	M198	max	7.482	0.191	0.046	0.067
378	M198	min	-6.883	-0.18	-0.05	-0.085
379	M199	max	12.491	0.233	0.037	0.045
380	M199	min	-11.373	-0.243	-0.006	-0.048
381	M200	max	8.229	0.142	0.036	0.036
382	M200	min	-9.163	-0.132	-0.035	-0.038
383	M201	max	11.359	0.152	0.086	0.113
384	M201	min	-10.258	-0.163	-0.102	-0.112
385	M202	max	7.136	0.091	0.034	0.04
386	M202	min	-8.054	-0.084	-0.039	-0.038
387	M203	max	10.898	0.09	0.076	0.088
388	M203	min	-9.78	-0.097	-0.084	-0.095
389	M204	max	6.405	0.051	0.026	0.03
390	M204	min	-7.327	-0.047	-0.03	-0.028
391	M205	max	10.855	0.047	0.081	0.096
392	M205	min	-9.663	-0.052	-0.09	-0.1

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
393	M206	max	5.899	0.025	0.02	0.024
394	M206	min	-6.838	-0.023	-0.024	-0.02
395	M207	max	10.948	0.02	0.085	0.102
396	M207	min	-9.726	-0.023	-0.094	-0.104
397	M208	max	5.514	0.009	0.015	0.019
398	M208	min	-6.458	-0.009	-0.019	-0.013
399	M209	max	11.177	0.005	0.089	0.108
400	M209	min	-9.929	-0.006	-0.099	-0.11
401	M210	max	5.19	0.003	0.012	0.022
402	M210	min	-6.134	-0.003	-0.016	-0.014
403	M211	max	11.479	0.002	0.094	0.115
404	M211	min	-10.208	-0.002	-0.104	-0.116
405	M212	max	4.926	0.002	0.014	0.025
406	M212	min	-5.868	-0.003	-0.018	-0.016
407	M213	max	11.773	0.003	0.098	0.12
408	M213	min	-10.484	-0.002	-0.108	-0.119
409	M215	max	4.759	0.006	0.022	0.029
410	M215	min	-5.713	-0.009	-0.025	-0.02
411	M216	max	12.088	0.009	0.115	0.139
412	M216	min	-10.776	-0.006	-0.127	-0.144
413	M217	max	-0.047	0.643	-0.019	0.101
414	M217	min	-2.779	-0.637	-0.133	-0.107
415	M218	max	7.867	0.688	0.086	0.125
416	M218	min	-4.693	-0.666	-0.161	-0.128
417	M219	max	1.204	0.507	0.3	0.252
418	M219	min	-1.324	-0.476	-0.266	-0.227
419	M220	max	1.585	0.336	0.261	0.205
420	M220	min	-1.828	-0.314	-0.234	-0.211
421	M221	max	1.848	0.2	0.251	0.199
422	M221	min	-1.981	-0.185	-0.221	-0.2
423	M222	max	2.256	0.103	0.244	0.193
424	M222	min	-2.425	-0.095	-0.214	-0.195
425	M223	max	2.631	0.043	0.242	0.191
426	M223	min	-2.815	-0.039	-0.211	-0.193
427	M224	max	3.008	0.01	0.241	0.191
428	M224	min	-3.206	-0.009	-0.211	-0.192
429	M225	max	3.355	0.005	0.242	0.191
430	M225	min	-3.567	-0.007	-0.211	-0.193
431	M226	max	3.823	0.008	0.241	0.192
432	M226	min	-4.057	-0.012	-0.21	-0.191
433	M228	max	-0.239	0.259	0.005	0.034
434	M228	min	-4.729	-0.267	-0.021	-0.031
435	M229	max	4.722	0.211	0.031	0.048
436	M229	min	0.386	-0.207	-0.056	-0.069
437	M230	max	12.186	0.226	0.006	0.048
438	M230	min	-11.058	-0.235	-0.036	-0.044
439	M231	max	7.339	0.189	0.049	0.083
440	M231	min	-6.772	-0.179	-0.045	-0.065
441	M232	max	11.121	0.147	0.1	0.109

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
442	M232	min	-10.01	-0.157	-0.083	-0.11
443	M233	max	8.111	0.139	0.035	0.039
444	M233	min	-9.056	-0.13	-0.036	-0.036
445	M234	max	10.669	0.088	0.082	0.093
446	M234	min	-9.545	-0.094	-0.074	-0.085
447	M235	max	7.066	0.089	0.039	0.039
448	M235	min	-7.992	-0.083	-0.034	-0.04
449	M236	max	10.616	0.046	0.087	0.097
450	M236	min	-9.421	-0.05	-0.078	-0.093
451	M237	max	6.368	0.05	0.031	0.029
452	M237	min	-7.297	-0.046	-0.027	-0.031
453	M238	max	10.695	0.02	0.091	0.101
454	M238	min	-9.472	-0.022	-0.082	-0.099
455	M239	max	5.888	0.024	0.026	0.022
456	M239	min	-6.831	-0.022	-0.021	-0.026
457	M240	max	10.907	0.005	0.096	0.106
458	M240	min	-9.659	-0.006	-0.086	-0.105
459	M241	max	5.527	0.009	0.021	0.015
460	M241	min	-6.474	-0.008	-0.016	-0.02
461	M242	max	11.191	0.002	0.101	0.111
462	M242	min	-9.922	-0.002	-0.091	-0.111
463	M243	max	5.231	0.002	0.016	0.014
464	M243	min	-6.176	-0.002	-0.012	-0.022
465	M244	max	11.468	0.004	0.104	0.114
466	M244	min	-10.183	-0.004	-0.094	-0.116
467	M245	max	4.974	0.002	0.018	0.016
468	M245	min	-5.915	-0.003	-0.014	-0.025
469	M247	max	11.883	0.008	0.122	0.139
470	M247	min	-10.56	-0.005	-0.111	-0.133
471	M248	max	4.929	0.005	0.024	0.018
472	M248	min	-5.896	-0.008	-0.021	-0.029
473	M249	max	1.261	0.489	0.271	0.257
474	M249	min	-1.384	-0.52	-0.305	-0.231
475	M250	max	4.651	0.022	0.227	0.2
476	M250	min	-4.915	-0.015	-0.261	-0.215
477	M253	max	4.405	0.015	0.269	0.208
478	M253	min	-4.669	-0.022	-0.234	-0.22
479	M256	max	0.004	0.363	0.107	0.089
480	M256	min	-0.729	-0.352	0.034	-0.078
481	M257	max	0.011	0.374	-0.033	0.088
482	M257	min	-0.718	-0.382	-0.104	-0.072
483	M258	max	24.679	1.153	0.535	1.165
484	M258	min	-15.184	-0.792	-0.55	-1.136
485	M259	max	18.601	0.046	0.506	0.881
486	M259	min	-10.808	-0.04	-0.555	-0.824
487	M260	max	11.942	0.146	0.399	0.481
488	M260	min	-6.017	-0.108	-0.443	-0.439
489	M261	max	6.269	0.124	0.309	0.308
490	M261	min	-2.162	-0.096	-0.359	-0.332

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
491	M262	max	5.033	0.126	0.262	0.278
492	M262	min	-2.529	-0.098	-0.315	-0.325
493	M263	max	7.058	0.122	0.245	0.279
494	M263	min	-6.12	-0.097	-0.302	-0.33
495	M264	max	10.857	0.117	0.251	0.299
496	M264	min	-11.376	-0.094	-0.31	-0.353
497	M265	max	14.667	0.112	0.276	0.338
498	M265	min	-16.533	-0.091	-0.335	-0.394
499	M266	max	18.353	0.104	0.315	0.4
500	M266	min	-21.451	-0.086	-0.372	-0.456
501	M267	max	21.889	0.095	0.364	0.491
502	M267	min	-26.096	-0.078	-0.417	-0.546
503	M268	max	25.17	0.083	0.398	0.603
504	M268	min	-30.354	-0.068	-0.443	-0.655
505	M269	max	28.03	0.071	0.387	0.722
506	M269	min	-33.96	-0.062	-0.42	-0.765
507	M270	max	30.119	0.047	0.256	0.722
508	M270	min	-36.521	-0.042	-0.276	-0.754
509	M271	max	31.109	0.018	0.086	0.614
510	M271	min	-37.712	-0.018	-0.092	-0.634
511	M272	max	30.904	0.02	0.094	0.598
512	M272	min	-37.437	-0.023	-0.084	-0.621
513	M273	max	29.532	0.044	0.255	0.66
514	M273	min	-35.719	-0.051	-0.231	-0.696
515	M274	max	27.187	0.056	0.349	0.648
516	M274	min	-32.752	-0.068	-0.311	-0.696
517	M275	max	24.095	0.07	0.425	0.613
518	M275	min	-28.752	-0.087	-0.375	-0.668
519	M276	max	20.468	0.081	0.427	0.508
520	M276	min	-23.988	-0.101	-0.369	-0.567
521	M277	max	16.54	0.089	0.391	0.412
522	M277	min	-18.787	-0.111	-0.33	-0.471
523	M278	max	12.44	0.095	0.361	0.352
524	M278	min	-13.287	-0.119	-0.298	-0.41
525	M279	max	8.3	0.099	0.347	0.322
526	M279	min	-7.621	-0.125	-0.286	-0.377
527	M280	max	4.923	0.101	0.356	0.315
528	M280	min	-2.611	-0.13	-0.298	-0.367
529	M281	max	6.198	0.101	0.398	0.339
530	M281	min	-2.214	-0.131	-0.343	-0.371
531	M282	max	11.6	0.115	0.483	0.514
532	M282	min	-5.727	-0.154	-0.434	-0.469
533	M283	max	18.707	0.048	0.598	0.923
534	M283	min	-10.887	-0.055	-0.545	-0.862
535	M284	max	25.203	0.709	0.589	1.248
536	M284	min	-15.604	-1.024	-0.564	-1.21
537	M285	max	0.217	0.398	2.712	3.11
538	M285	min	-7.486	-0.283	-2.66	-3.163
539	M286	max	0.815	0.244	2.765	2.575

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
540	M286	min	-6.364	-0.241	-2.716	-2.618
541	M287	max	1.361	0.279	2.853	2.55
542	M287	min	-5.228	-0.264	-2.798	-2.6
543	M288	max	1.854	0.284	2.9	2.621
544	M288	min	-4.094	-0.276	-2.839	-2.602
545	M289	max	4.577	0.284	2.91	2.66
546	M289	min	-4.997	-0.279	-2.844	-2.604
547	M290	max	7.85	0.277	2.893	2.674
548	M290	min	-6.798	-0.276	-2.825	-2.614
549	M291	max	11.301	0.263	2.856	2.668
550	M291	min	-8.855	-0.265	-2.786	-2.607
551	M292	max	14.806	0.245	2.803	2.648
552	M292	min	-11.077	-0.248	-2.733	-2.588
553	M293	max	18.344	0.22	2.727	2.607
554	M293	min	-13.445	-0.225	-2.659	-2.549
555	M294	max	21.927	0.193	2.696	2.655
556	M294	min	-15.981	-0.199	-2.636	-2.604
557	M295	max	25.437	0.141	2.215	2.181
558	M295	min	-18.62	-0.146	-2.166	-2.146
559	M296	max	27.298	0.086	1.347	1.736
560	M296	min	-19.879	-0.086	-1.314	-1.71
561	M297	max	28.41	0.045	0.603	1.115
562	M297	min	-20.654	-0.046	-0.588	-1.104
563	M298	max	28.719	0.017	0.131	0.698
564	M298	min	-20.892	-0.017	-0.134	-0.698
565	M299	max	28.212	0.059	0.86	1.336
566	M299	min	-20.581	-0.06	-0.881	-1.32
567	M300	max	26.985	0.12	1.629	1.823
568	M300	min	-19.819	-0.118	-1.668	-1.795
569	M301	max	24.129	0.182	2.484	2.638
570	M301	min	-17.718	-0.176	-2.54	-2.592
571	M302	max	20.444	0.218	2.906	2.911
572	M302	min	-15.046	-0.213	-2.973	-2.854
573	M303	max	16.612	0.247	2.914	2.83
574	M303	min	-12.416	-0.243	-2.986	-2.767
575	M304	max	12.835	0.268	2.978	2.858
576	M304	min	-9.965	-0.266	-3.053	-2.794
577	M305	max	9.112	0.282	3.02	2.865
578	M305	min	-7.687	-0.282	-3.095	-2.801
579	M306	max	5.537	0.289	3.044	2.852
580	M306	min	-5.639	-0.292	-3.115	-2.791
581	M307	max	2.269	0.289	3.04	2.811
582	M307	min	-4.027	-0.295	-3.106	-2.784
583	M308	max	1.414	0.279	2.997	2.728
584	M308	min	-5.109	-0.293	-3.057	-2.784
585	M309	max	0.841	0.255	2.912	2.759
586	M309	min	-6.281	-0.256	-2.966	-2.807
587	M310	max	0.216	0.317	2.859	3.36
588	M310	min	-7.445	-0.435	-2.917	-3.42

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
589	M311	max	3.328	0.023	0.128	0.125
590	M311	min	-4.666	-0.034	-0.122	-0.115
591	M312	max	6.452	0.061	0.14	0.195
592	M312	min	-4.519	-0.093	-0.145	-0.196
593	M313	max	3.986	0.03	0.07	0.11
594	M313	min	-5.717	-0.061	-0.069	-0.102
595	M314	max	6.17	0.036	0.173	0.205
596	M314	min	-4.253	-0.056	-0.172	-0.213
597	M315	max	3.735	0.034	0.076	0.12
598	M315	min	-5.347	-0.062	-0.078	-0.114
599	M316	max	5.799	0.029	0.155	0.189
600	M316	min	-4.005	-0.051	-0.154	-0.198
601	M317	max	3.592	0.037	0.1	0.144
602	M317	min	-5.14	-0.063	-0.102	-0.138
603	M318	max	5.462	0.02	0.136	0.176
604	M318	min	-3.79	-0.041	-0.135	-0.186
605	M319	max	3.465	0.042	0.117	0.16
606	M319	min	-4.929	-0.067	-0.119	-0.153
607	M320	max	5.16	0.013	0.122	0.167
608	M320	min	-3.614	-0.033	-0.121	-0.176
609	M321	max	3.351	0.048	0.129	0.169
610	M321	min	-4.727	-0.071	-0.129	-0.161
611	M322	max	4.865	0.006	0.111	0.158
612	M322	min	-3.448	-0.025	-0.111	-0.167
613	M323	max	3.234	0.054	0.138	0.174
614	M323	min	-4.516	-0.075	-0.137	-0.165
615	M324	max	4.554	0	0.102	0.147
616	M324	min	-3.269	-0.018	-0.103	-0.156
617	M325	max	3.087	0.061	0.145	0.175
618	M325	min	-4.271	-0.079	-0.143	-0.165
619	M326	max	4.219	-0.001	0.094	0.136
620	M326	min	-3.065	-0.016	-0.096	-0.144
621	M327	max	2.904	0.067	0.15	0.174
622	M327	min	-3.986	-0.083	-0.147	-0.164
623	M328	max	3.828	0.003	0.089	0.127
624	M328	min	-2.81	-0.019	-0.093	-0.133
625	M329	max	2.64	0.072	0.145	0.165
626	M329	min	-3.614	-0.086	-0.14	-0.155
627	M330	max	3.333	0.012	0.103	0.134
628	M330	min	-2.452	-0.027	-0.111	-0.137
629	M331	max	2.287	0.074	0.114	0.132
630	M331	min	-3.055	-0.086	-0.104	-0.121
631	M332	max	2.621	0.02	0.108	0.14
632	M332	min	-1.978	-0.031	-0.119	-0.139
633	M333	max	1.717	0.078	0.031	0.043
634	M333	min	-2.236	-0.085	-0.017	-0.036
635	M334	max	1.654	0.034	0.13	0.141
636	M334	min	-1.282	-0.041	-0.142	-0.139
637	M335	max	0.938	0.072	0.067	0.073

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
638	M335	min	-1.211	-0.074	-0.053	-0.088
639	M336	max	0.509	0.046	0.108	0.116
640	M336	min	-0.4	-0.05	-0.121	-0.134
641	M337	max	0.388	0.064	0.105	0.097
642	M337	min	-0.422	-0.062	-0.09	-0.114
643	M338	max	0.496	0.059	0.072	0.094
644	M338	min	-0.647	-0.058	-0.085	-0.11
645	M339	max	1.038	0.054	0.13	0.123
646	M339	min	-0.803	-0.048	-0.116	-0.126
647	M340	max	1.374	0.07	0.021	0.055
648	M340	min	-1.788	-0.065	-0.034	-0.068
649	M341	max	2.094	0.043	0.127	0.136
650	M341	min	-1.595	-0.033	-0.114	-0.132
651	M342	max	2.089	0.074	0.036	0.076
652	M342	min	-2.758	-0.065	-0.046	-0.065
653	M343	max	3.009	0.036	0.153	0.164
654	M343	min	-2.232	-0.022	-0.141	-0.163
655	M344	max	2.659	0.078	0.086	0.129
656	M344	min	-3.595	-0.065	-0.094	-0.117
657	M345	max	3.758	0.026	0.138	0.163
658	M345	min	-2.752	-0.008	-0.13	-0.166
659	M346	max	3.079	0.078	0.139	0.18
660	M346	min	-4.222	-0.062	-0.144	-0.169
661	M347	max	4.26	0.018	0.108	0.143
662	M347	min	-3.113	0.002	-0.103	-0.15
663	M348	max	3.349	0.075	0.153	0.193
664	M348	min	-4.608	-0.058	-0.155	-0.182
665	M349	max	4.646	0.019	0.109	0.149
666	M349	min	-3.36	0.003	-0.107	-0.157
667	M350	max	3.528	0.071	0.149	0.192
668	M350	min	-4.897	-0.052	-0.151	-0.182
669	M351	max	4.978	0.028	0.118	0.16
670	M351	min	-3.557	-0.006	-0.118	-0.169
671	M352	max	3.669	0.067	0.142	0.188
672	M352	min	-5.141	-0.046	-0.142	-0.178
673	M353	max	5.29	0.038	0.13	0.171
674	M353	min	-3.735	-0.014	-0.131	-0.181
675	M354	max	3.799	0.063	0.131	0.18
676	M354	min	-5.368	-0.041	-0.13	-0.171
677	M355	max	5.604	0.048	0.146	0.183
678	M355	min	-3.921	-0.023	-0.148	-0.193
679	M356	max	3.943	0.06	0.115	0.163
680	M356	min	-5.605	-0.036	-0.113	-0.156
681	M357	max	5.952	0.06	0.168	0.198
682	M357	min	-4.146	-0.034	-0.17	-0.208
683	M358	max	4.105	0.058	0.091	0.139
684	M358	min	-5.837	-0.033	-0.09	-0.132
685	M359	max	6.337	0.068	0.19	0.216
686	M359	min	-4.406	-0.043	-0.191	-0.224

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
687	M360	max	4.385	0.059	0.082	0.127
688	M360	min	-6.245	-0.029	-0.084	-0.118
689	M361	max	6.6	0.109	0.155	0.198
690	M361	min	-4.654	-0.073	-0.15	-0.199
691	M362	max	3.792	0.028	0.138	0.139
692	M362	min	-5.289	-0.018	-0.145	-0.129
693	M363	max	0.38	0.378	0.147	0.114
694	M363	min	0.18	-0.357	-0.143	-0.116
695	M364	max	1.404	0.023	0.18	0.14
696	M364	min	-2.4	-0.023	-0.174	-0.144
697	M365	max	0.817	0.027	0.171	0.133
698	M365	min	-1.111	-0.026	-0.165	-0.136
699	M366	max	2.89	0.235	0.021	0.028
700	M366	min	-3.597	-0.248	-0.033	-0.036
701	M367	max	1.429	0.227	0.012	0.017
702	M367	min	-1.795	-0.231	-0.019	-0.016
703	M368	max	6.279	0.004	0.047	0.079
704	M368	min	-5.621	-0.005	-0.038	-0.066
705	M369	max	1.175	0.018	0.17	0.133
706	M369	min	-1.922	-0.018	-0.165	-0.135
707	M370	max	1.455	0.233	0.019	0.015
708	M370	min	-1.773	-0.225	-0.013	-0.016
709	M371	max	4.219	0.172	0.042	0.051
710	M371	min	-4.796	-0.166	-0.031	-0.043
711	M373	max	5.588	0.053	0.04	0.061
712	M373	min	-5.604	-0.058	-0.043	-0.059
713	M374	max	6.408	0.015	0.052	0.089
714	M374	min	-5.602	-0.016	-0.037	-0.069
715	M376	max	4.978	0.102	0.043	0.057
716	M376	min	-5.449	-0.097	-0.036	-0.053
717	M378	max	0.671	0.059	0.17	0.133
718	M378	min	-0.752	-0.055	-0.164	-0.135
719	M379	max	4.282	0.163	0.032	0.044
720	M379	min	-4.684	-0.176	-0.041	-0.05
721	M380	max	6.075	0.012	0.044	0.071
722	M380	min	-5.735	-0.014	-0.04	-0.063
723	M381	max	5.708	0.028	0.043	0.063
724	M381	min	-5.915	-0.027	-0.041	-0.064
725	M382	max	0.205	0.5	0.029	0.02
726	M382	min	0.024	-0.503	-0.032	-0.024
727	M383	max	0.461	0.224	0.16	0.125
728	M383	min	-0.12	-0.21	-0.155	-0.127
729	M384	max	0.65	1.342	0.139	0.106
730	M384	min	0.107	-1.292	-0.14	-0.11
731	M385	max	0.555	0.121	0.167	0.13
732	M385	min	-0.423	-0.113	-0.162	-0.133
733	M386	max	5.073	0.096	0.037	0.054
734	M386	min	-5.29	-0.103	-0.042	-0.056
735	M387	max	0.961	0.016	0.171	0.133

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
736	M387	min	-1.458	-0.015	-0.165	-0.135
737	M388	max	2.87	0.246	0.033	0.037
738	M388	min	-3.643	-0.237	-0.021	-0.029
739	M389	max	6.191	0.015	0.038	0.07
740	M389	min	-5.747	-0.016	-0.05	-0.087
741	M390	max	5.447	0.057	0.044	0.061
742	M390	min	-5.795	-0.054	-0.039	-0.059
743	M391	max	5.892	0.027	0.042	0.066
744	M391	min	-5.719	-0.03	-0.042	-0.062
745	M392	max	5.862	0.013	0.042	0.064
746	M392	min	-5.915	-0.013	-0.043	-0.069
747	M393	max	6.191	0.006	0.046	0.075
748	M393	min	-5.687	-0.007	-0.039	-0.064
749	M394	max	5.975	0.006	0.04	0.066
750	M394	min	-5.848	-0.007	-0.044	-0.073
751	M395	max	6.063	0.004	0.039	0.067
752	M395	min	-5.765	-0.005	-0.046	-0.077
753	M396	max	0.607	0.583	0.126	0.096
754	M396	min	0.198	-0.554	-0.123	-0.099
755	M398	max	0.192	0.371	0.037	0.027
756	M398	min	-0.17	-0.389	-0.041	-0.031
757	M399	max	0.206	0.085	0.297	0.24
758	M399	min	-0.757	-0.077	-0.303	-0.243
759	M400	max	-0.202	0.623	0.421	0.339
760	M400	min	-0.647	-0.534	-0.425	-0.341
761	M401	max	8.699	0.139	0.062	0.062
762	M401	min	-7.819	-0.177	-0.048	-0.072
763	M402	max	9.831	0.09	0.071	0.074
764	M402	min	-9.149	-0.096	-0.057	-0.085
765	M403	max	1.568	0.033	0.301	0.243
766	M403	min	-1.374	-0.034	-0.306	-0.246
767	M404	max	-0.303	0.343	0.25	0.199
768	M404	min	-0.777	-0.312	-0.252	-0.202
769	M405	max	10.651	0.076	0.063	0.091
770	M405	min	-9.888	-0.071	-0.075	-0.082
771	M406	max	6.665	0.048	0.052	0.067
772	M406	min	-6.156	-0.014	-0.059	-0.062
773	M408	max	11.089	0.009	0.072	0.104
774	M408	min	-10.931	-0.01	-0.072	-0.107
775	M409	max	0.177	0.357	0.186	0.148
776	M409	min	-0.182	-0.38	-0.189	-0.15
777	M410	max	1.995	0.06	0.319	0.259
778	M410	min	-1.606	-0.061	-0.325	-0.261
779	M411	max	10.86	0.038	0.075	0.089
780	M411	min	-10.509	-0.042	-0.067	-0.093
781	M413	max	11.009	0.001	0.073	0.1
782	M413	min	-10.976	-0.002	-0.071	-0.098
783	M414	max	-0.071	0.86	0.423	0.345
784	M414	min	-0.183	-0.886	-0.433	-0.347

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
785	M415	max	10.95	0.006	0.072	0.104
786	M415	min	-11.073	-0.007	-0.072	-0.1
787	M416	max	9.927	0.099	0.057	0.086
788	M416	min	-9.074	-0.088	-0.072	-0.073
789	M417	max	11.005	0.015	0.074	0.094
790	M417	min	-10.811	-0.017	-0.069	-0.096
791	M418	max	-0.368	0.271	0.276	0.222
792	M418	min	-0.62	-0.249	-0.28	-0.225
793	M419	max	11.093	0.019	0.078	0.108
794	M419	min	-11.08	-0.02	-0.074	-0.116
795	M420	max	0.825	0.007	0.301	0.243
796	M420	min	-1.011	-0.006	-0.307	-0.246
797	M421	max	6.571	0.038	0.058	0.063
798	M421	min	-6.229	-0.022	-0.053	-0.065
799	M422	max	10.892	0.009	0.071	0.109
800	M422	min	-11.145	-0.009	-0.073	-0.102
801	M424	max	10.914	0.019	0.073	0.118
802	M424	min	-11.296	-0.02	-0.079	-0.107
803	M425	max	0.51	0.028	0.3	0.243
804	M425	min	-0.878	-0.024	-0.306	-0.246
805	M426	max	11.205	0.017	0.068	0.098
806	M426	min	-10.661	-0.015	-0.076	-0.093
807	M427	max	-0.086	0.171	0.29	0.234
808	M427	min	-0.646	-0.157	-0.295	-0.237
809	M428	max	10.505	0.07	0.074	0.083
810	M428	min	-9.997	-0.077	-0.063	-0.09
811	M429	max	1.134	0.021	0.301	0.243
812	M429	min	-1.14	-0.021	-0.307	-0.246
813	M430	max	8.745	0.152	0.048	0.074
814	M430	min	-7.779	-0.159	-0.063	-0.061
815	M431	max	11.038	0.041	0.066	0.095
816	M431	min	-10.378	-0.038	-0.076	-0.088
817	M432	max	11.222	0.001	0.069	0.1
818	M432	min	-10.803	-0.002	-0.075	-0.098
819	M433	max	11.166	0.006	0.071	0.102
820	M433	min	-10.877	-0.006	-0.073	-0.103
821	M435	max	0.803	0.023	0.171	0.133
822	M435	min	-1.12	-0.024	-0.165	-0.136
823	M436	max	0.216	0.076	0.289	0.233
824	M436	min	-0.735	-0.083	-0.294	-0.236
825	M437	max	-0.189	0.501	0.404	0.325
826	M437	min	-0.628	-0.583	-0.408	-0.326
827	M438	max	1.394	0.021	0.186	0.144
828	M438	min	-2.419	-0.02	-0.179	-0.148
829	M439	max	8.408	0.171	0.06	0.059
830	M439	min	-7.557	-0.134	-0.047	-0.069
831	M440	max	0.446	0.202	0.161	0.125
832	M440	min	-0.127	-0.215	-0.156	-0.127
833	M441	max	1.147	0.014	0.169	0.132

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
834	M441	min	-1.908	-0.014	-0.163	-0.134
835	M442	max	6.459	0.015	0.052	0.088
836	M442	min	-5.637	-0.014	-0.038	-0.069
837	M444	max	5.732	0.026	0.043	0.062
838	M444	min	-5.922	-0.027	-0.041	-0.063
839	M445	max	0.658	0.052	0.17	0.133
840	M445	min	-0.761	-0.056	-0.165	-0.135
841	M446	max	9.525	0.093	0.069	0.072
842	M446	min	-8.87	-0.088	-0.056	-0.082
843	M447	max	1.56	0.036	0.289	0.233
844	M447	min	-1.339	-0.035	-0.295	-0.237
845	M448	max	6.068	0.003	0.038	0.065
846	M448	min	-5.751	-0.002	-0.046	-0.075
847	M449	max	-0.287	0.302	0.243	0.194
848	M449	min	-0.76	-0.33	-0.245	-0.196
849	M450	max	10.328	0.069	0.061	0.088
850	M450	min	-9.588	-0.074	-0.073	-0.079
851	M451	max	6.535	0.025	0.054	0.071
852	M451	min	-6.054	-0.058	-0.061	-0.066
853	M454	max	10.716	0.011	0.07	0.099
854	M454	min	-10.589	-0.01	-0.069	-0.103
855	M455	max	0.175	0.408	0.197	0.157
856	M455	min	-0.184	-0.387	-0.2	-0.159
857	M456	max	0.95	0.012	0.171	0.133
858	M456	min	-1.472	-0.012	-0.165	-0.136
859	M457	max	2.038	0.065	0.324	0.262
860	M457	min	-1.609	-0.064	-0.33	-0.265
861	M458	max	6.281	0.003	0.047	0.077
862	M458	min	-5.609	-0.002	-0.037	-0.063
863	M459	max	10.527	0.041	0.073	0.086
864	M459	min	-10.199	-0.037	-0.065	-0.09
865	M461	max	10.669	0.002	0.071	0.096
866	M461	min	-10.661	-0.001	-0.069	-0.094
867	M462	max	5.917	0.028	0.043	0.065
868	M462	min	-5.729	-0.025	-0.042	-0.06
869	M463	max	0.186	0.236	0.036	0.025
870	M463	min	-0.174	-0.222	-0.038	-0.029
871	M464	max	-0.062	0.441	0.207	0.167
872	M464	min	-0.164	-0.429	-0.212	-0.169
873	M465	max	1.495	0.182	0.012	0.015
874	M465	min	-1.857	-0.178	-0.018	-0.015
875	M467	max	10.61	0.007	0.07	0.101
876	M467	min	-10.754	-0.006	-0.07	-0.096
877	M468	max	4.34	0.166	0.032	0.044
878	M468	min	-4.721	-0.154	-0.041	-0.049
879	M469	max	9.626	0.085	0.055	0.084
880	M469	min	-8.792	-0.096	-0.07	-0.071
881	M470	max	10.668	0.017	0.072	0.091
882	M470	min	-10.499	-0.015	-0.067	-0.092

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
883	M471	max	-0.354	0.243	0.268	0.215
884	M471	min	-0.599	-0.263	-0.272	-0.218
885	M472	max	10.853	0.018	0.078	0.104
886	M472	min	-10.867	-0.017	-0.074	-0.112
887	M473	max	0.835	0.007	0.292	0.236
888	M473	min	-0.988	-0.008	-0.298	-0.239
889	M474	max	6.442	0.032	0.06	0.067
890	M474	min	-6.127	-0.048	-0.054	-0.069
891	M475	max	10.526	0.011	0.068	0.105
892	M475	min	-10.801	-0.01	-0.071	-0.098
893	M477	max	10.679	0.018	0.072	0.114
894	M477	min	-11.083	-0.017	-0.079	-0.103
895	M478	max	0.52	0.023	0.292	0.236
896	M478	min	-0.856	-0.027	-0.297	-0.239
897	M479	max	10.866	0.015	0.066	0.094
898	M479	min	-10.348	-0.016	-0.074	-0.09
899	M480	max	-0.075	0.154	0.281	0.227
900	M480	min	-0.625	-0.167	-0.286	-0.23
901	M481	max	10.18	0.075	0.072	0.08
902	M481	min	-9.697	-0.068	-0.062	-0.086
903	M482	max	5.619	0.056	0.04	0.06
904	M482	min	-5.616	-0.051	-0.042	-0.058
905	M483	max	1.151	0.024	0.292	0.236
906	M483	min	-1.124	-0.024	-0.298	-0.239
907	M484	max	8.46	0.154	0.046	0.071
908	M484	min	-7.513	-0.146	-0.061	-0.058
909	M485	max	10.705	0.038	0.064	0.091
910	M485	min	-10.069	-0.041	-0.074	-0.085
911	M486	max	10.879	0.001	0.068	0.096
912	M486	min	-10.487	-0.002	-0.072	-0.095
913	M487	max	10.819	0.007	0.069	0.098
914	M487	min	-10.558	-0.006	-0.071	-0.099
915	M489	max	0.539	0.109	0.168	0.131
916	M489	min	-0.43	-0.117	-0.162	-0.133
917	M490	max	0.64	1.135	0.145	0.11
918	M490	min	0.097	-1.183	-0.145	-0.115
919	M491	max	2.983	0.228	0.022	0.029
920	M491	min	-3.665	-0.216	-0.033	-0.036
921	M492	max	0.597	0.517	0.127	0.098
922	M492	min	0.187	-0.544	-0.124	-0.1
923	M493	max	5.015	0.092	0.043	0.056
924	M493	min	-5.472	-0.097	-0.036	-0.052
925	M494	max	1.511	0.176	0.018	0.014
926	M494	min	-1.848	-0.184	-0.012	-0.014
927	M496	max	6.096	0.013	0.044	0.069
928	M496	min	-5.743	-0.011	-0.04	-0.062
929	M497	max	0.227	1.143	0.085	0.065
930	M497	min	0.023	-1.142	-0.093	-0.072
931	M498	max	6.207	0.006	0.046	0.074

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
932	M498	min	-5.691	-0.005	-0.039	-0.063
933	M499	max	4.273	0.157	0.042	0.05
934	M499	min	-4.838	-0.162	-0.031	-0.043
935	M500	max	0.365	0.339	0.147	0.114
936	M500	min	0.172	-0.359	-0.144	-0.117
937	M501	max	6.243	0.015	0.039	0.07
938	M501	min	-5.781	-0.014	-0.051	-0.086
939	M502	max	5.112	0.098	0.037	0.053
940	M502	min	-5.311	-0.092	-0.042	-0.055
941	M503	max	2.957	0.217	0.034	0.036
942	M503	min	-3.719	-0.226	-0.021	-0.029
943	M504	max	5.475	0.052	0.044	0.06
944	M504	min	-5.807	-0.055	-0.039	-0.058
945	M505	max	5.886	0.012	0.042	0.063
946	M505	min	-5.918	-0.012	-0.043	-0.068
947	M506	max	5.994	0.006	0.04	0.064
948	M506	min	-5.846	-0.005	-0.045	-0.072
949	M476	max	0.052	0.227	0.506	0.455
950	M476	min	-0.063	-0.231	-0.56	-0.455
951	M488	max	0.043	1.274	5.717	4.645
952	M488	min	-0.101	-1.24	-5.62	-4.645
953	M495	max	0.05	0.292	0.863	0.766
954	M495	min	-0.05	-0.296	-0.943	-0.767
955	M507	max	0.046	0.248	0.884	0.795
956	M507	min	-0.053	-0.253	-0.979	-0.795
957	M508	max	0.048	0.176	0.837	0.764
958	M508	min	-0.052	-0.183	-0.941	-0.764
959	M509	max	0.048	0.111	0.805	0.744
960	M509	min	-0.051	-0.121	-0.916	-0.744
961	M510	max	0.049	0.06	0.807	0.749
962	M510	min	-0.05	-0.071	-0.922	-0.749
963	M511	max	0.05	0.02	0.837	0.773
964	M511	min	-0.049	-0.035	-0.951	-0.773
965	M512	max	0.043	1.285	6.558	5.328
966	M512	min	-0.13	-1.248	-6.448	-5.328
967	M513	max	0.043	1.141	6.819	5.54
968	M513	min	-0.136	-1.107	-6.696	-5.54
969	M514	max	0.045	0.968	6.912	5.616
970	M514	min	-0.133	-0.939	-6.777	-5.616
971	M515	max	0.047	0.797	6.918	5.621
972	M515	min	-0.127	-0.774	-6.775	-5.621
973	M516	max	0.048	0.632	6.865	5.578
974	M516	min	-0.115	-0.617	-6.717	-5.577
975	M517	max	0.05	0.479	6.761	5.492
976	M517	min	-0.109	-0.473	-6.613	-5.493
977	M518	max	0.051	0.357	6.586	5.355
978	M518	min	-0.097	-0.363	-6.445	-5.347
979	M519	max	0.436	0.356	6.097	4.923
980	M519	min	-0.493	-0.33	-5.971	-4.983

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
981	M520	max	0.065	0.014	0.788	0.706
982	M520	min	-0.051	-0.053	-0.869	-0.706
983	M521	max	0.083	0.018	0.609	0.541
984	M521	min	-0.051	-0.062	-0.666	-0.541
985	M522	max	0.105	0.027	0.343	0.304
986	M522	min	-0.051	-0.063	-0.374	-0.304
987	M523	max	0.978	0.254	4.783	3.89
988	M523	min	-0.936	-0.249	-4.682	-3.882
989	M524	max	0.975	0.153	2.554	2.074
990	M524	min	-0.842	-0.148	-2.499	-2.076
991	M525	max	1.015	0.129	1.075	0.874
992	M525	min	-0.821	-0.13	-1.051	-0.874
993	M526	max	0.116	0.036	0.015	0.016
994	M526	min	-0.051	-0.072	-0.02	-0.016
995	M527	max	0.111	0.036	0.389	0.316
996	M527	min	-0.051	-0.071	-0.365	-0.316
997	M528	max	0.09	0.021	0.728	0.591
998	M528	min	-0.051	-0.061	-0.678	-0.591
999	M529	max	0.996	0.137	2.087	1.734
1,000	M529	min	-0.824	-0.135	-2.133	-1.732
1,001	M530	max	0.997	0.147	3.47	2.876
1,002	M530	min	-0.912	-0.137	-3.544	-2.882
1,003	M531	max	0.063	0.02	0.928	0.754
1,004	M531	min	-0.051	-0.057	-0.855	-0.754
1,005	M532	max	0.447	0.194	5.527	4.614
1,006	M532	min	-0.485	-0.176	-5.642	-4.554
1,007	M533	max	0.051	0.022	0.979	0.795
1,008	M533	min	-0.049	-0.045	-0.888	-0.795
1,009	M534	max	0.053	0.192	5.893	4.889
1,010	M534	min	-0.077	-0.204	-6.023	-4.898
1,011	M535	max	0.051	0.021	0.949	0.771
1,012	M535	min	-0.048	-0.036	-0.846	-0.771
1,013	M536	max	0.051	0.308	6.064	5.039
1,014	M536	min	-0.087	-0.308	-6.202	-5.038
1,015	M537	max	0.051	0.006	0.892	0.725
1,016	M537	min	-0.049	-0.022	-0.785	-0.725
1,017	M538	max	0.05	0.447	6.188	5.141
1,018	M538	min	-0.094	-0.437	-6.328	-5.141
1,019	M539	max	0.05	0.027	0.843	0.685
1,020	M539	min	-0.049	-0.037	-0.734	-0.685
1,021	M540	max	0.048	0.594	6.277	5.212
1,022	M540	min	-0.107	-0.578	-6.415	-5.212
1,023	M541	max	0.049	0.067	0.815	0.662
1,024	M541	min	-0.05	-0.076	-0.708	-0.662
1,025	M542	max	0.047	0.747	6.326	5.247
1,026	M542	min	-0.115	-0.725	-6.459	-5.247
1,027	M543	max	0.048	0.117	0.816	0.663
1,028	M543	min	-0.051	-0.124	-0.713	-0.663
1,029	M544	max	0.045	0.906	6.325	5.24

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
1,030	M544	min	-0.121	-0.879	-6.449	-5.24
1,031	M545	max	0.048	0.179	0.846	0.687
1,032	M545	min	-0.052	-0.184	-0.75	-0.687
1,033	M546	max	0.043	1.068	6.248	5.167
1,034	M546	min	-0.123	-1.037	-6.361	-5.167
1,035	M547	max	0.046	0.246	0.888	0.721
1,036	M547	min	-0.053	-0.249	-0.801	-0.721
1,037	M548	max	0.043	1.204	6.015	4.968
1,038	M548	min	-0.117	-1.171	-6.115	-4.968
1,039	M549	max	0.05	0.284	0.854	0.694
1,040	M549	min	-0.05	-0.287	-0.782	-0.694
1,041	M550	max	0.043	1.202	5.25	4.337
1,042	M550	min	-0.092	-1.171	-5.338	-4.337
1,043	M551	max	0.047	0.212	0.477	0.387
1,044	M551	min	-0.065	-0.214	-0.43	-0.388
1,045	M552	max	1.019	0.123	0.523	0.434
1,046	M552	min	-0.816	-0.124	-0.535	-0.434
1,047	M553	max	0.05	0.01	0.879	0.794
1,048	M553	min	-0.05	-0.041	-0.977	-0.794
1,049	M554	max	0.051	0.004	0.875	0.8
1,050	M554	min	-0.049	-0.028	-0.985	-0.8
1,051	M555	max	12.333	0.032	0.047	0.07
1,052	M555	min	-11.095	-0.033	-0.05	-0.079
1,053	M556	max	2.194	0.058	0.039	0.076
1,054	M556	min	-2.907	-0.057	-0.041	-0.061
1,055	M557	max	5.687	0.039	0.016	0.029
1,056	M557	min	-4.718	-0.046	-0.027	-0.023
1,057	M558	max	5.871	0.045	0.016	0.029
1,058	M558	min	-4.594	-0.04	-0.027	-0.023
1,059	M559	max	2.101	0.057	0.039	0.077
1,060	M559	min	-3.046	-0.059	-0.042	-0.061
1,061	M560	max	12.547	0.032	0.046	0.069
1,062	M560	min	-10.953	-0.034	-0.05	-0.08
1,063	M562	max	8.985	0.052	0.024	0.075
1,064	M562	min	-9.673	-0.048	-0.019	-0.065
1,065	M561	max	9.109	0.047	0.024	0.074
1,066	M561	min	-9.489	-0.053	-0.019	-0.066
1,067	M563	max	5.682	0.044	0.016	0.028
1,068	M563	min	-4.726	-0.038	-0.026	-0.022
1,069	M564	max	9.28	0.052	0.023	0.073
1,070	M564	min	-9.617	-0.046	-0.019	-0.067
1,071	M565	max	12.807	0.033	0.044	0.067
1,072	M565	min	-11.227	-0.032	-0.048	-0.076
1,073	M566	max	1.916	0.06	0.044	0.083
1,074	M566	min	-2.861	-0.058	-0.047	-0.066
1,075	M567	max	12.591	0.033	0.045	0.067
1,076	M567	min	-11.371	-0.032	-0.048	-0.075
1,077	M568	max	2.008	0.059	0.044	0.082
1,078	M568	min	-2.724	-0.059	-0.047	-0.067

Member Forces

ID	Member	Max/Min	Max of Axial[k]	Max of Vy[k]	Max of Vz[k]	Max of My[k-ft]
1,079	M569	max	9.156	0.046	0.023	0.074
1,080	M569	min	-9.801	-0.051	-0.019	-0.066
1,081	M570	max	5.869	0.039	0.016	0.028
1,082	M570	min	-4.601	-0.043	-0.026	-0.022

45. Gateway Arch
- A. Loading
 - B. Wind Loading
 - C. Pilaster Wall + Foundation Design
 - D. FEA Model Definition Sketches
 - E. Envelope Member Forces
 - F. Envelope Reactions**
 - G. Envelope Code Check
 - H. Baseplate + Anchor Bolts
-

Envelope Node Reactions

Node Label	Level	Location	max/min	LC	Vx [k]	LC2	Vy [k]	LC3	Pz [k]	LC4	Mx [k-ft]	LC5	My [k-ft]	LC6	Mz [k-ft]
N03	FDN	A	max	22	3.155	26	7.983	26	43.095	20	3.435	22	1.873	22	1.008
N03	FDN	A	min	13	-2.316	11	-8.285	11	-47.572	12	-3.460	13	-1.390	11	-0.994
N07	FDN	B	max	24	8.781	20	4.740	22	48.249	32	0.463	24	1.794	20	1.119
N07	FDN	B	min	12	-10.055	14	-4.063	13	-37.210	30	-0.476	12	-2.296	12	-1.132
N05	FDN	B	max	24	2.293	26	7.701	26	40.046	20	3.246	24	1.288	20	0.981
N05	FDN	B	min	12	-3.106	11	-8.032	11	-44.855	12	-3.265	12	-1.755	12	-0.994
N01	FDN	A	max	22	10.159	20	4.742	22	50.597	32	0.452	22	2.321	22	1.140
N01	FDN	A	min	13	-8.908	14	-4.096	13	-39.748	30	-0.458	13	-1.830	11	-1.126
N110	FDN	A	max	20	9.982	24	3.989	20	50.235	28	0.505	20	2.275	22	1.153
N110	FDN	A	min	14	-9.027	12	-4.901	14	-39.994	34	-0.409	14	-1.861	13	-1.116
N112	FDN	A	max	20	3.031	22	8.445	24	42.848	24	3.410	20	1.828	22	1.021
N112	FDN	A	min	14	-2.399	13	-7.877	12	-47.936	12	-3.491	14	-1.419	13	-0.984
N114	FDN	B	max	26	2.375	22	8.189	24	39.822	24	3.218	26	1.315	24	0.971
N114	FDN	B	min	11	-2.984	13	-7.597	12	-45.184	12	-3.299	11	-1.714	12	-1.008
N116	FDN	B	max	26	8.899	24	3.958	20	47.920	28	0.521	26	1.824	24	1.108
N116	FDN	B	min	11	-9.879	12	-4.896	14	-37.435	34	-0.421	11	-2.250	12	-1.146

45. Gateway Arch
- A. Loading
 - B. Wind Loading
 - C. Pilaster Wall + Foundation Design
 - D. FEA Model Definition Sketches
 - E. Envelope Member Forces
 - F. Envelope Reactions
 - G. Envelope Code Check**
 - H. Baseplate + Anchor Bolts
-

Load Cases

Description	Solve	P-Delta	SRSS	BLC	Factor	BLC2	Factor3	BLC4	Factor5	BLC6	Factor7
Deflection 1	TRUE	Y		DL	1						
Deflection 2	TRUE	Y		LL	1						
Deflection 3	TRUE	Y		DL	1	LL	1				
Deflection 4	TRUE	Y		DL	1	WLY	1				
Deflection 5	TRUE	Y		DL	1	ELY	1				
Deflection 6	TRUE	Y		DL	1	ELX	1				
IBC 21/ASCE Strength 1	TRUE	Y		DL	1.4						
IBC 21/ASCE Strength 2 (a)	TRUE	Y		DL	1.2	LL	1.6	LLS	1.6		
IBC 21/ASCE Strength 3 (b) (a)	TRUE	Y		DL	1.2	6	0.5				
IBC 21/ASCE Strength 3 (b) (b)	TRUE	Y		DL	1.2	6	-0.5				
IBC 21/ASCE Strength 4 (a) (a)	TRUE	Y		DL	1.2	6	1	LL	0.5	LLS	1
IBC 21/ASCE Strength 4 (a) (b)	TRUE	Y		DL	1.2	6	-1	LL	0.5	LLS	1
IBC 21/ASCE Strength 5 (a)	TRUE	Y		DL	0.9	6	1				
IBC 21/ASCE Strength 5 (b)	TRUE	Y		DL	0.9	6	-1				
IBC 21/ASCE Strength 3 (b) (a)	TRUE	Y		DL	1.2	WLX	0.5				
IBC 21/ASCE Strength 3 (b) (b)	TRUE	Y		DL	1.2	WLY	0.5				
IBC 21/ASCE Strength 3 (b) (c)	TRUE	Y		DL	1.2	WLX	-0.5				
IBC 21/ASCE Strength 3 (b) (d)	TRUE	Y		DL	1.2	WLY	-0.5				
IBC 21/ASCE Strength 4 (a) (a)	TRUE	Y		DL	1.2	WLX	1	LL	0.5	LLS	1
IBC 21/ASCE Strength 4 (a) (b)	TRUE	Y		DL	1.2	WLY	1	LL	0.5	LLS	1
IBC 21/ASCE Strength 4 (a) (c)	TRUE	Y		DL	1.2	WLX	-1	LL	0.5	LLS	1
IBC 21/ASCE Strength 4 (a) (d)	TRUE	Y		DL	1.2	WLY	-1	LL	0.5	LLS	1
IBC 21/ASCE Strength 5 (a)	TRUE	Y		DL	0.9	WLX	1				
IBC 21/ASCE Strength 5 (b)	TRUE	Y		DL	0.9	WLY	1				
IBC 21/ASCE Strength 5 (c)	TRUE	Y		DL	0.9	WLX	-1				
IBC 21/ASCE Strength 5 (d)	TRUE	Y		DL	0.9	WLY	-1				
IBC 21/ASCE Strength 6 (a)	TRUE	Y		DL	1.2	ELX	1	LL	0.5	LLS	1
IBC 21/ASCE Strength 6 (b)	TRUE	Y		DL	1.2	ELY	1	LL	0.5	LLS	1
IBC 21/ASCE Strength 6 (c)	TRUE	Y		DL	1.2	ELX	-1	LL	0.5	LLS	1
IBC 21/ASCE Strength 6 (d)	TRUE	Y		DL	1.2	ELY	-1	LL	0.5	LLS	1
IBC 21/ASCE Strength 7 (a)	TRUE	Y		DL	0.9	ELX	1				
IBC 21/ASCE Strength 7 (b)	TRUE	Y		DL	0.9	ELY	1				
IBC 21/ASCE Strength 7 (c)	TRUE	Y		DL	0.9	ELX	-1				
IBC 21/ASCE Strength 7 (d)	TRUE	Y		DL	0.9	ELY	-1				

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	φ Pnc [k]	φ Pnt [k]	φ Mn y-y [k-ft]	φ Mn z-z [k-ft]	Cb	Eqn
1	M1	HSS4.5X4.5X6	0.875	0.000	22	0.067	1.732 z		22	55.574	246.600	31.350	31.350	2.142	H1-1a
2	M2	HSS4.5X4.5X6	0.827	0.000	26	0.099	16.637 z		22	55.790	246.600	31.350	31.350	2.818	H1-1a
3	M3	HSS4.5X4.5X6	0.771	0.000	26	0.097	16.669 z		22	55.574	246.600	31.350	31.350	2.801	H1-1a
4	M4	HSS4.5X4.5X6	0.837	0.000	22	0.066	1.732 z		22	55.574	246.600	31.350	31.350	2.112	H1-1a
5	M5	HSS2X2X4	0.218	0.000	22	0.051	1.625 y		22	64.237	67.950	3.615	3.615	2.189	H1-1b
6	M6	HSS2X2X4	0.258	0.000	22	0.056	1.625 y		22	64.237	67.950	3.615	3.615	2.224	H1-1b
7	M7	HSS2X2X4	0.153	0.000	22	0.033	1.625 y		22	64.237	67.950	3.615	3.615	2.262	H1-1b
8	M8	HSS2X2X4	0.119	1.625	22	0.029	1.625 z		22	64.237	67.950	3.615	3.615	2.27	H1-1b
9	M9	HSS2X2X4	0.100	1.625	22	0.030	1.625 z		22	64.237	67.950	3.615	3.615	2.248	H1-1b
10	M10	HSS2X2X4	0.090	1.625	22	0.031	1.625 z		22	64.237	67.950	3.615	3.615	2.201	H1-1b
11	M11	HSS2X2X4	0.086	1.625	22	0.032	1.625 z		22	64.237	67.950	3.615	3.615	1.711	H1-1b
12	M12	HSS2X2X4	0.087	1.625	22	0.032	1.625 z		22	64.237	67.950	3.615	3.615	1.07	H1-1b
13	M13	HSS2X2X4	0.091	1.625	22	0.033	1.625 z		22	64.237	67.950	3.615	3.615	1.21	H1-1b
14	M15	HSS2X2X4	0.120	2.328	22	0.026	2.328 y		22	60.550	67.950	3.615	3.615	2.261	H1-1b
15	M16	HSS2X2X4	0.151	0.000	20	0.027	2.328 y		20	60.550	67.950	3.615	3.615	2.176	H1-1b
16	M17	HSS2X2X4	0.135	0.000	20	0.013	2.328 y		22	60.550	67.950	3.615	3.615	2.222	H1-1b
17	M18	HSS2X2X4	0.315	0.000	22	0.024	2.328 y		22	60.550	67.950	3.615	3.615	2.174	H1-1a
18	M19	HSS2X2X4	0.139	0.000	22	0.012	2.328 y		22	60.550	67.950	3.615	3.615	2.188	H1-1b*
19	M20	HSS2X2X4	0.202	0.000	22	0.014	2.328 y		22	60.550	67.950	3.615	3.615	2.158	H1-1b
20	M21	HSS2X2X4	0.122	0.000	22	0.011	2.328 y		22	60.550	67.950	3.615	3.615	2.148	H1-1b*
21	M22	HSS2X2X4	0.185	2.328	22	0.007	2.328 y		22	60.550	67.950	3.615	3.615	1.944	H1-1b*
22	M23	HSS2X2X4	0.111	0.000	22	0.009	2.328 y		22	60.550	67.950	3.615	3.615	1.736	H1-1b*
23	M24	HSS2X2X4	0.184	2.328	22	0.006	2.328 z		22	60.550	67.950	3.615	3.615	1.558	H1-1b*
24	M25	HSS2X2X4	0.103	0.000	22	0.008	0.000 z		22	60.550	67.950	3.615	3.615	1.381	H1-1b*
25	M26	HSS2X2X4	0.185	2.328	22	0.008	2.328 z		22	60.550	67.950	3.615	3.615	1.255	H1-1b*
26	M27	HSS2X2X4	0.098	0.000	22	0.008	0.000 z		22	60.550	67.950	3.615	3.615	1.156	H1-1b*
27	M28	HSS2X2X4	0.189	2.328	22	0.010	2.328 z		22	60.550	67.950	3.615	3.615	1.073	H1-1b*
28	M29	HSS2X2X4	0.093	0.000	22	0.008	0.000 z		22	60.550	67.950	3.615	3.615	1.053	H1-1b*
29	M30	HSS2X2X4	0.193	2.328	22	0.011	2.328 z		22	60.550	67.950	3.615	3.615	1.01	H1-1b*
30	M31	HSS2X2X4	0.089	0.000	22	0.008	0.000 z		22	60.550	67.950	3.615	3.615	1.043	H1-1b*
31	M32	HSS2X2X4	0.198	2.328	22	0.012	2.328 z		22	60.550	67.950	3.615	3.615	1.027	H1-1b*
32	M34	HSS2X2X4	0.087	0.000	22	0.008	0.000 z		20	60.550	67.950	3.615	3.615	1.097	H1-1b*
33	M35	HSS2X2X4	0.261	2.328	22	0.014	2.328 z		22	60.550	67.950	3.615	3.615	1.01	H1-1a
34	M36	HSS2X2X4	0.218	1.625	22	0.054	1.625 y		22	64.238	67.950	3.615	3.615	2.204	H1-1b
35	M37	HSS2X2X4	0.251	1.625	22	0.055	1.625 y		22	64.238	67.950	3.615	3.615	2.229	H1-1b
36	M38	HSS2X2X4	0.201	1.625	22	0.042	1.625 y		22	64.238	67.950	3.615	3.615	2.249	H1-1b
37	M39	HSS2X2X4	0.148	1.625	22	0.032	1.625 y		22	64.238	67.950	3.615	3.615	2.263	H1-1b
38	M40	HSS2X2X4	0.116	0.000	22	0.029	0.000 z		22	64.238	67.950	3.615	3.615	2.269	H1-1b
39	M41	HSS2X2X4	0.098	0.000	22	0.029	0.000 z		22	64.238	67.950	3.615	3.615	2.249	H1-1b
40	M42	HSS2X2X4	0.087	0.000	22	0.030	0.000 z		22	64.238	67.950	3.615	3.615	2.202	H1-1b
41	M43	HSS2X2X4	0.083	0.000	22	0.031	0.000 z		22	64.238	67.950	3.615	3.615	1.634	H1-1b
42	M44	HSS2X2X4	0.084	1.625	22	0.032	0.000 z		22	64.238	67.950	3.615	3.615	1.16	H1-1b
43	M45	HSS2X2X4	0.088	1.625	22	0.032	0.000 z		22	64.238	67.950	3.615	3.615	1.142	H1-1b
44	M47	HSS2X2X4	0.149	0.000	20	0.026	2.328 y		20	60.550	67.950	3.615	3.615	2.177	H1-1b
45	M48	HSS2X2X4	0.121	2.328	22	0.024	2.328 y		22	60.550	67.950	3.615	3.615	2.266	H1-1b
46	M49	HSS2X2X4	0.307	0.000	22	0.023	2.328 y		22	60.550	67.950	3.615	3.615	2.174	H1-1a
47	M50	HSS2X2X4	0.134	0.000	20	0.012	2.328 y		22	60.550	67.950	3.615	3.615	2.216	H1-1b
48	M51	HSS2X2X4	0.196	0.000	22	0.013	2.328 y		22	60.550	67.950	3.615	3.615	2.157	H1-1b
49	M52	HSS2X2X4	0.138	0.000	22	0.012	2.328 y		22	60.550	67.950	3.615	3.615	2.185	H1-1b*
50	M53	HSS2X2X4	0.181	2.328	22	0.007	2.328 y		22	60.550	67.950	3.615	3.615	1.94	H1-1b*
51	M54	HSS2X2X4	0.121	0.000	22	0.011	2.328 y		22	60.550	67.950	3.615	3.615	2.146	H1-1b*
52	M55	HSS2X2X4	0.180	2.328	22	0.006	2.328 z		22	60.550	67.950	3.615	3.615	1.556	H1-1b*
53	M56	HSS2X2X4	0.110	0.000	22	0.009	2.328 y		22	60.550	67.950	3.615	3.615	1.725	H1-1b*
54	M57	HSS2X2X4	0.181	2.328	22	0.008	2.328 z		22	60.550	67.950	3.615	3.615	1.254	H1-1b*
55	M58	HSS2X2X4	0.103	0.000	22	0.008	0.000 z		22	60.550	67.950	3.615	3.615	1.374	H1-1b*
56	M59	HSS2X2X4	0.184	2.328	22	0.009	2.328 z		22	60.550	67.950	3.615	3.615	1.068	H1-1b*

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
57	M60	HSS2X2X4	0.098	0.000	22	0.008	0.000 z		22	60.550	67.950	3.615	3.615	1.146	H1-1b*
58	M61	HSS2X2X4	0.189	2.328	22	0.010	2.328 z		22	60.550	67.950	3.615	3.615	1.021	H1-1b*
59	M62	HSS2X2X4	0.093	0.000	22	0.008	0.000 z		22	60.550	67.950	3.615	3.615	1.035	H1-1b*
60	M63	HSS2X2X4	0.193	2.328	22	0.011	2.328 z		22	60.550	67.950	3.615	3.615	1.042	H1-1b*
61	M64	HSS2X2X4	0.090	0.000	22	0.008	0.000 z		22	60.550	67.950	3.615	3.615	1.021	H1-1b*
62	M66	HSS2X2X4	0.257	2.328	22	0.013	2.328 z		22	60.550	67.950	3.615	3.615	1.052	H1-1a
63	M67	HSS2X2X4	0.089	0.000	22	0.007	0.000 z		20	60.550	67.950	3.615	3.615	1.019	H1-1b*
64	M68	HSS2X2X4	0.207	0.000	22	0.043	1.625 y		22	64.237	67.950	3.615	3.615	2.246	H1-1b
65	M69	HSS2X2X4	0.105	1.625	22	0.034	1.625 z		22	64.237	67.950	3.615	3.615	2.15	H1-1b
66	M72	HSS2X2X4	0.103	0.000	22	0.035	0.000 z		22	64.238	67.950	3.615	3.615	2.145	H1-1b
67	M75	HSS2X2X4	0.137	0.000	22	0.036	1.625 y		20	64.237	67.950	3.615	3.615	2.166	H1-1b
68	M76	HSS2X2X4	0.135	1.625	22	0.038	1.625 y		22	64.238	67.950	3.615	3.615	2.183	H1-1b
69	M77	HSS3.000X0.250	0.540	0.000	22	0.115	0.000		22	83.124	84.042	6.176	6.176	1	H1-1a
70	M78	HSS3.000X0.250	0.362	0.000	22	0.103	0.000		22	81.384	84.042	6.176	6.176	1	H1-1a
71	M79	HSS3.000X0.250	0.158	0.000	22	0.109	0.000		22	81.383	84.042	6.176	6.176	1	H1-1b*
72	M80	HSS3.000X0.250	0.090	0.000	29	0.113	0.000		22	81.383	84.042	6.176	6.176	1	H1-1b*
73	M81	HSS3.000X0.250	0.078	1.786	20	0.116	0.000		22	81.382	84.042	6.176	6.176	1	H1-1b
74	M82	HSS3.000X0.250	0.101	1.786	20	0.117	0.000		22	81.382	84.042	6.176	6.176	1	H1-1b
75	M83	HSS3.000X0.250	0.138	0.000	20	0.115	0.000		22	81.375	84.042	6.176	6.176	1	H1-1b*
76	M84	HSS3.000X0.250	0.194	1.784	22	0.110	0.000		22	81.388	84.042	6.176	6.176	1	H1-1b*
77	M85	HSS3.000X0.250	0.313	1.786	22	0.104	0.000		22	81.381	84.042	6.176	6.176	1	H1-1a
78	M86	HSS3.000X0.250	0.383	1.786	22	0.096	0.000		22	81.381	84.042	6.176	6.176	1	H1-1a
79	M87	HSS3.000X0.250	0.452	1.786	22	0.087	0.000		22	81.381	84.042	6.176	6.176	1	H1-1a
80	M88	HSS3.000X0.250	0.515	1.786	22	0.072	0.000		22	81.381	84.042	6.176	6.176	1	H1-1a
81	M89	HSS3.000X0.250	0.547	1.786	22	0.043	0.000		22	81.381	84.042	6.176	6.176	1	H1-1a
82	M90	HSS3.000X0.250	0.546	1.786	22	0.010	0.000		22	81.381	84.042	6.176	6.176	1	H1-1a
83	M91	HSS3.000X0.250	0.541	0.000	22	0.023	1.786		22	81.381	84.042	6.176	6.176	1	H1-1a
84	M92	HSS3.000X0.250	0.528	0.000	22	0.053	1.786		22	81.381	84.042	6.176	6.176	1	H1-1a
85	M93	HSS3.000X0.250	0.490	0.000	22	0.074	1.786		22	81.381	84.042	6.176	6.176	1	H1-1a
86	M94	HSS3.000X0.250	0.435	0.000	22	0.096	1.786		22	81.381	84.042	6.176	6.176	1	H1-1a
87	M95	HSS3.000X0.250	0.360	0.000	22	0.107	1.786		22	81.381	84.042	6.176	6.176	1	H1-1a
88	M96	HSS3.000X0.250	0.282	0.000	22	0.114	1.786		22	81.382	84.042	6.176	6.176	1	H1-1a
89	M97	HSS3.000X0.250	0.156	1.786	20	0.118	1.786		22	81.382	84.042	6.176	6.176	1	H1-1b*
90	M98	HSS3.000X0.250	0.116	0.000	20	0.121	1.786		22	81.382	84.042	6.176	6.176	1	H1-1b
91	M99	HSS3.000X0.250	0.090	0.000	20	0.121	1.786		22	81.382	84.042	6.176	6.176	1	H1-1b
92	M100	HSS3.000X0.250	0.089	1.786	27	0.119	1.786		22	81.383	84.042	6.176	6.176	1	H1-1b*
93	M101	HSS3.000X0.250	0.159	1.786	22	0.116	1.786		22	81.383	84.042	6.176	6.176	1	H1-1b
94	M102	HSS3.000X0.250	0.370	1.785	22	0.110	1.785		22	81.383	84.042	6.176	6.176	1	H1-1a
95	M103	HSS3.000X0.250	0.554	1.166	22	0.114	1.166		22	82.898	84.042	6.176	6.176	1	H1-1a
96	M104	HSS3.000X0.250	0.543	0.000	20	0.176	0.000		22	81.276	84.042	6.176	6.176	1	H1-1b
97	M105	HSS3.000X0.250	0.446	0.000	20	0.199	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
98	M106	HSS3.000X0.250	0.440	0.000	22	0.214	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
99	M107	HSS3.000X0.250	0.447	1.801	22	0.222	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
100	M108	HSS3.000X0.250	0.462	1.801	22	0.225	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
101	M109	HSS3.000X0.250	0.474	1.801	20	0.223	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
102	M110	HSS3.000X0.250	0.495	1.801	20	0.217	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
103	M111	HSS3.000X0.250	0.514	1.801	20	0.207	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
104	M112	HSS3.000X0.250	0.603	1.801	20	0.195	0.000		22	81.337	84.042	6.176	6.176	1	H1-1a
105	M113	HSS3.000X0.250	0.641	1.801	20	0.179	0.000		22	81.337	84.042	6.176	6.176	1	H1-1a
106	M114	HSS3.000X0.250	0.604	0.000	20	0.181	0.000		22	81.337	84.042	6.176	6.176	1	H1-1a
107	M115	HSS3.000X0.250	0.559	1.801	20	0.132	0.000		22	81.337	84.042	6.176	6.176	1	H1-1a
108	M116	HSS3.000X0.250	0.493	1.482	20	0.078	0.000		22	81.337	84.042	6.176	6.176	1	H1-1a
109	M117	HSS3.000X0.250	0.474	0.769	20	0.048	1.801		22	81.337	84.042	6.176	6.176	1	H1-1a
110	M118	HSS3.000X0.250	0.515	0.038	20	0.102	1.801		22	81.337	84.042	6.176	6.176	1	H1-1a
111	M119	HSS3.000X0.250	0.568	0.000	20	0.154	1.801		22	81.337	84.042	6.176	6.176	1	H1-1a
112	M120	HSS3.000X0.250	0.641	0.000	20	0.204	1.801		22	81.337	84.042	6.176	6.176	1	H1-1a

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	φ Pnc [k]	φ Pnt [k]	φ Mn y-y [k-ft]	φ Mn z-z [k-ft]	Cb	Eqn
113	M121	HSS3.000X0.250	0.659	0.000	20	0.201	1.801		22	81.337	84.042	6.176	6.176	1	H1-1a
114	M122	HSS3.000X0.250	0.613	0.000	20	0.216	1.801		22	81.337	84.042	6.176	6.176	1	H1-1a
115	M123	HSS3.000X0.250	0.535	0.000	20	0.227	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
116	M124	HSS3.000X0.250	0.513	0.000	20	0.234	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
117	M125	HSS3.000X0.250	0.496	0.000	22	0.237	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
118	M126	HSS3.000X0.250	0.481	0.000	22	0.235	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
119	M127	HSS3.000X0.250	0.471	1.801	22	0.227	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
120	M128	HSS3.000X0.250	0.474	1.801	20	0.213	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
121	M129	HSS3.000X0.250	0.583	1.822	20	0.190	1.822		22	81.276	84.042	6.176	6.176	1	H1-1b
122	M130	HSS1.900X0.188	0.141	1.801	22	0.055	0.000		20	35.914	39.040	1.794	1.794	1	H1-1b
123	M131	HSS1.900X0.188	0.218	0.000	22	0.037	1.966		22	35.343	39.040	1.794	1.794	1	H1-1b
124	M132	HSS1.900X0.188	0.155	0.000	22	0.021	0.000		20	35.906	39.040	1.794	1.794	1	H1-1b*
125	M133	HSS1.900X0.188	0.215	0.000	22	0.018	0.000		20	35.324	39.040	1.794	1.794	1	H1-1b
126	M134	HSS1.900X0.188	0.148	1.817	22	0.018	0.000		20	35.859	39.040	1.794	1.794	1	H1-1b
127	M135	HSS1.900X0.188	0.201	0.000	22	0.023	0.000		20	35.308	39.040	1.794	1.794	1	H1-1b
128	M136	HSS1.900X0.188	0.157	1.830	22	0.016	0.000		20	35.816	39.040	1.794	1.794	1	H1-1b
129	M137	HSS1.900X0.188	0.188	0.000	22	0.024	0.000		20	35.295	39.040	1.794	1.794	1	H1-1b
130	M138	HSS1.900X0.188	0.163	1.843	22	0.014	0.000		20	35.774	39.040	1.794	1.794	1	H1-1b
131	M139	HSS1.900X0.188	0.178	0.000	22	0.024	0.000		20	35.286	39.040	1.794	1.794	1	H1-1b
132	M140	HSS1.900X0.188	0.165	1.854	22	0.015	1.854		22	35.736	39.040	1.794	1.794	1	H1-1b
133	M141	HSS1.900X0.188	0.168	0.000	22	0.025	0.000		20	35.279	39.040	1.794	1.794	1	H1-1b
134	M142	HSS1.900X0.188	0.165	1.865	22	0.017	1.865		22	35.696	39.040	1.794	1.794	1	H1-1b
135	M143	HSS1.900X0.188	0.157	0.000	22	0.026	1.984		20	35.280	39.040	1.794	1.794	1	H1-1b
136	M144	HSS1.900X0.188	0.164	1.874	22	0.019	1.874		22	35.666	39.040	1.794	1.794	1	H1-1b
137	M145	HSS1.900X0.188	0.145	0.000	22	0.028	1.985		20	35.276	39.040	1.794	1.794	1	H1-1b
138	M146	HSS1.900X0.188	0.161	1.883	22	0.020	1.883		22	35.635	39.040	1.794	1.794	1	H1-1b
139	M147	HSS1.900X0.188	0.134	0.000	22	0.030	1.984		20	35.279	39.040	1.794	1.794	1	H1-1b
140	M148	HSS1.900X0.188	0.153	1.891	22	0.021	1.891		22	35.607	39.040	1.794	1.794	1	H1-1b
141	M149	HSS1.900X0.188	0.128	0.000	22	0.032	1.982		20	35.285	39.040	1.794	1.794	1	H1-1b
142	M150	HSS1.900X0.188	0.127	1.899	22	0.024	1.899		22	35.582	39.040	1.794	1.794	1	H1-1b
143	M151	HSS1.900X0.188	0.122	0.000	22	0.029	1.980		20	35.295	39.040	1.794	1.794	1	H1-1b
144	M152	HSS1.900X0.188	0.082	0.000	22	0.035	1.905		22	35.560	39.040	1.794	1.794	1	H1-1b
145	M153	HSS1.900X0.188	0.106	0.000	22	0.039	1.976		20	35.307	39.040	1.794	1.794	1	H1-1b
146	M154	HSS1.900X0.188	0.079	0.000	22	0.035	1.910		22	35.541	39.040	1.794	1.794	1	H1-1b
147	M155	HSS1.900X0.188	0.083	1.972	22	0.041	1.972		20	35.323	39.040	1.794	1.794	1	H1-1b
148	M156	HSS1.900X0.188	0.071	0.000	20	0.037	0.000		20	35.524	39.040	1.794	1.794	1	H1-1b
149	M157	HSS1.900X0.188	0.075	1.967	22	0.038	1.967		20	35.341	39.040	1.794	1.794	1	H1-1b
150	M158	HSS1.900X0.188	0.086	0.000	22	0.037	0.000		20	35.513	39.040	1.794	1.794	1	H1-1b
151	M159	HSS1.900X0.188	0.078	1.961	22	0.035	0.000		22	35.364	39.040	1.794	1.794	1	H1-1b
152	M160	HSS1.900X0.188	0.109	1.922	22	0.031	0.000		20	35.501	39.040	1.794	1.794	1	H1-1b
153	M161	HSS1.900X0.188	0.093	0.000	22	0.022	0.000		22	35.387	39.040	1.794	1.794	1	H1-1b
154	M162	HSS1.900X0.188	0.140	1.924	22	0.041	0.000		20	35.493	39.040	1.794	1.794	1	H1-1b
155	M163	HSS1.900X0.188	0.130	0.000	22	0.025	0.000		22	35.414	39.040	1.794	1.794	1	H1-1b
156	M164	HSS1.900X0.188	0.151	1.925	22	0.031	0.000		20	35.489	39.040	1.794	1.794	1	H1-1b
157	M165	HSS1.900X0.188	0.167	0.000	22	0.021	0.000		22	35.444	39.040	1.794	1.794	1	H1-1b
158	M166	HSS1.900X0.188	0.150	1.925	22	0.029	0.000		20	35.488	39.040	1.794	1.794	1	H1-1b
159	M167	HSS1.900X0.188	0.178	0.000	22	0.017	0.000		22	35.476	39.040	1.794	1.794	1	H1-1b
160	M168	HSS1.900X0.188	0.159	1.925	22	0.027	0.000		20	35.490	39.040	1.794	1.794	1	H1-1b
161	M169	HSS1.900X0.188	0.180	0.000	22	0.015	1.919		20	35.512	39.040	1.794	1.794	1	H1-1b
162	M170	HSS1.900X0.188	0.171	1.923	22	0.025	0.000		20	35.495	39.040	1.794	1.794	1	H1-1b
163	M171	HSS1.900X0.188	0.180	0.000	22	0.016	1.908		20	35.550	39.040	1.794	1.794	1	H1-1b
164	M172	HSS1.900X0.188	0.183	1.921	22	0.024	1.921		20	35.504	39.040	1.794	1.794	1	H1-1b
165	M173	HSS1.900X0.188	0.178	0.000	22	0.018	1.896		20	35.591	39.040	1.794	1.794	1	H1-1b
166	M174	HSS1.900X0.188	0.195	1.918	22	0.024	1.918		20	35.515	39.040	1.794	1.794	1	H1-1b
167	M175	HSS1.900X0.188	0.173	0.000	22	0.020	1.884		20	35.634	39.040	1.794	1.794	1	H1-1b
168	M176	HSS1.900X0.188	0.210	1.914	22	0.024	1.914		20	35.530	39.040	1.794	1.794	1	H1-1b

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	φ Pnc [k]	φ Pnt [k]	φ Mn y-y [k-ft]	φ Mn z-z [k-ft]	Cb	Eqn
169	M177	HSS1.900X0.188	0.164	0.000	22	0.023	1.870		20	35.679	39.040	1.794	1.794	1	H1-1b
170	M178	HSS1.900X0.188	0.225	1.908	22	0.019	1.908		20	35.548	39.040	1.794	1.794	1	H1-1b
171	M179	HSS1.900X0.188	0.169	1.857	22	0.027	1.857		20	35.727	39.040	1.794	1.794	1	H1-1b*
172	M180	HSS1.900X0.188	0.225	1.902	22	0.041	0.000		22	35.569	39.040	1.794	1.794	1	H1-1b
173	M181	HSS1.900X0.188	0.156	0.000	22	0.065	1.855		20	35.733	39.040	1.794	1.794	1	H1-1b
174	M182	HSS4.5X4.5X6	0.867	0.000	20	0.065	1.732 z		20	55.574	246.600	31.350	31.350	2.132	H1-1a
175	M183	HSS4.5X4.5X6	0.821	0.000	24	0.097	16.637 z		20	55.790	246.600	31.350	31.350	2.82	H1-1a
176	M184	HSS4.5X4.5X6	0.766	0.000	24	0.095	16.669 z		20	55.574	246.600	31.350	31.350	2.803	H1-1a
177	M185	HSS4.5X4.5X6	0.829	0.000	20	0.064	1.732 z		20	55.574	246.600	31.350	31.350	2.103	H1-1a
178	M186	HSS2X2X4	0.213	0.000	20	0.051	1.625 y		22	64.237	67.950	3.615	3.615	2.189	H1-1b
179	M187	HSS2X2X4	0.251	0.000	20	0.056	1.625 y		22	64.237	67.950	3.615	3.615	2.223	H1-1b
180	M188	HSS2X2X4	0.146	0.000	20	0.033	1.625 y		22	64.237	67.950	3.615	3.615	2.26	H1-1b
181	M189	HSS2X2X4	0.114	1.625	20	0.028	1.625 z		20	64.237	67.950	3.615	3.615	2.27	H1-1b
182	M190	HSS2X2X4	0.097	1.625	20	0.029	1.625 z		20	64.237	67.950	3.615	3.615	2.247	H1-1b
183	M191	HSS2X2X4	0.087	1.625	20	0.030	1.625 z		20	64.237	67.950	3.615	3.615	2.196	H1-1b
184	M192	HSS2X2X4	0.084	1.625	20	0.031	1.625 z		20	64.237	67.950	3.615	3.615	1.64	H1-1b
185	M193	HSS2X2X4	0.085	1.625	20	0.031	1.625 z		20	64.237	67.950	3.615	3.615	1.051	H1-1b
186	M194	HSS2X2X4	0.089	1.625	20	0.032	1.625 z		20	64.237	67.950	3.615	3.615	1.216	H1-1b
187	M196	HSS2X2X4	0.116	2.328	20	0.026	2.328 y		22	60.550	67.950	3.615	3.615	2.258	H1-1b
188	M197	HSS2X2X4	0.151	0.000	22	0.027	2.328 y		22	60.550	67.950	3.615	3.615	2.176	H1-1b
189	M198	HSS2X2X4	0.140	0.000	22	0.013	2.328 y		22	60.550	67.950	3.615	3.615	2.222	H1-1b
190	M199	HSS2X2X4	0.304	0.000	20	0.024	2.328 y		22	60.550	67.950	3.615	3.615	2.172	H1-1a
191	M200	HSS2X2X4	0.136	2.328	26	0.012	2.328 y		22	60.550	67.950	3.615	3.615	2.189	H1-1b*
192	M201	HSS2X2X4	0.194	0.000	20	0.014	2.328 y		22	60.550	67.950	3.615	3.615	2.155	H1-1b
193	M202	HSS2X2X4	0.119	0.000	20	0.011	2.328 y		22	60.550	67.950	3.615	3.615	2.144	H1-1b*
194	M203	HSS2X2X4	0.180	2.328	20	0.007	2.328 y		22	60.550	67.950	3.615	3.615	1.91	H1-1b*
195	M204	HSS2X2X4	0.108	0.000	20	0.009	2.328 y		22	60.550	67.950	3.615	3.615	1.702	H1-1b*
196	M205	HSS2X2X4	0.179	2.328	20	0.006	2.328 z		20	60.550	67.950	3.615	3.615	1.529	H1-1b*
197	M206	HSS2X2X4	0.101	0.000	20	0.008	2.328 y		22	60.550	67.950	3.615	3.615	1.359	H1-1b*
198	M207	HSS2X2X4	0.181	2.328	20	0.008	2.328 z		20	60.550	67.950	3.615	3.615	1.237	H1-1b*
199	M208	HSS2X2X4	0.095	0.000	20	0.008	0.000 z		20	60.550	67.950	3.615	3.615	1.145	H1-1b*
200	M209	HSS2X2X4	0.185	2.328	20	0.010	2.328 z		20	60.550	67.950	3.615	3.615	1.064	H1-1b*
201	M210	HSS2X2X4	0.090	0.000	20	0.008	0.000 z		20	60.550	67.950	3.615	3.615	1.05	H1-1b*
202	M211	HSS2X2X4	0.190	2.328	20	0.011	2.328 z		20	60.550	67.950	3.615	3.615	1.013	H1-1b*
203	M212	HSS2X2X4	0.086	0.000	20	0.008	0.000 z		20	60.550	67.950	3.615	3.615	1.045	H1-1b*
204	M213	HSS2X2X4	0.194	2.328	20	0.012	2.328 z		20	60.550	67.950	3.615	3.615	1.027	H1-1b*
205	M215	HSS2X2X4	0.084	0.000	20	0.008	0.000 z		22	60.550	67.950	3.615	3.615	1.101	H1-1b*
206	M216	HSS2X2X4	0.200	2.328	20	0.014	2.328 z		20	60.550	67.950	3.615	3.615	1.009	H1-1b*
207	M217	HSS2X2X4	0.213	1.625	20	0.055	1.625 y		22	64.238	67.950	3.615	3.615	2.204	H1-1b
208	M218	HSS2X2X4	0.243	1.625	20	0.055	1.625 y		22	64.238	67.950	3.615	3.615	2.227	H1-1b
209	M219	HSS2X2X4	0.193	1.625	20	0.043	1.625 y		22	64.238	67.950	3.615	3.615	2.247	H1-1b
210	M220	HSS2X2X4	0.142	1.625	20	0.032	1.625 y		22	64.238	67.950	3.615	3.615	2.262	H1-1b
211	M221	HSS2X2X4	0.111	0.000	20	0.028	0.000 z		20	64.238	67.950	3.615	3.615	2.27	H1-1b
212	M222	HSS2X2X4	0.094	0.000	20	0.029	0.000 z		20	64.238	67.950	3.615	3.615	2.247	H1-1b
213	M223	HSS2X2X4	0.085	0.000	20	0.030	0.000 z		20	64.238	67.950	3.615	3.615	2.197	H1-1b
214	M224	HSS2X2X4	0.081	0.000	20	0.030	0.000 z		20	64.238	67.950	3.615	3.615	1.563	H1-1b
215	M225	HSS2X2X4	0.082	1.625	20	0.031	0.000 z		20	64.238	67.950	3.615	3.615	1.176	H1-1b
216	M226	HSS2X2X4	0.086	1.625	20	0.031	0.000 z		20	64.238	67.950	3.615	3.615	1.133	H1-1b
217	M228	HSS2X2X4	0.149	0.000	22	0.026	2.328 y		22	60.550	67.950	3.615	3.615	2.178	H1-1b
218	M229	HSS2X2X4	0.117	2.328	20	0.024	2.328 y		22	60.550	67.950	3.615	3.615	2.268	H1-1b
219	M230	HSS2X2X4	0.296	0.000	20	0.023	2.328 y		22	60.550	67.950	3.615	3.615	2.172	H1-1a
220	M231	HSS2X2X4	0.139	0.000	22	0.012	2.328 y		22	60.550	67.950	3.615	3.615	2.217	H1-1b
221	M232	HSS2X2X4	0.190	0.000	20	0.014	2.328 y		22	60.550	67.950	3.615	3.615	2.155	H1-1b
222	M233	HSS2X2X4	0.134	2.328	26	0.012	2.328 y		22	60.550	67.950	3.615	3.615	2.186	H1-1b*
223	M234	HSS2X2X4	0.176	2.328	20	0.007	2.328 y		22	60.550	67.950	3.615	3.615	1.907	H1-1b*
224	M235	HSS2X2X4	0.118	0.000	20	0.011	2.328 y		22	60.550	67.950	3.615	3.615	2.136	H1-1b*

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
225	M236	HSS2X2X4	0.175	2.328	20	0.006	2.328 z		20	60.550	67.950	3.615	3.615	1.53	H1-1b*
226	M237	HSS2X2X4	0.107	0.000	20	0.009	2.328 y		22	60.550	67.950	3.615	3.615	1.694	H1-1b*
227	M238	HSS2X2X4	0.177	2.328	20	0.008	2.328 z		20	60.550	67.950	3.615	3.615	1.238	H1-1b*
228	M239	HSS2X2X4	0.101	0.000	20	0.008	2.328 y		22	60.550	67.950	3.615	3.615	1.354	H1-1b*
229	M240	HSS2X2X4	0.180	2.328	20	0.009	2.328 z		20	60.550	67.950	3.615	3.615	1.06	H1-1b*
230	M241	HSS2X2X4	0.095	0.000	20	0.008	0.000 z		20	60.550	67.950	3.615	3.615	1.136	H1-1b*
231	M242	HSS2X2X4	0.185	2.328	20	0.010	2.328 z		20	60.550	67.950	3.615	3.615	1.024	H1-1b*
232	M243	HSS2X2X4	0.091	0.000	20	0.008	0.000 z		20	60.550	67.950	3.615	3.615	1.032	H1-1b*
233	M244	HSS2X2X4	0.189	2.328	20	0.011	2.328 z		20	60.550	67.950	3.615	3.615	1.043	H1-1b*
234	M245	HSS2X2X4	0.087	0.000	20	0.008	0.000 z		20	60.550	67.950	3.615	3.615	1.022	H1-1b*
235	M247	HSS2X2X4	0.196	2.328	20	0.013	2.328 z		20	60.550	67.950	3.615	3.615	1.052	H1-1b*
236	M248	HSS2X2X4	0.087	0.000	20	0.007	0.000 z		22	60.550	67.950	3.615	3.615	1.022	H1-1b*
237	M249	HSS2X2X4	0.198	0.000	20	0.044	1.625 y		22	64.237	67.950	3.615	3.615	2.245	H1-1b
238	M250	HSS2X2X4	0.103	1.625	20	0.034	1.625 z		20	64.237	67.950	3.615	3.615	2.15	H1-1b
239	M253	HSS2X2X4	0.101	0.000	20	0.035	0.000 z		20	64.238	67.950	3.615	3.615	2.144	H1-1b
240	M256	HSS2X2X4	0.137	0.000	20	0.036	1.625 y		22	64.237	67.950	3.615	3.615	2.169	H1-1b
241	M257	HSS2X2X4	0.135	1.625	20	0.038	1.625 y		22	64.238	67.950	3.615	3.615	2.185	H1-1b
242	M258	HSS3.000X0.250	0.523	0.000	20	0.107	0.000		20	83.124	84.042	6.176	6.176	1	H1-1a
243	M259	HSS3.000X0.250	0.356	0.000	20	0.102	1.785		22	81.384	84.042	6.176	6.176	1	H1-1a
244	M260	HSS3.000X0.250	0.157	0.000	20	0.108	1.786		22	81.383	84.042	6.176	6.176	1	H1-1b
245	M261	HSS3.000X0.250	0.090	1.786	20	0.112	1.786		22	81.383	84.042	6.176	6.176	1	H1-1b
246	M262	HSS3.000X0.250	0.065	1.786	22	0.115	1.786		22	81.382	84.042	6.176	6.176	1	H1-1b
247	M263	HSS3.000X0.250	0.092	1.786	20	0.116	1.786		22	81.382	84.042	6.176	6.176	1	H1-1b
248	M264	HSS3.000X0.250	0.135	1.788	20	0.114	1.788		22	81.375	84.042	6.176	6.176	1	H1-1b*
249	M265	HSS3.000X0.250	0.197	1.784	20	0.110	1.784		22	81.388	84.042	6.176	6.176	1	H1-1b*
250	M266	HSS3.000X0.250	0.323	1.786	20	0.103	1.786		22	81.381	84.042	6.176	6.176	1	H1-1a
251	M267	HSS3.000X0.250	0.391	1.786	20	0.096	1.786		22	81.381	84.042	6.176	6.176	1	H1-1a
252	M268	HSS3.000X0.250	0.457	1.786	20	0.086	1.786		22	81.381	84.042	6.176	6.176	1	H1-1a
253	M269	HSS3.000X0.250	0.516	1.786	20	0.072	1.786		22	81.381	84.042	6.176	6.176	1	H1-1a
254	M270	HSS3.000X0.250	0.544	1.786	20	0.043	1.786		22	81.381	84.042	6.176	6.176	1	H1-1a
255	M271	HSS3.000X0.250	0.541	1.786	20	0.010	1.786		22	81.381	84.042	6.176	6.176	1	H1-1a
256	M272	HSS3.000X0.250	0.536	0.000	20	0.023	0.000		22	81.381	84.042	6.176	6.176	1	H1-1a
257	M273	HSS3.000X0.250	0.527	0.000	20	0.053	0.000		22	81.381	84.042	6.176	6.176	1	H1-1a
258	M274	HSS3.000X0.250	0.491	0.000	20	0.074	0.000		22	81.381	84.042	6.176	6.176	1	H1-1a
259	M275	HSS3.000X0.250	0.440	0.000	20	0.095	0.000		22	81.381	84.042	6.176	6.176	1	H1-1a
260	M276	HSS3.000X0.250	0.369	0.000	20	0.107	0.000		22	81.381	84.042	6.176	6.176	1	H1-1a
261	M277	HSS3.000X0.250	0.294	0.000	20	0.113	0.000		22	81.382	84.042	6.176	6.176	1	H1-1a
262	M278	HSS3.000X0.250	0.158	0.000	20	0.118	0.000		22	81.382	84.042	6.176	6.176	1	H1-1b*
263	M279	HSS3.000X0.250	0.108	0.000	20	0.121	0.000		22	81.382	84.042	6.176	6.176	1	H1-1b
264	M280	HSS3.000X0.250	0.076	0.000	22	0.121	0.000		22	81.382	84.042	6.176	6.176	1	H1-1b
265	M281	HSS3.000X0.250	0.091	0.000	20	0.118	0.000		22	81.383	84.042	6.176	6.176	1	H1-1b
266	M282	HSS3.000X0.250	0.160	1.786	20	0.115	0.000		22	81.383	84.042	6.176	6.176	1	H1-1b
267	M283	HSS3.000X0.250	0.363	1.785	20	0.110	0.000		22	81.383	84.042	6.176	6.176	1	H1-1a
268	M284	HSS3.000X0.250	0.538	1.166	20	0.105	1.166		20	82.898	84.042	6.176	6.176	1	H1-1a
269	M285	HSS3.000X0.250	0.550	0.000	22	0.175	1.822		22	81.276	84.042	6.176	6.176	1	H1-1b
270	M286	HSS3.000X0.250	0.451	0.000	22	0.199	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
271	M287	HSS3.000X0.250	0.433	0.000	22	0.213	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
272	M288	HSS3.000X0.250	0.438	1.801	20	0.222	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
273	M289	HSS3.000X0.250	0.460	1.801	22	0.225	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
274	M290	HSS3.000X0.250	0.483	1.801	22	0.223	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
275	M291	HSS3.000X0.250	0.503	1.801	22	0.217	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
276	M292	HSS3.000X0.250	0.521	1.801	22	0.208	1.801		22	81.337	84.042	6.176	6.176	1	H1-1b
277	M293	HSS3.000X0.250	0.602	1.801	22	0.195	1.801		22	81.337	84.042	6.176	6.176	1	H1-1a
278	M294	HSS3.000X0.250	0.653	1.801	22	0.182	1.801		22	81.337	84.042	6.176	6.176	1	H1-1a
279	M295	HSS3.000X0.250	0.627	1.801	22	0.149	1.801		22	81.337	84.042	6.176	6.176	1	H1-1a
280	M296	HSS3.000X0.250	0.586	1.801	22	0.095	1.801		22	81.337	84.042	6.176	6.176	1	H1-1a

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
281	M297	HSS3.000X0.250	0.510	1.801	22	0.042	1.801		22	81.337	84.042	6.176	6.176	1	H1-1a
282	M298	HSS3.000X0.250	0.454	0.000	22	0.012	0.000		22	81.337	84.042	6.176	6.176	1	H1-1a
283	M299	HSS3.000X0.250	0.539	0.000	22	0.066	0.000		22	81.337	84.042	6.176	6.176	1	H1-1a
284	M300	HSS3.000X0.250	0.595	0.000	22	0.118	0.000		22	81.337	84.042	6.176	6.176	1	H1-1a
285	M301	HSS3.000X0.250	0.677	0.000	22	0.171	0.000		22	81.337	84.042	6.176	6.176	1	H1-1a
286	M302	HSS3.000X0.250	0.671	0.000	22	0.205	0.000		22	81.337	84.042	6.176	6.176	1	H1-1a
287	M303	HSS3.000X0.250	0.613	0.000	22	0.216	0.000		22	81.337	84.042	6.176	6.176	1	H1-1a
288	M304	HSS3.000X0.250	0.543	0.000	22	0.227	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
289	M305	HSS3.000X0.250	0.522	0.000	22	0.234	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
290	M306	HSS3.000X0.250	0.497	0.000	22	0.237	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
291	M307	HSS3.000X0.250	0.471	0.000	20	0.235	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
292	M308	HSS3.000X0.250	0.461	1.801	20	0.227	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
293	M309	HSS3.000X0.250	0.480	1.801	22	0.213	0.000		22	81.337	84.042	6.176	6.176	1	H1-1b
294	M310	HSS3.000X0.250	0.591	1.822	22	0.189	0.000		22	81.276	84.042	6.176	6.176	1	H1-1b
295	M311	HSS1.900X0.188	0.132	1.801	20	0.055	1.801		20	35.914	39.040	1.794	1.794	1	H1-1b
296	M312	HSS1.900X0.188	0.211	0.000	20	0.036	1.966		20	35.343	39.040	1.794	1.794	1	H1-1b
297	M313	HSS1.900X0.188	0.146	0.000	20	0.023	1.804		20	35.906	39.040	1.794	1.794	1	H1-1b*
298	M314	HSS1.900X0.188	0.205	0.000	20	0.018	1.972		20	35.324	39.040	1.794	1.794	1	H1-1b
299	M315	HSS1.900X0.188	0.141	1.817	20	0.020	1.817		20	35.859	39.040	1.794	1.794	1	H1-1b
300	M316	HSS1.900X0.188	0.190	0.000	20	0.024	1.976		20	35.308	39.040	1.794	1.794	1	H1-1b
301	M317	HSS1.900X0.188	0.150	1.830	20	0.017	1.830		20	35.816	39.040	1.794	1.794	1	H1-1b
302	M318	HSS1.900X0.188	0.178	0.000	20	0.024	1.980		20	35.295	39.040	1.794	1.794	1	H1-1b
303	M319	HSS1.900X0.188	0.155	1.843	20	0.014	1.843		20	35.774	39.040	1.794	1.794	1	H1-1b
304	M320	HSS1.900X0.188	0.168	0.000	20	0.024	1.982		20	35.286	39.040	1.794	1.794	1	H1-1b
305	M321	HSS1.900X0.188	0.157	1.854	20	0.014	0.000		22	35.736	39.040	1.794	1.794	1	H1-1b
306	M322	HSS1.900X0.188	0.158	0.000	20	0.025	1.984		20	35.279	39.040	1.794	1.794	1	H1-1b
307	M323	HSS1.900X0.188	0.157	1.865	20	0.017	0.000		22	35.696	39.040	1.794	1.794	1	H1-1b
308	M324	HSS1.900X0.188	0.147	0.000	20	0.026	1.984		20	35.280	39.040	1.794	1.794	1	H1-1b
309	M325	HSS1.900X0.188	0.155	1.874	20	0.018	0.000		22	35.666	39.040	1.794	1.794	1	H1-1b
310	M326	HSS1.900X0.188	0.136	0.000	20	0.028	1.985		20	35.276	39.040	1.794	1.794	1	H1-1b
311	M327	HSS1.900X0.188	0.152	1.883	20	0.019	0.000		22	35.635	39.040	1.794	1.794	1	H1-1b
312	M328	HSS1.900X0.188	0.125	0.000	20	0.030	1.984		20	35.279	39.040	1.794	1.794	1	H1-1b
313	M329	HSS1.900X0.188	0.142	1.891	20	0.021	0.000		22	35.607	39.040	1.794	1.794	1	H1-1b
314	M330	HSS1.900X0.188	0.122	0.000	20	0.035	0.000		20	35.285	39.040	1.794	1.794	1	H1-1b
315	M331	HSS1.900X0.188	0.118	1.899	20	0.022	0.000		22	35.582	39.040	1.794	1.794	1	H1-1b
316	M332	HSS1.900X0.188	0.116	0.000	20	0.028	0.000		20	35.295	39.040	1.794	1.794	1	H1-1b
317	M333	HSS1.900X0.188	0.079	0.000	20	0.036	0.000		22	35.560	39.040	1.794	1.794	1	H1-1b
318	M334	HSS1.900X0.188	0.104	1.976	20	0.039	0.000		20	35.307	39.040	1.794	1.794	1	H1-1b
319	M335	HSS1.900X0.188	0.080	0.000	20	0.036	0.000		22	35.541	39.040	1.794	1.794	1	H1-1b
320	M336	HSS1.900X0.188	0.087	1.972	20	0.040	0.000		20	35.323	39.040	1.794	1.794	1	H1-1b
321	M337	HSS1.900X0.188	0.074	0.000	20	0.036	0.000		22	35.524	39.040	1.794	1.794	1	H1-1b
322	M338	HSS1.900X0.188	0.079	1.967	20	0.038	1.967		22	35.341	39.040	1.794	1.794	1	H1-1b
323	M339	HSS1.900X0.188	0.090	0.000	20	0.036	1.919		20	35.513	39.040	1.794	1.794	1	H1-1b
324	M340	HSS1.900X0.188	0.078	1.961	20	0.036	1.961		22	35.364	39.040	1.794	1.794	1	H1-1b
325	M341	HSS1.900X0.188	0.106	1.922	20	0.030	1.922		20	35.501	39.040	1.794	1.794	1	H1-1b
326	M342	HSS1.900X0.188	0.086	0.000	20	0.023	1.954		22	35.387	39.040	1.794	1.794	1	H1-1b
327	M343	HSS1.900X0.188	0.134	1.924	20	0.040	1.924		20	35.493	39.040	1.794	1.794	1	H1-1b
328	M344	HSS1.900X0.188	0.122	0.000	20	0.022	1.947		22	35.414	39.040	1.794	1.794	1	H1-1b
329	M345	HSS1.900X0.188	0.144	1.925	20	0.034	1.925		20	35.489	39.040	1.794	1.794	1	H1-1b
330	M346	HSS1.900X0.188	0.156	0.000	20	0.021	1.938		22	35.444	39.040	1.794	1.794	1	H1-1b
331	M347	HSS1.900X0.188	0.140	1.925	20	0.028	0.000		20	35.488	39.040	1.794	1.794	1	H1-1b
332	M348	HSS1.900X0.188	0.167	0.000	20	0.017	1.929		22	35.476	39.040	1.794	1.794	1	H1-1b
333	M349	HSS1.900X0.188	0.149	1.925	20	0.027	0.000		20	35.490	39.040	1.794	1.794	1	H1-1b
334	M350	HSS1.900X0.188	0.170	0.000	20	0.016	0.000		20	35.512	39.040	1.794	1.794	1	H1-1b
335	M351	HSS1.900X0.188	0.161	1.923	20	0.026	0.000		20	35.495	39.040	1.794	1.794	1	H1-1b
336	M352	HSS1.900X0.188	0.171	0.000	20	0.017	0.000		20	35.550	39.040	1.794	1.794	1	H1-1b

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	φ Pnc [k]	φ Pnt [k]	φ Mn y-y [k-ft]	φ Mn z-z [k-ft]	Cb	Eqn
337	M353	HSS1.900X0.188	0.172	1.921	20	0.025	0.000		20	35.504	39.040	1.794	1.794	1	H1-1b
338	M354	HSS1.900X0.188	0.170	0.000	20	0.019	0.000		20	35.591	39.040	1.794	1.794	1	H1-1b
339	M355	HSS1.900X0.188	0.183	1.918	20	0.025	0.000		20	35.515	39.040	1.794	1.794	1	H1-1b
340	M356	HSS1.900X0.188	0.164	0.000	20	0.021	0.000		20	35.634	39.040	1.794	1.794	1	H1-1b
341	M357	HSS1.900X0.188	0.198	1.914	20	0.025	0.000		20	35.530	39.040	1.794	1.794	1	H1-1b
342	M358	HSS1.900X0.188	0.155	0.000	20	0.024	0.000		20	35.679	39.040	1.794	1.794	1	H1-1b
343	M359	HSS1.900X0.188	0.214	1.908	20	0.019	0.000		20	35.548	39.040	1.794	1.794	1	H1-1b
344	M360	HSS1.900X0.188	0.160	1.857	20	0.028	0.000		20	35.727	39.040	1.794	1.794	1	H1-1b*
345	M361	HSS1.900X0.188	0.217	1.902	20	0.039	0.000		20	35.569	39.040	1.794	1.794	1	H1-1b
346	M362	HSS1.900X0.188	0.145	0.000	20	0.065	0.000		20	35.733	39.040	1.794	1.794	1	H1-1b
347	M363	HSS2X2X4	0.120	0.000	22	0.045	1.625 y		22	64.237	67.950	3.615	3.615	2.271	H1-1b
348	M364	HSS2X2X4	0.049	0.000	22	0.031	0.000 z		22	64.237	67.950	3.615	3.615	2.263	H1-1b
349	M365	HSS2X2X4	0.045	0.000	22	0.028	0.000 z		22	64.237	67.950	3.615	3.615	2.272	H1-1b
350	M366	HSS2X2X4	0.128	2.328	20	0.017	2.328 y		22	60.550	67.950	3.615	3.615	2.203	H1-1b
351	M367	HSS2X2X4	0.094	2.328	20	0.017	2.328 y		22	60.550	67.950	3.615	3.615	2.252	H1-1b
352	M368	HSS2X2X4	0.104	2.328	22	0.004	2.328 z		27	60.550	67.950	3.615	3.615	1.065	H1-1b*
353	M369	HSS2X2X4	0.044	0.000	22	0.027	0.000 z		22	64.237	67.950	3.615	3.615	2.258	H1-1b
354	M370	HSS2X2X4	0.096	2.328	22	0.017	2.328 y		20	60.550	67.950	3.615	3.615	2.255	H1-1b
355	M371	HSS2X2X4	0.126	2.328	22	0.013	2.328 y		22	60.550	67.950	3.615	3.615	2.165	H1-1b
356	M373	HSS2X2X4	0.102	2.328	22	0.004	2.328 y		20	60.550	67.950	3.615	3.615	1.627	H1-1b
357	M374	HSS2X2X4	0.106	2.328	22	0.005	2.328 z		27	60.550	67.950	3.615	3.615	1.194	H1-1b*
358	M376	HSS2X2X4	0.110	2.328	22	0.008	2.328 y		22	60.550	67.950	3.615	3.615	1.944	H1-1b
359	M378	HSS2X2X4	0.051	0.000	22	0.029	0.000 z		22	64.237	67.950	3.615	3.615	2.27	H1-1b
360	M379	HSS2X2X4	0.123	2.328	22	0.013	2.328 y		20	60.550	67.950	3.615	3.615	2.172	H1-1b
361	M380	HSS2X2X4	0.100	2.328	22	0.003	2.328 z		22	60.550	67.950	3.615	3.615	1.175	H1-1b*
362	M381	HSS2X2X4	0.094	2.328	24	0.003	0.000 z		22	60.550	67.950	3.615	3.615	1.336	H1-1b*
363	M382	HSS2X2X4	0.121	1.625	20	0.037	1.625 y		22	64.237	67.950	3.615	3.615	2.272	H1-1b
364	M383	HSS2X2X4	0.087	0.000	22	0.034	1.625 y		22	64.237	67.950	3.615	3.615	2.271	H1-1b
365	M384	HSS2.5X2.5X4	0.199	0.000	22	0.068	1.625 y		22	85.721	88.650	6.113	6.113	2.272	H1-1b
366	M385	HSS2X2X4	0.065	0.000	22	0.030	0.000 z		22	64.237	67.950	3.615	3.615	2.27	H1-1b
367	M386	HSS2X2X4	0.110	2.328	22	0.008	2.328 y		20	60.550	67.950	3.615	3.615	1.975	H1-1b
368	M387	HSS2X2X4	0.043	0.000	22	0.028	0.000 z		22	64.237	67.950	3.615	3.615	2.263	H1-1b
369	M388	HSS2X2X4	0.132	2.328	22	0.017	2.328 y		20	60.550	67.950	3.615	3.615	2.206	H1-1b
370	M389	HSS2X2X4	0.102	2.328	20	0.005	2.328 z		27	60.550	67.950	3.615	3.615	1.198	H1-1b*
371	M390	HSS2X2X4	0.098	2.328	22	0.005	2.328 y		22	60.550	67.950	3.615	3.615	1.603	H1-1b
372	M391	HSS2X2X4	0.097	2.328	22	0.003	2.328 z		22	60.550	67.950	3.615	3.615	1.351	H1-1b*
373	M392	HSS2X2X4	0.097	2.328	20	0.003	2.328 z		20	60.550	67.950	3.615	3.615	1.167	H1-1b*
374	M393	HSS2X2X4	0.102	2.328	22	0.004	2.328 z		22	60.550	67.950	3.615	3.615	1.092	H1-1b*
375	M394	HSS2X2X4	0.099	2.328	20	0.003	0.000 z		22	60.550	67.950	3.615	3.615	1.09	H1-1b*
376	M395	HSS2X2X4	0.100	2.328	20	0.004	2.328 z		27	60.550	67.950	3.615	3.615	1.066	H1-1b*
377	M396	HSS2X2X4	0.162	0.000	22	0.056	1.625 y		22	64.237	67.950	3.615	3.615	2.272	H1-1b
378	M398	HSS2X2X4	0.096	1.625	20	0.031	1.625 y		22	64.237	67.950	3.615	3.615	2.272	H1-1b
379	M399	HSS2X2X4	0.089	1.625	22	0.038	1.625 z		22	64.237	67.950	3.615	3.615	2.269	H1-1b
380	M400	HSS2.5X2.5X4	0.141	0.000	22	0.033	1.625 y		22	85.721	88.650	6.113	6.113	2.271	H1-1b
381	M401	HSS2X2X4	0.156	2.328	20	0.019	2.328 y		22	60.550	67.950	3.615	3.615	2.04	H1-1b
382	M402	HSS2X2X4	0.162	2.328	20	0.006	2.328 y		20	60.550	67.950	3.615	3.615	1.775	H1-1b*
383	M403	HSS2X2X4	0.077	1.625	22	0.036	1.625 z		22	64.237	67.950	3.615	3.615	2.265	H1-1b
384	M404	HSS2X2X4	0.137	1.625	22	0.047	1.625 y		22	64.237	67.950	3.615	3.615	2.272	H1-1b
385	M405	HSS2X2X4	0.176	2.328	22	0.006	2.328 y		22	60.550	67.950	3.615	3.615	1.711	H1-1b*
386	M406	HSS2X2X4	0.110	2.328	22	0.014	0.000 z		20	60.550	67.950	3.615	3.615	1.869	H1-1b*
387	M408	HSS2X2X4	0.183	2.328	22	0.006	2.328 z		22	60.550	67.950	3.615	3.615	1.126	H1-1b*
388	M409	HSS2X2X4	0.127	1.625	22	0.032	1.625 y		22	64.237	67.950	3.615	3.615	2.273	H1-1b
389	M410	HSS2X2X4	0.088	1.625	22	0.036	1.625 z		22	64.237	67.950	3.615	3.615	2.269	H1-1b
390	M411	HSS2X2X4	0.179	2.328	20	0.005	2.328 z		20	60.550	67.950	3.615	3.615	1.411	H1-1b*
391	M413	HSS2X2X4	0.182	2.328	20	0.005	2.328 z		20	60.550	67.950	3.615	3.615	1.008	H1-1b*
392	M414	HSS2.875X0.250	0.132	1.625	22	0.057	1.625		22	84.152	86.850	6.113	6.113	1	H1-1b

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
393	M415	HSS2X2X4	0.181	2.328	24	0.005	2.328 z		20	60.550	67.950	3.615	3.615	1.087	H1-1b*
394	M416	HSS2X2X4	0.164	2.328	22	0.007	2.328 y		22	60.550	67.950	3.615	3.615	1.824	H1-1b*
395	M417	HSS2X2X4	0.182	2.328	20	0.005	0.000 z		22	60.550	67.950	3.615	3.615	1.178	H1-1b*
396	M418	HSS2X2X4	0.127	1.625	22	0.039	1.625 z		22	64.237	67.950	3.615	3.615	2.271	H1-1b
397	M419	HSS2X2X4	0.183	2.328	22	0.006	2.328 z		22	60.550	67.950	3.615	3.615	1.269	H1-1b*
398	M420	HSS2X2X4	0.070	1.625	22	0.037	1.625 z		22	64.237	67.950	3.615	3.615	2.268	H1-1b
399	M421	HSS2X2X4	0.109	2.328	20	0.015	0.000 z		22	60.550	67.950	3.615	3.615	1.665	H1-1b*
400	M422	HSS2X2X4	0.180	2.328	24	0.005	2.328 z		20	60.550	67.950	3.615	3.615	1.125	H1-1b*
401	M424	HSS2X2X4	0.180	2.328	24	0.006	2.328 z		20	60.550	67.950	3.615	3.615	1.268	H1-1b*
402	M425	HSS2X2X4	0.076	1.625	22	0.037	1.625 z		22	64.237	67.950	3.615	3.615	2.268	H1-1b
403	M426	HSS2X2X4	0.185	2.328	22	0.005	2.328 z		22	60.550	67.950	3.615	3.615	1.198	H1-1b*
404	M427	HSS2X2X4	0.107	1.625	22	0.039	1.625 z		22	64.237	67.950	3.615	3.615	2.27	H1-1b
405	M428	HSS2X2X4	0.173	2.328	20	0.005	2.328 z		20	60.550	67.950	3.615	3.615	1.672	H1-1b*
406	M429	HSS2X2X4	0.073	1.625	22	0.036	1.625 z		22	64.237	67.950	3.615	3.615	2.265	H1-1b
407	M430	HSS2X2X4	0.162	2.328	22	0.018	2.328 y		20	60.550	67.950	3.615	3.615	2.14	H1-1b
408	M431	HSS2X2X4	0.182	2.328	22	0.005	2.328 z		22	60.550	67.950	3.615	3.615	1.44	H1-1b*
409	M432	HSS2X2X4	0.185	2.328	22	0.005	2.328 z		22	60.550	67.950	3.615	3.615	1.019	H1-1b*
410	M433	HSS2X2X4	0.184	2.328	22	0.005	2.328 z		22	60.550	67.950	3.615	3.615	1.084	H1-1b*
411	M435	HSS2X2X4	0.044	0.000	22	0.028	0.000 z		22	64.237	67.950	3.615	3.615	2.271	H1-1b
412	M436	HSS2X2X4	0.086	1.625	22	0.038	1.625 z		22	64.237	67.950	3.615	3.615	2.27	H1-1b
413	M437	HSS2.5X2.5X4	0.133	0.000	22	0.031	1.625 y		22	85.721	88.650	6.113	6.113	2.271	H1-1b
414	M438	HSS2X2X4	0.050	0.000	22	0.031	0.000 z		22	64.237	67.950	3.615	3.615	2.261	H1-1b
415	M439	HSS2X2X4	0.151	2.328	20	0.019	2.328 y		22	60.550	67.950	3.615	3.615	2.035	H1-1b
416	M440	HSS2X2X4	0.085	0.000	22	0.033	1.625 y		22	64.237	67.950	3.615	3.615	2.271	H1-1b
417	M441	HSS2X2X4	0.043	0.000	22	0.026	0.000 z		22	64.237	67.950	3.615	3.615	2.253	H1-1b
418	M442	HSS2X2X4	0.107	2.328	22	0.005	2.328 z		29	60.550	67.950	3.615	3.615	1.187	H1-1b*
419	M444	HSS2X2X4	0.095	2.328	24	0.003	2.328 z		20	60.550	67.950	3.615	3.615	1.329	H1-1b*
420	M445	HSS2X2X4	0.050	0.000	22	0.029	0.000 z		22	64.237	67.950	3.615	3.615	2.271	H1-1b
421	M446	HSS2X2X4	0.157	2.328	20	0.006	2.328 y		20	60.550	67.950	3.615	3.615	1.775	H1-1b*
422	M447	HSS2X2X4	0.074	1.625	22	0.035	1.625 z		22	64.237	67.950	3.615	3.615	2.265	H1-1b
423	M448	HSS2X2X4	0.100	2.328	20	0.004	2.328 z		29	60.550	67.950	3.615	3.615	1.048	H1-1b*
424	M449	HSS2X2X4	0.133	1.625	22	0.045	1.625 y		22	64.237	67.950	3.615	3.615	2.272	H1-1b
425	M450	HSS2X2X4	0.171	2.328	22	0.005	2.328 y		22	60.550	67.950	3.615	3.615	1.71	H1-1b*
426	M451	HSS2X2X4	0.108	2.328	22	0.014	0.000 z		20	60.550	67.950	3.615	3.615	1.613	H1-1b*
427	M454	HSS2X2X4	0.177	2.328	22	0.005	2.328 z		22	60.550	67.950	3.615	3.615	1.148	H1-1b*
428	M455	HSS2X2X4	0.136	1.625	22	0.033	1.625 y		22	64.237	67.950	3.615	3.615	2.272	H1-1b
429	M456	HSS2X2X4	0.042	0.000	22	0.027	0.000 z		22	64.237	67.950	3.615	3.615	2.258	H1-1b
430	M457	HSS2X2X4	0.090	1.625	22	0.037	1.625 z		22	64.237	67.950	3.615	3.615	2.269	H1-1b
431	M458	HSS2X2X4	0.104	2.328	22	0.004	2.328 z		29	60.550	67.950	3.615	3.615	1.046	H1-1b*
432	M459	HSS2X2X4	0.174	2.328	20	0.005	2.328 z		20	60.550	67.950	3.615	3.615	1.414	H1-1b*
433	M461	HSS2X2X4	0.176	2.328	20	0.005	2.328 z		20	60.550	67.950	3.615	3.615	1.006	H1-1b*
434	M462	HSS2X2X4	0.098	2.328	22	0.003	2.328 z		22	60.550	67.950	3.615	3.615	1.343	H1-1b*
435	M463	HSS2X2X4	0.061	1.625	20	0.021	1.625 y		22	64.237	67.950	3.615	3.615	2.272	H1-1b
436	M464	HSS2X2X4	0.147	1.625	22	0.039	1.625 y		22	64.237	67.950	3.615	3.615	2.272	H1-1b
437	M465	HSS2X2X4	0.081	2.328	20	0.016	2.328 y		22	60.550	67.950	3.615	3.615	2.235	H1-1b
438	M467	HSS2X2X4	0.175	2.328	24	0.005	2.328 z		20	60.550	67.950	3.615	3.615	1.095	H1-1b*
439	M468	HSS2X2X4	0.120	2.328	22	0.012	2.328 y		20	60.550	67.950	3.615	3.615	2.169	H1-1b
440	M469	HSS2X2X4	0.159	2.328	22	0.007	2.328 y		22	60.550	67.950	3.615	3.615	1.819	H1-1b*
441	M470	HSS2X2X4	0.176	2.328	20	0.004	0.000 z		22	60.550	67.950	3.615	3.615	1.18	H1-1b*
442	M471	HSS2X2X4	0.123	1.625	22	0.038	1.625 z		22	64.237	67.950	3.615	3.615	2.271	H1-1b
443	M472	HSS2X2X4	0.179	2.328	22	0.006	2.328 z		22	60.550	67.950	3.615	3.615	1.239	H1-1b*
444	M473	HSS2X2X4	0.068	1.625	22	0.036	1.625 z		22	64.237	67.950	3.615	3.615	2.266	H1-1b
445	M474	HSS2X2X4	0.106	2.328	20	0.015	0.000 z		22	60.550	67.950	3.615	3.615	1.423	H1-1b*
446	M475	HSS2X2X4	0.174	2.328	24	0.005	2.328 z		20	60.550	67.950	3.615	3.615	1.147	H1-1b*
447	M477	HSS2X2X4	0.176	2.328	24	0.006	2.328 z		20	60.550	67.950	3.615	3.615	1.238	H1-1b*
448	M478	HSS2X2X4	0.073	1.625	22	0.037	1.625 z		22	64.237	67.950	3.615	3.615	2.269	H1-1b

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	φ Pnc [k]	φ Pnt [k]	φ Mn y-y [k-ft]	φ Mn z-z [k-ft]	Cb	Eqn
449 M479	HSS2X2X4		0.179	2.328	22	0.005	2.328 z		22	60.550	67.950	3.615	3.615	1.198	H1-1b*
450 M480	HSS2X2X4		0.104	1.625	22	0.038	1.625 z		22	64.237	67.950	3.615	3.615	2.27	H1-1b
451 M481	HSS2X2X4		0.168	2.328	20	0.005	2.328 z		20	60.550	67.950	3.615	3.615	1.673	H1-1b*
452 M482	HSS2X2X4		0.101	2.328	22	0.004	2.328 y		20	60.550	67.950	3.615	3.615	1.615	H1-1b
453 M483	HSS2X2X4		0.072	1.625	22	0.035	1.625 z		22	64.237	67.950	3.615	3.615	2.265	H1-1b
454 M484	HSS2X2X4		0.157	2.328	22	0.018	2.328 y		20	60.550	67.950	3.615	3.615	2.128	H1-1b
455 M485	HSS2X2X4		0.177	2.328	22	0.005	2.328 z		22	60.550	67.950	3.615	3.615	1.441	H1-1b*
456 M486	HSS2X2X4		0.180	2.328	22	0.005	2.328 z		22	60.550	67.950	3.615	3.615	1.016	H1-1b*
457 M487	HSS2X2X4		0.179	2.328	22	0.005	2.328 z		22	60.550	67.950	3.615	3.615	1.093	H1-1b*
458 M489	HSS2X2X4		0.064	0.000	22	0.029	0.000 z		22	64.237	67.950	3.615	3.615	2.27	H1-1b
459 M490	HSS2.5X2.5X4		0.179	0.000	22	0.060	1.625 y		22	85.721	88.650	6.113	6.113	2.272	H1-1b
460 M491	HSS2X2X4		0.122	2.328	20	0.017	2.328 y		22	60.550	67.950	3.615	3.615	2.198	H1-1b
461 M492	HSS2X2X4		0.154	0.000	22	0.053	1.625 y		22	64.237	67.950	3.615	3.615	2.272	H1-1b
462 M493	HSS2X2X4		0.108	2.328	22	0.008	2.328 y		22	60.550	67.950	3.615	3.615	1.922	H1-1b
463 M494	HSS2X2X4		0.082	2.328	22	0.016	2.328 y		20	60.550	67.950	3.615	3.615	2.24	H1-1b
464 M496	HSS2X2X4		0.101	2.328	22	0.003	2.328 z		22	60.550	67.950	3.615	3.615	1.165	H1-1b*
465 M497	HSS3X3X4		0.109	1.625	20	0.049	1.625 y		22	107.362	109.800	9.300	9.300	2.272	H1-1b
466 M498	HSS2X2X4		0.103	2.328	22	0.003	2.328 z		22	60.550	67.950	3.615	3.615	1.077	H1-1b*
467 M499	HSS2X2X4		0.122	2.328	22	0.012	2.328 y		22	60.550	67.950	3.615	3.615	2.162	H1-1b
468 M500	HSS2X2X4		0.116	0.000	22	0.044	1.625 y		22	64.237	67.950	3.615	3.615	2.271	H1-1b
469 M501	HSS2X2X4		0.103	2.328	20	0.005	2.328 z		29	60.550	67.950	3.615	3.615	1.191	H1-1b*
470 M502	HSS2X2X4		0.109	2.328	22	0.007	2.328 y		20	60.550	67.950	3.615	3.615	1.952	H1-1b
471 M503	HSS2X2X4		0.126	2.328	22	0.016	2.328 y		20	60.550	67.950	3.615	3.615	2.201	H1-1b
472 M504	HSS2X2X4		0.097	2.328	24	0.004	2.328 y		22	60.550	67.950	3.615	3.615	1.593	H1-1b
473 M505	HSS2X2X4		0.097	2.328	20	0.003	2.328 z		20	60.550	67.950	3.615	3.615	1.158	H1-1b*
474 M506	HSS2X2X4		0.099	2.328	20	0.003	0.000 z		22	60.550	67.950	3.615	3.615	1.076	H1-1b*
475 M476	HSS1.900X0.188		0.274	0.000	20	0.098	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
476 M488	HSS2.875X0.250		0.847	0.000	22	0.317	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
477 M495	HSS1.900X0.188		0.448	1.625	20	0.134	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
478 M507	HSS1.900X0.188		0.458	1.625	20	0.144	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
479 M508	HSS1.900X0.188		0.434	1.625	20	0.142	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
480 M509	HSS1.900X0.188		0.419	1.625	20	0.140	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
481 M510	HSS1.900X0.188		0.419	1.625	20	0.138	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
482 M511	HSS1.900X0.188		0.431	1.625	20	0.137	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
483 M512	HSS2.875X0.250		0.966	0.000	22	0.362	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
484 M513	HSS2.875X0.250		1.000	0.000	22	0.379	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
485 M514	HSS2.875X0.250		1.009	0.000	22	0.385	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
486 M515	HSS2.875X0.250		1.007	0.000	22	0.384	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
487 M516	HSS2.875X0.250		0.997	0.000	22	0.378	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
488 M517	HSS2.875X0.250		0.980	0.000	22	0.367	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
489 M518	HSS2.875X0.250		0.954	1.625	22	0.350	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
490 M519	HSS2.875X0.250		0.890	0.000	22	0.319	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
491 M520	HSS1.900X0.188		0.395	0.000	20	0.109	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
492 M521	HSS1.900X0.188		0.303	1.625	20	0.083	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
493 M522	HSS1.900X0.188		0.173	1.625	20	0.047	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
494 M523	HSS2.875X0.250		0.698	1.625	22	0.249	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
495 M524	HSS2.500X0.250		0.508	0.000	22	0.155	0.000		22	66.075	68.724	4.140	4.140	1	H1-1b
496 M525	HSS2.500X0.250		0.217	0.000	22	0.066	0.000		22	66.075	68.724	4.140	4.140	1	H1-1b
497 M526	HSS1.900X0.188		0.033	1.625	20	0.009	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
498 M527	HSS1.900X0.188		0.180	1.625	20	0.042	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
499 M528	HSS1.900X0.188		0.332	1.625	20	0.082	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
500 M529	HSS2.500X0.250		0.425	0.000	22	0.125	0.000		22	66.075	68.724	4.140	4.140	1	H1-1b
501 M530	HSS2.500X0.250		0.703	1.625	22	0.209	0.000		22	66.075	68.724	4.140	4.140	1	H1-1b
502 M531	HSS1.900X0.188		0.421	0.000	20	0.109	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
503 M532	HSS2.875X0.250		0.824	0.000	22	0.290	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
504 M533	HSS1.900X0.188		0.444	0.000	20	0.121	0.000		20	36.476	39.040	1.794	1.794	1	H1-1b

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
505	M534	HSS2.875X0.250	0.872	1.625	22	0.317	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
506	M535	HSS1.900X0.188	0.430	0.000	20	0.126	0.000		20	36.476	39.040	1.794	1.794	1	H1-1b
507	M536	HSS2.875X0.250	0.898	0.000	22	0.335	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
508	M537	HSS1.900X0.188	0.404	0.000	20	0.127	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
509	M538	HSS2.875X0.250	0.917	1.625	22	0.347	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
510	M539	HSS1.900X0.188	0.382	1.625	20	0.127	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
511	M540	HSS2.875X0.250	0.931	0.000	22	0.357	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
512	M541	HSS1.900X0.188	0.371	1.625	20	0.128	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
513	M542	HSS2.875X0.250	0.940	0.000	22	0.362	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
514	M543	HSS1.900X0.188	0.374	1.625	20	0.129	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
515	M544	HSS2.875X0.250	0.942	0.000	22	0.362	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
516	M545	HSS1.900X0.188	0.392	1.625	20	0.132	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
517	M546	HSS2.875X0.250	0.932	0.000	22	0.356	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
518	M547	HSS1.900X0.188	0.417	1.625	20	0.133	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
519	M548	HSS2.875X0.250	0.901	0.000	22	0.339	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
520	M549	HSS1.900X0.188	0.408	1.625	20	0.123	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
521	M550	HSS2.875X0.250	0.791	0.000	22	0.296	0.000		22	77.616	79.902	5.623	5.623	1	H1-1b
522	M551	HSS1.900X0.188	0.237	0.000	20	0.088	0.000		22	36.476	39.040	1.794	1.794	1	H1-1b
523	M552	HSS2.500X0.250	0.112	1.625	20	0.031	0.000		22	66.075	68.724	4.140	4.140	1	H1-1b
524	M553	HSS1.900X0.188	0.443	0.000	20	0.126	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
525	M554	HSS1.900X0.188	0.446	1.625	20	0.134	1.625		20	36.476	39.040	1.794	1.794	1	H1-1b
526	M555	HSS2X2X4	0.253	2.413	20	0.006	0.000 z		20	60.030	67.950	3.615	3.615	1.375	H1-1a
527	M556	HSS2X2X4	0.056	0.000	20	0.015	2.413 y		22	60.030	67.950	3.615	3.615	2.18	H1-1b
528	M557	HSS2X2X4	0.095	0.000	20	0.009	2.413 y		22	60.029	67.950	3.615	3.615	1.576	H1-1b*
529	M558	HSS2X2X4	0.098	0.000	22	0.009	2.413 y		20	60.029	67.950	3.615	3.615	1.579	H1-1b*
530	M559	HSS2X2X4	0.057	0.000	22	0.016	2.413 y		22	60.030	67.950	3.615	3.615	2.178	H1-1b
531	M560	HSS2X2X4	0.257	2.413	22	0.006	0.000 z		22	60.030	67.950	3.615	3.615	1.38	H1-1a
532	M562	HSS2X2X4	0.150	0.000	24	0.009	2.413 y		20	60.029	67.950	3.615	3.615	1.895	H1-1b*
533	M561	HSS2X2X4	0.152	0.000	26	0.009	2.413 y		22	60.029	67.950	3.615	3.615	1.893	H1-1b*
534	M563	HSS2X2X4	0.095	0.000	20	0.009	2.443 y		22	59.844	67.950	3.615	3.615	1.568	H1-1b*
535	M564	HSS2X2X4	0.155	0.000	26	0.009	2.413 y		22	60.029	67.950	3.615	3.615	1.882	H1-1b*
536	M565	HSS2X2X4	0.262	2.443	22	0.005	0.000 z		22	59.844	67.950	3.615	3.615	1.379	H1-1a
537	M566	HSS2X2X4	0.058	0.000	22	0.016	2.413 y		22	60.028	67.950	3.615	3.615	2.184	H1-1b
538	M567	HSS2X2X4	0.257	2.443	20	0.005	0.000 z		20	59.844	67.950	3.615	3.615	1.374	H1-1a
539	M568	HSS2X2X4	0.057	0.000	20	0.016	2.413 y		22	60.029	67.950	3.615	3.615	2.186	H1-1b
540	M569	HSS2X2X4	0.153	0.000	24	0.009	2.413 y		20	60.029	67.950	3.615	3.615	1.884	H1-1b*
541	M570	HSS2X2X4	0.098	0.000	22	0.009	2.443 y		20	59.843	67.950	3.615	3.615	1.571	H1-1b*

45. Gateway Arch
- A. Loading
 - B. Wind Loading
 - C. Pilaster Wall + Foundation Design
 - D. FEA Model Definition Sketches
 - E. Envelope Member Forces
 - F. Envelope Reactions
 - G. Envelope Code Check
 - H. Baseplate + Anchor Bolts
-



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Geotechnical	Date:	3/31/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: Sports park main entrance arches

Location:

Design name: OSE Main Entrance Arches

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19

Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place

Material: AB

Diameter (inch): 0.875

Effective Embedment depth, h_{ef} (inch): 6.000

Anchor category: -

Anchor ductility: Yes

h_{min} (inch): 8.38

C_{min} (inch): 5.25

S_{min} (inch): 5.25

Base Material

Concrete: Normal-weight

Concrete thickness, h (inch): 12.00

State: Uncracked

Compressive strength, f'_c (psi): 4000

$\Psi_{c,v}$: 1.4

Reinforcement condition: A tension, A shear

Supplemental edge reinforcement: No

Reinforcement provided at corners: No

Ignore concrete breakout in tension: No

Ignore concrete breakout in shear: No

Ignore 6d requirement: No

Build-up grout pad: Yes

Base Plate

Length x Width x Thickness (inch): 32.00 x 32.00 x 1.00

Yield stress: 50000 psi

Profile type/size: 16X16X5/8

Recommended Anchor

Anchor Name: PAB Pre-Assembled Anchor Bolt - PAB7 (7/8"Ø)





Anchor Designer™ for Concrete Software

Version 3.3.2501.2

Company:	GMU Geotechnical	Date:	3/31/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 47600

V_{uax} [lb]: 0

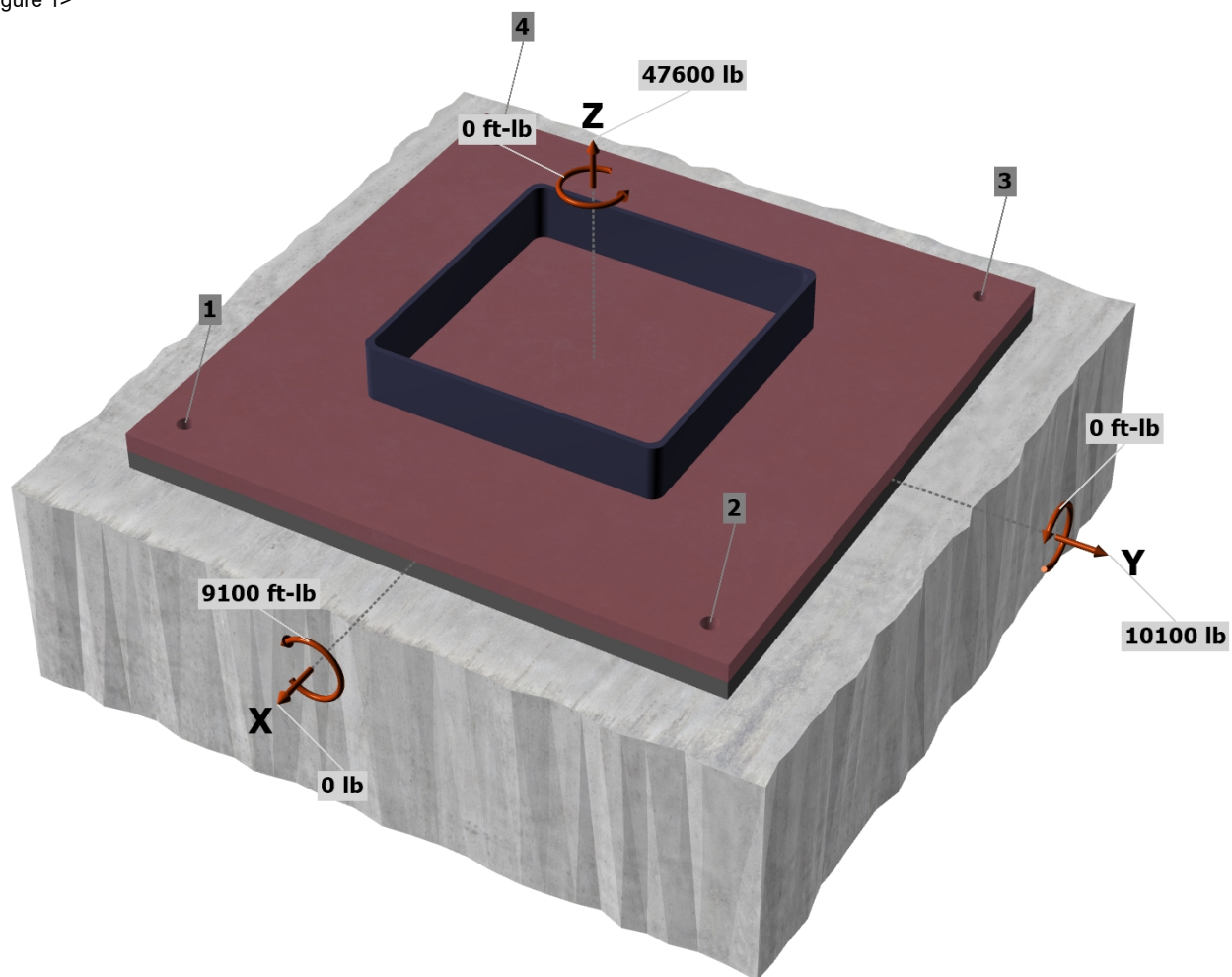
V_{uay} [lb]: 10100

M_{ux} [ft-lb]: 9100

M_{uy} [ft-lb]: 0

M_{uz} [ft-lb]: 0

<Figure 1>



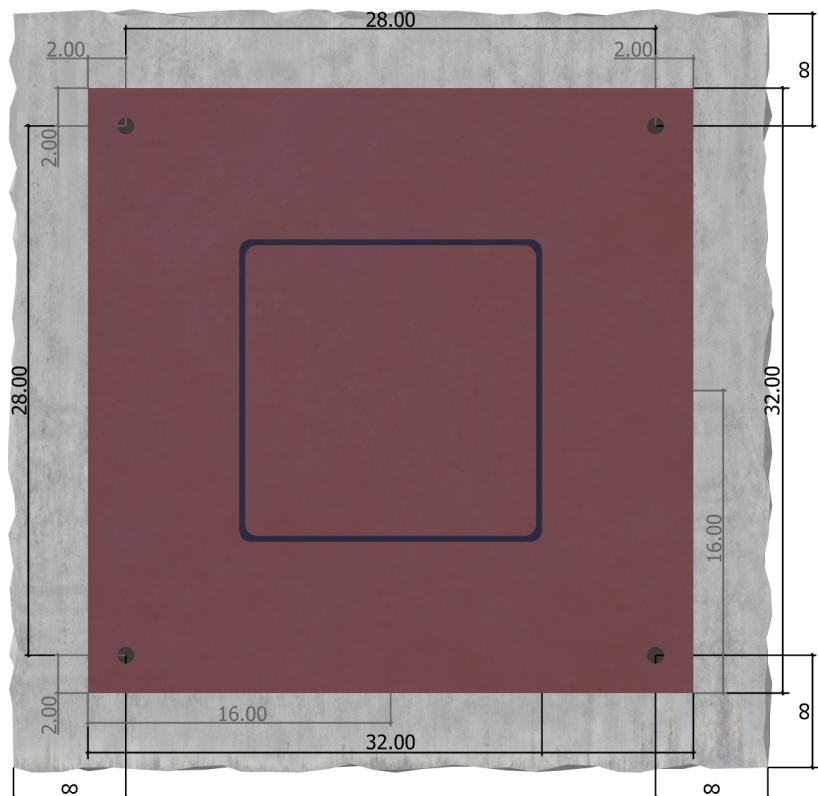
Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Company:	GMU Geotechnical	Date:	3/31/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>

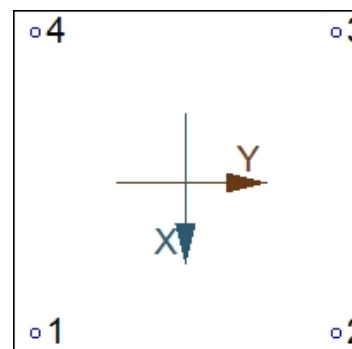


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	9949.9	0.0	2525.0	2525.0
2	13850.1	0.0	2525.0	2525.0
3	13850.1	0.0	2525.0	2525.0
4	9949.9	0.0	2525.0	2525.0
Sum	47600.0	0.0	10100.0	10100.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 47600
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 2.29
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>





**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Geotechnical	Date:	3/31/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
26795	0.75	20096

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \text{ (Eq. 17.6.2.2.1)}$$

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
24.0	1.00	4000	6.000	22308

$$\phi N_{cbg} = \phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b \text{ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)}$$

A_{Nc} (in ²)	A_{Nco} (in ²)	$c_{a,min}$ (in)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
1670.77	324.00	-	0.797	1.000	1.25	1.000	22308	0.75	85940

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$$\phi N_{pn} = \phi \Psi_{c,P} N_p = \phi \Psi_{c,P} 8 A_{brg} f'_c \text{ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)}$$

$\Psi_{c,P}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	4.07	4000	0.70	127478



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Geotechnical	Date:	3/31/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
16080	0.8	0.65	8362

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cp} = \phi k_{cp} N_{cbg} = \phi k_{cp} (A_{Nc} / A_{Nco}) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1b)

k_{cp}	A_{Nc} (in ²)	A_{Nco} (in ²)	$\psi_{ec,N}$	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	1670.77	324.00	1.000	1.000	1.250	1.000	22308	0.70	201315

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status	
Steel	13850	20096	0.69	Pass (Governs)	
Concrete breakout	47600	85940	0.55	Pass	
Pullout	13850	127478	0.11	Pass	
Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status	
Steel	2525	8362	0.30	Pass (Governs)	
Pryout	10100	201315	0.05	Pass	
Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Utilization Ratio	Permissible	Status
Sec. R17.8	0.54	0.14	67.4%	1.0	Pass

PAB7 (7/8"Ø) with hef = 6.000 inch meets the selected design criteria.



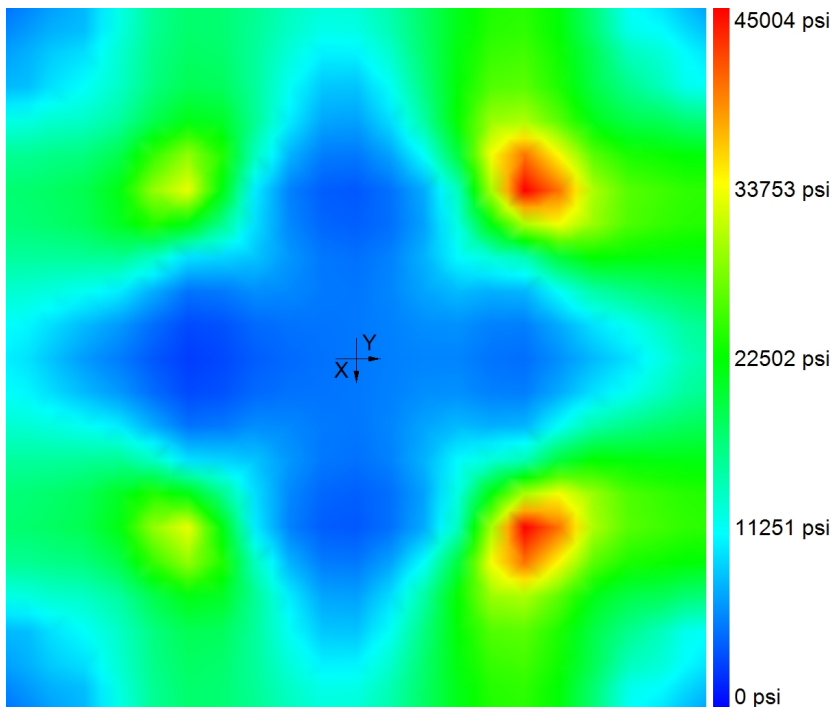
Company:	GMU Geotechnical	Date:	3/31/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel	50000 psi
Maximum stress	45004 psi
Calculated plate thickness	1.087 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{ top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{ top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{ top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$

12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.

46. A11 Field Identity Pylon, (W-04)

A11 Field Identity Pylon / Signage Drawing W-04

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $20 \text{ psf} \times 2.5' \times 7.5' = 0.375 \text{ kips}$

$W = 0.375 \text{ kips}$

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 0.375 \text{ kips} = 0.405 \text{ kips}$

Applied Moment to footing, (seismic) = $0.405 \times 3.75 = 1.52 \text{ k-ft}$

Post Moment = $1.52 \text{ k-ft} / 2 = 0.76 \text{ k-ft}$

Wind Load, (ASCE 7-22)

Total Wind Load = $30 \text{ psf} \times 2.5' \times 7.5' = 0.563 \text{ kips}$

Applied Moment, (wind) = $0.563 \text{ kips} \times 3.75' = 2.11 \text{ k-ft}$, $0.844 \text{ k-ft} / \text{ft width}$

(Wind Controls)

Column Load: 2.11 k-ft (conservative)

Post Moment = $2.11 \text{ k-ft} / 2 = 1.055 \text{ k-ft}$

Column Wind Load:

$1.055 \text{ k-ft} / 7.5 \text{ ft} = 0.141 \text{ kips @ } 7.5 \text{ ft}$

Column Seismic Load:

$0.76 \text{ k-ft} / 7.5 \text{ ft} = 0.01 \text{ kips @ } 7.5 \text{ ft}$

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A11 Slgn Foundation

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.50 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2,000.0 ksf
Soil Density	=	120.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	3.0 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.50 ft

Increases based on footing plan dimension

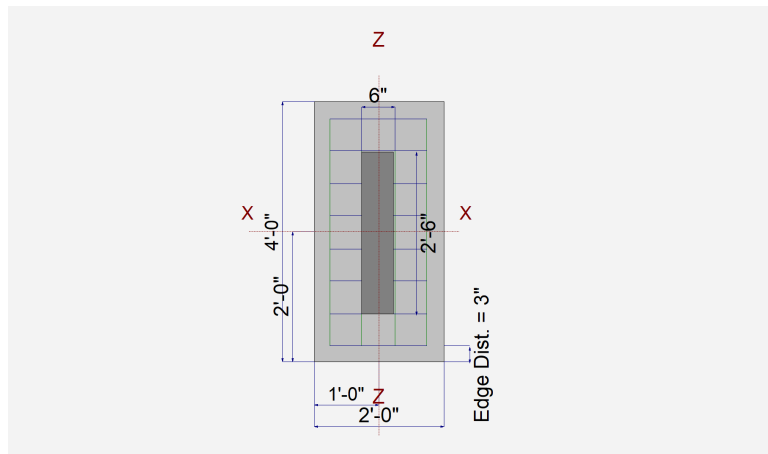
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	6.0 in
pz : parallel to Z-Z Axis	=	30.0 in
Height	=	18.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



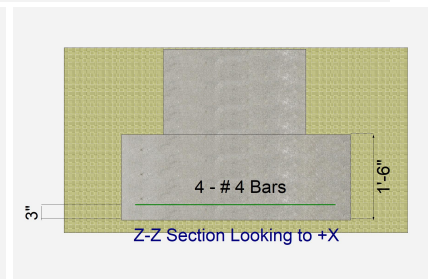
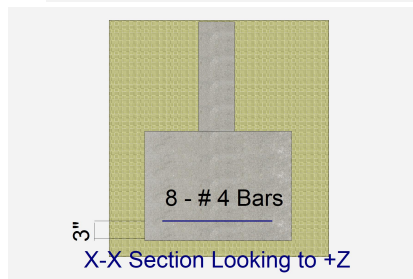
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	8
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	4
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	Bars along X-X Axis	
# Bars required within zone	66.7 %	
# Bars required on each side of zone	33.3 %	



Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	0.3750						k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=				2.110	1.520		k-ft
V-x	=				0.0	0.0		k
V-z	=							k

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A11 Slgn Foundation

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.2573	Soil Bearing	0.9007 ksf	3.50 ksf	+0.60D+0.60W about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.578	Overturning - Z-Z	1.266 k-ft	1.998 k-ft	+0.60D+0.60W
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.009060	Z Flexure (+X)	0.2404 k-ft/ft	26.529 k-ft/ft	+0.90D+W
PASS	0.005028	Z Flexure (-X)	0.1334 k-ft/ft	26.529 k-ft/ft	+1.20D+W
PASS	0.000278	X Flexure (+Z)	0.007382 k-ft/ft	26.529 k-ft/ft	+1.40D
PASS	0.000278	X Flexure (-Z)	0.007382 k-ft/ft	26.529 k-ft/ft	+1.40D
PASS	n/a	1-way Shear (+X)	0.0 psi	52.523 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	52.523 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	52.523 psi	n/a
PASS	n/a	2-way Punching	0.1058 psi	52.523 psi	+0.90D+W



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	3.50	n/a	0.0	0.4163	0.4163	n/a	n/a	0.119
X-X, +D+0.60W	3.50	n/a	0.0	0.4163	0.4163	n/a	n/a	0.119
X-X, +D+0.450W	3.50	n/a	0.0	0.4163	0.4163	n/a	n/a	0.119
X-X, +0.60D+0.60W	3.50	n/a	0.0	0.2498	0.2498	n/a	n/a	0.071
X-X, +D+0.70E	3.50	n/a	0.0	0.4163	0.4163	n/a	n/a	0.119
X-X, +D+0.5250E	3.50	n/a	0.0	0.4163	0.4163	n/a	n/a	0.119
X-X, +0.60D+0.70E	3.50	n/a	0.0	0.2498	0.2498	n/a	n/a	0.071
Z-Z, D Only	3.50	0.0	n/a	n/a	n/a	0.4163	0.4163	0.119
Z-Z, +D+0.60W	3.50	4.562	n/a	n/a	n/a	0.0	0.8906	0.255
Z-Z, +D+0.450W	3.50	3.422	n/a	n/a	n/a	0.06375	0.7688	0.220
Z-Z, +0.60D+0.60W	3.50	7.604	n/a	n/a	n/a	0.0	0.9007	0.257
Z-Z, +D+0.70E	3.50	3.834	n/a	n/a	n/a	0.02124	0.8113	0.232
Z-Z, +D+0.5250E	3.50	2.876	n/a	n/a	n/a	0.120	0.7125	0.204
Z-Z, +0.60D+0.70E	3.50	6.390	n/a	n/a	n/a	0.0	0.7073	0.202

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	None	0.0 k-ft	Infinity	OK
X-X, +D+0.5250E	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	1.266 k-ft	3.330 k-ft	2.630	OK
Z-Z, +D+0.450W	0.9495 k-ft	3.330 k-ft	3.507	OK
Z-Z, +0.60D+0.60W	1.266 k-ft	1.998 k-ft	1.578	OK
Z-Z, +D+0.70E	1.064 k-ft	3.330 k-ft	3.130	OK
Z-Z, +D+0.5250E	0.7980 k-ft	3.330 k-ft	4.173	OK
Z-Z, +0.60D+0.70E	1.064 k-ft	1.998 k-ft	1.878	OK

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A11 Slgn Foundation

Sliding Stability

All units k

Force Application Axis
Load Combination...

Sliding Force

Resisting Force

Stability Ratio

Status

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.007382	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.40D	0.007382	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D	0.006327	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D	0.006327	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+0.50W	0.006327	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+0.50W	0.006327	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+W	0.006327	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+W	0.006327	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+W	0.004745	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+W	0.004745	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+W	0.004745	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+E	0.006327	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+E	0.006327	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+E	0.004745	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+E	0.004745	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.40D	0.007382	-X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.40D	0.007382	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D	0.006327	-X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D	0.006327	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+0.50W	0.07711	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+0.50W	0.08976	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+W	0.1334	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+W	0.1926	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+W	0.1006	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+W	0.2404	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+E	0.1124	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+E	0.1275	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+E	0.09924	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+E	0.1362	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.02 psi	140.87psi	0.00013	OK
+1.20D	0.02 psi	140.87psi	0.000112	OK
+1.20D+0.50W	0.02 psi	140.87psi	0.000112	OK
+1.20D+W	0.06 psi	140.87psi	0.000401	OK
+0.90D+W	0.11 psi	140.87psi	0.000751	OK
+1.20D+E	0.02 psi	140.87psi	0.000156	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A11 Slgn Foundation

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D+E	0.04 psi	140.87psi	0.000268	OK

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A11 Field Identity Pylon - Col - HSS3x3x1/4

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : **HSS3x3x1/4**

Analysis Method : Load Resistance Factor

Steel Stress Grade : A500, Grade B, Fy = 46 ksi, Carbon Steel

Fy : Steel Yield 46.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height

7.50 ft

Top & Bottom Fixity

Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 7.50 ft, K = 1.20

Unbraced Length for buckling ABOUT Y-Y Axis = 7.50 ft, K = 1.20

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 66.075 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 7.50 ft, D = 3.50 k

BENDING LOADS . . .

Lat. Point Load at 7.50 ft creating Mx-x, W = 0.1410, E = 0.010 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1636** : 1
Load Combination +1.20D+W
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu 4.279 k
0.9 * Pn 53.435 k
Mu-x -1.058 k-ft
0.9 * Mn-x : 8.556 k-ft
Mu-y 0.0 k-ft
0.9 * Mn-y : 8.556 k-ft

Maximum Load Reactions . .
Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.1410 k

Maximum Load Deflections . . .
Along Y-Y 0.3892 in at 7.50ft above base
for load combination :W Only
Along X-X 0.0 in at 0.0ft above base
for load combination :

PASS Maximum Shear Stress Ratio = **0.006353** : 1
Load Combination +1.20D+W
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 0.1410 k
Vn * Phi : Allowable 22.196 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios			
	Stress Ratio	Status	Location						Stress Ratio	Status	Location	
+1.40D	0.093	PASS	0.00 ft		1.67	1.00	97.30	97.30	0.000	PASS	0.00 ft	
+1.20D	0.080	PASS	0.00 ft		1.67	1.00	97.30	97.30	0.000	PASS	0.00 ft	
+1.20D+0.50W	0.102	PASS	0.00 ft		1.67	1.00	97.30	97.30	0.003	PASS	0.00 ft	
+1.20D+W	0.164	PASS	0.00 ft		1.67	1.00	97.30	97.30	0.006	PASS	0.00 ft	
+0.90D+W	0.154	PASS	0.00 ft		1.67	1.00	97.30	97.30	0.006	PASS	0.00 ft	
+1.20D+E	0.080	PASS	7.50 ft		1.67	1.00	97.30	97.30	0.000	PASS	0.00 ft	
+0.90D+E	0.060	PASS	7.50 ft		1.67	1.00	97.30	97.30	0.000	PASS	0.00 ft	

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
	@ Base		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	3.566										
+D+0.60W	3.566					0.085		-0.635			
+D+0.450W	3.566					0.063		-0.476			
+0.60D+0.60W	2.140					0.085		-0.635			
+D+0.70E	3.566					0.007		-0.053			
+D+0.5250E	3.566					0.005		-0.039			
+0.60D+0.70E	2.140					0.007		-0.053			

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A11 Field Identity Pylon - Col - HSS3x3x1/4

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
W Only				0.141	-1.058		
E Only				0.010	-0.075		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	3.566						
"	Minimum				0.141	-1.058		
Reaction, X-X Axis Base	Maximum	3.566						
"	Minimum	3.566						
Reaction, Y-Y Axis Base	Maximum				0.141	-1.058		
"	Minimum	3.566						
Reaction, X-X Axis Top	Maximum	3.566						
"	Minimum	3.566						
Reaction, Y-Y Axis Top	Maximum	3.566						
"	Minimum	3.566						
Moment, X-X Axis Base	Maximum	3.566						
"	Minimum		-1.058		0.141	-1.058		
Moment, Y-Y Axis Base	Maximum	3.566						
"	Minimum	3.566						
Moment, X-X Axis Top	Maximum	3.566						
"	Minimum	3.566						
Moment, Y-Y Axis Top	Maximum	3.566						
"	Minimum	3.566						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.234 in	7.500 ft
+D+0.450W	0.0000 in	0.000 ft	0.175 in	7.500 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.234 in	7.500 ft
+D+0.70E	0.0000 in	0.000 ft	0.019 in	7.500 ft
+D+0.5250E	0.0000 in	0.000 ft	0.014 in	7.500 ft
+0.60D+0.70E	0.0000 in	0.000 ft	0.019 in	7.500 ft
W Only	0.0000 in	0.000 ft	0.389 in	7.500 ft
E Only	0.0000 in	0.000 ft	0.027 in	7.450 ft

Steel Section Properties : HSS3x3x1/4

Depth	=	3.000 in	I xx	=	3.02 in^4	J	=	5.080 in^4
Design Thick	=	0.233 in	S xx	=	2.01 in^3			
Width	=	3.000 in	R xx	=	1.110 in			
Wall Thick	=	0.250 in	Zx	=	2.480 in^3			
Area	=	2.440 in^2	I yy	=	3.020 in^4	C	=	3.520 in^3
Weight	=	8.810 plf	S yy	=	2.010 in^3			
			R yy	=	1.110 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

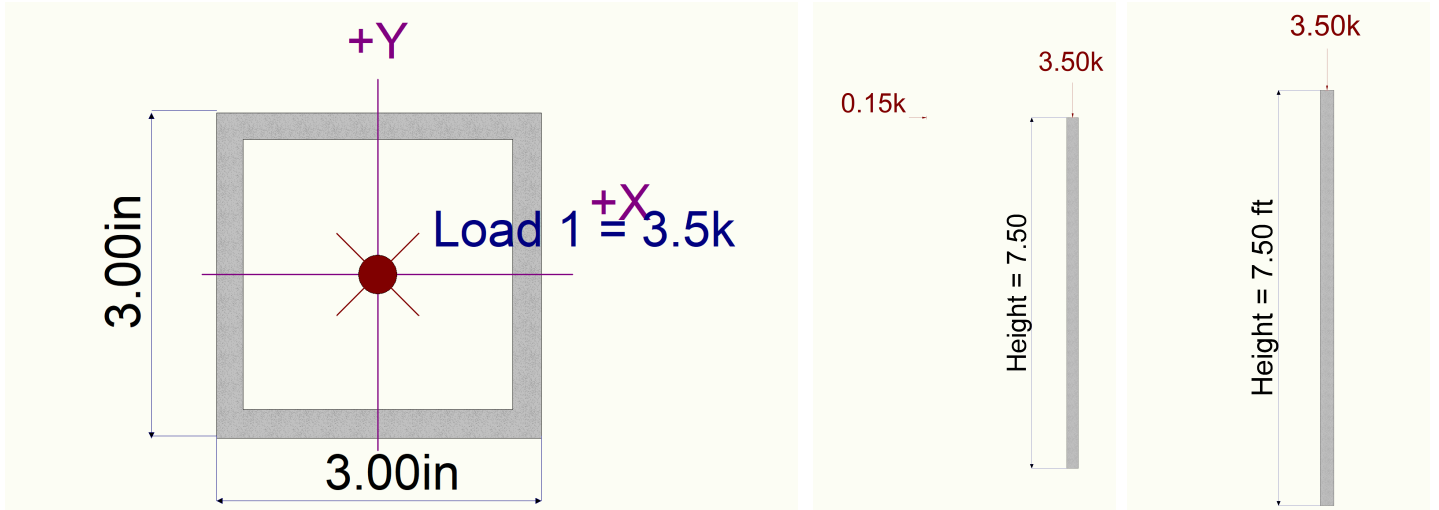
LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: A11 Field Identity Pylon - Col - HSS3x3x1/4

Sketches



47. B01 Vehicle Direction Pylon, (W-06)

B01 Vehicle Direction Pylon / Signage Drawing W-06

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $20 \text{ psf} \times 3.5' \times 10' = 0.7 \text{ kips}$

$W = 0.7 \text{ kips}$

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 0.7 \text{ kips} = 0.756 \text{ kips}$

Applied Moment to footing, (seismic) = $0.756 \times 5' = 3.78 \text{ k-ft}$

Post Moment = $3.78 \text{ k-ft} / 2 = 1.89 \text{ k-ft}$

Wind Load, (ASCE 7-22)

Total Wind Load = $30 \text{ psf} \times 3.5' \times 10' = 1.05 \text{ kips}$

Applied Moment, (wind) = $1.05 \text{ kips} \times 5' = 5.25 \text{ k-ft}$

(Wind Controls)

Column Load = 5.25 k-ft

Post Moment = $5.25 \text{ k-ft} / 2 = 2.625 \text{ k-ft}$

Column Wind Load:

$2.625 \text{ k-ft} / 10 \text{ ft} = 0.2625 \text{ kips @ } 10 \text{ ft}$

Column Seismic Load:

$1.89 \text{ k-ft} / 10 \text{ ft} = 0.189 \text{ kips @ } 10 \text{ ft}$

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B01 Sign Foundation

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.50 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2,000.0 ksf
Soil Density	=	120.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	3.0 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.50 ft

Increases based on footing plan dimension

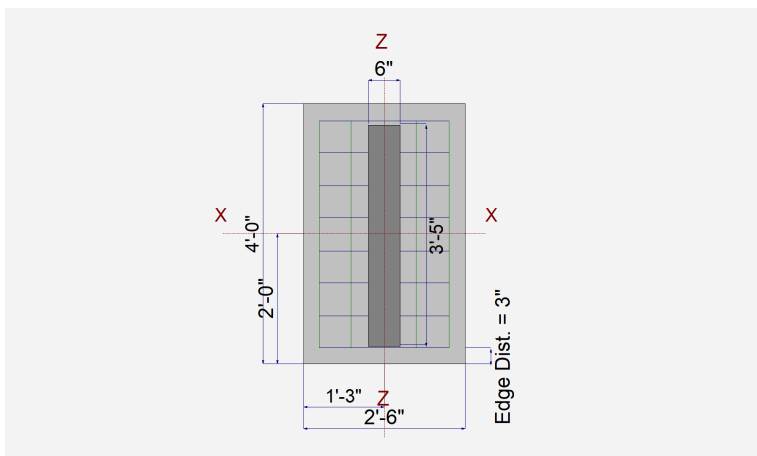
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	2.50 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	6.0 in
pz : parallel to Z-Z Axis	=	41.0 in
Height	=	18.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



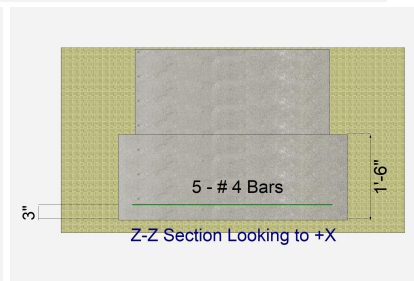
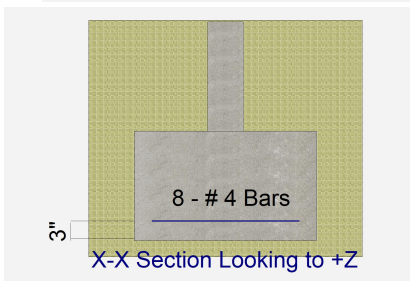
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	8
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	5
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	Bars along X-X Axis	
# Bars required within zone	76.9 %	
# Bars required on each side of zone	23.1 %	



Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	0.70						k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=				2.625	1.890		k-ft
V-x	=							k
V-z	=							k

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B01 Sign Foundation

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.2317	Soil Bearing	0.8110 ksf	3.50 ksf	+D+0.60W about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	2.080	Overturning - Z-Z	1.575 k-ft	3.276 k-ft	+0.60D+0.60W
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.01042	Z Flexure (+X)	0.2764 k-ft/ft	26.529 k-ft/ft	+0.90D+W
PASS	0.007628	Z Flexure (-X)	0.2024 k-ft/ft	26.529 k-ft/ft	+1.20D+W
PASS	.0000880	X Flexure (+Z)	0.002334 k-ft/ft	26.529 k-ft/ft	+1.40D
PASS	.0000880	X Flexure (-Z)	0.002334 k-ft/ft	26.529 k-ft/ft	+1.40D
PASS	n/a	1-way Shear (+X)	0.0 psi	52.523 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	52.523 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	52.523 psi	n/a
PASS	n/a	2-way Punching	0.08381 psi	52.523 psi	+1.40D



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	3.50	n/a	0.0	0.4368	0.4368	n/a	n/a	0.125
X-X, +D+0.60W	3.50	n/a	0.0	0.4368	0.4368	n/a	n/a	0.125
X-X, +D+0.450W	3.50	n/a	0.0	0.4368	0.4368	n/a	n/a	0.125
X-X, +0.60D+0.60W	3.50	n/a	0.0	0.2621	0.2621	n/a	n/a	0.075
X-X, +D+0.70E	3.50	n/a	0.0	0.4368	0.4368	n/a	n/a	0.125
X-X, +D+0.5250E	3.50	n/a	0.0	0.4368	0.4368	n/a	n/a	0.125
X-X, +0.60D+0.70E	3.50	n/a	0.0	0.2621	0.2621	n/a	n/a	0.075
Z-Z, D Only	3.50	0.0	n/a	n/a	n/a	0.4368	0.4368	0.125
Z-Z, +D+0.60W	3.50	4.327	n/a	n/a	n/a	0.06253	0.8110	0.232
Z-Z, +D+0.450W	3.50	3.246	n/a	n/a	n/a	0.1561	0.7174	0.205
Z-Z, +0.60D+0.60W	3.50	7.212	n/a	n/a	n/a	0.0	0.6687	0.191
Z-Z, +D+0.70E	3.50	3.635	n/a	n/a	n/a	0.1224	0.7511	0.215
Z-Z, +D+0.5250E	3.50	2.726	n/a	n/a	n/a	0.2010	0.6725	0.192
Z-Z, +0.60D+0.70E	3.50	6.058	n/a	n/a	n/a	0.0	0.5829	0.167

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	None	0.0 k-ft	Infinity	OK
X-X, +D+0.5250E	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	1.575 k-ft	5.459 k-ft	3.466	OK
Z-Z, +D+0.450W	1.181 k-ft	5.459 k-ft	4.622	OK
Z-Z, +0.60D+0.60W	1.575 k-ft	3.276 k-ft	2.080	OK
Z-Z, +D+0.70E	1.323 k-ft	5.459 k-ft	4.127	OK
Z-Z, +D+0.5250E	0.9923 k-ft	5.459 k-ft	5.502	OK
Z-Z, +0.60D+0.70E	1.323 k-ft	3.276 k-ft	2.476	OK

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B01 Sign Foundation

Sliding Stability

All units k

Force Application Axis
Load Combination...

Sliding Force

Resisting Force

Stability Ratio

Status

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.002334	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.40D	0.002334	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D	0.0020	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D	0.0020	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+0.50W	0.0020	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+0.50W	0.0020	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+W	0.0020	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+W	0.0020	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+W	0.00150	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+W	0.00150	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+E	0.0020	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+E	0.0020	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+E	0.00150	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+E	0.00150	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.40D	0.02748	-X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.40D	0.02748	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D	0.02355	-X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D	0.02355	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+0.50W	0.09194	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+0.50W	0.1390	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+W	0.2024	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+W	0.2580	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+W	0.1773	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+W	0.2764	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+E	0.1428	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+E	0.1899	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+E	0.1465	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+E	0.1855	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.08 psi	130.07 psi	0.000644	OK
+1.20D	0.08 psi	130.07 psi	0.000644	OK
+1.20D+0.50W	0.08 psi	130.07 psi	0.000644	OK
+1.20D+W	0.08 psi	130.07 psi	0.000644	OK
+0.90D+W	0.08 psi	130.07 psi	0.000644	OK
+1.20D+E	0.08 psi	130.07 psi	0.000644	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B01 Sign Foundation

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D+E	0.08 psi	130.07 psi	0.000644	OK

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B01 Vehicle Direction Pylon - Col - HSS3x3x1/4

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name :	HSS3x3x1/4	Overall Column Height	10.0 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade	, A500, Grade B, Fy = 46 ksi, Carbon Steel	Brace condition :	
Fy : Steel Yield	46.0 ksi	Unbraced Length for buckling ABOUT X-X Axis = 10.0 ft, K = 1.20	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 10.0 ft, K = 1.20	

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 88.10 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 0.70 k

BENDING LOADS . . .

Lat. Point Load at 10.0 ft creating Mx-x, W = 0.2625, E = 0.1890 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.3212 : 1	Maximum Load Reactions . .	
Load Combination	+1.20D+W	Top along X-X	0.0 k
Location of max.above base	0.0 ft	Bottom along X-X	0.0 k
At maximum location values are . . .		Top along Y-Y	0.0 k
Pu	0.9457 k	Bottom along Y-Y	0.2625 k
0.9 * Pn	32.753 k	Maximum Load Deflections . . .	
Mu-x	-2.625 k-ft	Along Y-Y	1.718 in at 10.0ft above base
0.9 * Mn-x :	8.556 k-ft	for load combination :W Only	
Mu-y	0.0 k-ft	Along X-X	0.0 in at 0.0ft above base
0.9 * Mn-y :	8.556 k-ft	for load combination :	
PASS Maximum Shear Stress Ratio	0.01183 : 1		
Load Combination	+1.20D+W		
Location of max.above base	0.0 ft		
At maximum location values are . . .			
Vu : Applied	0.2625 k		
Vn * Phi : Allowable	22.196 k		

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Maximum Shear Ratios					
	Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Stress Ratio	Status	Location
+1.40D	0.034	PASS	0.00 ft	1.67	1.00	129.73	129.73	0.000	PASS	0.00 ft
+1.20D	0.029	PASS	0.00 ft	1.67	1.00	129.73	129.73	0.000	PASS	0.00 ft
+1.20D+0.50W	0.168	PASS	0.00 ft	1.67	1.00	129.73	129.73	0.006	PASS	0.00 ft
+1.20D+W	0.321	PASS	0.00 ft	1.67	1.00	129.73	129.73	0.012	PASS	0.00 ft
+0.90D+W	0.318	PASS	0.00 ft	1.67	1.00	129.73	129.73	0.012	PASS	0.00 ft
+1.20D+E	0.235	PASS	0.00 ft	1.67	1.00	129.73	129.73	0.009	PASS	0.00 ft
+0.90D+E	0.232	PASS	0.00 ft	1.67	1.00	129.73	129.73	0.009	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
D Only	0.788						
+D+0.60W	0.788			0.158	-1.575		
+D+0.450W	0.788			0.118	-1.181		
+0.60D+0.60W	0.473			0.158	-1.575		
+D+0.70E	0.788			0.132	-1.323		
+D+0.5250E	0.788			0.099	-0.992		
+0.60D+0.70E	0.473			0.132	-1.323		



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B01 Vehicle Direction Pylon - Col - HSS3x3x1/4

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
W Only				0.263	-2.625		
E Only				0.189	-1.890		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	0.788						
"	Minimum				0.263	-2.625		
Reaction, X-X Axis Base	Maximum	0.788						
"	Minimum	0.788						
Reaction, Y-Y Axis Base	Maximum				0.263	-2.625		
"	Minimum	0.788						
Reaction, X-X Axis Top	Maximum	0.788						
"	Minimum	0.788						
Reaction, Y-Y Axis Top	Maximum	0.788						
"	Minimum	0.788						
Moment, X-X Axis Base	Maximum	0.788						
"	Minimum		-2.625		0.263	-2.625		
Moment, Y-Y Axis Base	Maximum	0.788						
"	Minimum	0.788						
Moment, X-X Axis Top	Maximum	0.788						
"	Minimum	0.788						
Moment, Y-Y Axis Top	Maximum	0.788						
"	Minimum	0.788						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	1.031 in	10.000 ft
+D+0.450W	0.0000 in	0.000 ft	0.773 in	10.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	1.031 in	10.000 ft
+D+0.70E	0.0000 in	0.000 ft	0.866 in	10.000 ft
+D+0.5250E	0.0000 in	0.000 ft	0.649 in	10.000 ft
+0.60D+0.70E	0.0000 in	0.000 ft	0.866 in	10.000 ft
W Only	0.0000 in	0.000 ft	1.718 in	10.000 ft
E Only	0.0000 in	0.000 ft	1.224 in	9.933 ft

Steel Section Properties : HSS3x3x1/4

Depth	=	3.000 in	I xx	=	3.02 in^4	J	=	5.080 in^4
Design Thick	=	0.233 in	S xx	=	2.01 in^3			
Width	=	3.000 in	R xx	=	1.110 in			
Wall Thick	=	0.250 in	Zx	=	2.480 in^3			
Area	=	2.440 in^2	I yy	=	3.020 in^4	C	=	3.520 in^3
Weight	=	8.810 plf	S yy	=	2.010 in^3			
			R yy	=	1.110 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

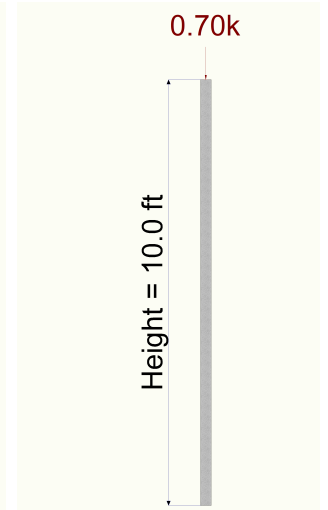
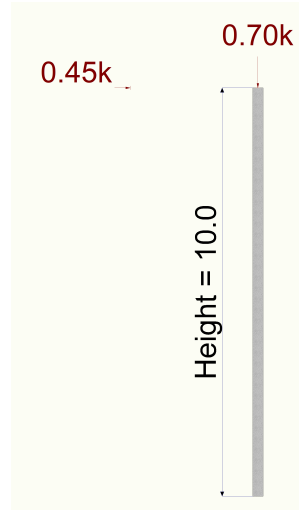
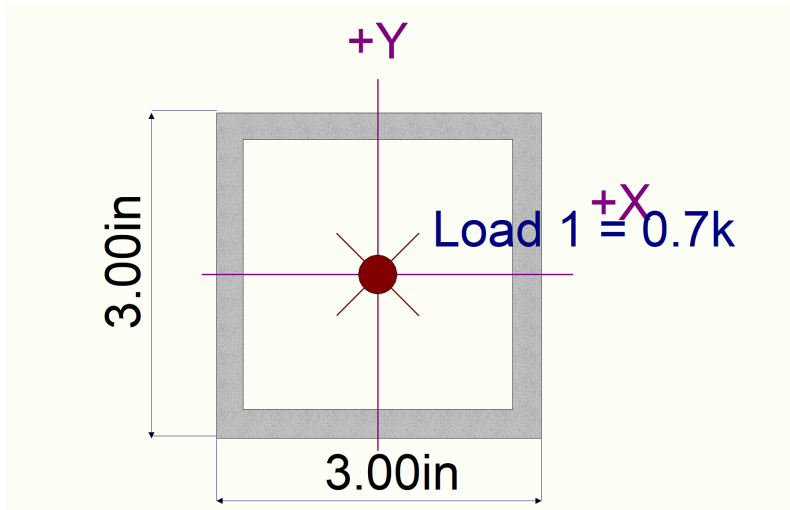
LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B01 Vehicle Direction Pylon - Col - HSS3x3x1/4

Sketches



48. B03 Pedestrian Direction Pylon, (W-06)

B03 Pedestrian Direction Pylon / Signage Drawing W-06

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $20 \text{ psf} \times 2.5' \times 7.5' = 0.375 \text{ kips}$

$W = 0.375 \text{ kips}$

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 0.375 \text{ kips} = 0.405 \text{ kips}$

Applied Moment to footing, (seismic) = $0.405 \times 3.75 = 1.52 \text{ k-ft}$

Post Moment = $1.52 \text{ k-ft} / 2 = 0.76 \text{ k-ft}$

Wind Load, (ASCE 7-22)

Total Wind Load = $30 \text{ psf} \times 2.5' \times 7.5' = 0.563 \text{ kips}$

Applied Moment, (wind) = $0.563 \text{ kips} \times 3.75' = 2.11 \text{ k-ft}$, $0.844 \text{ k-ft} / \text{ft width}$

(Wind Controls)

Column Load: 2.11 k-ft (conservative)

Post Moment = $2.11 \text{ k-ft} / 2 = 1.055 \text{ k-ft}$

Column Wind Load:

$1.055 \text{ k-ft} / 7.5 \text{ ft} = 0.141 \text{ kips @ } 7.5 \text{ ft}$

Column Seismic Load:

$0.76 \text{ k-ft} / 7.5 \text{ ft} = 0.101 \text{ kips @ } 7.5 \text{ ft}$

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B03 Sign Foundation

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.50 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2,000.0 ksf
Soil Density	=	120.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	3.0 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.50 ft

Increases based on footing plan dimension

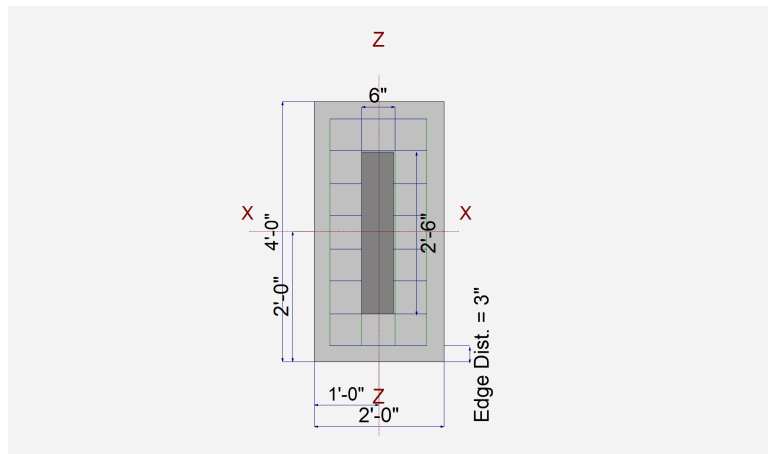
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	6.0 in
pz : parallel to Z-Z Axis	=	30.0 in
Height	=	18.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



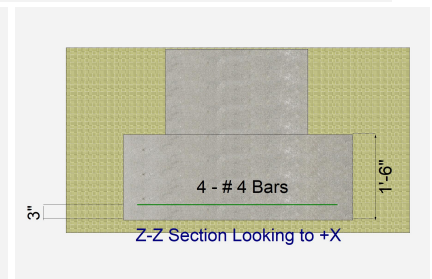
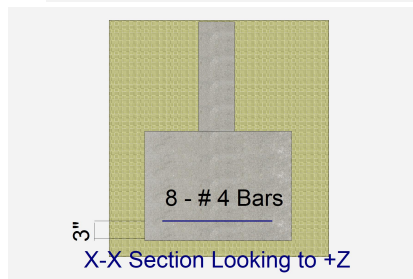
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	8
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	4
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	Bars along X-X Axis	
# Bars required within zone	66.7 %	
# Bars required on each side of zone	33.3 %	



Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	0.3750						k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=				2.110	1.520		k-ft
V-x	=				0.0	0.0		k
V-z	=							k

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B03 Sln Foundation

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.2573	Soil Bearing	0.9007 ksf	3.50 ksf	+0.60D+0.60W about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.578	Overturning - Z-Z	1.266 k-ft	1.998 k-ft	+0.60D+0.60W
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.009060	Z Flexure (+X)	0.2404 k-ft/ft	26.529 k-ft/ft	+0.90D+W
PASS	0.005028	Z Flexure (-X)	0.1334 k-ft/ft	26.529 k-ft/ft	+1.20D+W
PASS	0.000278	X Flexure (+Z)	0.007382 k-ft/ft	26.529 k-ft/ft	+1.40D
PASS	0.000278	X Flexure (-Z)	0.007382 k-ft/ft	26.529 k-ft/ft	+1.40D
PASS	n/a	1-way Shear (+X)	0.0 psi	52.523 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	52.523 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	52.523 psi	n/a
PASS	n/a	2-way Punching	0.1058 psi	52.523 psi	+0.90D+W



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	3.50	n/a	0.0	0.4163	0.4163	n/a	n/a	0.119
X-X, +D+0.60W	3.50	n/a	0.0	0.4163	0.4163	n/a	n/a	0.119
X-X, +D+0.450W	3.50	n/a	0.0	0.4163	0.4163	n/a	n/a	0.119
X-X, +0.60D+0.60W	3.50	n/a	0.0	0.2498	0.2498	n/a	n/a	0.071
X-X, +D+0.70E	3.50	n/a	0.0	0.4163	0.4163	n/a	n/a	0.119
X-X, +D+0.5250E	3.50	n/a	0.0	0.4163	0.4163	n/a	n/a	0.119
X-X, +0.60D+0.70E	3.50	n/a	0.0	0.2498	0.2498	n/a	n/a	0.071
Z-Z, D Only	3.50	0.0	n/a	n/a	n/a	0.4163	0.4163	0.119
Z-Z, +D+0.60W	3.50	4.562	n/a	n/a	n/a	0.0	0.8906	0.255
Z-Z, +D+0.450W	3.50	3.422	n/a	n/a	n/a	0.06375	0.7688	0.220
Z-Z, +0.60D+0.60W	3.50	7.604	n/a	n/a	n/a	0.0	0.9007	0.257
Z-Z, +D+0.70E	3.50	3.834	n/a	n/a	n/a	0.02124	0.8113	0.232
Z-Z, +D+0.5250E	3.50	2.876	n/a	n/a	n/a	0.120	0.7125	0.204
Z-Z, +0.60D+0.70E	3.50	6.390	n/a	n/a	n/a	0.0	0.7073	0.202

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	None	0.0 k-ft	Infinity	OK
X-X, +D+0.5250E	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	1.266 k-ft	3.330 k-ft	2.630	OK
Z-Z, +D+0.450W	0.9495 k-ft	3.330 k-ft	3.507	OK
Z-Z, +0.60D+0.60W	1.266 k-ft	1.998 k-ft	1.578	OK
Z-Z, +D+0.70E	1.064 k-ft	3.330 k-ft	3.130	OK
Z-Z, +D+0.5250E	0.7980 k-ft	3.330 k-ft	4.173	OK
Z-Z, +0.60D+0.70E	1.064 k-ft	1.998 k-ft	1.878	OK

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B03 Sln Foundation

Sliding Stability

All units k

Force Application Axis
Load Combination...

Sliding Force

Resisting Force

Stability Ratio

Status

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in ²	Gvrn. As in ²	Actual As in ²	Phi*Mn k-ft	Status
X-X, +1.40D	0.007382	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.40D	0.007382	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D	0.006327	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D	0.006327	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+0.50W	0.006327	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+0.50W	0.006327	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+W	0.006327	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+W	0.006327	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+W	0.004745	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+W	0.004745	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+E	0.006327	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+E	0.006327	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+E	0.004745	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+E	0.004745	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.40D	0.007382	-X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.40D	0.007382	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D	0.006327	-X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D	0.006327	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+0.50W	0.07711	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+0.50W	0.08976	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+W	0.1334	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+W	0.1926	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+W	0.1006	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+W	0.2404	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+E	0.1124	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+E	0.1275	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+E	0.09924	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+E	0.1362	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.02 psi	140.87psi	0.00013	OK
+1.20D	0.02 psi	140.87psi	0.000112	OK
+1.20D+0.50W	0.02 psi	140.87psi	0.000112	OK
+1.20D+W	0.06 psi	140.87psi	0.000401	OK
+0.90D+W	0.11 psi	140.87psi	0.000751	OK
+1.20D+E	0.02 psi	140.87psi	0.000156	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B03 Slgn Foundation

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D+E	0.04 psi	140.87psi	0.000268	OK

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B03 Field Identity Pylon - Col - HSS3x3x1/4

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name :	HSS3x3x1/4	Overall Column Height	7.50 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade	, A500, Grade B, Fy = 46 ksi, Carbon Steel	Brace condition :	
Fy : Steel Yield	46.0 ksi	Unbraced Length for buckling ABOUT X-X Axis = 7.50 ft, K = 1.20	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 7.50 ft, K = 1.20	

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 66.075 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 7.50 ft, D = 3.50 k

BENDING LOADS . . .

Lat. Point Load at 7.50 ft creating Mx-x, W = 0.1410, E = 0.010 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.1636 : 1
Load Combination	+1.20D+W
Location of max.above base	0.0 ft
At maximum location values are . . .	
Pu	4.279 k
0.9 * Pn	53.435 k
Mu-x	-1.058 k-ft
0.9 * Mn-x :	8.556 k-ft
Mu-y	0.0 k-ft
0.9 * Mn-y :	8.556 k-ft

Maximum Load Reactions . .	
Top along X-X	0.0 k
Bottom along X-X	0.0 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.1410 k

Maximum Load Deflections . . .	
Along Y-Y	0.3892 in at 7.50ft above base
for load combination :W Only	
Along X-X	0.0 in at 0.0ft above base
for load combination :	

PASS Maximum Shear Stress Ratio	0.006353 : 1
Load Combination	+1.20D+W
Location of max.above base	0.0 ft
At maximum location values are . . .	
Vu : Applied	0.1410 k
Vn * Phi : Allowable	22.196 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Maximum Shear Ratios					
	Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Stress Ratio	Status	Location
+1.40D	0.093	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.000	PASS	0.00 ft
+1.20D	0.080	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.000	PASS	0.00 ft
+1.20D+0.50W	0.102	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.003	PASS	0.00 ft
+1.20D+W	0.164	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.006	PASS	0.00 ft
+0.90D+W	0.154	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.006	PASS	0.00 ft
+1.20D+E	0.080	PASS	7.50 ft	1.67	1.00	97.30	97.30	0.000	PASS	0.00 ft
+0.90D+E	0.060	PASS	7.50 ft	1.67	1.00	97.30	97.30	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
D Only	3.566						
+D+0.60W	3.566			0.085	-0.635		
+D+0.450W	3.566			0.063	-0.476		
+0.60D+0.60W	2.140			0.085	-0.635		
+D+0.70E	3.566			0.007	-0.053		
+D+0.5250E	3.566			0.005	-0.039		
+0.60D+0.70E	2.140			0.007	-0.053		

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B03 Field Identity Pylon - Col - HSS3x3x1/4

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
W Only				0.141	-1.058		
E Only				0.010	-0.075		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	3.566						
"	Minimum				0.141	-1.058		
Reaction, X-X Axis Base	Maximum	3.566						
"	Minimum	3.566						
Reaction, Y-Y Axis Base	Maximum				0.141	-1.058		
"	Minimum	3.566						
Reaction, X-X Axis Top	Maximum	3.566						
"	Minimum	3.566						
Reaction, Y-Y Axis Top	Maximum	3.566						
"	Minimum	3.566						
Moment, X-X Axis Base	Maximum	3.566						
"	Minimum		-1.058		0.141	-1.058		
Moment, Y-Y Axis Base	Maximum	3.566						
"	Minimum	3.566						
Moment, X-X Axis Top	Maximum	3.566						
"	Minimum	3.566						
Moment, Y-Y Axis Top	Maximum	3.566						
"	Minimum	3.566						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.234 in	7.500 ft
+D+0.450W	0.0000 in	0.000 ft	0.175 in	7.500 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.234 in	7.500 ft
+D+0.70E	0.0000 in	0.000 ft	0.019 in	7.500 ft
+D+0.5250E	0.0000 in	0.000 ft	0.014 in	7.500 ft
+0.60D+0.70E	0.0000 in	0.000 ft	0.019 in	7.500 ft
W Only	0.0000 in	0.000 ft	0.389 in	7.500 ft
E Only	0.0000 in	0.000 ft	0.027 in	7.450 ft

Steel Section Properties : HSS3x3x1/4

Depth	=	3.000 in	I xx	=	3.02 in^4	J	=	5.080 in^4
Design Thick	=	0.233 in	S xx	=	2.01 in^3			
Width	=	3.000 in	R xx	=	1.110 in			
Wall Thick	=	0.250 in	Zx	=	2.480 in^3			
Area	=	2.440 in^2	I yy	=	3.020 in^4	C	=	3.520 in^3
Weight	=	8.810 plf	S yy	=	2.010 in^3			
			R yy	=	1.110 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

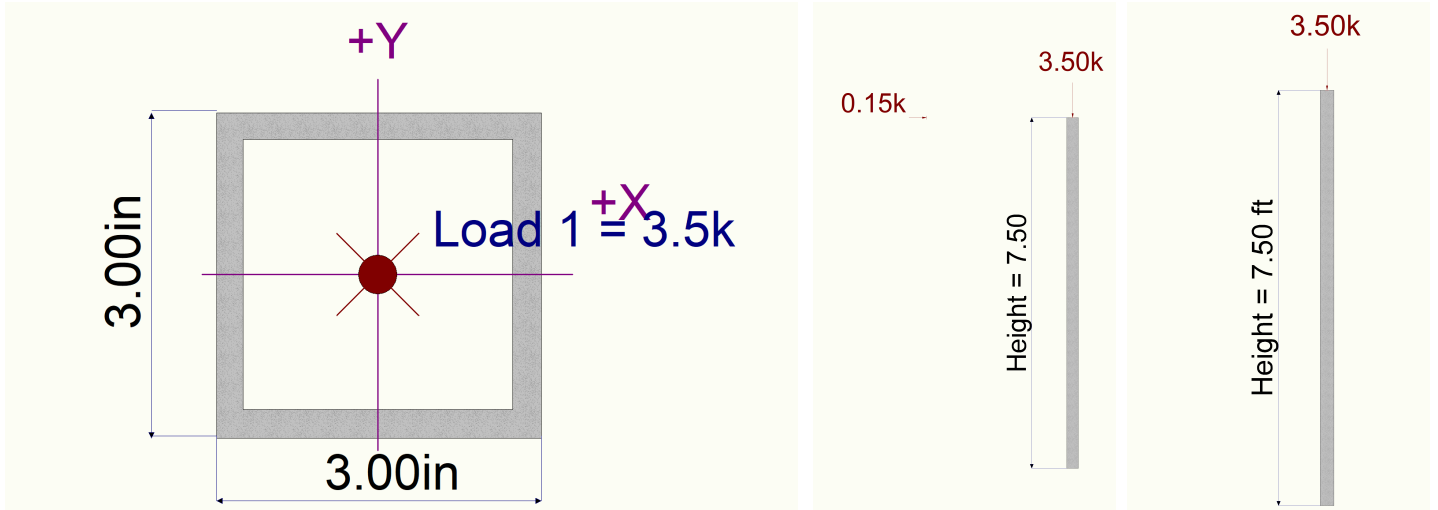
LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B03 Field Identity Pylon - Col - HSS3x3x1/4

Sketches



49. B04 Pedestrian Direction Pole, (W-07)

B04 Pedestrian Direction Pole / Signage Drawing W-07

Wind Load, (ASCE 7-22)

Total Wind Load = $30\text{psf} \times (0.5' \times 11' + 2 \times 1' \times 4.5') = .435 \text{ kips}$

Applied Moment, (wind) = $0.435 \text{ kips} \times 10.5' = 4.6 \text{ k-ft}$

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park-signs.ec6

LIC#: KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B04 Post Embedment

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

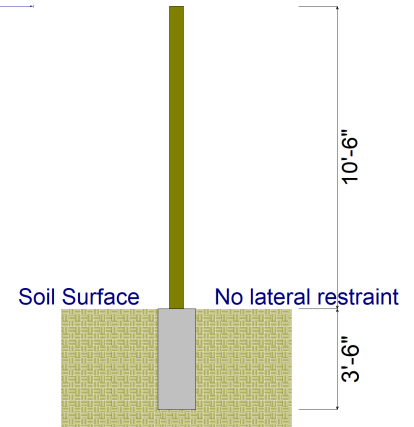
General Information

Pole Footing Shape Circular
16.0 in

Calculate Min. Depth for Allowable Pressures
No Lateral Restraint at Ground Surface

Allow Passive 500.0 psf
Max Passive 5,000.0 psf

Point Load



Controlling Values

Governing Load Combination 0.60W

Lateral Load 0.2610 k
Moment 2.741 k-ft

NO Ground Surface Restraint

Pressures at 1/3 Depth
Actual **571.44 psf**
Allowable **576.01 psf**

Minimum Required Depth 3.50 ft

Footing Base Area 1.396 ft²
Maximum Soil Pressure 0.0 ksf

Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.4350 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	10.50 ft	TOP of Load above ground surface	ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.261	2.741	3.50	571.4	576.0	1.000
+0.450W	0.196	2.055	3.13	517.0	518.3	1.000

Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B04 CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

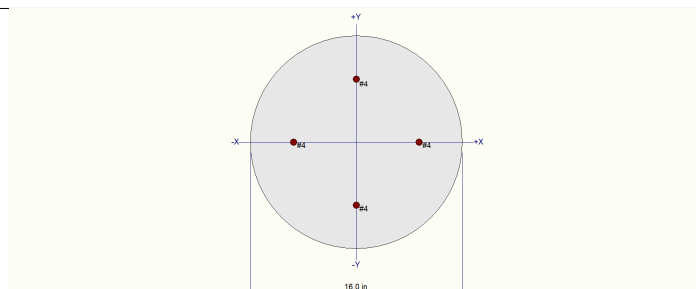
f'c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
fy - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	A

Overall Column Height	=	3.50 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column		
X-X (width) axis :		
Fully braced against buckling ABOUT Y-Y Axis		
Y-Y (depth) axis :		
Fully braced against buckling ABOUT Y-Y Axis		

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 4 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 733.04 lbs * Dead Load Factor

BENDING LOADS . . .

Moment acting about X-X axisat 3.50 ft, W = 4.60 k-ft

DESIGN SUMMARY

Load Combination	+0.90D+W		
Location of max.above base	3.477 ft		
Maximum Stress Ratio	0.179 : 1		
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5			
Pu =	0.6597 k	φ * Pn =	3.141 k
Mu-x =	4.60 k-ft	φ * Mn-x =	26.169 k-ft
Mu-y =	0.05938 k-ft	φ* Mn-y =	0.4269 k-ft
Mu Angle =	1.0 deg	φ =	0.90
Mu at Angle =	4.60 k-ft	φMn at Angle =	25.732 k-ft

Pn & Mn values located at Pu-Mu vector intersection with capacity curve

Column Capacities . .

Pnmax : Nominal Max. Compressive Axial Capacit	728.89 k
Pnmin : Nominal Min. Tension Axial Capacity	k
φ Pn, max : Usable Compressive Axial Capacity	464.668 k
φ Pn, min : Usable Tension Axial Capacity	k

Maximum SERVICE Load Reactions .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Deflections . .

Along Y-Y	-0.004815 in	at	3.50 ft	above base
for load combination : W Only				
Along X-X	0.0in	at	0.0 ft	above base
for load combination :				

General Section Information

	β = 0.850	θ = 0.850
ρ : % Reinforcing	0.3979 %	Rebar < Min of 0.50 %
Reinforcing Area	0.80 in^2	
Concrete Area	201.062 in^2	

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft								Utilization	
	X-X	Y-Y		Pu	ϕ * Pn	δ x	δ x * Mux	δ y	δ y * Muy	Alpha (deg)	δ Mu	ϕ Mn	Ratio		
+1.40D	Actual	M2,min	3.48	1.03	458.84	1.000		1.000	0.09	90.000	0.09	40.82	0.002		

Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B04 CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft										Utilization	
	X-X	Y-Y		Pu	ϕ * Pn	δ x	δ x * Mu _x	δ y	δ y * Mu _y	Alpha (deg)	δ Mu	ϕ Mn	Ratio				
+1.40D	M2,min	Actual	3.48	1.03	458.90	1.000	0.09	1.000		0.000	0.09	40.80	0.002				
+1.20D	Actual	M2,min	3.48	0.88	458.84	1.000		1.000	0.08	90.000	0.08	40.82	0.002				
+1.20D	M2,min	Actual	3.48	0.88	458.90	1.000	0.08	1.000		0.000	0.08	40.80	0.002				
+1.20D+0.50W	Actual	M2,min	3.48	0.88	11.37	1.000	2.30	1.000	0.08	2.000	2.30	29.62	0.078				
+1.20D+W	Actual	M2,min	3.48	0.88	5.90	1.000	4.60	1.000	0.08	1.000	4.60	27.04	0.170				
+0.90D+W	Actual	M2,min	3.48	0.66	3.14	1.000	4.60	1.000	0.06	1.000	4.60	25.73	0.179				
+0.90D	Actual	M2,min	3.48	0.66	458.84	1.000		1.000	0.06	90.000	0.06	40.82	0.001				
+0.90D	M2,min	Actual	3.48	0.66	458.90	1.000	0.06	1.000		0.000	0.06	40.80	0.001				

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments k-ft		My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only						0.733				
+D+0.60W						0.733	-2.760			
+D+0.450W						0.733	-2.070			
+0.60D+0.60W						0.440	-2.760			
+0.60D						0.440				
W Only							-4.600			

Maximum Moment Reactions

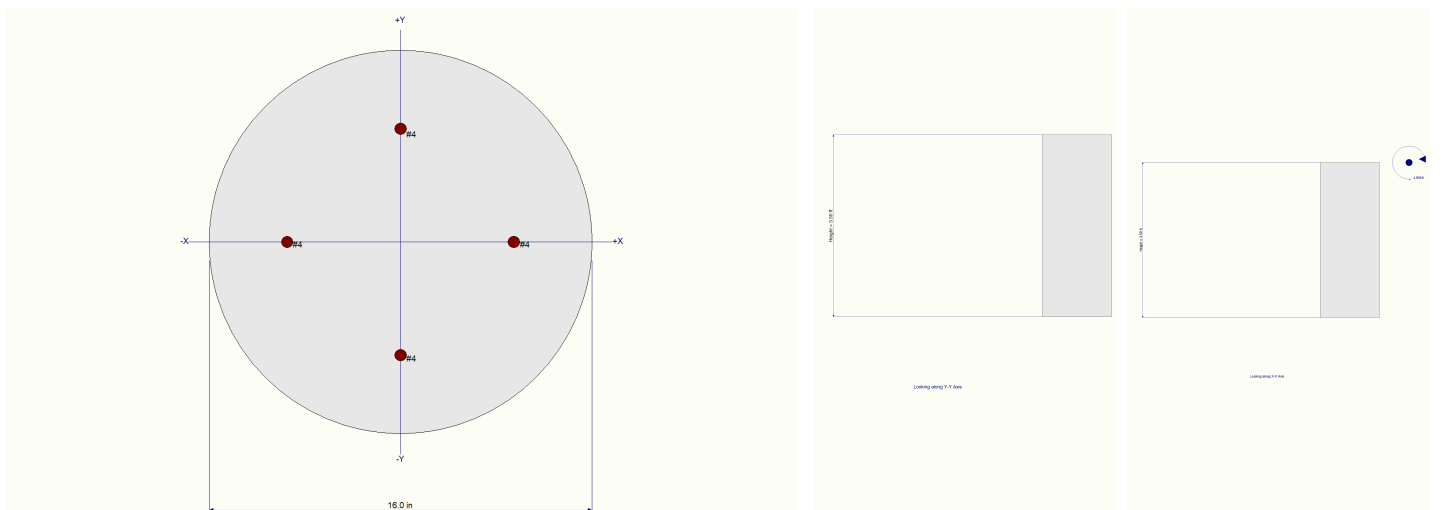
Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		k-ft	Moment About Y-Y Axis		k-ft
	@ Base	@ Top		@ Base	@ Top	
D Only						
+D+0.60W	-2.760		k-ft			k-ft
+D+0.450W	-2.070		k-ft			k-ft
+0.60D+0.60W	-2.760		k-ft			k-ft
+0.60D			k-ft			k-ft
W Only	-4.600		k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.60W	0.0000	in	0.000	ft	-0.003	in	3.500	ft
+D+0.450W	0.0000	in	0.000	ft	-0.002	in	3.500	ft
+0.60D+0.60W	0.0000	in	0.000	ft	-0.003	in	3.500	ft
+0.60D	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	-0.005	in	3.477	ft

Sketches



Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

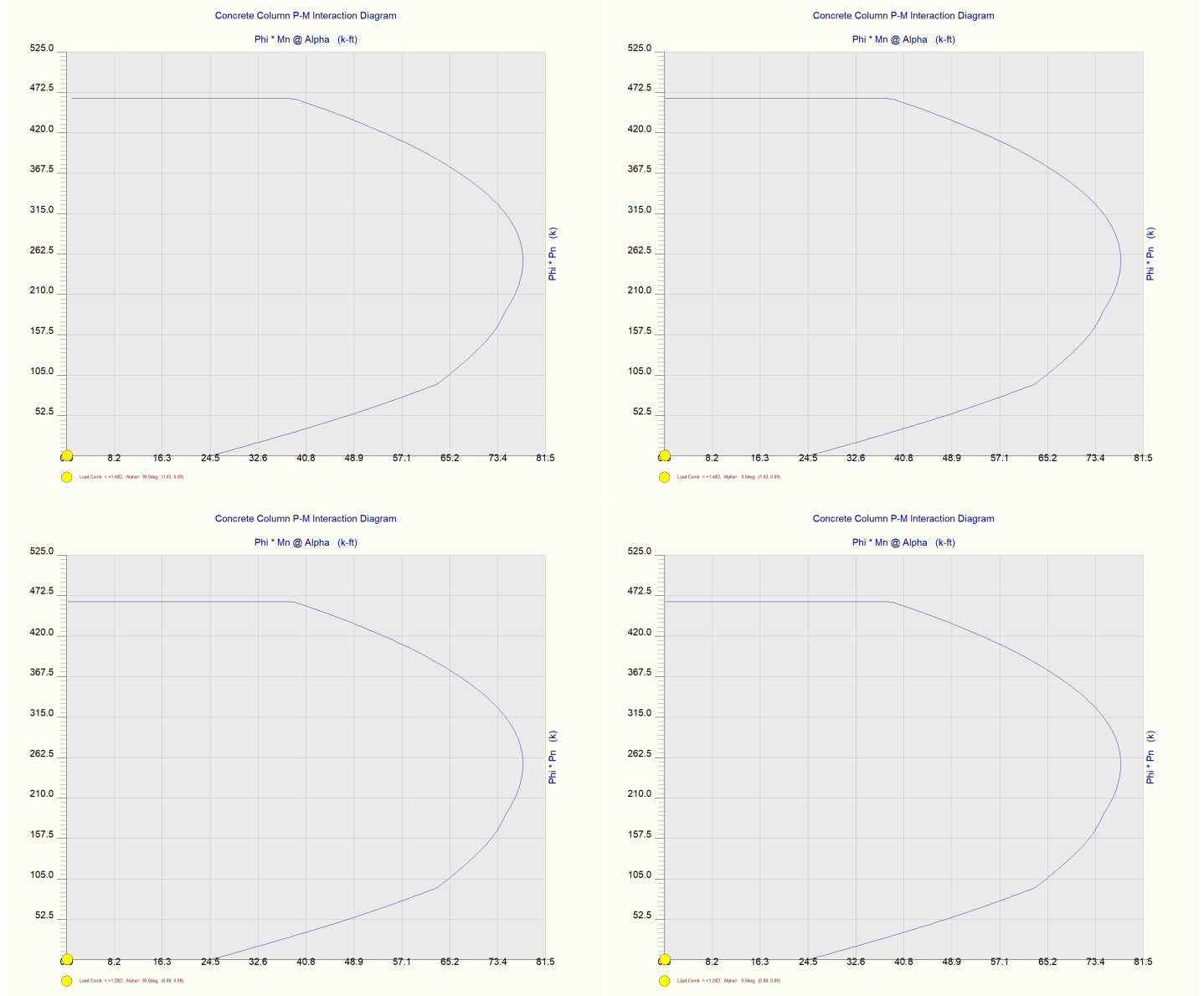
LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B04 CIDH Caisson

Interaction Diagrams



Concrete Column

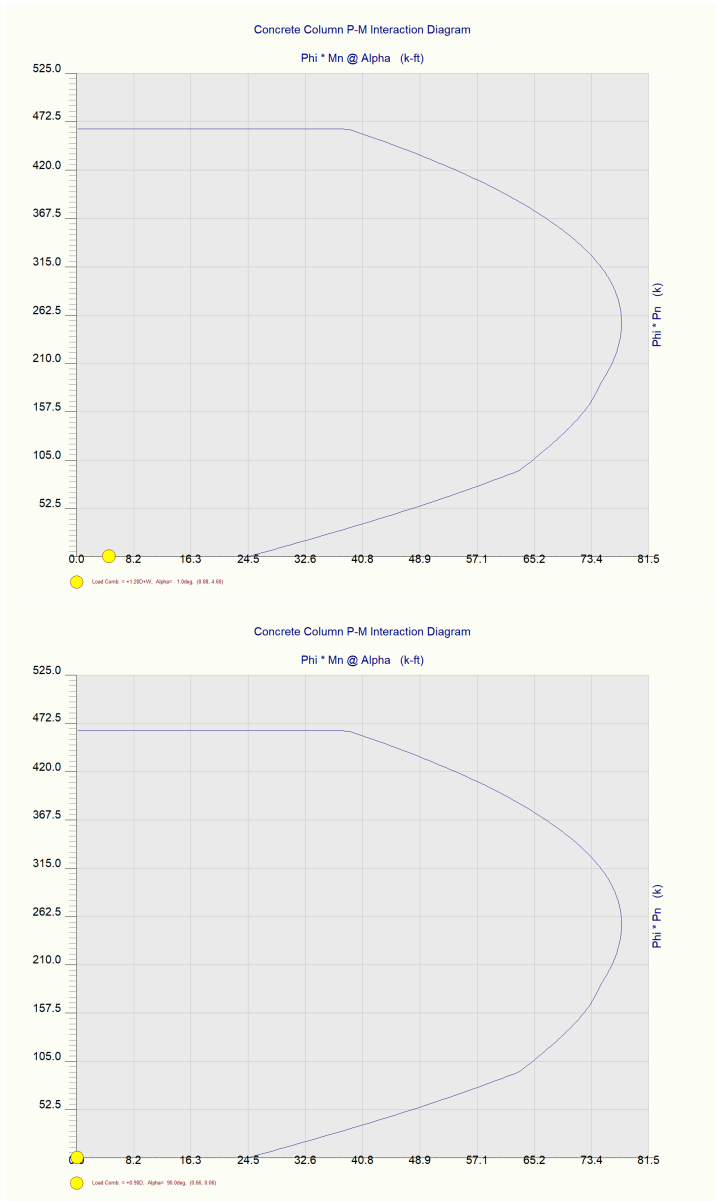
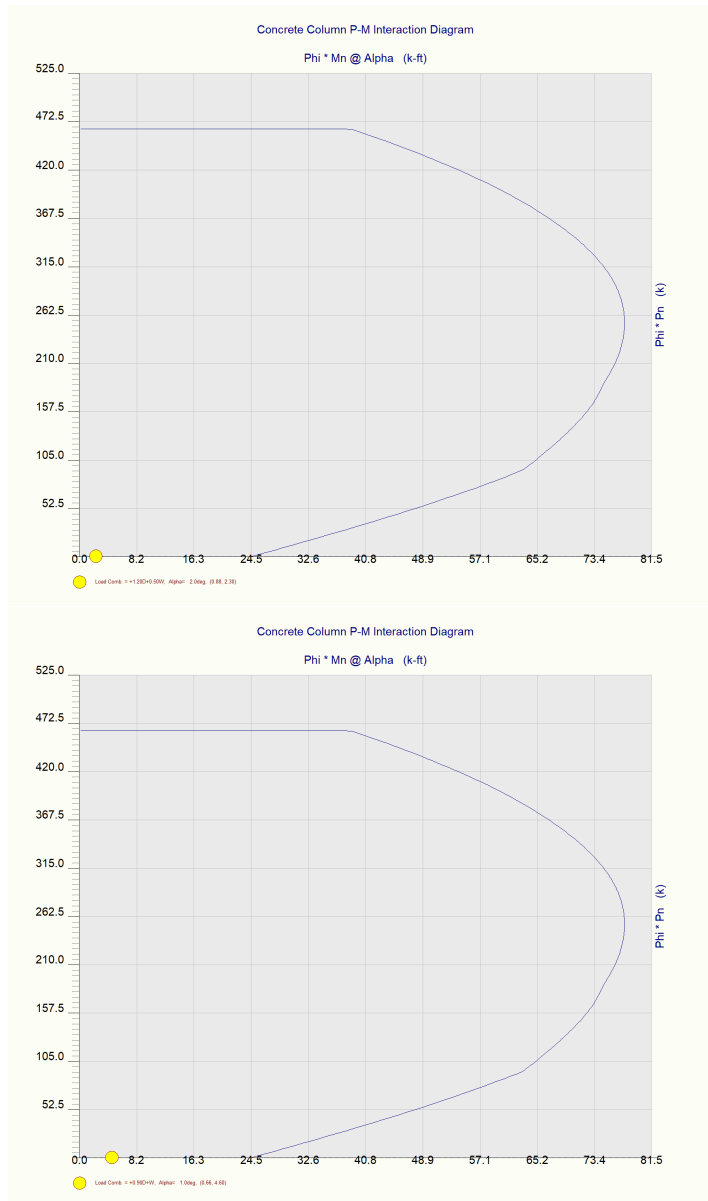
Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B04 CIDH Caisson



Concrete Column

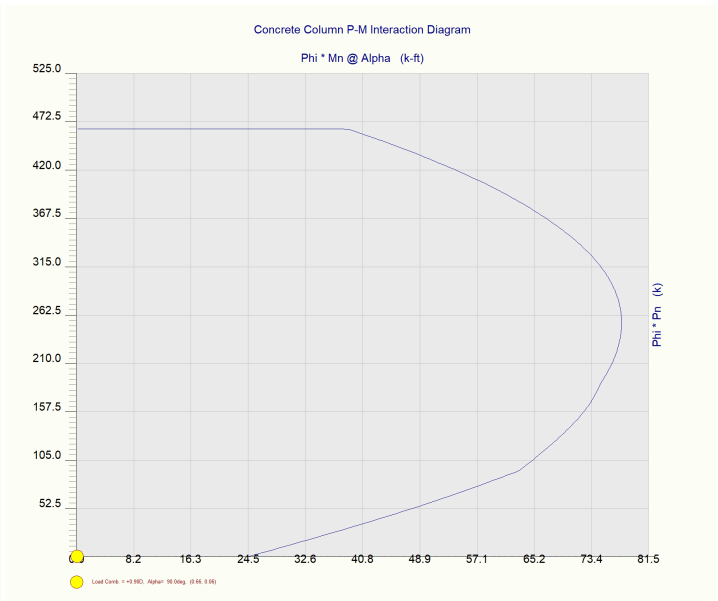
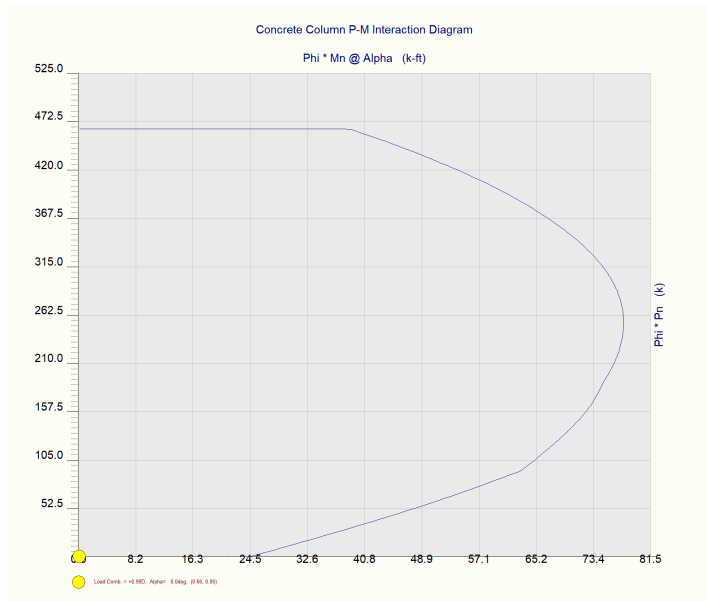
Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: B04 CIDH Caisson



50. C01 Pedestrian Information Pylon, (W-07)

C01 Pedestrian Information Pylon / Signage Drawing W-07

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $20 \text{ psf} \times 3.2' \times 7.5' = 0.48 \text{ kips}$

$W = 0.48 \text{ kips}$

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 0.48 \text{ kips} = 0.52 \text{ kips}$

Applied Moment to footing, (seismic) = $0.52 \times 3.75 = 1.95 \text{ k-ft}$

Post Moment = $1.95 \text{ k-ft} / 2 = 0.98 \text{ k-ft}$

Wind Load, (ASCE 7-22)

Total Wind Load = $30 \text{ psf} \times 3.2' \times 7.5' = 0.72 \text{ kips}$

Applied Moment, (wind) = $0.72 \text{ kips} \times 3.75' = 2.7 \text{ k-ft}$

(Wind Controls)

Column Load: 2.7 k-ft (conservative)

Post Moment = $2.7 \text{ k-ft} / 2 = 1.35 \text{ k-ft}$

Column Wind Load:

$1.35 \text{ k-ft} / 7.5 \text{ ft} = 0.18 \text{ kips @ } 7.5 \text{ ft}$

Column Seismic Load:

$0.98 \text{ k-ft} / 7.5 \text{ ft} = 0.13 \text{ kips @ } 7.5 \text{ ft}$

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: C01 Sign Foundation

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.50 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2,000.0 ksf
Soil Density	=	120.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	3.0 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.50 ft

Increases based on footing plan dimension

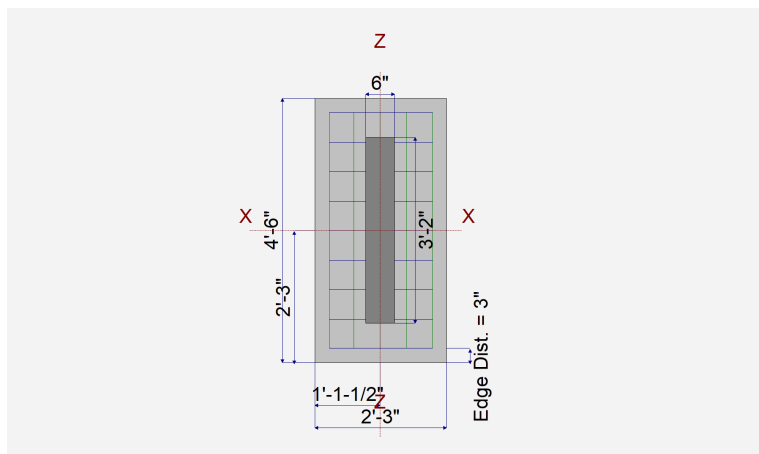
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	2.250 ft
Length parallel to Z-Z Axis	=	4.50 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	6.0 in
pz : parallel to Z-Z Axis	=	38.0 in
Height	=	18.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



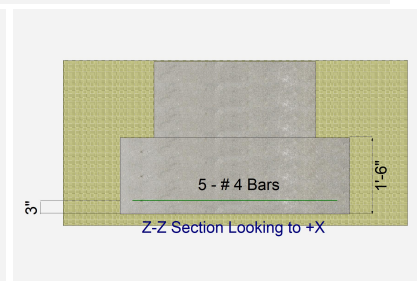
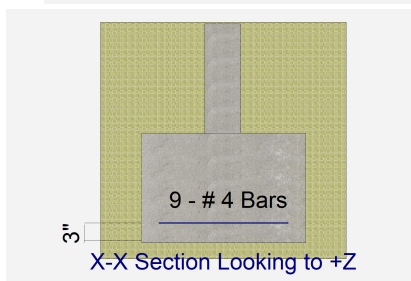
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	9
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	5
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	Bars along X-X Axis	
# Bars required within zone	66.7 %	
# Bars required on each side of zone	33.3 %	



Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	0.480						k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=				2.70	1.950		k-ft
V-x	=							k
V-z	=							k

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: C01 Slgn Foundation

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.2398	Soil Bearing	0.8393 ksf	3.50 ksf	+D+0.60W about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.758	Overturning - Z-Z	1.620 k-ft	2.848 k-ft	+0.60D+0.60W
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.009840	Z Flexure (+X)	0.2610 k-ft/ft	26.529 k-ft/ft	+0.90D+W
PASS	0.006595	Z Flexure (-X)	0.1750 k-ft/ft	26.529 k-ft/ft	+1.20D+W
PASS	0.000204	X Flexure (+Z)	0.005991 k-ft/ft	29.419 k-ft/ft	+1.40D
PASS	0.000204	X Flexure (-Z)	0.005991 k-ft/ft	29.419 k-ft/ft	+1.40D
PASS	n/a	1-way Shear (+X)	0.0 psi	52.523 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	54.401 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	54.401 psi	n/a
PASS	n/a	2-way Punching	0.03984 psi	52.523 psi	+0.90D+W



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	3.50	n/a	0.0	0.4168	0.4168	n/a	n/a	0.119
X-X, +D+0.60W	3.50	n/a	0.0	0.4168	0.4168	n/a	n/a	0.119
X-X, +D+0.450W	3.50	n/a	0.0	0.4168	0.4168	n/a	n/a	0.119
X-X, +0.60D+0.60W	3.50	n/a	0.0	0.2501	0.2501	n/a	n/a	0.071
X-X, +D+0.70E	3.50	n/a	0.0	0.4168	0.4168	n/a	n/a	0.119
X-X, +D+0.5250E	3.50	n/a	0.0	0.4168	0.4168	n/a	n/a	0.119
X-X, +0.60D+0.70E	3.50	n/a	0.0	0.2501	0.2501	n/a	n/a	0.071
Z-Z, D Only	3.50	0.0	n/a	n/a	n/a	0.4168	0.4168	0.119
Z-Z, +D+0.60W	3.50	4.607	n/a	n/a	n/a	0.0	0.8393	0.240
Z-Z, +D+0.450W	3.50	3.455	n/a	n/a	n/a	0.09996	0.7336	0.210
Z-Z, +0.60D+0.60W	3.50	7.678	n/a	n/a	n/a	0.0	0.7672	0.219
Z-Z, +D+0.70E	3.50	3.882	n/a	n/a	n/a	0.06085	0.7727	0.221
Z-Z, +D+0.5250E	3.50	2.911	n/a	n/a	n/a	0.1498	0.6837	0.195
Z-Z, +0.60D+0.70E	3.50	6.470	n/a	n/a	n/a	0.0	0.6361	0.182

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	None	0.0 k-ft	Infinity	OK
X-X, +D+0.5250E	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	1.620 k-ft	4.747 k-ft	2.930	OK
Z-Z, +D+0.450W	1.215 k-ft	4.747 k-ft	3.907	OK
Z-Z, +0.60D+0.60W	1.620 k-ft	2.848 k-ft	1.758	OK
Z-Z, +D+0.70E	1.365 k-ft	4.747 k-ft	3.478	OK
Z-Z, +D+0.5250E	1.024 k-ft	4.747 k-ft	4.637	OK
Z-Z, +0.60D+0.70E	1.365 k-ft	2.848 k-ft	2.087	OK

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: C01 Slgn Foundation

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
---	---------------	-----------------	-----------------	--------

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.005991	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +1.40D	0.005991	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +1.20D	0.005135	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +1.20D	0.005135	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +1.20D+0.50W	0.005135	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +1.20D+0.50W	0.005135	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +1.20D+W	0.005135	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +1.20D+W	0.005135	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +0.90D+W	0.003851	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +0.90D+W	0.003851	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +1.20D+E	0.005135	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +1.20D+E	0.005135	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +0.90D+E	0.003851	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
X-X, +0.90D+E	0.003851	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4444	29.419	OK
Z-Z, +1.40D	0.01032	-X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.40D	0.01032	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D	0.008847	-X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D	0.008847	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+0.50W	0.09196	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+0.50W	0.1097	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+W	0.1750	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+W	0.2229	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+W	0.1370	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+W	0.2610	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+E	0.1367	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+E	0.1545	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+E	0.1288	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+E	0.1592	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	54.40 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	54.40 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	54.40 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	54.40 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	54.40 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	54.40 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	54.40 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.03 psi	132.40psi	0.000219	OK
+1.20D	0.02 psi	132.40psi	0.000188	OK
+1.20D+0.50W	0.02 psi	132.40psi	0.000188	OK
+1.20D+W	0.03 psi	132.40psi	0.000257	OK
+0.90D+W	0.04 psi	132.40psi	0.000301	OK
+1.20D+E	0.03 psi	132.40psi	0.00019	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: C01 Slgn Foundation

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D+E	0.02 psi	132.40psi	0.000185	OK

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: C01 Pedestrian Information Pylon - Col - HSS2x2x1/4

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name :	HSS3x3x1/4	Overall Column Height	7.50 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade	, A500, Grade B, Fy = 46 ksi, Carbon Steel	Brace condition :	
Fy : Steel Yield	46.0 ksi	Unbraced Length for buckling ABOUT X-X Axis = 7.50 ft, K = 1.20	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 7.50 ft, K = 1.20	

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 66.075 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 7.50 ft, D = 3.250 k

BENDING LOADS . . .

Lat. Point Load at 7.50 ft creating Mx-x, W = 0.180, E = 0.130 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.1950 : 1	Maximum Load Reactions . .	
Load Combination	+1.20D+W	Top along X-X	0.0 k
Location of max.above base	0.0 ft	Bottom along X-X	0.0 k
At maximum location values are . . .		Top along Y-Y	0.0 k
Pu	3.979 k	Bottom along Y-Y	0.180 k
0.9 * Pn	53.435 k	Maximum Load Deflections . . .	
Mu-x	-1.350 k-ft	Along Y-Y	0.4969 in at 7.50ft above base
0.9 * Mn-x :	8.556 k-ft	for load combination :W Only	
Mu-y	0.0 k-ft	Along X-X	0.0 in at 0.0ft above base
0.9 * Mn-y :	8.556 k-ft	for load combination :	
PASS Maximum Shear Stress Ratio	0.008110 : 1		
Load Combination	+1.20D+W		
Location of max.above base	0.0 ft		
At maximum location values are . . .			
Vu : Applied	0.180 k		
Vn * Phi : Allowable	22.196 k		

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Maximum Shear Ratios					
	Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Stress Ratio	Status	Location
+1.40D	0.087	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.000	PASS	0.00 ft
+1.20D	0.074	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.000	PASS	0.00 ft
+1.20D+0.50W	0.116	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.004	PASS	0.00 ft
+1.20D+W	0.195	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.008	PASS	0.00 ft
+0.90D+W	0.186	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.008	PASS	0.00 ft
+1.20D+E	0.151	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.006	PASS	0.00 ft
+0.90D+E	0.142	PASS	0.00 ft	1.67	1.00	97.30	97.30	0.006	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
D Only	3.316						
+D+0.60W	3.316			0.108	-0.810		
+D+0.450W	3.316			0.081	-0.608		
+0.60D+0.60W	1.990			0.108	-0.810		
+D+0.70E	3.316			0.091	-0.683		
+D+0.5250E	3.316			0.068	-0.512		
+0.60D+0.70E	1.990			0.091	-0.683		

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: C01 Pedestrian Information Pylon - Col - HSS2x2x1/4

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
W Only				0.180	-1.350		
E Only				0.130	-0.975		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	3.316						
"	Minimum				0.180	-1.350		
Reaction, X-X Axis Base	Maximum	3.316						
"	Minimum	3.316						
Reaction, Y-Y Axis Base	Maximum				0.180	-1.350		
"	Minimum	3.316						
Reaction, X-X Axis Top	Maximum	3.316						
"	Minimum	3.316						
Reaction, Y-Y Axis Top	Maximum	3.316						
"	Minimum	3.316						
Moment, X-X Axis Base	Maximum	3.316						
"	Minimum		-1.350		0.180	-1.350		
Moment, Y-Y Axis Base	Maximum	3.316						
"	Minimum	3.316						
Moment, X-X Axis Top	Maximum	3.316						
"	Minimum	3.316						
Moment, Y-Y Axis Top	Maximum	3.316						
"	Minimum	3.316						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.298 in	7.500 ft
+D+0.450W	0.0000 in	0.000 ft	0.224 in	7.500 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.298 in	7.500 ft
+D+0.70E	0.0000 in	0.000 ft	0.251 in	7.500 ft
+D+0.5250E	0.0000 in	0.000 ft	0.188 in	7.500 ft
+0.60D+0.70E	0.0000 in	0.000 ft	0.251 in	7.500 ft
W Only	0.0000 in	0.000 ft	0.497 in	7.500 ft
E Only	0.0000 in	0.000 ft	0.355 in	7.450 ft

Steel Section Properties : HSS3x3x1/4

Depth	=	3.000 in	I xx	=	3.02 in^4	J	=	5.080 in^4
Design Thick	=	0.233 in	S xx	=	2.01 in^3			
Width	=	3.000 in	R xx	=	1.110 in			
Wall Thick	=	0.250 in	Zx	=	2.480 in^3			
Area	=	2.440 in^2	I yy	=	3.020 in^4	C	=	3.520 in^3
Weight	=	8.810 plf	S yy	=	2.010 in^3			
			R yy	=	1.110 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

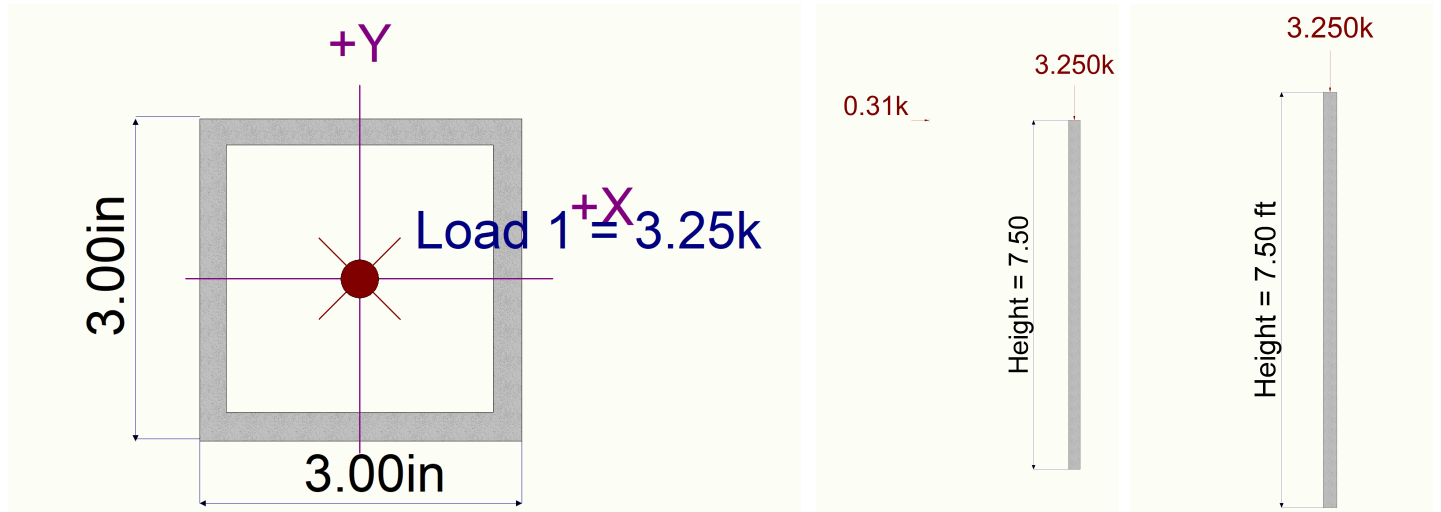
LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: C01 Pedestrian Information Pylon - Col - HSS2x2x1/4

Sketches



51. D20 Parking Regulations Pylon, (W-08)

D20 Parking Regulations Pylon / Signage Drawing W-08

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $20 \text{ psf} \times 5' \times 2.25' = 0.225 \text{ kips}$

$W = 0.225 \text{ kips}$

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 0.225 \text{ kips} = 0.243 \text{ kips}$

Applied Moment to footing, (seismic) = $0.243 \times 2.5' = 0.61 \text{ k-ft}$

Post Moment = $0.61 \text{ k-ft} / 2 = 0.305 \text{ k-ft}$

Wind Load, (ASCE 7-22)

Total Wind Load = $30 \text{ psf} \times 5' \times 2.25' = 0.3375 \text{ kips}$

Applied Moment, (wind) = $0.3375 \text{ kips} \times 2.5' = 0.84 \text{ k-ft}$

(Wind Controls)

Column Load: 0.84 k-ft

Post Moment = $0.84 \text{ k-ft} / 2 = 0.42 \text{ k-ft}$

Column Wind Load:

$0.42 \text{ k-ft} / 2.5 \text{ ft} = 0.168 \text{ kips @ } 2.5 \text{ ft}$

Column Seismic Load:

$0.305 \text{ k-ft} / 2.5 \text{ ft} = 0.122 \text{ kips @ } 2.5 \text{ ft}$

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: D20 Sign Foundation

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.50 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2,000.0 ksf
Soil Density	=	120.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	2.0 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.50 ft

Increases based on footing plan dimension

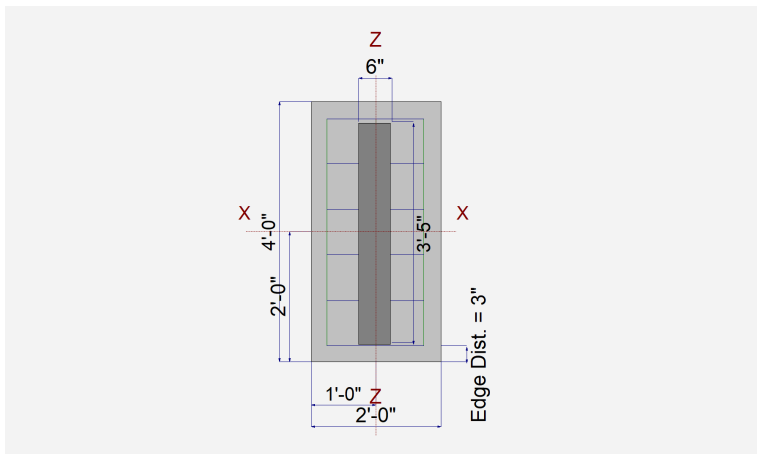
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	6.0 in
pz : parallel to Z-Z Axis	=	41.0 in
Height	=	12.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



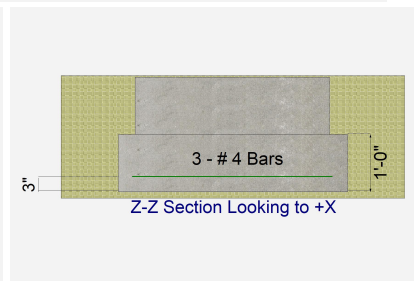
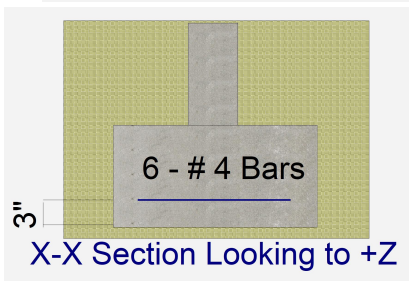
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	6
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	3
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

Bars along X-X Axis	
# Bars required within zone	66.7 %
# Bars required on each side of zone	33.3 %



Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	0.2250						k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=				0.840	0.610		k-ft
V-x	=							k
V-z	=							k

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: D20 Sign Foundation

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.1299	Soil Bearing	0.4546 ksf	3.50 ksf	+D+0.60W about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	2.548	Overturning - Z-Z	0.5040 k-ft	1.284 k-ft	+0.60D+0.60W
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.005836	Z Flexure (+X)	0.06936 k-ft/ft	11.885 k-ft/ft	+0.90D+W
PASS	0.005519	Z Flexure (-X)	0.06559 k-ft/ft	11.885 k-ft/ft	+1.20D+W
PASS	.0000130	X Flexure (+Z)	0.000149 k-ft/ft	11.885 k-ft/ft	+1.40D
PASS	.0000130	X Flexure (-Z)	0.000149 k-ft/ft	11.885 k-ft/ft	+1.40D
PASS	n/a	1-way Shear (+X)	0.0 psi	56.579 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	56.579 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	56.579 psi	n/a
PASS	n/a	2-way Punching	0.08381 psi	56.579 psi	+1.40D



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	3.50	n/a	0.0	0.2675	0.2675	n/a	n/a	0.076
X-X, +D+0.60W	3.50	n/a	0.0	0.2675	0.2675	n/a	n/a	0.076
X-X, +D+0.450W	3.50	n/a	0.0	0.2675	0.2675	n/a	n/a	0.076
X-X, +0.60D+0.60W	3.50	n/a	0.0	0.1605	0.1605	n/a	n/a	0.046
X-X, +D+0.70E	3.50	n/a	0.0	0.2675	0.2675	n/a	n/a	0.076
X-X, +D+0.5250E	3.50	n/a	0.0	0.2675	0.2675	n/a	n/a	0.076
X-X, +0.60D+0.70E	3.50	n/a	0.0	0.1605	0.1605	n/a	n/a	0.046
Z-Z, D Only	3.50	0.0	n/a	n/a	n/a	0.2675	0.2675	0.076
Z-Z, +D+0.60W	3.50	2.826	n/a	n/a	n/a	0.08039	0.4546	0.130
Z-Z, +D+0.450W	3.50	2.120	n/a	n/a	n/a	0.1272	0.4078	0.117
Z-Z, +0.60D+0.60W	3.50	4.710	n/a	n/a	n/a	0.0	0.3503	0.100
Z-Z, +D+0.70E	3.50	2.394	n/a	n/a	n/a	0.1090	0.4260	0.122
Z-Z, +D+0.5250E	3.50	1.796	n/a	n/a	n/a	0.1486	0.3864	0.110
Z-Z, +0.60D+0.70E	3.50	3.991	n/a	n/a	n/a	0.001976	0.3190	0.091

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	None	0.0 k-ft	Infinity	OK
X-X, +D+0.5250E	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	0.5040 k-ft	2.140 k-ft	4.246	OK
Z-Z, +D+0.450W	0.3780 k-ft	2.140 k-ft	5.661	OK
Z-Z, +0.60D+0.60W	0.5040 k-ft	1.284 k-ft	2.548	OK
Z-Z, +D+0.70E	0.4270 k-ft	2.140 k-ft	5.012	OK
Z-Z, +D+0.5250E	0.3203 k-ft	2.140 k-ft	6.682	OK
Z-Z, +0.60D+0.70E	0.4270 k-ft	1.284 k-ft	3.007	OK

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: D20 Sign Foundation

Sliding Stability

All units k

Force Application Axis
Load Combination...

Sliding Force

Resisting Force

Stability Ratio

Status

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.000149	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +1.40D	0.000149	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +1.20D	0.000127	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +1.20D	0.000127	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +1.20D+0.50W	0.000127	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +1.20D+0.50W	0.000127	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +1.20D+W	0.000127	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +1.20D+W	0.000127	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +0.90D+W	.0000960	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +0.90D+W	.0000960	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +1.20D+E	0.000127	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +1.20D+E	0.000127	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +0.90D+E	.0000960	+Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
X-X, +0.90D+E	.0000960	-Z	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +1.40D	0.000984	-X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +1.40D	0.000984	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +1.20D	0.000844	-X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +1.20D	0.000844	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +1.20D+0.50W	0.03237	-X	Top	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +1.20D+0.50W	0.03406	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +1.20D+W	0.06559	-X	Top	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +1.20D+W	0.06728	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +0.90D+W	0.06224	-X	Top	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +0.90D+W	0.06936	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +1.20D+E	0.04740	-X	Top	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +1.20D+E	0.04909	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +0.90D+E	0.04761	-X	Top	0.2592	ACI 7.6.1.1	0.30	11.885	OK
Z-Z, +0.90D+E	0.04888	+X	Bottom	0.2592	ACI 7.6.1.1	0.30	11.885	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	56.58 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.08 psi	130.07psi	0.000644	OK
+1.20D	0.08 psi	130.07psi	0.000644	OK
+1.20D+0.50W	0.08 psi	130.07psi	0.000644	OK
+1.20D+W	0.08 psi	130.07psi	0.000644	OK
+0.90D+W	0.08 psi	130.07psi	0.000644	OK
+1.20D+E	0.08 psi	130.07psi	0.000644	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: D20 Sign Foundation

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D+E	0.08 psi	130.07 psi	0.000644	OK

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: D20 Parking Regulations Pylon - Col - HSS2x2x1/4

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name :	HSS2x2x1/4	Overall Column Height	4.90 ft
Analysis Method :	Load Resistance Factor	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade	, A500, Grade B, Fy = 46 ksi, Carbon Steel	Brace condition :	
Fy : Steel Yield	46.0 ksi	Unbraced Length for buckling ABOUT X-X Axis = 4.90 ft, K = 2.1	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for buckling ABOUT Y-Y Axis = 4.90 ft, K = 2.1	

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 26.509 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 4.90 ft, D = 0.2250 k

BENDING LOADS . . .

Lat. Point Load at 2.50 ft creating Mx-x, W = 0.1680, E = 0.1220 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.1399 : 1
Load Combination	+1.20D+W
Location of max.above base	0.0 ft
At maximum location values are . . .	
Pu	0.3018 k
0.9 * Pn	11.088 k
Mu-x	-0.420 k-ft
0.9 * Mn-x :	3.326 k-ft
Mu-y	0.0 k-ft
0.9 * Mn-y :	3.326 k-ft

Maximum Load Reactions . .	
Top along X-X	0.0 k
Bottom along X-X	0.0 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.1680 k

Maximum Load Deflections . . .	
Along Y-Y	0.1696 in at 4.90ft above base
for load combination :W Only	
Along X-X	0.0 in at 0.0ft above base
for load combination :	

PASS Maximum Shear Stress Ratio	0.01339 : 1
Load Combination	+1.20D+W
Location of max.above base	0.0 ft
At maximum location values are . . .	
Vu : Applied	0.1680 k
Vn * Phi : Allowable	12.550 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Maximum Shear Ratios					
	Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Stress Ratio	Status	Location
+1.40D	0.032	PASS	0.00 ft	3.00	1.00	175.40	175.40	0.000	PASS	0.00 ft
+1.20D	0.027	PASS	0.00 ft	3.00	1.00	175.40	175.40	0.000	PASS	0.00 ft
+1.20D+0.50W	0.077	PASS	0.00 ft	3.00	1.00	175.40	175.40	0.007	PASS	0.00 ft
+1.20D+W	0.140	PASS	0.00 ft	3.00	1.00	175.40	175.40	0.013	PASS	0.00 ft
+0.90D+W	0.136	PASS	0.00 ft	3.00	1.00	175.40	175.40	0.013	PASS	0.00 ft
+1.20D+E	0.105	PASS	0.00 ft	3.00	1.00	175.40	175.40	0.010	PASS	0.00 ft
+0.90D+E	0.102	PASS	0.00 ft	3.00	1.00	175.40	175.40	0.010	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
D Only	0.252						
+D+0.60W	0.252			0.101	-0.252		
+D+0.450W	0.252			0.076	-0.189		
+0.60D+0.60W	0.151			0.101	-0.252		
+D+0.70E	0.252			0.085	-0.214		
+D+0.5250E	0.252			0.064	-0.160		
+0.60D+0.70E	0.151			0.085	-0.214		

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: D20 Parking Regulations Pylon - Col - HSS2x2x1/4

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
W Only				0.168	-0.420		
E Only				0.122	-0.305		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	0.252						
"	Minimum				0.168	-0.420		
Reaction, X-X Axis Base	Maximum	0.252						
"	Minimum	0.252						
Reaction, Y-Y Axis Base	Maximum				0.168	-0.420		
"	Minimum	0.252						
Reaction, X-X Axis Top	Maximum	0.252						
"	Minimum	0.252						
Reaction, Y-Y Axis Top	Maximum	0.252						
"	Minimum	0.252						
Moment, X-X Axis Base	Maximum	0.252						
"	Minimum		-0.420		0.168	-0.420		
Moment, Y-Y Axis Base	Maximum	0.252						
"	Minimum	0.252						
Moment, X-X Axis Top	Maximum	0.252						
"	Minimum	0.252						
Moment, Y-Y Axis Top	Maximum	0.252						
"	Minimum	0.252						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.102 in	4.900 ft
+D+0.450W	0.0000 in	0.000 ft	0.076 in	4.900 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.102 in	4.900 ft
+D+0.70E	0.0000 in	0.000 ft	0.086 in	4.900 ft
+D+0.5250E	0.0000 in	0.000 ft	0.065 in	4.900 ft
+0.60D+0.70E	0.0000 in	0.000 ft	0.086 in	4.900 ft
W Only	0.0000 in	0.000 ft	0.170 in	4.900 ft
E Only	0.0000 in	0.000 ft	0.122 in	4.867 ft

Steel Section Properties : HSS2x2x1/4

Depth	=	2.000 in	I xx	=	0.75 in^4	J	=	1.310 in^4
Design Thick	=	0.233 in	S xx	=	0.75 in^3			
Width	=	2.000 in	R xx	=	0.704 in			
Wall Thick	=	0.250 in	Zx	=	0.964 in^3			
Area	=	1.510 in^2	I yy	=	0.747 in^4	C	=	1.410 in^3
Weight	=	5.410 plf	S yy	=	0.747 in^3			
			R yy	=	0.704 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

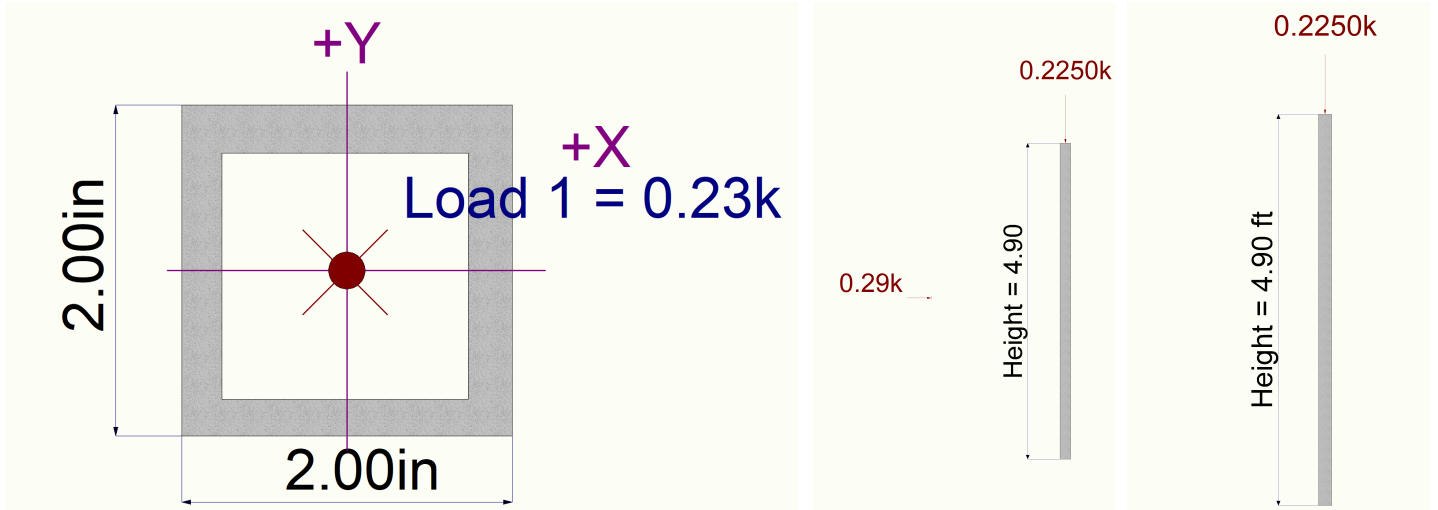
LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: D20 Parking Regulations Pylon - Col - HSS2x2x1/4

Sketches



52. E02 Fence Topper Art, (W-09)

E02 Column / Signage Drawing W-09

Case 1: Part of fence

Weight of fencing above grade is insignificant, seismic loading is ignored.

- 6'-0" Tall
- 6'-0" (typ.) spacing between main set of posts
- Fence Topper: 11.1 sq ft area (largest)

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% reduction in wind loading due to open nature of chain-link fencing

Total Wind Load per Post = $30 \text{ psf} \times 6 \times 6' \times 0.25 + 11.1 \text{ sq ft} \times 30 \text{ psf} = 603 \text{ lbs}$

Applied Moment due to Wind = $603 \text{ lbs} \times 7.5' = 4.52 \text{ kip} - \text{ft}$

$M_u = 4.52 \text{ k-ft}$

$V_u = 603 \text{ lbs}$

Enercalc: $4.52/6' = 754 \text{ lbs @ } 6'$

Case 2: Standalone

- Fence Topper: 11.1 sq ft area (largest)

Wind Load, (ASCE 7-22)

Wind Load = 30 psf

Use 25% reduction in wind loading due to open nature of chain-link fencing

Total Wind Load per Post = $11.1 \text{ sq ft} \times 30 \text{ psf} = 333 \text{ lbs}$

Applied Moment due to Wind = $333 \text{ lbs} \times 7.5' = 2.5 \text{ kip} - \text{ft}$

$M_u = 2.5 \text{ k-ft}$

$V_u = 333 \text{ lbs}$

Enercalc: $2.5/6' = 417 \text{ lbs @ } 6'$

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E02 Post Embedment-Fence

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape	Circular
	16.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	500.0 pcf
Max Passive	5,000.0 pcf

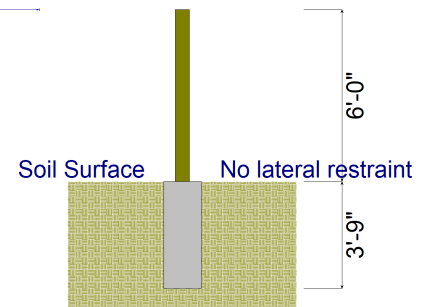
Controlling Values

Governing Load Combination	0.60W
Lateral Load	0.4524 k
Moment	2.714 k-ft
NO Ground Surface Restraint	
Pressures at 1/3 Depth	
Actual	605.46 psf
Allowable	609.45 psf

Minimum Required Depth 3.750 ft

Footing Base Area	1.396 ft^2
Maximum Soil Pressure	0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.7540 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	6.0 ft	TOP of Load above ground surface	6.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.452	2.714	3.75	605.5	609.4	1.000
+0.450W	0.339	2.036	3.38	545.2	545.7	1.000

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park-signs.ec6

LIC#: KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E02 Post Embedment-Standalone

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape	Circular
	16.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	500.0 pcf
Max Passive	5,000.0 pcf

Controlling Values

Governing Load Combination	0.60W
Lateral Load	0.2520 k
Moment	1.512 k-ft

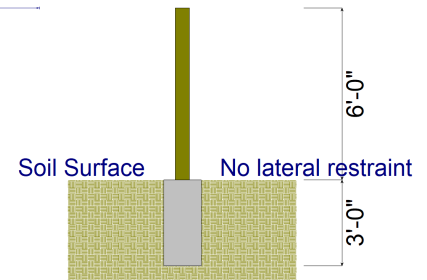
NO Ground Surface Restraint

Pressures at 1/3 Depth	
Actual	485.687 psf
Allowable	489.623 psf

Minimum Required Depth 3.0 ft

Footing Base Area	1.396 ft ²
Maximum Soil Pressure	0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.420 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	6.0 ft	TOP of Load above ground surface	6.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.252	1.512	3.00	485.7	489.6	1.000
+0.450W	0.189	1.134	2.75	437.7	439.5	1.000

Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E02 CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

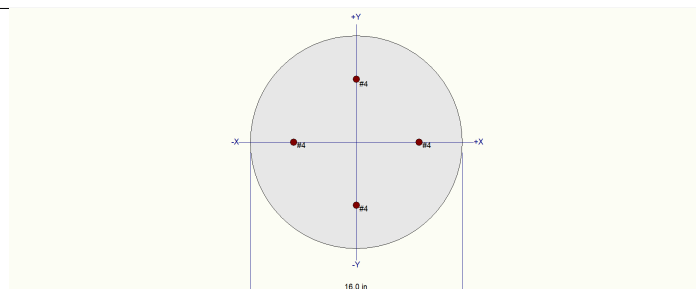
f'c : Concrete 28 day streng	=	4.0 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
fy - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits	ASTM A615 Bars Used	
Min. Reinf.	=	0.50 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	A

Overall Column Height	=	3.750 ft
End Fixity	Top Free, Bottom Fixed	
Brace condition for deflection (buckling) along column		
X-X (width) axis :		
Fully braced against buckling ABOUT Y-Y Axis		
Y-Y (depth) axis :		
Fully braced against buckling ABOUT Y-Y Axis		

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 4 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 785.40 lbs * Dead Load Factor

BENDING LOADS . . .

Moment acting about X-X axis at 3.750 ft, W = 4.520 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+W		
Location of max.above base	3.725 ft		
Maximum Stress Ratio	0.167 : 1		
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5			
Pu =	0.9425 k	φ * Pn =	5.902 k
Mu-x =	4.520 k-ft	φ * Mn-x =	27.910 k-ft
Mu-y =	0.08482 k-ft	φ* Mn-y =	0.4509 k-ft
Mu Angle =	1.0 deg	φ =	0.90
Vu at Angle =	4.521 k-ft	φMn at Angle =	27.043 k-ft

Pn & Mn values located at Pu-Mu vector intersection with capacity curve

Column Capacities . .

Pnmax : Nominal Max. Compressive Axial Capacit	728.89 k
Pnmin : Nominal Min. Tension Axial Capacity	k
φ Pn, max : Usable Compressive Axial Capacity	464.668 k
φ Pn, min : Usable Tension Axial Capacity	k

Maximum SERVICE Load Reactions .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Deflections . .

Along Y-Y	-0.005431 in	at	3.750 ft	above base
for load combination : W Only				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination :				

General Section Information

β	= 0.850	θ	= 0.850
ρ : % Reinforcing	0.3979 %	Rebar < Min of 0.50 %	
Reinforcing Area	0.80 in ²		
Concrete Area	201.062 in ²		

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft								Utilization	
	X-X	Y-Y		Pu	φ * Pn	δ x	δ x * Mu x	δ y	δ y * Mu y	Alpha (deg)	δ Mu	φ Mn	Ratio		
+1.40D	Actual	M2,min	3.72	1.10	458.84	1.000		1.000	0.10	90.000	0.10	40.82	0.002		

Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E02 CIDH Caisson

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft							Utilization	
	X-X	Y-Y		Pu	ϕ * Pn	δ x	δ x * Mu _x	δ y	δ y * Mu _y	Alpha (deg)	δ Mu	ϕ Mn	Ratio	
+1.40D	M2,min	Actual	3.72	1.10	458.90	1.000	0.10	1.000		0.000	0.10	40.80	0.002	
+1.20D	Actual	M2,min	3.72	0.94	458.84	1.000		1.000	0.08	90.000	0.08	40.82	0.002	
+1.20D	M2,min	Actual	3.72	0.94	458.90	1.000	0.08	1.000		0.000	0.08	40.80	0.002	
+1.20D+0.50W	Actual	M2,min	3.72	0.94	11.37	1.000	2.26	1.000	0.08	2.000	2.26	29.62	0.076	
+1.20D+W	Actual	M2,min	3.72	0.94	5.90	1.000	4.52	1.000	0.08	1.000	4.52	27.04	0.167	
+0.90D+W	Actual	M2,min	3.72	0.71	5.90	1.000	4.52	1.000	0.06	1.000	4.52	27.04	0.167	
+0.90D	Actual	M2,min	3.72	0.71	458.84	1.000		1.000	0.06	90.000	0.06	40.82	0.002	
+0.90D	M2,min	Actual	3.72	0.71	458.90	1.000	0.06	1.000		0.000	0.06	40.80	0.002	

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		My - End Moments
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	
D Only						0.785			
+D+0.60W						0.785	-2.712		
+D+0.450W						0.785	-2.034		
+0.60D+0.60W						0.471	-2.712		
+0.60D						0.471			
W Only							-4.520		

Maximum Moment Reactions

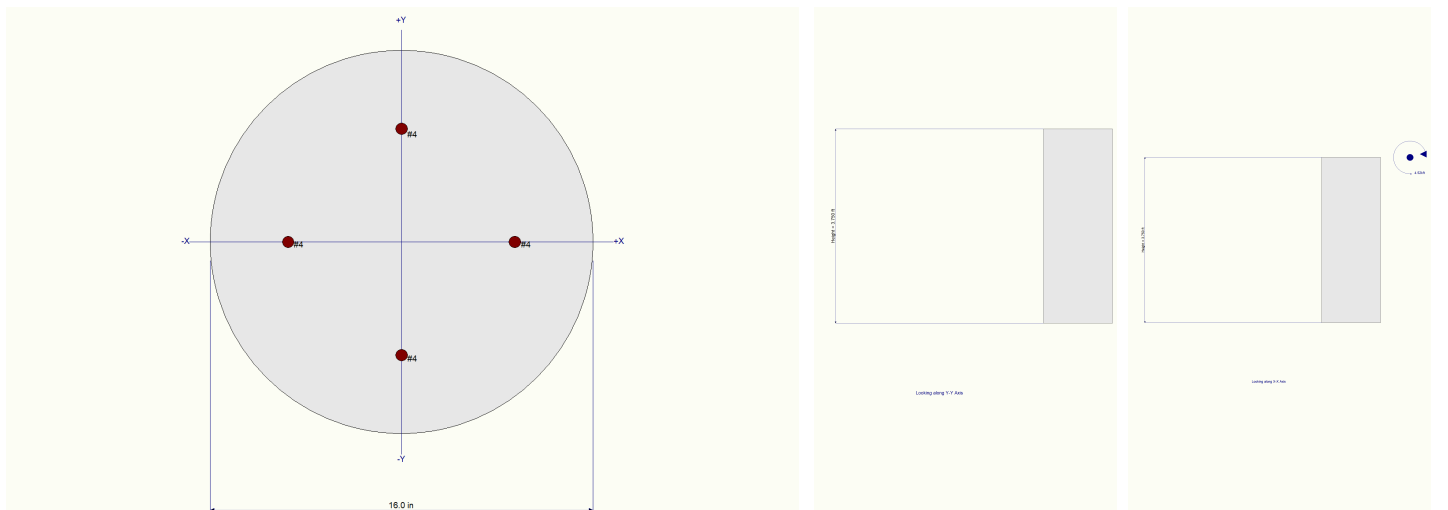
Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		k-ft	Moment About Y-Y Axis		k-ft
	@ Base	@ Top		@ Base	@ Top	
D Only						
+D+0.60W	-2.712		k-ft			k-ft
+D+0.450W	-2.034		k-ft			k-ft
+0.60D+0.60W	-2.712		k-ft			k-ft
+0.60D			k-ft			k-ft
W Only	-4.520		k-ft			k-ft

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
+D+0.60W	0.0000	in	0.000	ft	-0.003	in	3.750	ft
+D+0.450W	0.0000	in	0.000	ft	-0.002	in	3.750	ft
+0.60D+0.60W	0.0000	in	0.000	ft	-0.003	in	3.750	ft
+0.60D	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	-0.005	in	3.725	ft

Sketches



Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

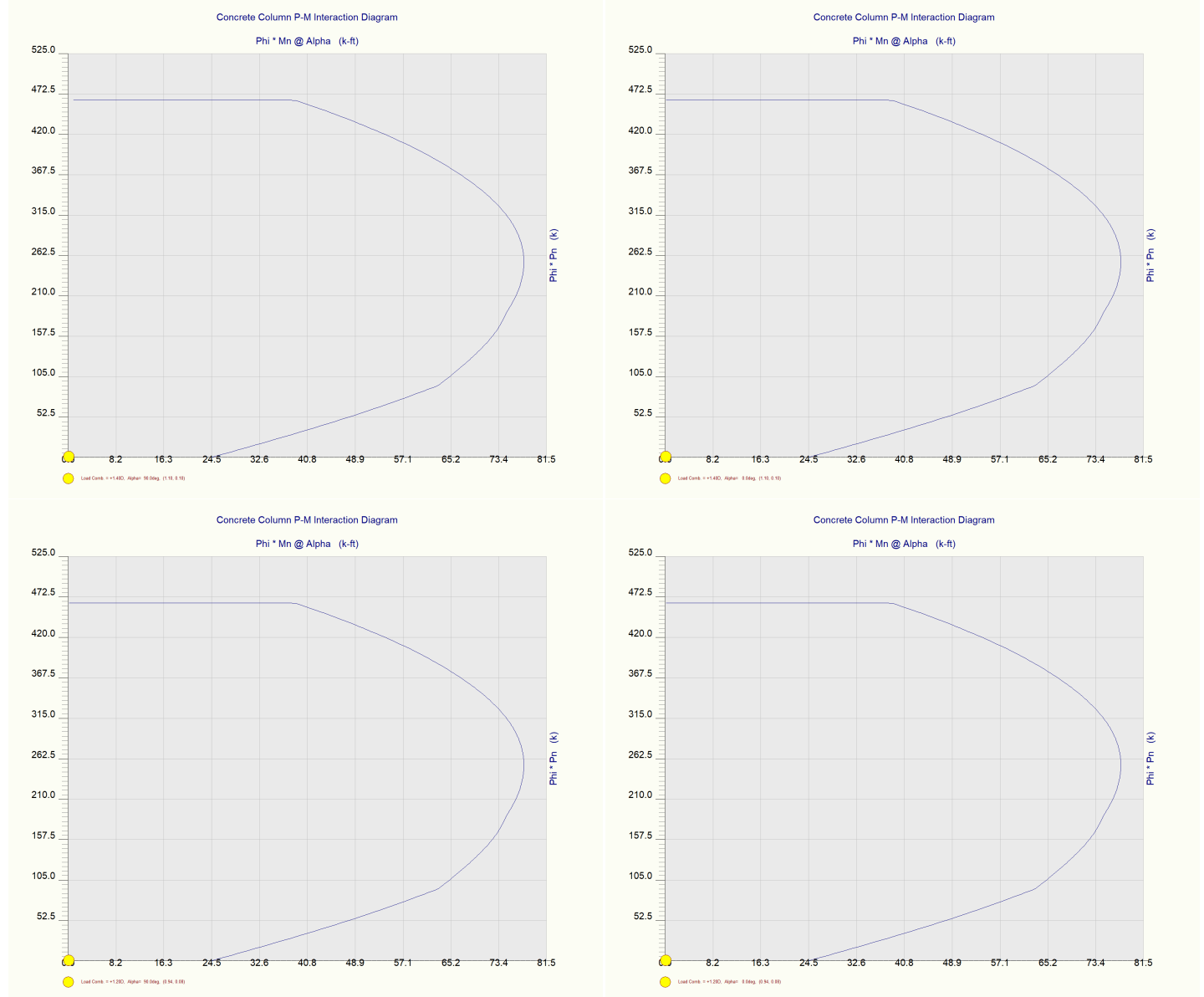
LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E02 CIDH Caisson

Interaction Diagrams



Concrete Column

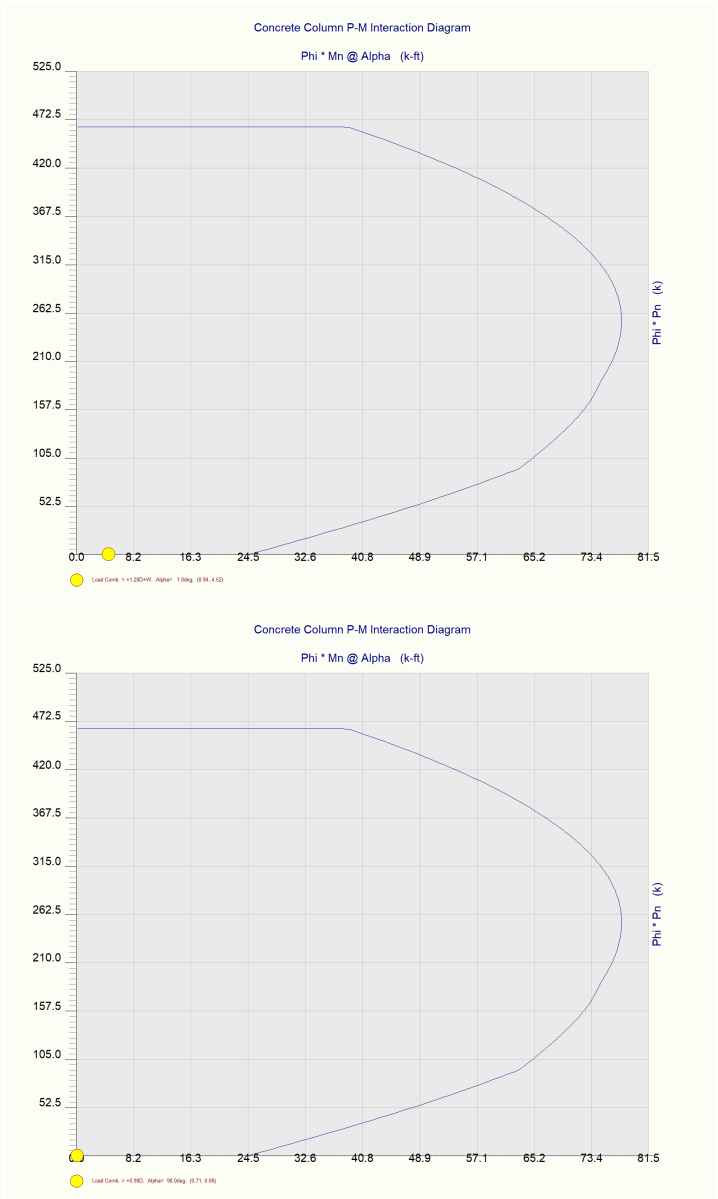
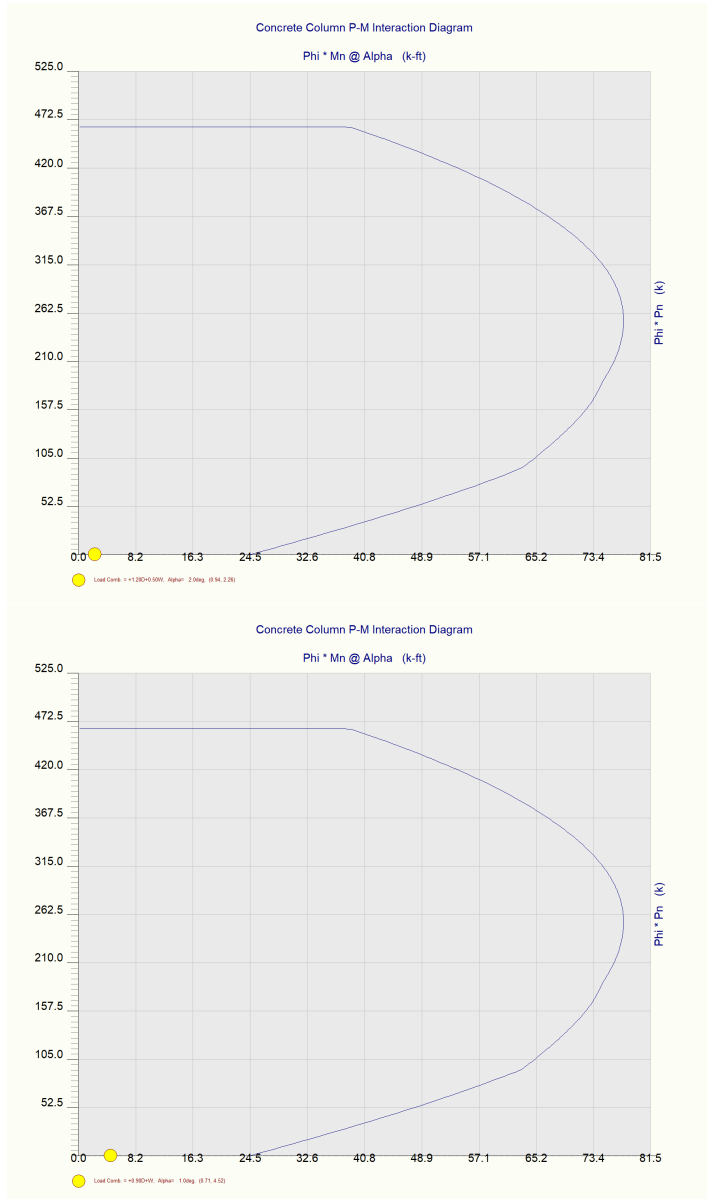
Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E02 CIDH Caisson



Concrete Column

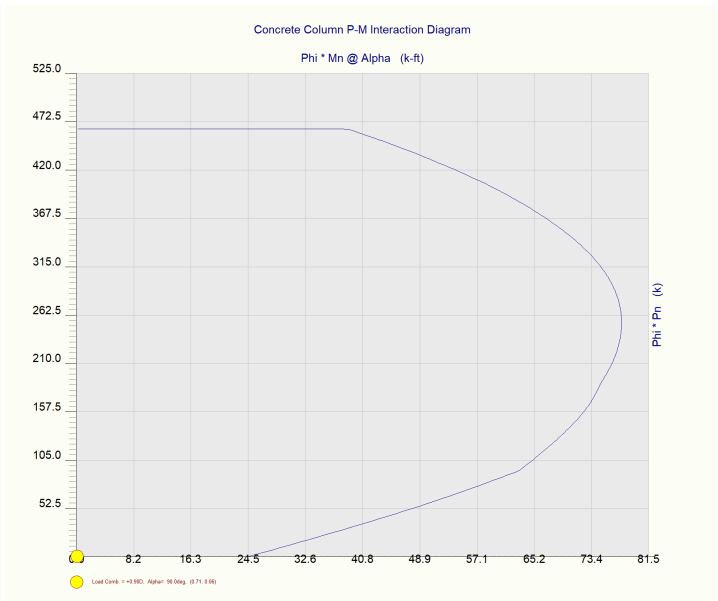
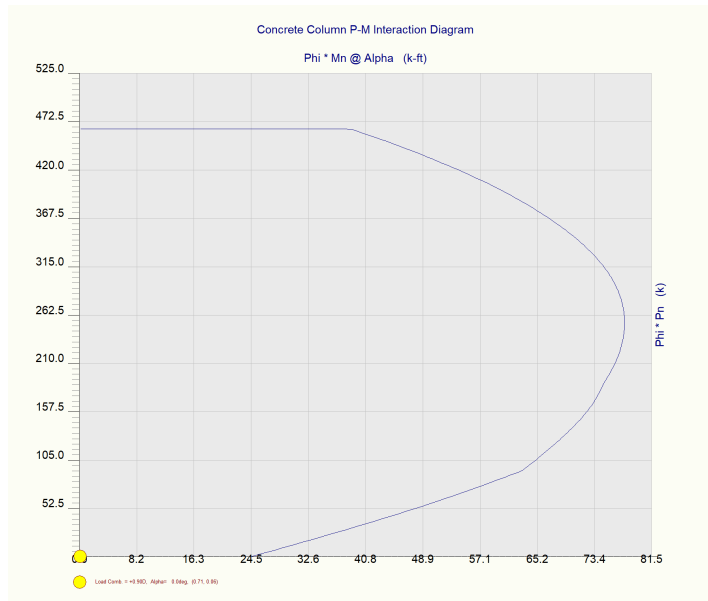
Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E02 CIDH Caisson



53. E03-W – Whistle, (W-10)

E03-W Column / Signage Drawing W-10

Whistle

NOTE: GRAVITY LOADING IS ASSUMED, WIND LOADING BASED ON PROJECTED AREA OF SURFACE

Overall Dimensions: 40' high x 15' wide x 20' deep

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Approximate (TBD) = 10 kips

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 10 \text{ kips} = 10.8 \text{ kips}$

Applied Moment to each footing, (seismic) = $10.8 \times 20' = 216 \text{ k-ft}$

Wind Load, (ASCE 7-22)

Total Wind Load = $30 \text{ psf} \times 15' \times 40' = 18 \text{ kips}$

Applied Moment, (wind) = $18 \text{ kips} \times 20' = 360 \text{ k-ft}$

(Wind Controls)

Load per bolt line:

$360 \text{ k-ft} / 5 \text{ ft} = 72 \text{ kips}$, (Tension per side)

$6 \text{ bolts per line} = 72 \text{ kips} / 6 = 12.67 \text{ kips tension / pullout load on each anchor bolt}$

Foundation weight to resist overturning:

$72 \text{ kips} = 0.150 \text{ kips/cu ft} \times 20 \text{ ft} \times 20 \text{ ft} \times \text{slab thickness} \Rightarrow \text{minimum slab thickness} = 14.4 \text{ in}$

Foundation weight: $20' \times 20' \times 18'' = 90 \text{ kips}$, (OK)

Tension / pullout per anchor bolt = 12.67 kips

Shear per anchor bolt = $18 \text{ kips} / 12 \text{ bolts} = 1.5 \text{ kips}$

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC#: KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Sign Type E03-W - Whistle

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	Yes
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	Yes
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	1.50 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.0 ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

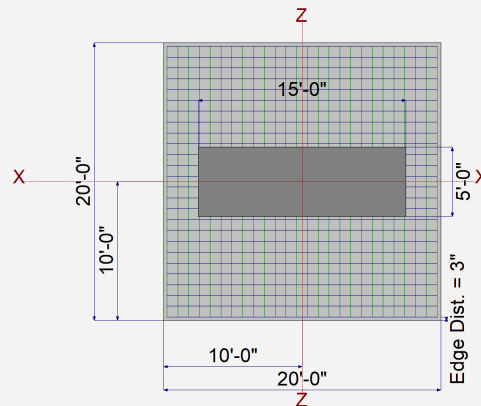
Width parallel to X-X Axis	=	20.0 ft
Length parallel to Z-Z Axis	=	20.0 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	180.0 in
pz : parallel to Z-Z Axis	=	60.0 in
Height	=	0.50 in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in
----------------------	---	--------



Reinforcing

Bars parallel to X-X Axis

Number of Bars	=	26
Reinforcing Bar Size	=	# 5

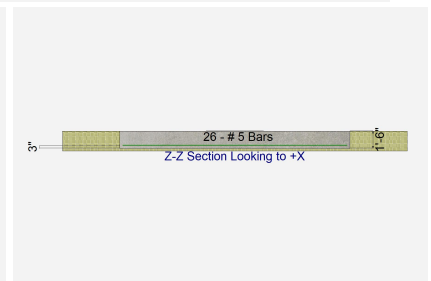
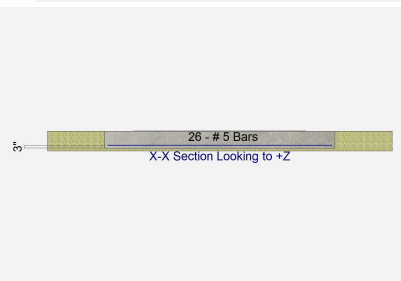
Bars parallel to Z-Z Axis

Number of Bars	=	26
Reinforcing Bar Size	=	# 5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	10.0						k
OB : Overburden	=							ksf
M-xx	=				360.0			k-ft
M-zz	=							k-ft
V-x	=							k
V-z	=							k

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Sign Type E03-W - Whistle

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.1154	Soil Bearing	0.4040 ksf	3.50 ksf	+D+0.60W about X-X axis
PASS	2.694	Overturning - X-X	216.0 k-ft	582.0 k-ft	+0.60D+0.60W
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.004281	Z Flexure (+X)	0.1141 k-ft/ft	26.665 k-ft/ft	+1.40D
PASS	0.004281	Z Flexure (-X)	0.1141 k-ft/ft	26.665 k-ft/ft	+1.40D
PASS	0.2466	X Flexure (+Z)	6.576 k-ft/ft	26.665 k-ft/ft	+1.20D+W
PASS	0.1820	X Flexure (-Z)	4.853 k-ft/ft	26.665 k-ft/ft	+0.90D+W
PASS	0.004913	1-way Shear (+X)	0.2439 psi	49.643 psi	+1.40D
PASS	0.004913	1-way Shear (-X)	0.2439 psi	49.643 psi	+1.40D
PASS	0.1510	1-way Shear (+Z)	7.497 psi	49.643 psi	+1.20D+W
PASS	0.1121	1-way Shear (-Z)	5.567 psi	49.643 psi	+0.90D+W
PASS	0.009030	2-way Punching	1.333 psi	147.573 psi	+1.40D



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	3.50	n/a	0.0	0.2436	0.2436	n/a	n/a	0.070
X-X, +D+0.60W	3.50	n/a	26.597	0.08325	0.4040	n/a	n/a	0.115
X-X, +D+0.450W	3.50	n/a	19.948	0.1233	0.3639	n/a	n/a	0.104
X-X, +0.60D+0.60W	3.50	n/a	44.329	0.0	0.3075	n/a	n/a	0.088
X-X, +0.60D	3.50	n/a	0.0	0.1462	0.1462	n/a	n/a	0.042
Z-Z, D Only	3.50	0.0	n/a	n/a	n/a	0.2436	0.2436	0.070
Z-Z, +D+0.60W	3.50	0.0	n/a	n/a	n/a	0.2436	0.2436	0.070
Z-Z, +D+0.450W	3.50	0.0	n/a	n/a	n/a	0.2436	0.2436	0.070
Z-Z, +0.60D+0.60W	3.50	0.0	n/a	n/a	n/a	0.1462	0.1462	0.042
Z-Z, +0.60D	3.50	0.0	n/a	n/a	n/a	0.1462	0.1462	0.042

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	216.0 k-ft	970.0 k-ft	4.491	OK
X-X, +D+0.450W	162.0 k-ft	970.0 k-ft	5.988	OK
X-X, +0.60D+0.60W	216.0 k-ft	582.0 k-ft	2.694	OK
X-X, +0.60D	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.450W	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D	None	0.0 k-ft	Infinity	OK

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
--	---------------	-----------------	-----------------	--------

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	1.029	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.40D	1.029	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Sign Type E03-W - Whistle

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in ²	Gvrn. As in ²	Actual As in ²	Phi*Mn k-ft	Status
X-X, +1.20D	0.8818	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D	0.8818	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D+0.50W	3.729	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D+0.50W	1.965	-Z	Top	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D+W	6.576	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D+W	4.812	-Z	Top	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +0.90D+W	6.469	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +0.90D+W	4.853	-Z	Top	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +0.90D	0.6614	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +0.90D	0.6614	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.40D	0.1141	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.40D	0.1141	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D	0.09784	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D	0.09784	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D+0.50W	0.09784	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D+0.50W	0.09784	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D+W	0.09784	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D+W	0.09784	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +0.90D+W	0.07338	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +0.90D+W	0.07338	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +0.90D	0.07338	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +0.90D	0.07338	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.24 psi	0.24 psi	0.24 psi	49.64 psi	0.00	OK
+1.20D	0.21 psi	0.21 psi	0.21 psi	49.64 psi	0.00	OK
+1.20D+0.50W	0.21 psi	0.21 psi	0.21 psi	49.64 psi	0.00	OK
+1.20D+W	0.21 psi	0.21 psi	0.21 psi	49.64 psi	0.00	OK
+0.90D+W	0.16 psi	0.16 psi	0.16 psi	49.64 psi	0.00	OK
+0.90D	0.16 psi	0.16 psi	0.16 psi	49.64 psi	0.00	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.26 psi	1.26 psi	1.26 psi	49.64 psi	0.03	OK
+1.20D	1.08 psi	1.08 psi	1.08 psi	49.64 psi	0.02	OK
+1.20D+0.50W	2.13 psi	4.29 psi	4.29 psi	49.64 psi	0.09	OK
+1.20D+W	5.34 psi	7.50 psi	7.50 psi	49.64 psi	0.15	OK
+0.90D+W	5.57 psi	7.35 psi	7.35 psi	49.64 psi	0.15	OK
+0.90D	0.81 psi	0.81 psi	0.81 psi	49.64 psi	0.02	OK

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	1.33 psi	147.57psi	0.00903	OK
+1.20D	1.14 psi	147.57psi	0.00774	OK
+1.20D+0.50W	1.14 psi	147.57psi	0.00774	OK
+1.20D+W	1.14 psi	147.57psi	0.00774	OK
+0.90D+W	0.91 psi	147.57psi	0.006133	OK
+0.90D	0.86 psi	147.57psi	0.005805	OK

All units k



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Geotechnical	Date:	2/4/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park - Whistle Anchor Bolt		
Address:			
Phone:			
E-mail:			

1. Project information

Project description:
Location:
Design name: Design

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19
Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place
Material: AB_H
Diameter (inch): 1.000
Effective Embedment depth, h_{ef} (inch): 8.000
Anchor category: -
Anchor ductility: Yes
 h_{min} (inch): 10.63
 C_{min} (inch): 6.00
 S_{min} (inch): 6.00

Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Uncracked
Compressive strength, f'_c (psi): 2500
 $\Psi_{c,v}$: 1.4
Reinforcement condition: B tension, B shear
Supplemental edge reinforcement: No
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: No
Build-up grout pad: No

Recommended Anchor

Anchor Name: PAB Pre-Assembled Anchor Bolt - PAB8H (1"Ø)





Company:	GMU Geotechnical	Date:	2/4/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park - Whistle Anchor Bolt		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

Apply entire shear load at front row: Yes

Anchors only resisting wind and/or seismic loads: No

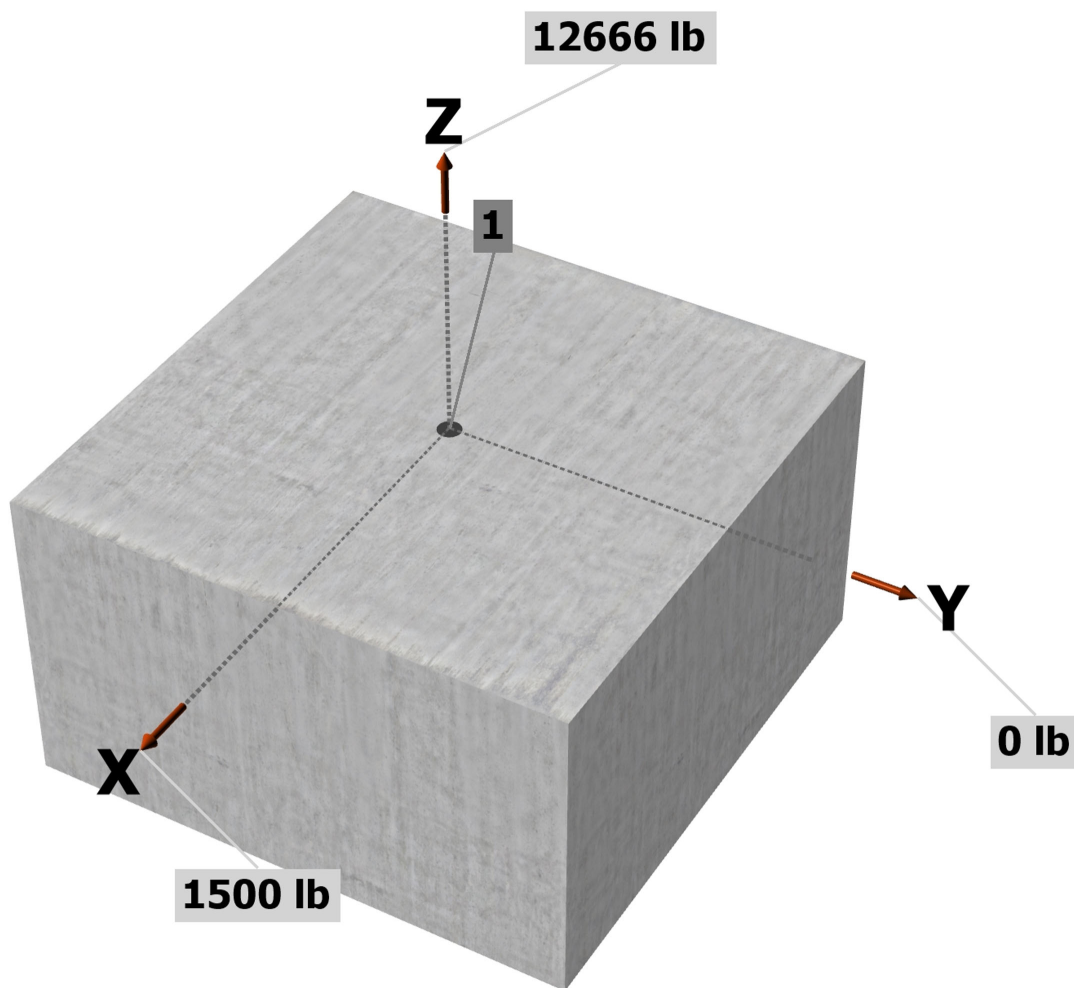
Strength level loads:

N_{ua} [lb]: 12666

V_{uax} [lb]: 1500

V_{uay} [lb]: 0

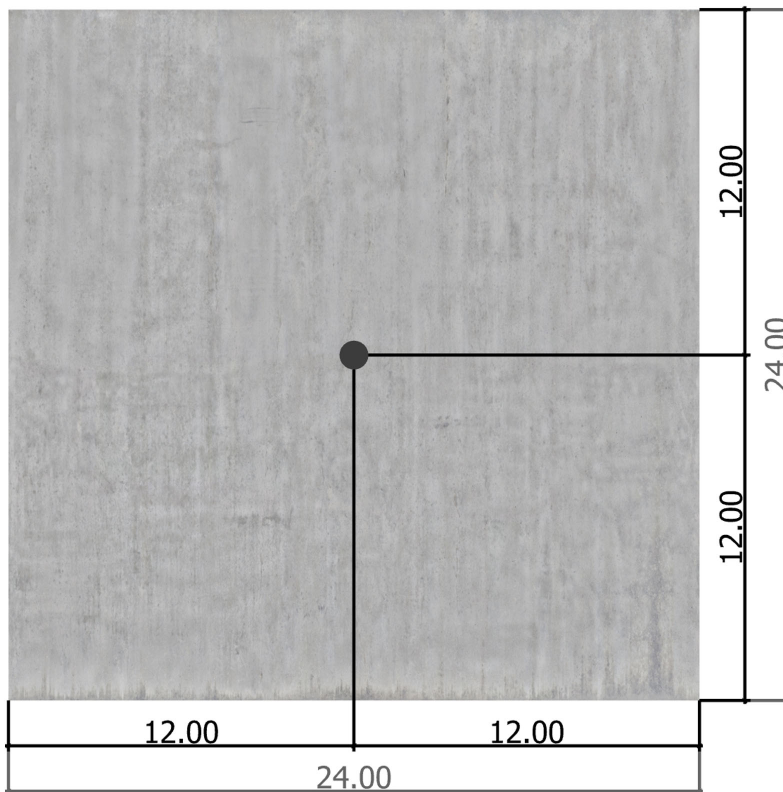
<Figure 1>





Company:	GMU Geotechnical	Date:	2/4/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park - Whistle Anchor Bolt		
Address:			
Phone:			
E-mail:			

<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	12666.0	1500.0	0.0	1500.0
Sum	12666.0	1500.0	0.0	1500.0

Maximum concrete compression strain (‰): 0.00

Maximum concrete compression stress (psi): 0

Resultant tension force (lb): 12666

Resultant compression force (lb): 0

Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00

Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00

Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00

Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Geotechnical	Date:	2/4/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park - Whistle Anchor Bolt		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
72720	0.75	54540

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \text{ (Eq. 17.6.2.2.1)}$$

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
24.0	1.00	2500	8.000	27153

$$\phi N_{cb} = \phi (A_{Nc} / A_{Nco}) \psi'_{ed,N} \psi'_{c,N} \psi'_{cp,N} N_b \text{ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)}$$

A_{Nc} (in ²)	A_{Nco} (in ²)	$C_{a,min}$ (in)	$\psi'_{ed,N}$	$\psi'_{c,N}$	$\psi'_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
576.00	576.00	12.00	1.000	1.25	1.000	27153	0.70	23759

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$$\phi N_{pn} = \phi \psi'_{c,P} N_p = \phi \psi'_{c,P} 8 A_{brg} f'_c \text{ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)}$$

$\psi'_{c,P}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	5.15	2500	0.70	101018



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Geotechnical	Date:	2/4/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park - Whistle Anchor Bolt		
Address:			
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
43630	1.0	0.65	28360

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.7.2)

Shear perpendicular to edge in x-direction:

$$V_{bx} = \min[7(l_e / d_a)^{0.2} \sqrt{d_a \lambda_a} \sqrt{f'_c c_{a1}^{1.5}}; 9 \lambda_a \sqrt{f'_c c_{a1}^{1.5}}] \text{ (Eq. 17.7.2.2.1a \& Eq. 17.7.2.2.1b)}$$

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
8.00	1.000	1.00	2500	12.00	18706

$$\phi V_{cbx} = \phi (A_{Vc} / A_{Vco}) \psi_{ed,V} \psi_{c,V} \psi_{h,V} V_{bx} \text{ (Sec. 17.5.1.2 \& Eq. 17.7.2.1a)}$$

A_{Vc} (in ²)	A_{Vco} (in ²)	$\psi_{ed,V}$	$\psi_{c,V}$	$\psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
432.00	648.00	0.900	1.400	1.000	18706	0.70	10999

Shear parallel to edge in y-direction:

$$V_{by} = \min[7(l_e / d_a)^{0.2} \sqrt{d_a \lambda_a} \sqrt{f'_c c_{a1}^{1.5}}; 9 \lambda_a \sqrt{f'_c c_{a1}^{1.5}}] \text{ (Eq. 17.7.2.2.1a \& Eq. 17.7.2.2.1b)}$$

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
8.00	1.000	1.00	2500	12.00	18706

$$\phi V_{cbx} = \phi (2)(A_{Vc} / A_{Vco}) \psi_{ed,V} \psi_{c,V} \psi_{h,V} V_{bx} \text{ (Sec. 17.5.1.2, 17.7.2.1(c) \& Eq. 17.7.2.1a)}$$

A_{Vc} (in ²)	A_{Vco} (in ²)	$\psi_{ed,V}$	$\psi_{c,V}$	$\psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
432.00	648.00	1.000	1.400	1.000	18706	0.70	24443

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp} (A_{Nc} / A_{Nco}) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \text{ (Sec. 17.5.1.2 \& Eq. 17.7.3.1a)}$$

k_{cp}	A_{Nc} (in ²)	A_{Nco} (in ²)	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	576.00	576.00	1.000	1.250	1.000	27153	0.70	47518

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.8)

Tension	Factored Load, N _{ua} (lb)	Design Strength, ϕN _n (lb)	Ratio	Status	
Steel	12666	54540	0.23	Pass	
Concrete breakout	12666	23759	0.53	Pass (Governs)	
Pullout	12666	101018	0.13	Pass	
Shear	Factored Load, V _{ua} (lb)	Design Strength, ϕV _n (lb)	Ratio	Status	
Steel	1500	28360	0.05	Pass	
T Concrete breakout x+	1500	10999	0.14	Pass (Governs)	
|| Concrete breakout y+	1500	24443	0.06	Pass (Governs)	
Pryout	1500	47518	0.03	Pass	
Interaction check	(N _{ua} /ϕN _{ua}) ^{5/3}	(V _{ua} /ϕV _{ua}) ^{5/3}	Utilization Ratio	Permissible	Status
Sec. R17.8	0.35	0.04	38.7%	1.0	Pass

PAB8H (1"Ø) with hef = 8.000 inch meets the selected design criteria.

12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.

54. E03-B – Baseball, (W-11)

E03-B Column / Signage Drawing W-11

Baseball

NOTE: GRAVITY LOADING IS ASSUMED, WIND LOADING BASED ON PROJECTED AREA OF SURFACE

Overall Dimensions: 28' high x 28' wide x 24' deep

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Approximate (TBD) = 10 kips

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 10 \text{ kips} = 10.8 \text{ kips}$

Applied Moment to each footing, (seismic) = $10.8 \times 15' = 162 \text{ k-ft}$

Wind Load, (ASCE 7-22)

Total Wind Load = $30 \text{ psf} \times 28' \times 28' = 23.5 \text{ kips}$

Applied Moment, (wind) = $23.5 \text{ kips} \times 14' = 329 \text{ k-ft}$

(Wind Controls)

Load per bolt line:

$329 \text{ k-ft} / 20 \text{ ft} = 16 \text{ kips}$ (Tension per side)

5 bolts per line = $16 \text{ kips} / 5 = 3.3 \text{ kips}$ tension / pullout load on anchor bolt

Foundation weight to resist overturning:

$16 \text{ kips} = 0.150 \text{ kips/cu ft} \times 20 \text{ ft dia} \times \text{slab thickness} \Rightarrow \text{minimum slab thickness} = 4 \text{ in}$

Foundation weight: $20' \times 20' \times 18'' = 90 \text{ kips}$, (OK)

Tension / Pullout per anchor bolt = 3.3 kips

Shear per anchor bolt = $23.5 \text{ kips} / 10 \text{ bolts} = 2.35 \text{ kips}$

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Sign Type E03-B - Baseball

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	Yes
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	Yes
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	1.50 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf 1.0 ft

Increases based on footing plan dimension

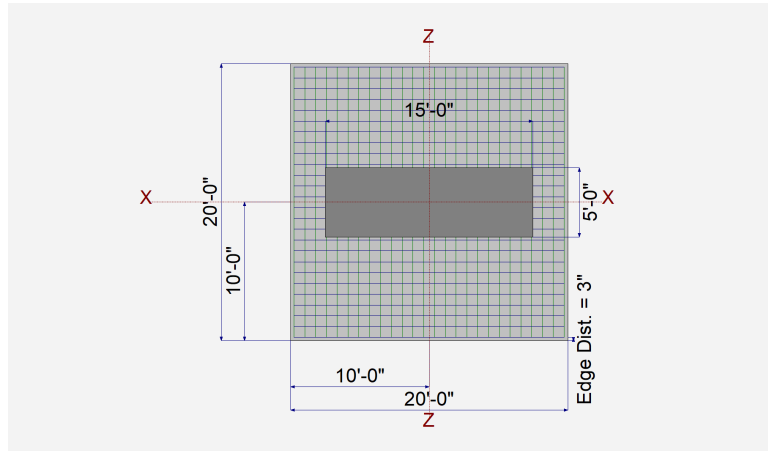
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf 1.0 ft
---	---	--------------------

Dimensions

Width parallel to X-X Axis	=	20.0 ft
Length parallel to Z-Z Axis	=	20.0 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	180.0 in
pz : parallel to Z-Z Axis	=	60.0 in
Height	=	1.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



Reinforcing

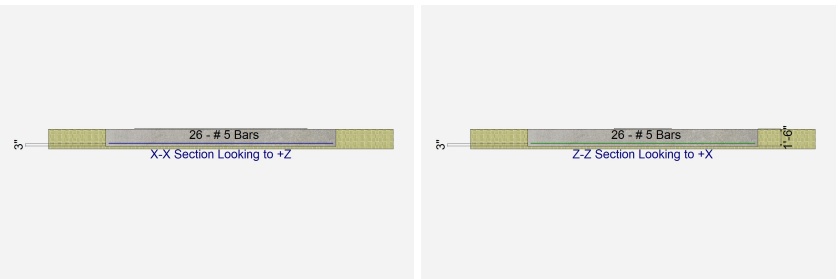
Bars parallel to X-X Axis	=	
Number of Bars	=	26
Reinforcing Bar Size	=	# 5

Bars parallel to Z-Z Axis	=	
Number of Bars	=	26
Reinforcing Bar Size	=	# 5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	10.0						k
OB : Overburden	=							ksf
M-xx	=				329.0	162.0		k-ft
M-zz	=							k-ft
V-x	=							k
V-z	=							k

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Sign Type E03-B - Baseball

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.1118	Soil Bearing	0.3913 ksf	3.50 ksf	+D+0.60W about X-X axis
PASS	2.948	Overturning - X-X	197.40 k-ft	582.0 k-ft	+0.60D+0.60W
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.004466	Z Flexure (+X)	0.1191 k-ft/ft	26.665 k-ft/ft	+1.40D
PASS	0.004466	Z Flexure (-X)	0.1191 k-ft/ft	26.665 k-ft/ft	+1.40D
PASS	0.2297	X Flexure (+Z)	6.124 k-ft/ft	26.665 k-ft/ft	+1.20D+W
PASS	0.1675	X Flexure (-Z)	4.466 k-ft/ft	26.665 k-ft/ft	+0.90D+W
PASS	0.005126	1-way Shear (+X)	0.2545 psi	49.643 psi	+1.40D
PASS	0.005126	1-way Shear (-X)	0.2545 psi	49.643 psi	+1.40D
PASS	0.1408	1-way Shear (+Z)	6.991 psi	49.643 psi	+1.20D+W
PASS	0.1010	1-way Shear (-Z)	5.012 psi	49.643 psi	+0.90D+W
PASS	0.009422	2-way Punching	1.390 psi	147.573 psi	+1.40D



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	3.50	n/a	0.0	0.2448	0.2448	n/a	n/a	0.070
X-X, +D+0.60W	3.50	n/a	24.195	0.09820	0.3913	n/a	n/a	0.112
X-X, +D+0.450W	3.50	n/a	18.146	0.1348	0.3547	n/a	n/a	0.101
X-X, +0.60D+0.60W	3.50	n/a	40.324	0.000280	0.2934	n/a	n/a	0.084
X-X, +D+0.70E	3.50	n/a	13.899	0.1606	0.3290	n/a	n/a	0.094
X-X, +D+0.5250E	3.50	n/a	10.424	0.1816	0.3079	n/a	n/a	0.088
X-X, +0.60D+0.70E	3.50	n/a	23.165	0.06266	0.2311	n/a	n/a	0.066
Z-Z, D Only	3.50	0.0	n/a	n/a	n/a	0.2448	0.2448	0.070
Z-Z, +D+0.60W	3.50	0.0	n/a	n/a	n/a	0.2448	0.2448	0.070
Z-Z, +D+0.450W	3.50	0.0	n/a	n/a	n/a	0.2448	0.2448	0.070
Z-Z, +0.60D+0.60W	3.50	0.0	n/a	n/a	n/a	0.1469	0.1469	0.042
Z-Z, +D+0.70E	3.50	0.0	n/a	n/a	n/a	0.2448	0.2448	0.070
Z-Z, +D+0.5250E	3.50	0.0	n/a	n/a	n/a	0.2448	0.2448	0.070
Z-Z, +0.60D+0.70E	3.50	0.0	n/a	n/a	n/a	0.1469	0.1469	0.042

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	197.40 k-ft	970.0 k-ft	4.914	OK
X-X, +D+0.450W	148.050 k-ft	970.0 k-ft	6.552	OK
X-X, +0.60D+0.60W	197.40 k-ft	582.0 k-ft	2.948	OK
X-X, +D+0.70E	113.40 k-ft	970.0 k-ft	8.554	OK
X-X, +D+0.5250E	85.050 k-ft	970.0 k-ft	11.405	OK
X-X, +0.60D+0.70E	113.40 k-ft	582.0 k-ft	5.132	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.450W	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.5250E	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Sign Type E03-B - Baseball

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				
Footing Flexure				

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	1.073	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.40D	1.073	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D	0.9201	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D	0.9201	-Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D+0.50W	3.522	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D+0.50W	1.682	-Z	Top	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D+W	6.124	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D+W	4.284	-Z	Top	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +0.90D+W	5.923	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +0.90D+W	4.466	-Z	Top	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D+E	3.482	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +1.20D+E	1.642	-Z	Top	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +0.90D+E	3.252	+Z	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
X-X, +0.90D+E	1.872	-Z	Top	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.40D	0.1191	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.40D	0.1191	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D	0.1021	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D	0.1021	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D+0.50W	0.1021	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D+0.50W	0.1021	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D+W	0.1021	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D+W	0.1021	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +0.90D+W	0.07656	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +0.90D+W	0.07656	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D+E	0.1021	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +1.20D+E	0.1021	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +0.90D+E	0.07656	-X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK
Z-Z, +0.90D+E	0.07656	+X	Bottom	0.3888	ACI 7.6.1.1	0.4030	26.665	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.25 psi	0.25 psi	0.25 psi	49.64 psi	0.01	OK
+1.20D	0.22 psi	0.22 psi	0.22 psi	49.64 psi	0.00	OK
+1.20D+0.50W	0.22 psi	0.22 psi	0.22 psi	49.64 psi	0.00	OK
+1.20D+W	0.22 psi	0.22 psi	0.22 psi	49.64 psi	0.00	OK
+0.90D+W	0.16 psi	0.16 psi	0.16 psi	49.64 psi	0.00	OK
+1.20D+E	0.22 psi	0.22 psi	0.22 psi	49.64 psi	0.00	OK
+0.90D+E	0.16 psi	0.16 psi	0.16 psi	49.64 psi	0.00	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.32 psi	1.32 psi	1.32 psi	49.64 psi	0.03	OK
+1.20D	1.13 psi	1.13 psi	1.13 psi	49.64 psi	0.02	OK
+1.20D+0.50W	1.81 psi	4.06 psi	4.06 psi	49.64 psi	0.08	OK
+1.20D+W	4.74 psi	6.99 psi	6.99 psi	49.64 psi	0.14	OK
+0.90D+W	5.01 psi	6.74 psi	6.74 psi	49.64 psi	0.14	OK
+1.20D+E	1.76 psi	4.02 psi	4.02 psi	49.64 psi	0.08	OK
+0.90D+E	2.04 psi	3.73 psi	3.73 psi	49.64 psi	0.08	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	1.39 psi	147.57psi	0.009422	OK
+1.20D	1.19 psi	147.57psi	0.008076	OK
+1.20D+0.50W	1.19 psi	147.57psi	0.008076	OK
+1.20D+W	1.19 psi	147.57psi	0.008076	OK
+0.90D+W	0.91 psi	147.57psi	0.006136	OK
+1.20D+E	1.19 psi	147.57psi	0.008076	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Sign Type E03-B - Baseball

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D+E	0.89 psi	147.57 psi	0.006057	OK



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Geotechnical	Date:	2/4/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park - Baseball Anchor Bolt		
Address:			
Phone:			
E-mail:			

1. Project information

Project description:
Location:
Design name: Design

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19
Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place
Material: AB_H
Diameter (inch): 1.000
Effective Embedment depth, h_{ef} (inch): 8.000
Anchor category: -
Anchor ductility: Yes
 h_{min} (inch): 10.63
 C_{min} (inch): 6.00
 S_{min} (inch): 6.00

Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Uncracked
Compressive strength, f'_c (psi): 2500
 $\Psi_{c,v}$: 1.4
Reinforcement condition: B tension, B shear
Supplemental edge reinforcement: No
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: No
Build-up grout pad: No

Recommended Anchor

Anchor Name: PAB Pre-Assembled Anchor Bolt - PAB8H (1"Ø)





Company:	GMU Geotechnical	Date:	2/4/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park - Baseball Anchor Bolt		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

Apply entire shear load at front row: Yes

Anchors only resisting wind and/or seismic loads: No

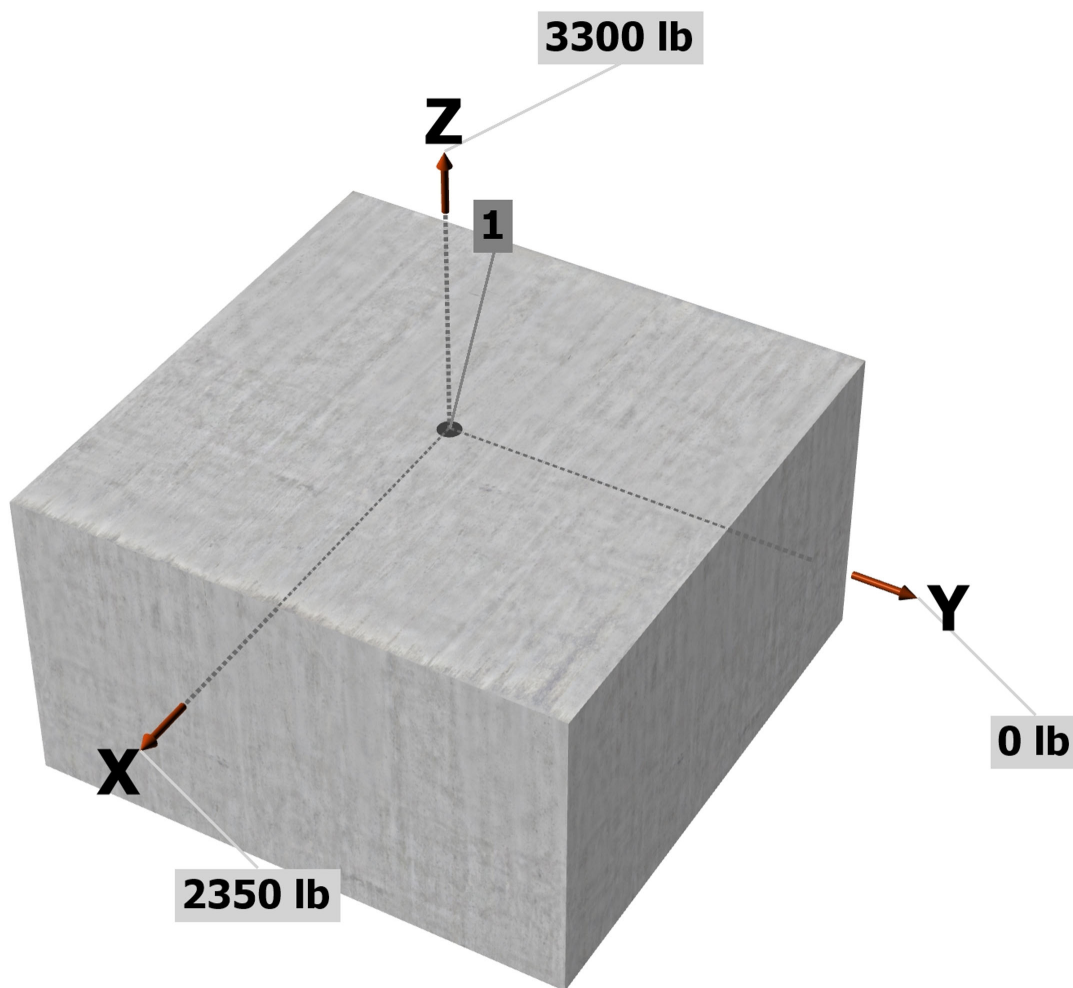
Strength level loads:

N_{ua} [lb]: 3300

V_{uax} [lb]: 2350

V_{uay} [lb]: 0

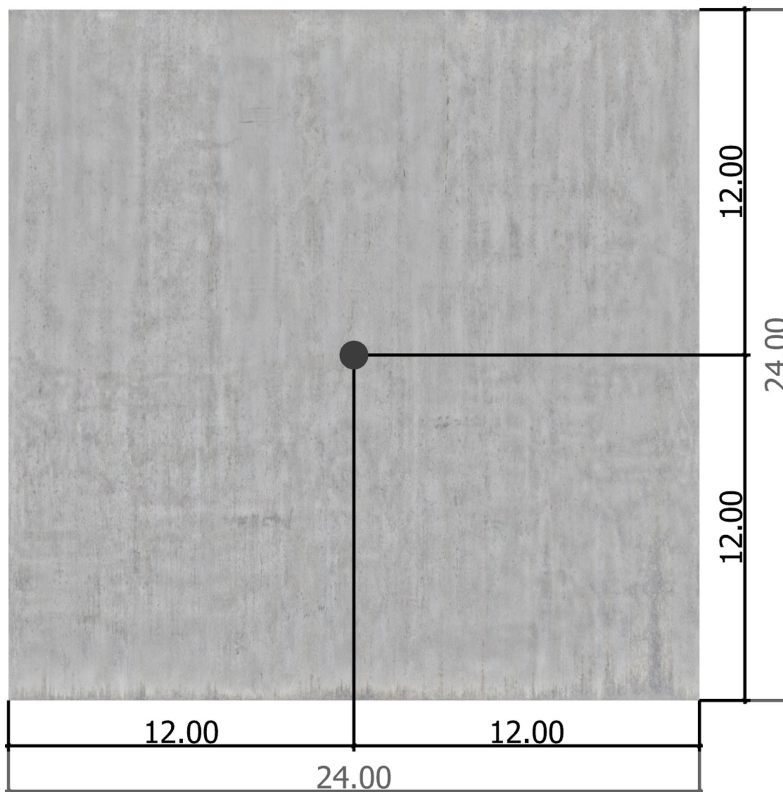
<Figure 1>





Company:	GMU Geotechnical	Date:	2/4/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park - Baseball Anchor Bolt		
Address:			
Phone:			
E-mail:			

<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	3300.0	2350.0	0.0	2350.0
Sum	3300.0	2350.0	0.0	2350.0

Maximum concrete compression strain (‰): 0.00

Maximum concrete compression stress (psi): 0

Resultant tension force (lb): 3300

Resultant compression force (lb): 0

Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00

Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00

Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00

Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00



Company:	GMU Geotechnical	Date:	2/4/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park - Baseball Anchor Bolt		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
72720	0.75	54540

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \text{ (Eq. 17.6.2.2.1)}$$

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
24.0	1.00	2500	8.000	27153

$$\phi N_{cb} = \phi (A_{Nc} / A_{Nco}) \psi'_{ed,N} \psi'_{c,N} \psi'_{cp,N} N_b \text{ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)}$$

A_{Nc} (in ²)	A_{Nco} (in ²)	$C_{a,min}$ (in)	$\psi'_{ed,N}$	$\psi'_{c,N}$	$\psi'_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
576.00	576.00	12.00	1.000	1.25	1.000	27153	0.70	23759

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$$\phi N_{pn} = \phi \psi'_{c,P} N_p = \phi \psi'_{c,P} 8 A_{brg} f'_c \text{ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)}$$

$\psi'_{c,P}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	5.15	2500	0.70	101018



Company:	GMU Geotechnical	Date:	2/4/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park - Baseball Anchor Bolt		
Address:			
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
43630	1.0	0.65	28360

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.7.2)

Shear perpendicular to edge in x-direction:

$$V_{bx} = \min[7(l_e/d_a)^{0.2}\sqrt{d_a\lambda_a\sqrt{f'_c}c_{a1}^{1.5}}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}] \text{ (Eq. 17.7.2.2.1a \& Eq. 17.7.2.2.1b)}$$

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
8.00	1.000	1.00	2500	12.00	18706

$$\phi V_{cbx} = \phi (A_{Vc}/A_{Vco}) \psi_{ed,V} \psi_{c,V} \psi_{h,V} V_{bx} \text{ (Sec. 17.5.1.2 \& Eq. 17.7.2.1a)}$$

A_{Vc} (in ²)	A_{Vco} (in ²)	$\psi_{ed,V}$	$\psi_{c,V}$	$\psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
432.00	648.00	0.900	1.400	1.000	18706	0.70	10999

Shear parallel to edge in y-direction:

$$V_{by} = \min[7(l_e/d_a)^{0.2}\sqrt{d_a\lambda_a\sqrt{f'_c}c_{a1}^{1.5}}; 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}] \text{ (Eq. 17.7.2.2.1a \& Eq. 17.7.2.2.1b)}$$

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
8.00	1.000	1.00	2500	12.00	18706

$$\phi V_{cbx} = \phi (2)(A_{Vc}/A_{Vco}) \psi_{ed,V} \psi_{c,V} \psi_{h,V} V_{by} \text{ (Sec. 17.5.1.2, 17.7.2.1(c) \& Eq. 17.7.2.1a)}$$

A_{Vc} (in ²)	A_{Vco} (in ²)	$\psi_{ed,V}$	$\psi_{c,V}$	$\psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
432.00	648.00	1.000	1.400	1.000	18706	0.70	24443

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp} (A_{Nc}/A_{Nco}) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \text{ (Sec. 17.5.1.2 \& Eq. 17.7.3.1a)}$$

k_{cp}	A_{Nc} (in ²)	A_{Nco} (in ²)	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	576.00	576.00	1.000	1.250	1.000	27153	0.70	47518

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status	
Steel	3300	54540	0.06	Pass	
Concrete breakout	3300	23759	0.14	Pass (Governs)	
Pullout	3300	101018	0.03	Pass	
Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status	
Steel	2350	28360	0.08	Pass	
T Concrete breakout x+	2350	10999	0.21	Pass (Governs)	
|| Concrete breakout y+	2350	24443	0.10	Pass (Governs)	
Pryout	2350	47518	0.05	Pass	
Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Utilization Ratio	Permissible	Status
Sec. R17.8	0.04	0.08	11.4%	1.0	Pass

PAB8H (1"Ø) with hef = 8.000 inch meets the selected design criteria.

12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.

55. E03-S – Soccer, (W-12)

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC#: KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Sign Type E03-S - Soccer

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	Yes
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	Yes
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	1.50 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.0 ft

Increases based on footing plan dimension

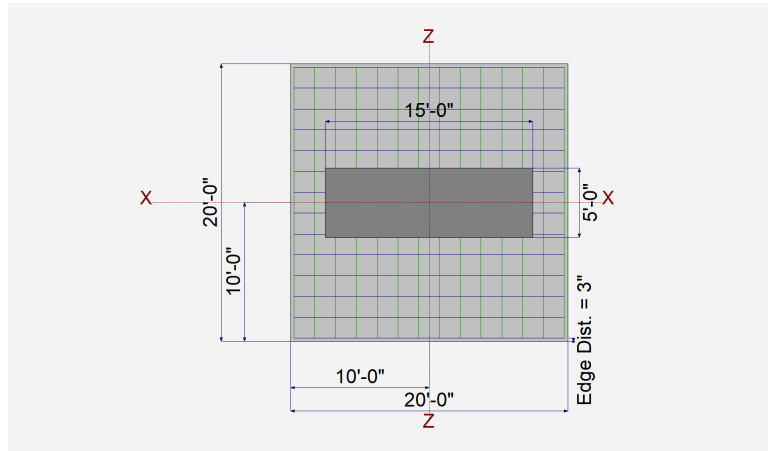
Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

Dimensions

Width parallel to X-X Axis	=	20.0 ft
Length parallel to Z-Z Axis	=	20.0 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	180.0 in
pz : parallel to Z-Z Axis	=	60.0 in
Height	=	6.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



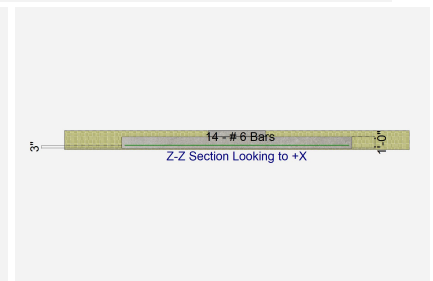
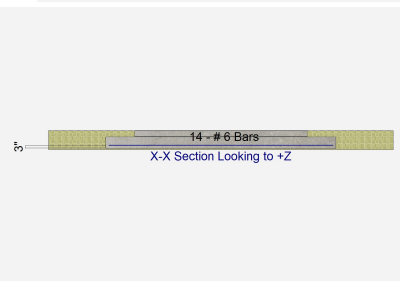
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	14.0
Reinforcing Bar Size	=	# 6
Bars parallel to Z-Z Axis	=	
Number of Bars	=	14.0
Reinforcing Bar Size	=	# 6

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	17.0					k
OB : Overburden	=						ksf
M-xx	=				513.0		k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Sign Type E03-S - Soccer

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.1355	Soil Bearing	0.4743 ksf	3.50 ksf	+D+0.60W about X-X axis
PASS	1.810	Overturning - X-X	307.80 k-ft	557.25 k-ft	+0.60D+0.60W
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.01645	Z Flexure (+X)	0.20 k-ft/ft	12.160 k-ft/ft	+1.40D
PASS	0.01645	Z Flexure (-X)	0.20 k-ft/ft	12.160 k-ft/ft	+1.40D
PASS	0.8849	X Flexure (+Z)	10.761 k-ft/ft	12.160 k-ft/ft	+0.90D+W
PASS	0.5053	X Flexure (-Z)	6.145 k-ft/ft	12.160 k-ft/ft	+1.20D+W
PASS	0.01985	1-way Shear (+X)	1.068 psi	53.813 psi	+1.40D
PASS	0.01985	1-way Shear (-X)	1.068 psi	53.813 psi	+1.40D
PASS	0.3891	1-way Shear (+Z)	20.940 psi	53.813 psi	+0.90D+W
PASS	0.2310	1-way Shear (-Z)	12.433 psi	53.813 psi	+1.20D+W
PASS	0.03372	2-way Punching	4.315 psi	127.962 psi	+1.40D



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	3.50	n/a	0.0	0.2458	0.2458	n/a	n/a	0.070
X-X, +D+0.60W	3.50	n/a	37.570	0.01724	0.4743	n/a	n/a	0.136
X-X, +D+0.450W	3.50	n/a	28.178	0.07438	0.4172	n/a	n/a	0.119
X-X, +0.60D+0.60W	3.50	n/a	62.617	0.0	0.4083	n/a	n/a	0.117
X-X, +0.60D	3.50	n/a	0.0	0.1475	0.1475	n/a	n/a	0.042
Z-Z, D Only	3.50	0.0	n/a	n/a	n/a	0.2458	0.2458	0.070
Z-Z, +D+0.60W	3.50	0.0	n/a	n/a	n/a	0.2458	0.2458	0.070
Z-Z, +D+0.450W	3.50	0.0	n/a	n/a	n/a	0.2458	0.2458	0.070
Z-Z, +0.60D+0.60W	3.50	0.0	n/a	n/a	n/a	0.1475	0.1475	0.042
Z-Z, +0.60D	3.50	0.0	n/a	n/a	n/a	0.1475	0.1475	0.042

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	307.80 k-ft	928.75 k-ft	3.017	OK
X-X, +D+0.450W	230.850 k-ft	928.75 k-ft	4.023	OK
X-X, +0.60D+0.60W	307.80 k-ft	557.25 k-ft	1.810	OK
X-X, +0.60D	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.450W	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
Z-Z, +0.60D	None	0.0 k-ft	Infinity	OK

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
--	---------------	-----------------	-----------------	--------

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	1.802	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
X-X, +1.40D	1.802	-Z	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Sign Type E03-S - Soccer

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in ²	Gvrn. As in ²	Actual As in ²	Phi*Mn k-ft	Status
X-X, +1.20D	1.545	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
X-X, +1.20D	1.545	-Z	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
X-X, +1.20D+0.50W	5.602	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
X-X, +1.20D+0.50W	2.512	-Z	Top	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
X-X, +1.20D+W	9.933	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
X-X, +1.20D+W	6.145	-Z	Top	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
X-X, +1.20D+W	10.761	+Z	Bottom	0.2717	Applied Mu	0.3080	12.160	OK
X-X, +0.90D+W	5.062	-Z	Top	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
X-X, +0.90D	1.159	+Z	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
X-X, +0.90D	1.159	-Z	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +1.40D	0.20	-X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +1.40D	0.20	+X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +1.20D	0.1714	-X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +1.20D	0.1714	+X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +1.20D+0.50W	0.1714	-X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +1.20D+0.50W	0.1714	+X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +1.20D+W	0.1714	-X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +1.20D+W	0.1714	+X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +0.90D+W	0.1286	-X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +0.90D+W	0.1286	+X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +0.90D	0.1286	-X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK
Z-Z, +0.90D	0.1286	+X	Bottom	0.2592	ACI 7.6.1.1	0.3080	12.160	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.07 psi	1.07 psi	1.07 psi	53.81 psi	0.02	OK
+1.20D	0.92 psi	0.92 psi	0.92 psi	53.81 psi	0.02	OK
+1.20D+0.50W	0.92 psi	0.92 psi	0.92 psi	53.81 psi	0.02	OK
+1.20D+W	0.92 psi	0.92 psi	0.92 psi	53.81 psi	0.02	OK
+0.90D+W	0.69 psi	0.69 psi	0.69 psi	53.81 psi	0.01	OK
+0.90D	0.69 psi	0.69 psi	0.69 psi	53.81 psi	0.01	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	4.04 psi	4.04 psi	4.04 psi	53.81 psi	0.07	OK
+1.20D	3.46 psi	3.46 psi	3.46 psi	53.81 psi	0.06	OK
+1.20D+0.50W	4.54 psi	11.45 psi	11.45 psi	53.81 psi	0.21	OK
+1.20D+W	12.43 psi	19.91 psi	19.91 psi	53.81 psi	0.37	OK
+0.90D+W	11.33 psi	20.94 psi	20.94 psi	53.81 psi	0.39	OK
+0.90D	2.59 psi	2.59 psi	2.59 psi	53.81 psi	0.05	OK

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	4.32 psi	127.96psi	0.03372	OK
+1.20D	3.70 psi	127.96psi	0.0289	OK
+1.20D+0.50W	3.70 psi	127.96psi	0.0289	OK
+1.20D+W	3.88 psi	127.96psi	0.0303	OK
+0.90D+W	4.20 psi	127.96psi	0.03284	OK
+0.90D	2.77 psi	127.96psi	0.02168	OK

All units k

56. E04 Column, (W-09)

E04 Column / Signage Drawing W-9

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $20 \text{ psf} \times 4' \times 20' = 1.6 \text{ kips}$

$W = 1.6 \text{ kips}$

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 1.6 \text{ kips} = 1.728 \text{ kips}$

Applied Moment to each footing, (seismic) = $1.728 \times 10' = 17.28 \text{ k-ft}$

Post Moment = $17.28 \text{ k-ft} / 2 = 8.64 \text{ k-ft}$

Wind Load, (ASCE 7-22)

Total Wind Load = $30 \text{ psf} \times 4' \times 20' = 2.4 \text{ kips}$

Applied Moment, (wind) = $2.4 \text{ kips} \times 10' = 24 \text{ k-ft}$

(Wind Controls)

Column Load: 24 k-ft

Post Moment = $24 \text{ k-ft} / 2 = 12 \text{ k-ft}$

Column Wind Load:

$12 \text{ k-ft} / 10 \text{ ft} = 1.2 \text{ kips @ } 10 \text{ ft}$

Column Seismic Load:

$8.64 \text{ k-ft} / 10 \text{ ft} = 0.864 \text{ kips @ } 10 \text{ ft}$

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E04 Column Footing

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-16

General Information

Material Properties

f'c : Concrete 28 day strength	=	4.50 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2,000.0 ksf
Soil Density	=	120.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	500.0 pcf
Soil/Concrete Friction Coeff.	=	0.480

Increases based on footing Depth

Footing base depth below soil surface	=	3.50 ft
Allow press. increase per foot of depth when footing base is below	=	0.20 ksf
	=	1.50 ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth when max. length or width is greater than	=	0.20 ksf
	=	1.0 ft

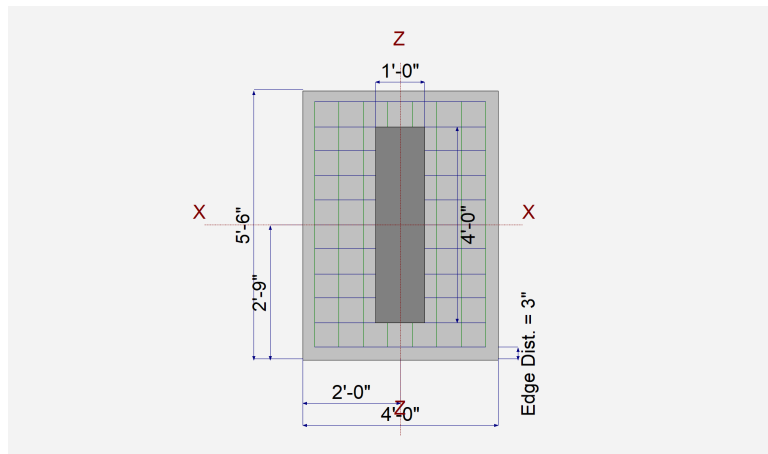
Dimensions

Width parallel to X-X Axis	=	4.0 ft
Length parallel to Z-Z Axis	=	5.50 ft
Footing Thickness	=	18.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	12.0 in
pz : parallel to Z-Z Axis	=	48.0 in
Height	=	24.0 in

Rebar Centerline to Edge of Concrete...
at Bottom of footing = 3.0 in



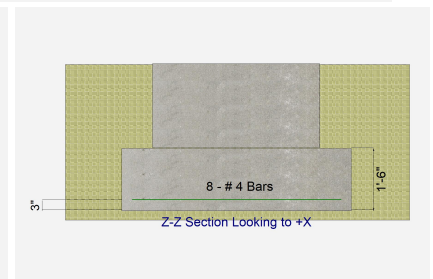
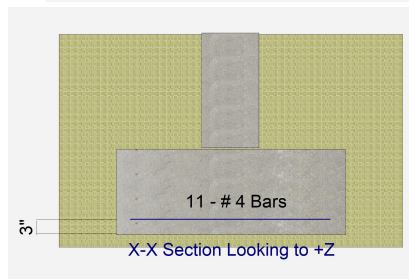
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	11
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	8
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

Bars along X-X Axis	
# Bars required within zone	84.2 %
# Bars required on each side of zone	15.8 %



Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	1.60						k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=				12.0	8.640		k-ft
V-x	=							k
V-z	=							k

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E04 Column Footing

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.2779	Soil Bearing	0.9726 ksf	3.50 ksf	+D+0.60W about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.784	Overturning - Z-Z	7.20 k-ft	12.846 k-ft	+0.60D+0.60W
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.03367	Z Flexure (+X)	0.8933 k-ft/ft	26.529 k-ft/ft	+0.90D+W
PASS	0.02230	Z Flexure (-X)	0.5917 k-ft/ft	26.529 k-ft/ft	+1.20D+W
PASS	0.000431	X Flexure (+Z)	0.01145 k-ft/ft	26.529 k-ft/ft	+1.40D
PASS	0.000431	X Flexure (-Z)	0.01145 k-ft/ft	26.529 k-ft/ft	+1.40D
PASS	0.02676	1-way Shear (+X)	1.405 psi	52.523 psi	+0.90D+W
PASS	0.01394	1-way Shear (-X)	0.7320 psi	52.523 psi	+1.20D+W
PASS	n/a	1-way Shear (+Z)	0.0 psi	52.523 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	52.523 psi	n/a
PASS	0.001043	2-way Punching	0.1574 psi	150.935 psi	+0.90D+W



Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	3.50	n/a	0.0	0.4866	0.4866	n/a	n/a	0.139
X-X, +D+0.60W	3.50	n/a	0.0	0.4866	0.4866	n/a	n/a	0.139
X-X, +D+0.450W	3.50	n/a	0.0	0.4866	0.4866	n/a	n/a	0.139
X-X, +0.60D+0.60W	3.50	n/a	0.0	0.2920	0.2920	n/a	n/a	0.083
X-X, +D+0.70E	3.50	n/a	0.0	0.4866	0.4866	n/a	n/a	0.139
X-X, +D+0.5250E	3.50	n/a	0.0	0.4866	0.4866	n/a	n/a	0.139
X-X, +0.60D+0.70E	3.50	n/a	0.0	0.2920	0.2920	n/a	n/a	0.083
Z-Z, D Only	3.50	0.0	n/a	n/a	n/a	0.4866	0.4866	0.139
Z-Z, +D+0.60W	3.50	8.071	n/a	n/a	n/a	0.000553	0.9726	0.278
Z-Z, +D+0.450W	3.50	6.053	n/a	n/a	n/a	0.1221	0.8511	0.243
Z-Z, +0.60D+0.60W	3.50	13.452	n/a	n/a	n/a	0.0	0.8790	0.251
Z-Z, +D+0.70E	3.50	6.780	n/a	n/a	n/a	0.07835	0.8948	0.256
Z-Z, +D+0.5250E	3.50	5.085	n/a	n/a	n/a	0.1804	0.7928	0.227
Z-Z, +0.60D+0.70E	3.50	11.299	n/a	n/a	n/a	0.0	0.7310	0.209

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
X-X, D Only	None	0.0 k-ft	Infinity	OK
X-X, +D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.450W	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.60W	None	0.0 k-ft	Infinity	OK
X-X, +D+0.70E	None	0.0 k-ft	Infinity	OK
X-X, +D+0.5250E	None	0.0 k-ft	Infinity	OK
X-X, +0.60D+0.70E	None	0.0 k-ft	Infinity	OK
Z-Z, D Only	None	0.0 k-ft	Infinity	OK
Z-Z, +D+0.60W	7.20 k-ft	21.410 k-ft	2.974	OK
Z-Z, +D+0.450W	5.40 k-ft	21.410 k-ft	3.965	OK
Z-Z, +0.60D+0.60W	7.20 k-ft	12.846 k-ft	1.784	OK
Z-Z, +D+0.70E	6.048 k-ft	21.410 k-ft	3.540	OK
Z-Z, +D+0.5250E	4.536 k-ft	21.410 k-ft	4.720	OK
Z-Z, +0.60D+0.70E	6.048 k-ft	12.846 k-ft	2.124	OK

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E04 Column Footing

Sliding Stability

All units k

Force Application Axis
Load Combination...

Sliding Force

Resisting Force

Stability Ratio

Status

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in ²	Gvrn. As in ²	Actual As in ²	Phi*Mn k-ft	Status
X-X, +1.40D	0.01145	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.40D	0.01145	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D	0.009811	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D	0.009811	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+0.50W	0.009811	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+0.50W	0.009811	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+W	0.009811	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+W	0.009811	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+W	0.007358	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+W	0.007358	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+E	0.009811	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +1.20D+E	0.009811	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+E	0.007358	+Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
X-X, +0.90D+E	0.007358	-Z	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.40D	0.04581	-X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.40D	0.04581	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D	0.03927	-X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D	0.03927	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+0.50W	0.3058	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+0.50W	0.3844	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+W	0.5917	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+W	0.7687	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+W	0.4631	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+W	0.8933	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+E	0.4577	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +1.20D+E	0.5362	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+E	0.4349	-X	Top	0.3888	ACI 7.6.1.1	0.40	26.529	OK
Z-Z, +0.90D+E	0.5476	+X	Bottom	0.3888	ACI 7.6.1.1	0.40	26.529	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.05 psi	0.05 psi	0.05 psi	52.52 psi	0.00	OK
+1.20D	0.05 psi	0.05 psi	0.05 psi	52.52 psi	0.00	OK
+1.20D+0.50W	0.47 psi	0.56 psi	0.56 psi	52.52 psi	0.01	OK
+1.20D+W	0.73 psi	1.14 psi	1.14 psi	52.52 psi	0.02	OK
+0.90D+W	0.55 psi	1.41 psi	1.41 psi	52.52 psi	0.03	OK
+1.20D+E	0.69 psi	0.78 psi	0.78 psi	52.52 psi	0.01	OK
+0.90D+E	0.55 psi	0.81 psi	0.81 psi	52.52 psi	0.02	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+0.50W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+W	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+1.20D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK
+0.90D+E	0.00 psi	0.00 psi	0.00 psi	52.52 psi	0.00	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.15 psi	150.94psi	0.001017	OK
+1.20D	0.13 psi	150.94psi	0.000871	OK
+1.20D+0.50W	0.13 psi	150.94psi	0.000871	OK
+1.20D+W	0.16 psi	150.94psi	0.001038	OK
+0.90D+W	0.16 psi	150.94psi	0.001043	OK
+1.20D+E	0.13 psi	150.94psi	0.000871	OK



GMU Structural Engineering
23241 Arroyo Vista

Project Title: Ontario Sports Complex
Engineer:
Project ID: 24-130-00
Project Descr: Ancillary Structure Design

General Footing

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E04 Column Footing

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+0.90D+E	0.11 psi	150.94psi	0.000756	OK

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E04 Column - Col - HSS5x5x1/2

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : HSS5x5x1/2

Analysis Method : Load Resistance Factor

Steel Stress Grade : A500, Grade B, Fy = 46 ksi, Carbon Steel

Fy : Steel Yield 46.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height

20.0 ft

Top & Bottom Fixity

Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 10 ft, K = 1.20

Unbraced Length for buckling ABOUT Y-Y Axis = 10 ft, K = 1.20

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 568.60 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 20.0 ft, D = 1.60 k

BENDING LOADS . . .

Lat. Point Load at 10.0 ft creating Mx-x, W = 1.20, E = 0.8640 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2716** : 1
Load Combination +1.20D+W
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu 2.602 k
0.9 * Pn 214.113 k
Mu-x -12.0 k-ft
0.9 * Mn-x : 45.195 k-ft
Mu-y 0.0 k-ft
0.9 * Mn-y : 45.195 k-ft

Maximum Load Reactions . .
Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 1.20 k

Maximum Load Deflections . . .
Along Y-Y 2.283 in at 20.0ft above base
for load combination : W Only
Along X-X 0.0 in at 0.0ft above base
for load combination :

PASS Maximum Shear Stress Ratio = **0.01729** : 1
Load Combination +1.20D+W
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 1.20 k
Vn * Phi : Allowable 69.40 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios			
	Stress Ratio	Status	Location						Stress Ratio	Status	Location	
+1.40D	0.014	PASS	0.00 ft		3.00	1.00	79.12	79.12	0.000	PASS	0.00 ft	
+1.20D	0.012	PASS	0.00 ft		3.00	1.00	79.12	79.12	0.000	PASS	0.00 ft	
+1.20D+0.50W	0.139	PASS	0.00 ft		3.00	1.00	79.12	79.12	0.009	PASS	0.00 ft	
+1.20D+W	0.272	PASS	0.00 ft		3.00	1.00	79.12	79.12	0.017	PASS	0.00 ft	
+0.90D+W	0.270	PASS	0.00 ft		3.00	1.00	79.12	79.12	0.017	PASS	0.00 ft	
+1.20D+E	0.197	PASS	0.00 ft		3.00	1.00	79.12	79.12	0.012	PASS	0.00 ft	
+0.90D+E	0.196	PASS	0.00 ft		3.00	1.00	79.12	79.12	0.012	PASS	0.00 ft	

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
	@ Base		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
D Only	2.169											
+D+0.60W	2.169					0.720		-7.200				
+D+0.450W	2.169					0.540		-5.400				
+0.60D+0.60W	1.301					0.720		-7.200				
+D+0.70E	2.169					0.605		-6.048				
+D+0.5250E	2.169					0.454		-4.536				
+0.60D+0.70E	1.301					0.605		-6.048				

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E04 Column - Col - HSS5x5x1/2

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
W Only				1.200	-12.000		
E Only				0.864	-8.640		

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	2.169						
"	Minimum				1.200	-12.000		
Reaction, X-X Axis Base	Maximum	2.169						
"	Minimum	2.169						
Reaction, Y-Y Axis Base	Maximum				1.200	-12.000		
"	Minimum	2.169						
Reaction, X-X Axis Top	Maximum	2.169						
"	Minimum	2.169						
Reaction, Y-Y Axis Top	Maximum	2.169						
"	Minimum	2.169						
Moment, X-X Axis Base	Maximum	2.169						
"	Minimum		-12.000		1.200	-12.000		
Moment, Y-Y Axis Base	Maximum	2.169						
"	Minimum	2.169						
Moment, X-X Axis Top	Maximum	2.169						
"	Minimum	2.169						
Moment, Y-Y Axis Top	Maximum	2.169						
"	Minimum	2.169						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	1.370 in	20.000 ft
+D+0.450W	0.0000 in	0.000 ft	1.027 in	20.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	1.370 in	20.000 ft
+D+0.70E	0.0000 in	0.000 ft	1.150 in	20.000 ft
+D+0.5250E	0.0000 in	0.000 ft	0.863 in	20.000 ft
+0.60D+0.70E	0.0000 in	0.000 ft	1.150 in	20.000 ft
W Only	0.0000 in	0.000 ft	2.283 in	20.000 ft
E Only	0.0000 in	0.000 ft	1.630 in	19.866 ft

Steel Section Properties : HSS5x5x1/2

Depth	=	5.000 in	I xx	=	26.00 in^4	J	=	44.600 in^4
Design Thick	=	0.465 in	S xx	=	10.40 in^3			
Width	=	5.000 in	R xx	=	1.820 in			
Wall Thick	=	0.500 in	Zx	=	13.100 in^3			
Area	=	7.880 in^2	I yy	=	26.000 in^4	C	=	18.700 in^3
Weight	=	28.430 plf	S yy	=	10.400 in^3			
			R yy	=	1.820 in			

Ycg = 0.000 in

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

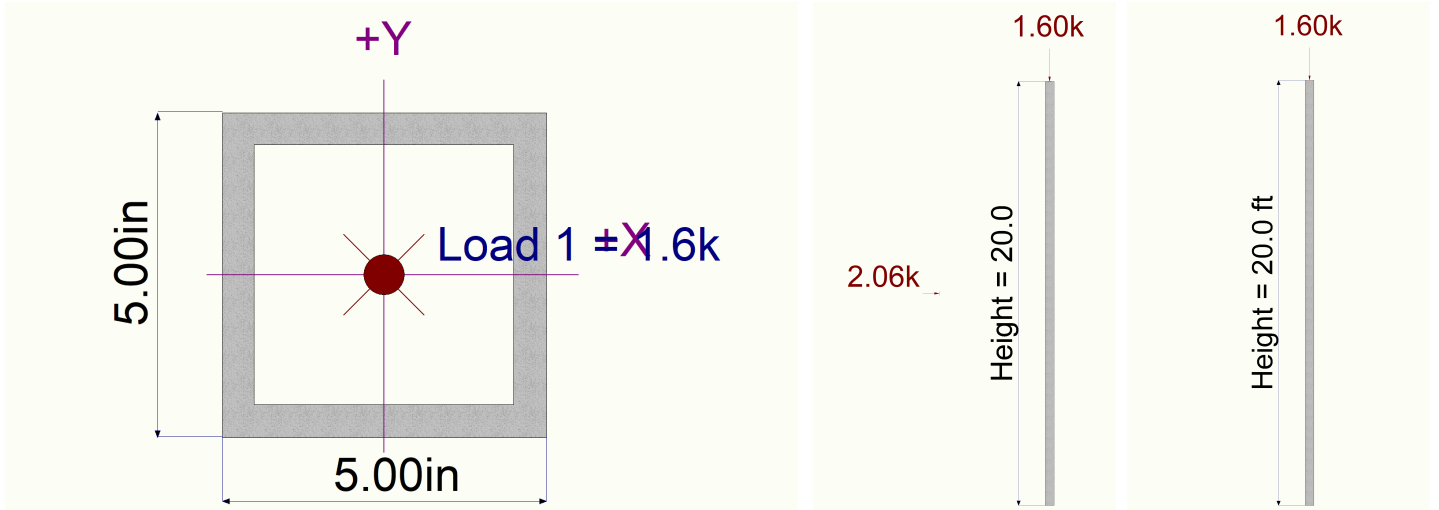
LIC# : KW-06015733, Build:20.25.03.24

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E04 Column - Col - HSS5x5x1/2

Sketches



57. E05 Graphic Wall – Long, (W-13)

E05 Column / Signage Drawing W-3

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $20 \text{ psf} \times 4.5' \times 16' = 1.44 \text{ kips}$

$W = 1.44 \text{ kips}$

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 1.44 \text{ kips} = 1.555 \text{ kips}$

Applied Moment to each footing, (seismic) = $1.555 \times 3.25' = 5.1 \text{ k-ft}$

Wind Load, (ASCE 7-22)

Wind Load = $30 \text{ psf} \times 4.5' \times 16' = 2.16 \text{ kips}$

Applied Moment, (wind) = $2.16 \text{ kips} \times 3.25' = 7.0 \text{ k-ft}$ (over full sign width)

End Columns: $7/4 = 1.75 \text{ k-ft}$

Mid Column: $7/2 = 3.5 \text{ k-ft}$

(Wind Controls)

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park-signs.ec6

LIC#: KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E05 Post Embedment - Mid

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape	Circular
	16.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	500.0 pcf
Max Passive	5,000.0 pcf

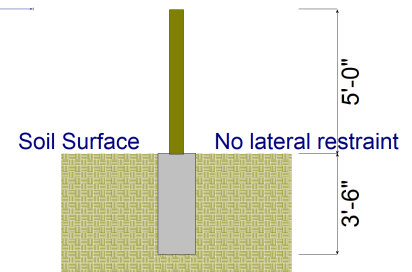
Controlling Values

Governing Load Combination	0.60W
Lateral Load	0.420 k
Moment	2.10 k-ft
NO Ground Surface Restraint	
Pressures at 1/3 Depth	
Actual	564.03 psf
Allowable	566.84 psf

Minimum Required Depth 3.50 ft

Footing Base Area	1.396 ft ²
Maximum Soil Pressure	0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.70 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	5.0 ft	TOP of Load above ground surface	5.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.420	2.100	3.50	564.0	566.8	1.000
+0.450W	0.315	1.575	3.13	507.0	507.2	1.000

Pole Footing Embedded in Soil

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E05 Post Embedment - End

Code References

Calculations per IBC 2021 1807.3

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Pole Footing Shape	Circular
	16.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	500.0 pcf
Max Passive	5,000.0 pcf

Controlling Values

Governing Load Combination	0.60W
Lateral Load	0.210 k
Moment	1.050 k-ft

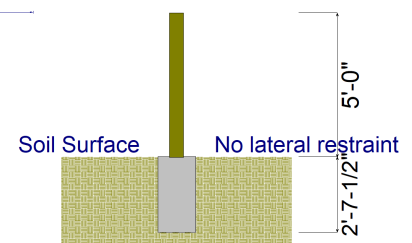
NO Ground Surface Restraint

Pressures at 1/3 Depth	
Actual	435.022 psf
Allowable	435.622 psf

Minimum Required Depth 2.625 ft

Footing Base Area	1.396 ft ²
Maximum Soil Pressure	0.0 ksf

Point Load



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k)		Vertical Load (k)
D : Dead Load	k		k/ft	k
Lr : Roof Live	k		k/ft	k
L : Live	k		k/ft	k
S : Snow	k		k/ft	k
W : Wind	0.350 k		k/ft	k
E : Earthquake	k		k/ft	k
H : Lateral Earth	k		k/ft	k
Load distance above ground surface	5.0 ft	TOP of Load above ground surface	5.0 ft	
		BOTTOM of Load above ground surface	ft	

Load Combination Results

Load Combination	Forces @ Ground Surface		Required Depth - (ft)	Pressure at 1/3 Depth		Soil Increase Factor
	Loads - (k)	Moments - (ft-k)		Actual - (psf)	Allow - (psf)	
	0.000	0.000	0.13	0.0	0.0	1.000
+0.60W	0.210	1.050	2.63	435.0	435.6	1.000
+0.450W	0.158	0.788	2.38	389.9	392.0	1.000

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E05 Column - Col - HSS4x2x1/4

Code References

Calculations per AISC 360-16, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

Steel Section Name : **HSS4x2x1/4**

Analysis Method : Load Resistance Factor

Steel Stress Grade : A500, Grade B, Fy = 46 ksi, Carbon Steel

Fy : Steel Yield 46.0 ksi

E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height

5.50 ft

Top & Bottom Fixity

Top Free, Bottom Fixed

Brace condition :

Unbraced Length for buckling ABOUT X-X Axis = 10 ft, K = 1.20

Unbraced Length for buckling ABOUT Y-Y Axis = 10 ft, K = 1.20

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 48.455 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 5.50 ft, D = 1.0 k

BENDING LOADS . . .

Wind: Moment acting about X-X axis at 5.50 ft, W = 3.50 k-ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =

0.3841 : 1

Load Combination

+1.20D+W

Location of max.above base

4.688 ft

At maximum location values are . . .

Pu 1.258 k

0.9 * Pn 16.132 k

Mu-x 3.50 k-ft

0.9 * Mn-x : 10.143 k-ft

Mu-y 0.0 k-ft

0.9 * Mn-y : 6.176 k-ft

Maximum Load Reactions . .

Top along X-X k

Bottom along X-X k

Top along Y-Y k

Bottom along Y-Y k

Maximum Load Deflections . . .

Along Y-Y in at ft above base

for load combination :

Along X-X in at ft above base

for load combination :

PASS Maximum Shear Stress Ratio

0.0 : 1

Load Combination

0.0

Location of max.above base

0.0 ft

At maximum location values are . . .

Vu : Applied 0.0 k

Vn * Phi : Allowable 0.0 k

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Cb _x	Cb _y	K _x L _x /R _x	K _y L _y /R _y	Maximum Shear Ratios		
	Stress Ratio	Status	Location					Stress Ratio	Status	Location

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		M _x - End Moments		k-ft	M _y - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top

Extreme Reactions

Item	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		M _x - End Moments		k-ft	M _y - End Moments	
	Extreme Value	@ Base	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top

Steel Section Properties : HSS4x2x1/4

Steel Section Properties : HSS4x2x1/4

Steel Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

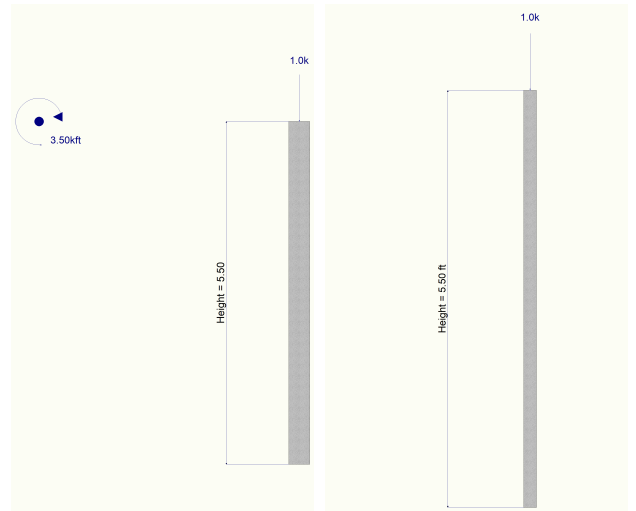
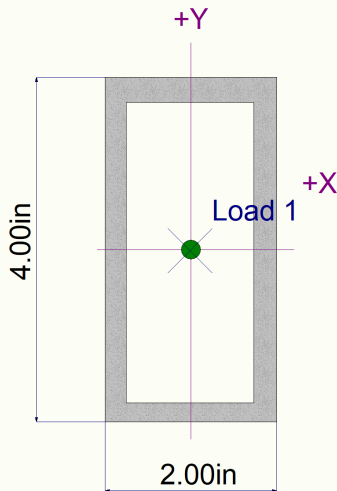
GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E05 Column - Col - HSS4x2x1/4

Depth	=	4.000 in	I xx	=	4.49 in ⁴	J	=	3.820 in ⁴
Design Thick	=	0.233 in	S xx	=	2.25 in ³	Cw	=	3.05 in ⁶
Width	=	2.000 in	R xx	=	1.360 in			
Wall Thick	=	0.250 in	Zx	=	2.940 in ³			
Area	=	2.440 in ²	I yy	=	1.480 in ⁴	C	=	3.050 in ³
Weight	=	8.810 plf	S yy	=	1.480 in ³			
			R yy	=	0.779 in			
			Zy	=	1.790 in ³			
Ycg	=	0.000 in						

Sketches



Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E05 CIDH Caisson

Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : ASCE 7-22 / IBC 2024 (L<=100psf)

General Information

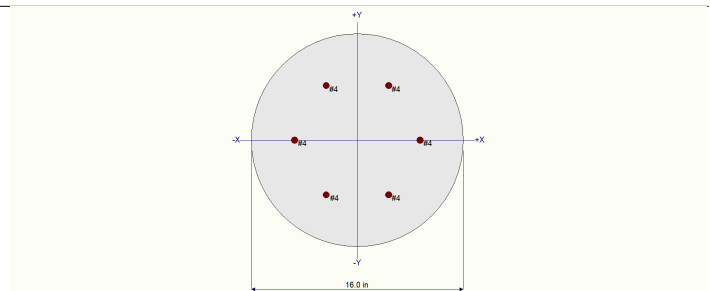
f'c : Concrete 28 day strength = 4.0 ksi
E = 3,122.0 ksi
Density = 150.0 pcf
 β = 0.0
fy - Main Rebar = 60.0 ksi
E - Main Rebar = 29,000.0 ksi
Allow. Reinforcing Limits *ASTM A615 Bars Used*
Min. Reinf. = 0.50 %
Max. Reinf. = 8.0 %
Seismic Design Category = A

Overall Column Height = 4.50 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along column
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 16.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 6 - #4 bars



Entered loads are factored per load combinations specified by user.

Applied Loads

Column self weight included : 942.48 lbs * Dead Load Factor

BENDING LOADS . . .

Moment acting about X-X axis at 4.50 ft, W = 3.50 k-ft

DESIGN SUMMARY

Load Combination	0.0	Maximum SERVICE Load Reactions .			
Location of max.above base	0.0 ft	Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
		Top along X-X	0.0 k	Bottom along X-X	0.0 k
Maximum Stress Ratio	0.0 : 1	Maximum SERVICE Load Deflections . .			
Ratio = $(P_u^2 + M_u^2)^{0.5} / (\Phi P_n^2 + \Phi M_n^2)^{0.5}$		Along Y-Y	0.0 in	at	0.0 ft above base
Pu = 0.0 k	$\Phi * P_n = 0.0 k$	for load combination : 0.0			
Mu-x = 0.0 k-ft	$\Phi * M_{n-x} = 0.0 k-ft$	Along X-X	0.0 in	at	0.0 ft above base
Mu-y = 0.0 k-ft	$\Phi * M_{n-y} = 0.0 k-ft$	for load combination : 0.0			
Mu Angle = deg	$\Phi =$	General Section Information			
Mu at Angle = k-ft	ΦM_n at Angle = k-ft	β : % Reinforcing	0.0 %	Rebar < Min of 0.50 %	
<i>Pn & Mn values located at Pu-Mu vector intersection with capacity curve</i>		Reinforcing Area	0.0 in ²		
Column Capacities . .		Concrete Area	0.0 in ²		
Pnmax : Nominal Max. Compressive Axial Capacity	0.0 k				
Pnmin : Nominal Min. Tension Axial Capacity	k				
ΦP_n , max : Usable Compressive Axial Capacity	0.0 k				
ΦP_n , min : Usable Tension Axial Capacity	k				

Governing Load Combination Results

Governing Factored Load Combination	Moment		Dist. from base ft	Axial Load k		Bending Analysis k-ft										Utilization	
	X-X	Y-Y		Pu	$\phi * P_n$	δx	$\delta x * M_{ux}$	δy	$\delta y * M_{uy}$	Alpha (deg)	δM_u	ϕM_n	Ratio				

Concrete Column

Project File: 24-130-00_ontario sports park-signs.ec6

LIC# : KW-06015733, Build:20.25.02.26

GMU Geotechnical

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: E05 CIDH Caisson

Maximum Reactions

Note: Only non-zero reactions are listed.

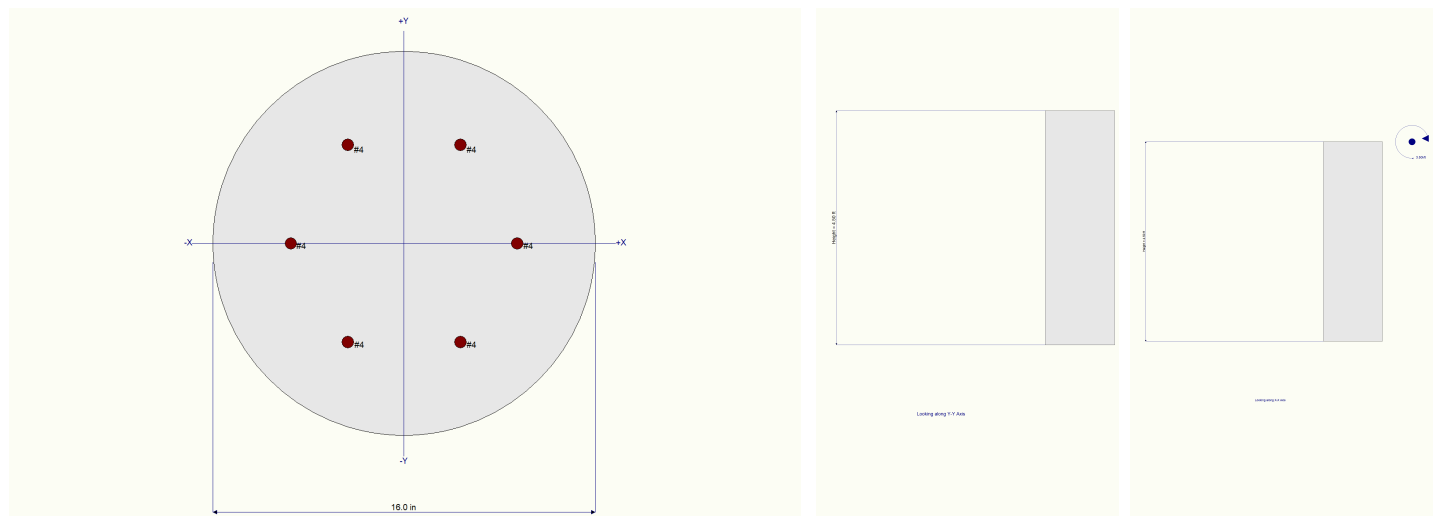
Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	Mx - End Moments		k-ft	My - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis		Moment About Y-Y Axis
	@ Base	@ Top	@ Base @ Top

Sketches



58. E06 Graphic Wall – Short, (W-13)

E06 Column / Signage Drawing W-13

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $20 \text{ psf} \times 5' \times 10' = 1.0 \text{ kips}$

$W = 1.0 \text{ kips}$

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 1.0 \text{ kips} = 1.08 \text{ kips}$

Applied Moment to each footing, (seismic) = $1.08 \times 2.75' = 2.97 \text{ k-ft}$

Column: $2.97/2 = 1.5 \text{ k-ft}$

Wind Load, (ASCE 7-22)

Wind Load = $30 \text{ psf} \times 5' \times 10' = 1.5 \text{ kips}$

Applied Moment, (wind) = $1.5 \text{ kips} \times 2.75' = 4.125 \text{ k-ft}$ (over full sign width)

Columns: $4.125/2 = 2.1 \text{ k-ft}$

(Wind Controls)

NOTE: This feature does not require a foundation design

59. E07 Display Wall – Long, (W-13)

E07 Signboard

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $20 \text{ psf} \times 9' \times 16' = 2.88 \text{ kips}$

$W = 2.88 \text{ kips}$

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 2.88 \text{ kips} = 3.11 \text{ kips}$

Applied Moment to each footing, (seismic) = $3.11/2 \times 4.5' = 7 \text{ k-ft/post}$ (2 posts)

Wind Load, (ASCE 7-22)

Wind Load = $30 \text{ psf} \times 9' \times 16' = 4.32 \text{ kips}$

Applied Moment, (wind) = $4.32 \text{ kips} \times 4.5' = 19.44 \text{ k-ft}$ (over full sign width)

Anchor Bolt: $19.44 \text{ k-ft} / 1' / 4 \text{ bolts} = 4.86 \text{ k/bolt}$

(Wind Controls)

Wind Load (ASCE 7-22) - Chapter 29, Solid Free-Standing Wall

Improvement: E07 Signboard

Velocity Pressure $q_z = 0.00256 K_z K_{zt} K_d K_e V^2$ (lb/ft²); V in mi/h (26.10-1)

Risk Category	II	(table 1.5-1)
Basic Wind Speed (V)	110	(figure 26.5-1B)

Wind Load Parameters

K_d	0.85	(table 26.6-1)
Exposure Category	C	(section 26.7)
K_{zt}	1	(section 26.8) - Assume no speed-up
K_z	0.85	(table 26.10-1)
K_e	1	(section 26.9)
G	0.85	(section 26.11.1) - Rigid Structure
q_z	22.38016	(equation 26.10-1)

Wind Load on Netting $F = q_h G C_f A_s$ (Eqn. 29.3-1)

B = (Maximum Tributary Width)	16	feet
S = (Maximum Tributary Height)	9	feet
H = (Height to top of Wind Loaded Area)	9	feet
B/S	1.8	Aspect Ratio
S/H	1	Clearance Ratio
C_f	1.4	(Force Coefficient, Figure 29.3-1)
A_s	144	Unit Area of Loading, sqft
Total Wind Load	3,835.1	lbs
	26.6	psf

Height to Center of Wind Loaded Area 4.5 feet

Moment due to Wind Loading **17.3 ft-kips**

Column Wind Load (@ 10') **4.3 ft-kips per column**



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers and Geologists	Date:	4/1/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description:

Location:

Design name: OSE Project

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19

Units: Imperial units

Anchor Information:

Anchor type: Bonded anchor

Material: F1554 Grade 36

Diameter (inch): 0.750

Effective Embedment depth, h_{ef} (inch): 6.000

Code report: ICC-ES ESR-4057

Anchor category: -

Anchor ductility: Yes

h_{min} (inch): 7.75

c_{ac} (inch): 10.50

c_{min} (inch): 1.75

S_{min} (inch): 3.00

Base Material

Concrete: Normal-weight

Concrete thickness, h (inch): 12.00

State: Uncracked

Compressive strength, f'_c (psi): 2500

Reinforcement condition: B tension, B shear

Supplemental edge reinforcement: No

Reinforcement provided at corners: No

Ignore concrete breakout in tension: No

Ignore concrete breakout in shear: No

Hole condition: Dry concrete

Inspection: Continuous

Temperature range, Short/Long: 150/110°F

Reduced installation torque (for AT-3G): Not applicable

Ignore 6do requirement: Not applicable

Build-up grout pad: No

Recommended Anchor

Anchor Name: SET-3G™ - SET-3G w/ 3/4"Ø F1554 Gr. 36

Code Report: ICC-ES ESR-4057





Company:	GMU Engineers and Geologists	Date:	4/1/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: No

Apply entire shear load at front row: Yes

Anchors only resisting wind and/or seismic loads: No

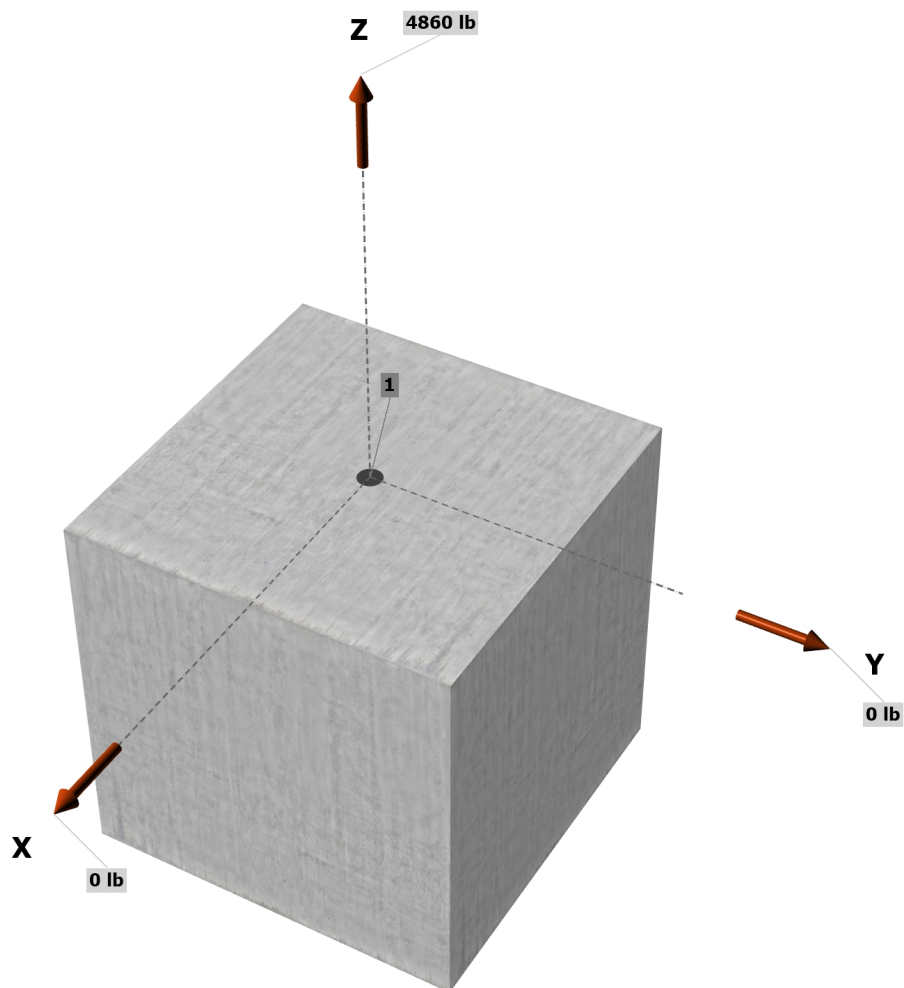
Strength level loads:

N_{ua} [lb]: 4860

V_{uax} [lb]: 0

V_{uay} [lb]: 0

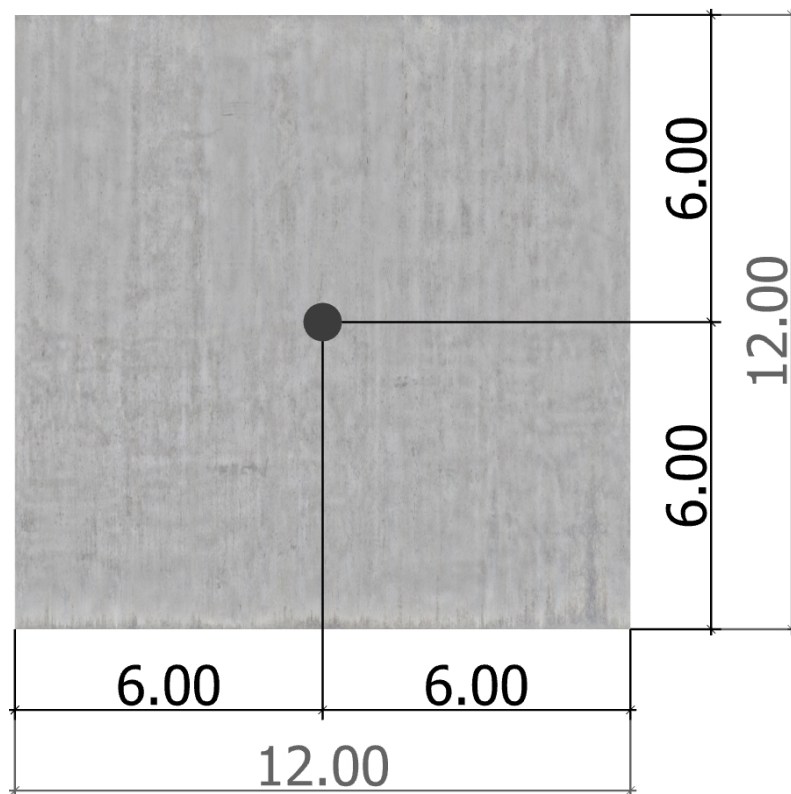
<Figure 1>





Company:	GMU Engineers and Geologists	Date:	4/1/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	4860.0	0.0	0.0	0.0
Sum	4860.0	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.00

Maximum concrete compression stress (psi): 0

Resultant tension force (lb): 4860

Resultant compression force (lb): 0

Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00

Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers and Geologists	Date:	4/1/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
19370	0.75	14528

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \text{ (Eq. 17.6.2.2.1)}$$

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
24.0	1.00	2500	4.000	9600

$$\phi N_{cb} = \phi (A_{Nc} / A_{Nco}) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \text{ (Sec. 17.5.1.2 \& Eq. 17.6.2.1a)}$$

A_{Nc} (in ²)	A_{Nco} (in ²)	$c_{a,min}$ (in)	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
144.00	144.00	6.00	1.000	1.00	0.857	9600	0.65	5348

6. Adhesive Strength of Anchor in Tension (Sec. 17.6.5)

$$\tau_{k,uncr} = \tau_{k,uncr} f_{short-term} K_{sat} (f'_c / 2,500)^n$$

$\tau_{k,uncr}$ (psi)	$f_{short-term}$	K_{sat}	f'_c (psi)	n	$\tau_{k,uncr}$ (psi)
2064	1.00	1.00	2500	0.35	2064

$$N_{ba} = \lambda_a \tau_{uncr} \pi d_a h_{ef} \text{ (Eq. 17.6.5.2.1)}$$

λ_a	τ_{uncr} (psi)	d_a (in)	h_{ef} (in)	N_{ba} (lb)
1.00	2064	0.75	6.000	29179

$$\phi N_a = \phi (A_{Na} / A_{Na0}) \psi_{ed,Na} \psi_{cp,Na} N_{ba} \text{ (Sec. 17.5.1.2 \& Eq. 17.6.5.1a)}$$

A_{Na} (in ²)	A_{Na0} (in ²)	c_{Na} (in)	$c_{a,min}$ (in)	$\psi_{ed,Na}$	$\psi_{cp,Na}$	N_{ba} (lb)	ϕ	ϕN_a (lb)
144.00	422.18	10.27	6.00	0.875	0.978	29179	0.65	5539

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	4860	14528	0.33	Pass
Concrete breakout	4860	5348	0.91	Pass (Governs)
Adhesive	4860	5539	0.88	Pass

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers and Geologists	Date:	4/1/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

SET-3G w/ 3/4"Ø F1554 Gr. 36 with hef = 6.000 inch meets the selected design criteria.

12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.
- Refer to manufacturer's product literature for hole cleaning and installation instructions.

60. E08 Display Wall – Short (W-14)

E08 Column

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 1.25$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (1.25/1.0) = 1.08$

$C_{s-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{s-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 1.08$

Seismic Weight, W :

- Signboard. = $20 \text{ psf} \times 9' \times 8' = 1.44 \text{ kips}$

$W = 1.44 \text{ kips}$

Seismic Base Shear, V :

$V = C_s W$, ASCE 7-22, 12.8-1

$V = \text{Seismic Base Shear} = 1.08 \times 1.44 \text{ kips} = 1.56 \text{ kips}$

Applied Moment to each footing, (seismic) = $1.56/2 \times 4.5' = 3.5 \text{ k-ft/post}$ (2 posts)

Wind Load, (ASCE 7-22)

Wind Load = $30 \text{ psf} \times 9' \times 8' = 2.16 \text{ kips}$

Applied Moment, (wind) = $2.16 \text{ kips} \times 4.5' = 9.72 \text{ k-ft}$ (over full sign width)

Column: $9.72/1\frac{1}{2} \text{ bolts} = 4.86 \text{ k-ft}$

(Wind Controls)

Wind Load (ASCE 7-22) - Chapter 29, Solid Free-Standing Wall

Improvement: E08 Signboard

Velocity Pressure $q_z = 0.00256 K_z K_{zt} K_d K_e V^2$ (lb/ft²); V in mi/h (26.10-1)

Risk Category	II	(table 1.5-1)
Basic Wind Speed (V)	110	(figure 26.5-1B)

Wind Load Parameters

K_d	0.85	(table 26.6-1)
Exposure Category	C	(section 26.7)
K_{zt}	1	(section 26.8) - Assume no speed-up
K_z	0.85	(table 26.10-1)
K_e	1	(section 26.9)
G	0.85	(section 26.11.1) - Rigid Structure
q_z	22.38016	(equation 26.10-1)

Wind Load on Netting $F = q_h G C_f A_s$ (Eqn. 29.3-1)

B = (Maximum Tributary Width)	8	feet
S = (Maximum Tributary Height)	9	feet
H = (Height to top of Wind Loaded Area)	9	feet
B/S	0.9	Aspect Ratio
S/H	1	Clearance Ratio
C_f	1.4	(Force Coefficient, Figure 29.3-1)
A_s	72	Unit Area of Loading, sqft
Total Wind Load	1,917.5	lbs
	26.6	psf

Height to Center of Wind Loaded Area 4.5 feet

Moment due to Wind Loading

Column Wind Load (@ 10')

8.6	ft-kips
4.3	ft-kips per column



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers and Geologists	Date:	4/1/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description:

Location:

Design name: OSE Project

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19

Units: Imperial units

Anchor Information:

Anchor type: Bonded anchor

Material: F1554 Grade 36

Diameter (inch): 0.750

Effective Embedment depth, h_{ef} (inch): 6.000

Code report: ICC-ES ESR-4057

Anchor category: -

Anchor ductility: Yes

h_{min} (inch): 7.75

c_{ac} (inch): 10.50

c_{min} (inch): 1.75

S_{min} (inch): 3.00

Base Material

Concrete: Normal-weight

Concrete thickness, h (inch): 12.00

State: Uncracked

Compressive strength, f'_c (psi): 2500

Reinforcement condition: B tension, B shear

Supplemental edge reinforcement: No

Reinforcement provided at corners: No

Ignore concrete breakout in tension: No

Ignore concrete breakout in shear: No

Hole condition: Dry concrete

Inspection: Continuous

Temperature range, Short/Long: 150/110°F

Reduced installation torque (for AT-3G): Not applicable

Ignore 6do requirement: Not applicable

Build-up grout pad: No

Recommended Anchor

Anchor Name: SET-3G™ - SET-3G w/ 3/4"Ø F1554 Gr. 36

Code Report: ICC-ES ESR-4057





Company:	GMU Engineers and Geologists	Date:	4/1/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: No

Apply entire shear load at front row: Yes

Anchors only resisting wind and/or seismic loads: No

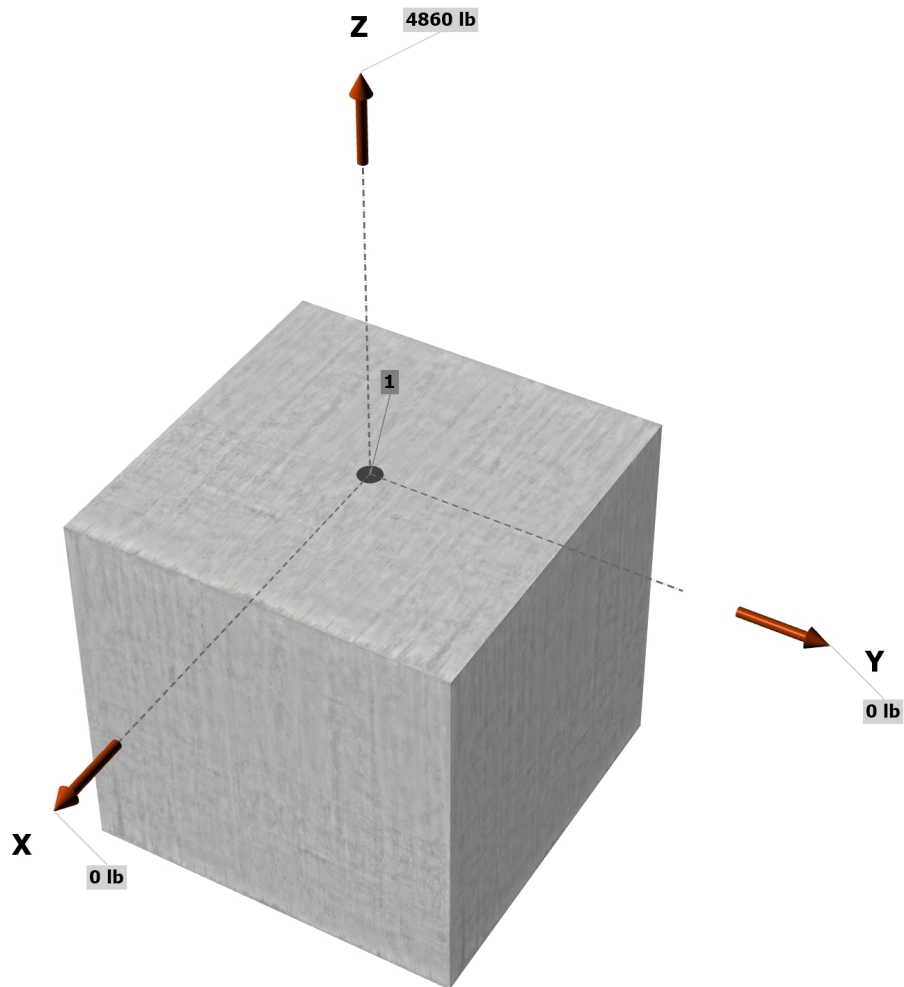
Strength level loads:

N_{ua} [lb]: 4860

V_{uax} [lb]: 0

V_{uay} [lb]: 0

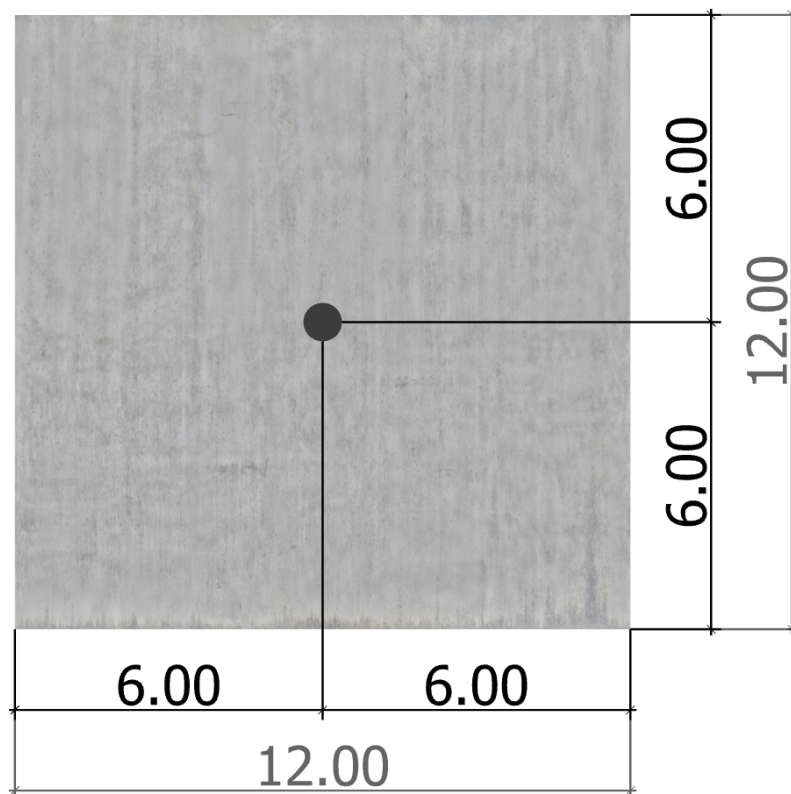
<Figure 1>





Company:	GMU Engineers and Geologists	Date:	4/1/2025
Engineer:	SB	Page:	3
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	4860.0	0.0	0.0	0.0
Sum	4860.0	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.00

Maximum concrete compression stress (psi): 0

Resultant tension force (lb): 4860

Resultant compression force (lb): 0

Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00

Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers and Geologists	Date:	4/1/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
19370	0.75	14528

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \text{ (Eq. 17.6.2.2.1)}$$

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
24.0	1.00	2500	4.000	9600

$$\phi N_{cb} = \phi (A_{Nc} / A_{Nco}) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \text{ (Sec. 17.5.1.2 \& Eq. 17.6.2.1a)}$$

A_{Nc} (in ²)	A_{Nco} (in ²)	$c_{a,min}$ (in)	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
144.00	144.00	6.00	1.000	1.00	0.857	9600	0.65	5348

6. Adhesive Strength of Anchor in Tension (Sec. 17.6.5)

$$\tau_{k,uncr} = \tau_{k,uncr} f_{short-term} K_{sat} (f'_c / 2,500)^n$$

$\tau_{k,uncr}$ (psi)	$f_{short-term}$	K_{sat}	f'_c (psi)	n	$\tau_{k,uncr}$ (psi)
2064	1.00	1.00	2500	0.35	2064

$$N_{ba} = \lambda_a \tau_{uncr} \pi d_a h_{ef} \text{ (Eq. 17.6.5.2.1)}$$

λ_a	τ_{uncr} (psi)	d_a (in)	h_{ef} (in)	N_{ba} (lb)
1.00	2064	0.75	6.000	29179

$$\phi N_a = \phi (A_{Na} / A_{Na0}) \psi_{ed,Na} \psi_{cp,Na} N_{ba} \text{ (Sec. 17.5.1.2 \& Eq. 17.6.5.1a)}$$

A_{Na} (in ²)	A_{Na0} (in ²)	c_{Na} (in)	$c_{a,min}$ (in)	$\psi_{ed,Na}$	$\psi_{cp,Na}$	N_{ba} (lb)	ϕ	ϕN_a (lb)
144.00	422.18	10.27	6.00	0.875	0.978	29179	0.65	5539

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	4860	14528	0.33	Pass
Concrete breakout	4860	5348	0.91	Pass (Governs)
Adhesive	4860	5539	0.88	Pass

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers and Geologists	Date:	4/1/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

SET-3G w/ 3/4"Ø F1554 Gr. 36 with hef = 6.000 inch meets the selected design criteria.

12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.
- Refer to manufacturer's product literature for hole cleaning and installation instructions.

61. Main Display (50' x 150')
- A. Loading
 - B. Wind Loading
 - C. FEA Model Definition Sketches
 - D. Envelope Member Forces
 - E. Envelope Reactions
 - F. Envelope Code Check
 - G. Baseplate + Anchor Bolts
 - H. Caisson & Foundation Design
-

Video Display (50' x 150') Foundation + Support Framing

Sign Weight:

Mount: 97.4 kips (from AMD Design drawings and specifications)

Display: 40.7 kips (from AMD Design drawings and specifications)

Total: 138.1 kips

Dead load applied to support frame: $138.1 \text{ kips} / (9 \text{ levels of beams}) = 15.34 \text{ kips/level}$

Distributed Load per beam: $15.34 \text{ kips} / 150' = \mathbf{0.1023 \text{ kips/ft}}$

Structure Weight: 247,500 lbs

Total Seismic DL = 385.6

Seismic Base Shear, (ASCE 7-22)

Seismic Coefficient, C_s

$I_e = 1.0$ (Risk Category II)

$R = 3.0$ (Table 15.4-2, Signs and Billboards)

$S_{DS} = 1.349g$

$S_{D1} = 0.806g$

$S_1 = 0.581g$

$T_L = 8$

$C_T = 0.02$

$C_{TExp} = 0.75$

$C_s = S_{DS} / (R/I_e)$ (ASCE 7-22, 12.8-5), $C_s = 1.349 / (3.0/1.0) = 0.45$

$C_{S-Min} = 0.044S_{DS}I_e$, (ASCE 7-22, 12.8-5), $C_{S-Min} = 0.044 \times 1.349 \times 1 = 0.06$

Therefore, use $C_s = 0.45$

See seismic loading (follows)

Wind Load, (ASCE 7-22)

Wind Load (pressure) = $0.85 \times 1.55 \times 22.38 \text{ psf} = 29.5 \text{ psf}$

Wind Load = **29.5 psf** x 150' x 50' = 221.25 kips

9 frames resist seismic loading: $221.25/9 = 24.58 \text{ kips/frame}$

(Wind Controls)

Loads applied in FEA model:

1. Dead Load = Self weight (included in model automatically) + screen weight + backing frame
 2. Live Load = 20psf at catwalks. Since catwalks are used for maintenance only, 20psf will be applied in a single bay (20' long x 4.66' wide) per level.
 3. Wind load will be applied as an area load over the front face of the structure where the video board is (ie, 23' above grade, 150' wide x 50' high). Load is applied inward and outward on the face of the screen.
 4. Seismic loading is 1/3 wind load. If R is neglected elastic response load is equal to the wind load.
-

Seismic Load Generator

Seismic Generation Input

Seismic Code **ASCE 7-16** S_{D1} **0.806** g
 Risk Category **I or II** S_{DS} **1.349** g
 Seismic Weight LC **LC 1: Dead** S_1 **0.581** g
 Base Elevation **0** ft T_L **8** sec

Y-Direction Parameters

C_{TY} **0.02** R_Y **3** C_{TY_Exp} **0.75** T_Y **Not Entered** sec

X-Direction Parameters

C_{TX} **0.02** R_X **3** C_{TX_Exp} **0.75** T_X **Not Entered** sec

Seismic Generation Detail Results

Importance Factor **1** Design Category **D**

Period Determination

Y - Direction T_{aY} **0.502** sec $T_{Y,LIMIT}$ **0.703** sec T_Y **0.502** sec
 X - Direction T_{aX} **0.502** sec $T_{X,LIMIT}$ **0.703** sec T_X **0.502** sec

Base Shear Determination

Y - Direction C_{SY} **0.45** sec V_Y **422.742** kips ASCE Eqn 12.8-2
 X - Direction C_{SX} **0.45** sec V_X **422.742** kips ASCE Eqn 12.8-2

Seismic Load Generator

Seismic Generation Force Results

Floor Level	Height (ft)	Weight (kips)	Force X (kips)	Force Y (kips)	CG X (ft)	CG Y (ft)
Diaphragm 1	73.5	58.421	89.142	89.142	76.558	1.277
Diaphragm 2	67.333	41.71	58.299	58.299	75	2.811
Diaphragm 3	61	41.846	52.981	52.981	75	2.818
Diaphragm 4	54.667	41.846	47.475	47.475	75	2.818
Diaphragm 5	48.333	41.846	41.97	41.97	75	2.818
Diaphragm 6	42	41.845	36.465	36.465	75	2.818
Diaphragm 7	35.667	41.846	30.962	30.962	75	2.818
Diaphragm 8	29.333	41.846	25.458	25.458	75	2.818
Diaphragm 9	23	83.851	39.99	39.99	76.085	2.392
Base		505.066				

Seismic Generation Diaphragm Results

Floor Level	Width (X) (ft)	Length (Y) (ft)	X Plus (ft)	X Minus (ft)	Y Plus (ft)	Y Minus (ft)
Diaphragm 1	150	10	7.5	7.5	0.5	0.5
Diaphragm 2	150	10	7.5	7.5	0.5	0.5
Diaphragm 3	150	10	7.5	7.5	0.5	0.5
Diaphragm 4	150	10	7.5	7.5	0.5	0.5
Diaphragm 5	150	10	7.5	7.5	0.5	0.5
Diaphragm 6	150	10	7.5	7.5	0.5	0.5
Diaphragm 7	150	10	7.5	7.5	0.5	0.5
Diaphragm 8	150	10	7.5	7.5	0.5	0.5
Diaphragm 9	150	10	7.5	7.5	0.5	0.5

61. **Main Display (50' x 150')**
- A. Loading
 - B. Wind Loading**
 - C. FEA Model Definition Sketches
 - D. Envelope Member Forces
 - E. Envelope Reactions
 - F. Envelope Code Check
 - G. Baseplate + Anchor Bolts
 - H. Caisson & Foundation Design
-

Wind Load (ASCE 7-22) - Chapter 29, Solid Free-Standing Wall

Improvement: 50x150 ft signboard

Velocity Pressure $q_z = 0.00256 K_z K_{zt} K_d K_e V^2$ (lb/ft²); V in mi/h (26.10-1)

Risk Category	II	(table 1.5-1)
Basic Wind Speed (V)	110	(figure 26.5-1B)

Wind Load Parameters

K_d	0.85	(table 26.6-1)
Exposure Category	C	(section 26.7)
K_{zt}	1	(section 26.8) - Assume no speed-up
K_z	0.85	(table 26.10-1)
K_e	1	(section 26.9)
G	0.85	(section 26.11.1) - Rigid Structure
q_z	22.38016	(equation 26.10-1)

Wind Load on Netting $F = q_h G C_f A_s$ (Eqn. 29.3-1)

B = (Maximum Tributary Width)	150	feet
S = (Maximum Tributary Height)	50	feet
H = (Height to top of Wind Loaded Area)	73	feet
B/S	3.0	Aspect Ratio
S/H	0.684931507	Clearance Ratio
C_f	1.6	(Force Coefficient, Figure 29.3-1)
A_s	7500	Unit Area of Loading, sqft
Total Wind Load	228,277.6	lbs
	30.4	psf

Height to Center of Wind Loaded Area 48 feet

Moment due to Wind Loading	10,957.3	ft-kips
Column Wind Load (@ 10')	730.5	ft-kips per column

61. **Main Display (50' x 150')**
- A. Loading
 - B. Wind Loading
 - C. FEA Model Definition Sketches**
 - D. Envelope Member Forces
 - E. Envelope Reactions
 - F. Envelope Code Check
 - G. Baseplate + Anchor Bolts
 - H. Caisson & Foundation Design
-

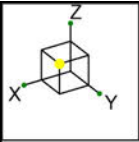
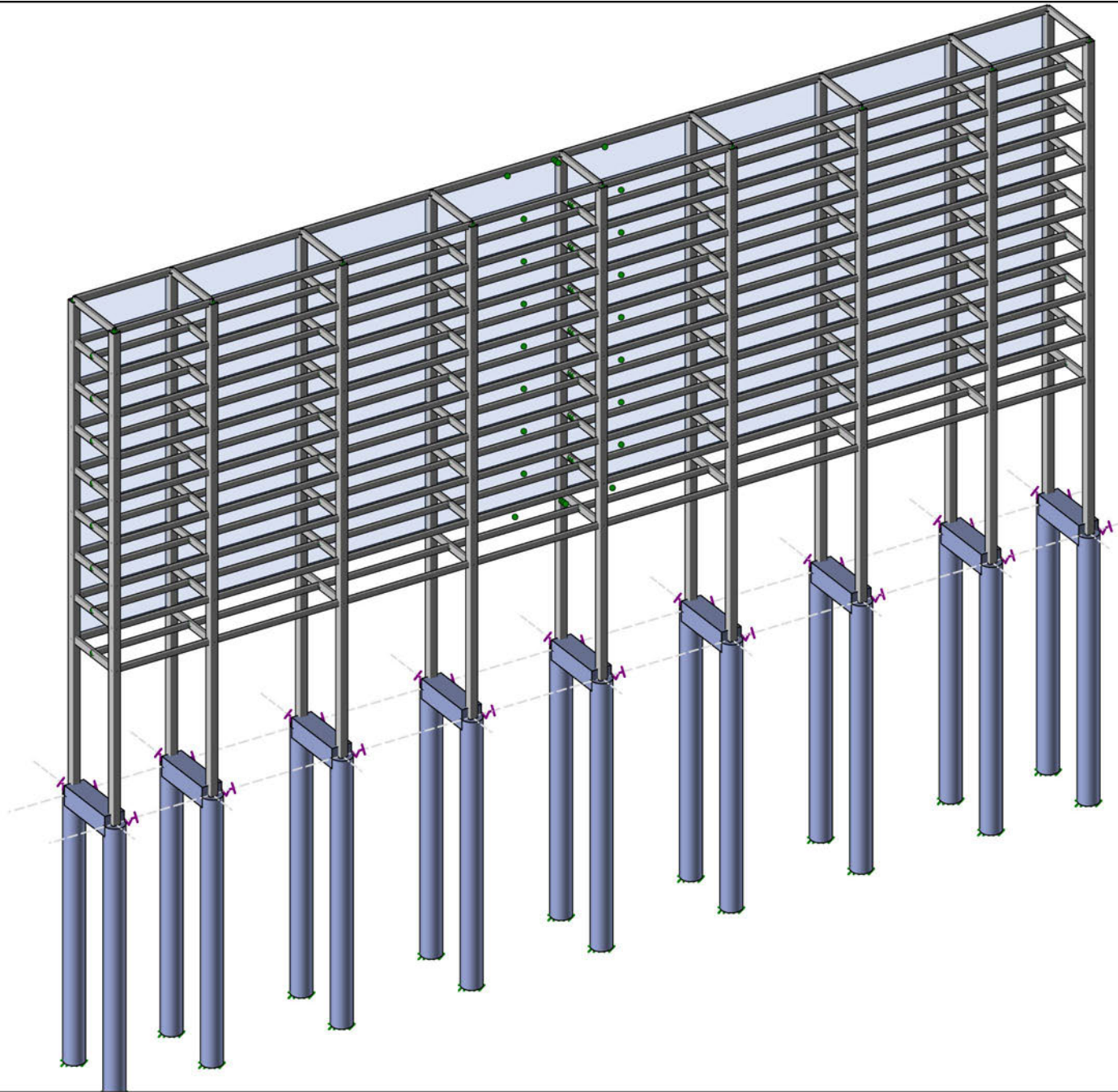


Plate Material Sets
gen_Alum
gen_Steel



GMU Geotechnical
sboin
24-130-00

Signboard Box Sections

SK-1

Mar 28, 2025 at 02:51 PM

Signboard_box sections_Rev3.r3d

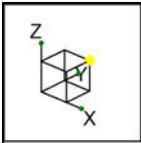
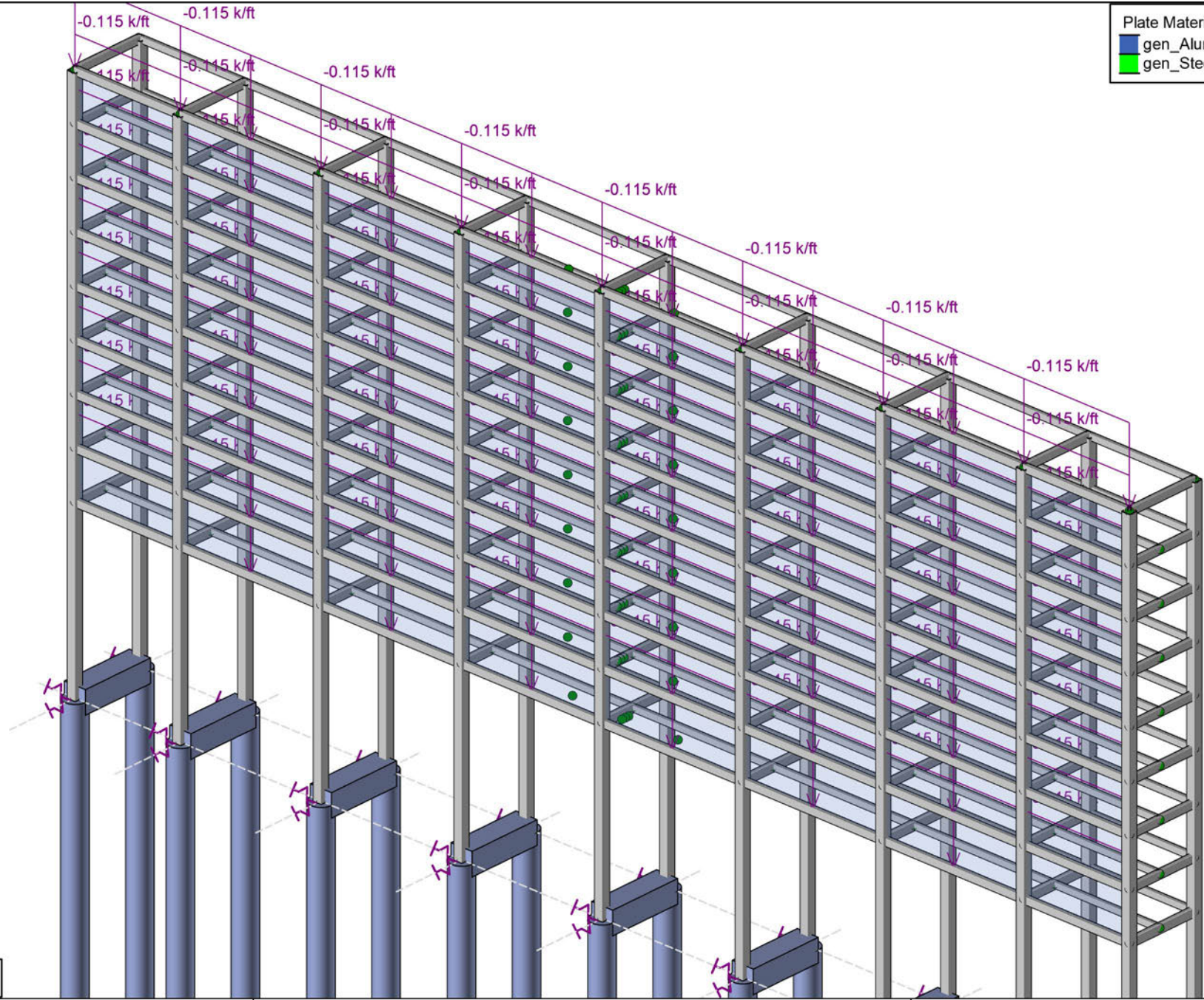


Plate Material Sets
gen_Alum
gen_Steel



Loads: LC 1, Dead

GMU
STRUCTURAL
ENGINEERING

GMU Geotechnical
sbolin
24-130-00

Signboard Box Sections

SK-2
Mar 28, 2025 at 02:56 PM
Signboard_box sections_Rev3.r3d

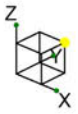
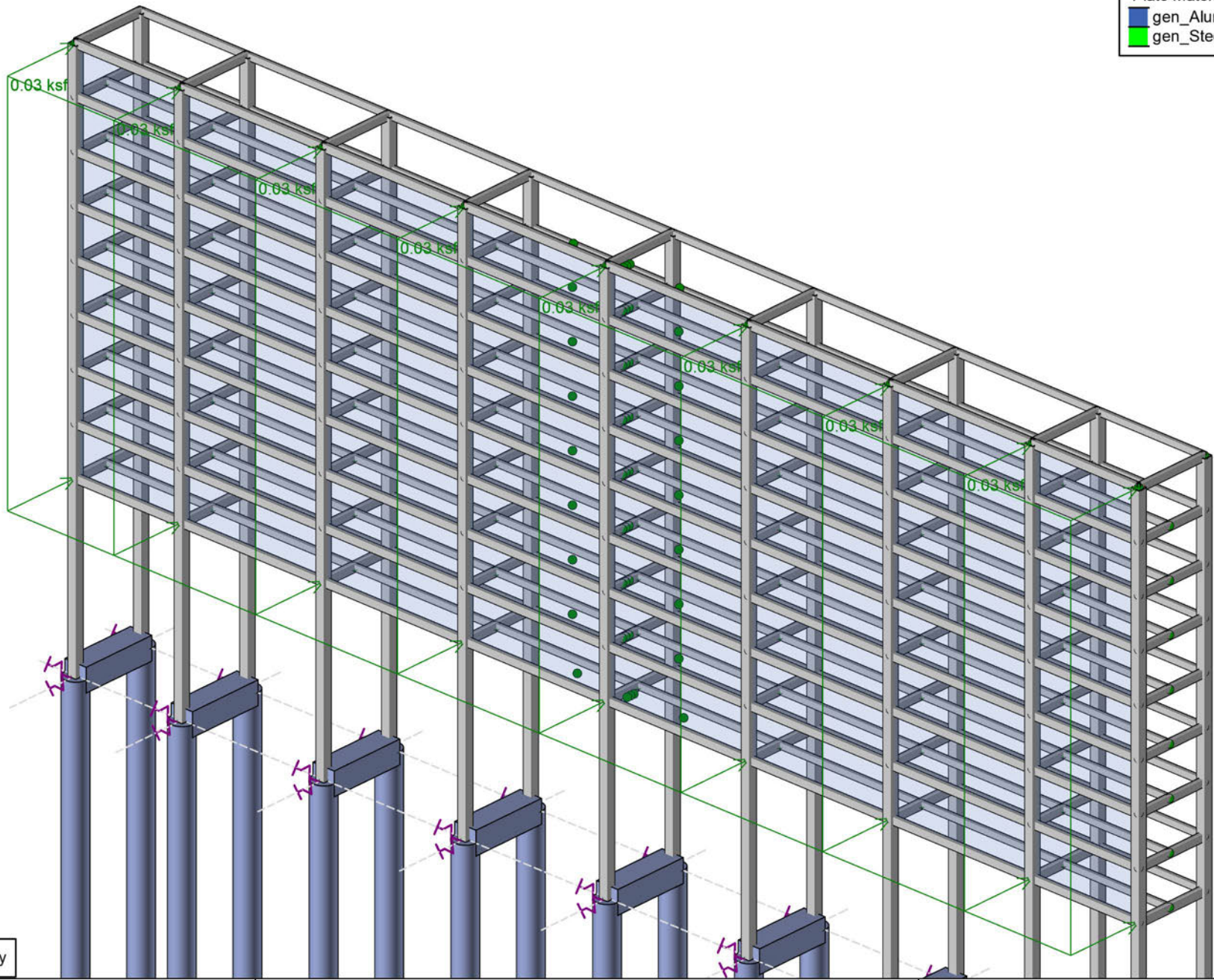


Plate Material Sets
gen_Alum
gen_Steel



Loads: LC 3, Wind-y



GMU Geotechnical
sbohin
24-130-00

Signboard Box Sections

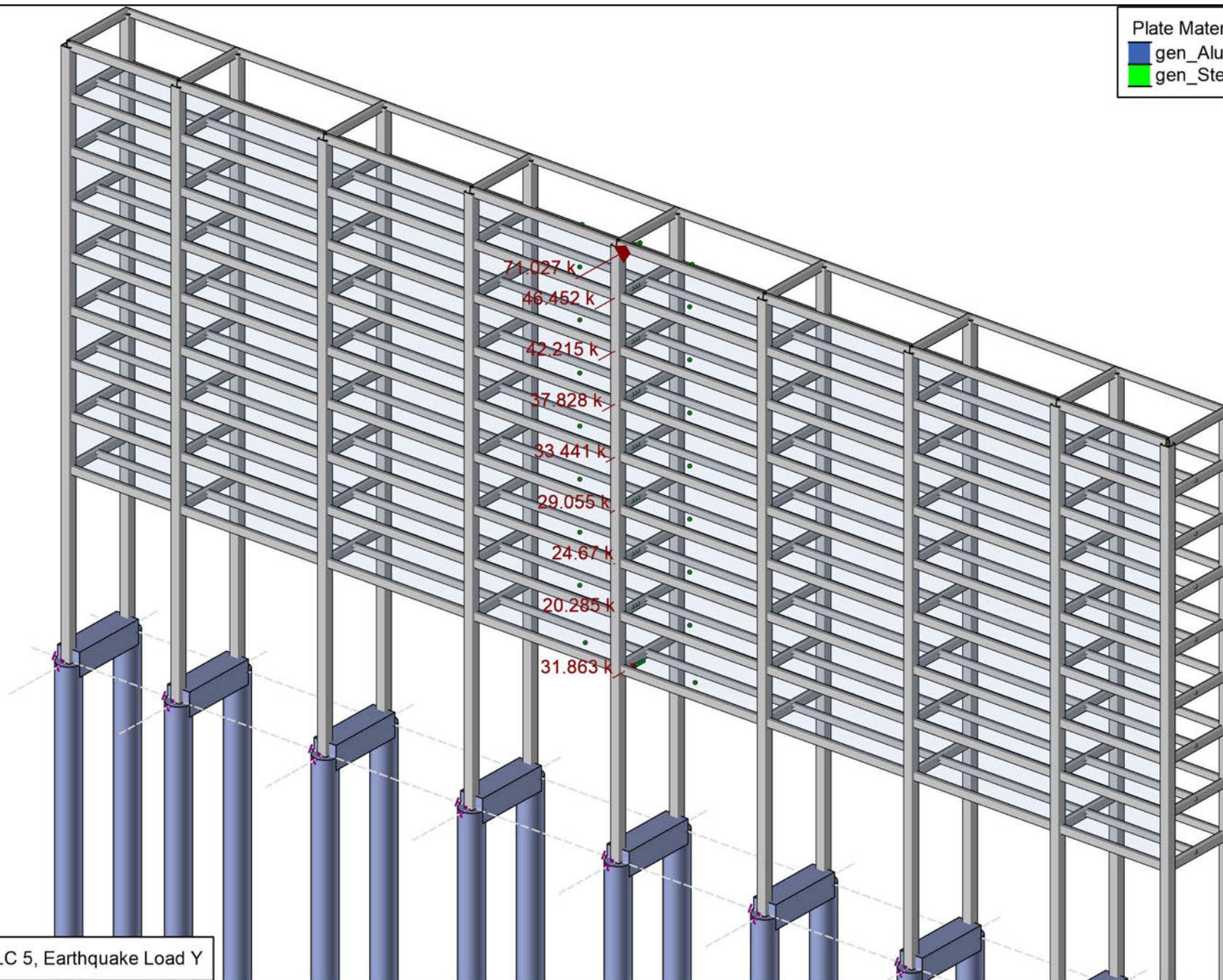
SK-3

Mar 28, 2025 at 02:56 PM

Signboard_box sections_Rev3.r3d



Plate Material Sets
gen_Alum
gen_Steel



Loads: BLC 5, Earthquake Load Y



GMU Geotechnical
sbohin
24-130-00

Signboard Box Sections

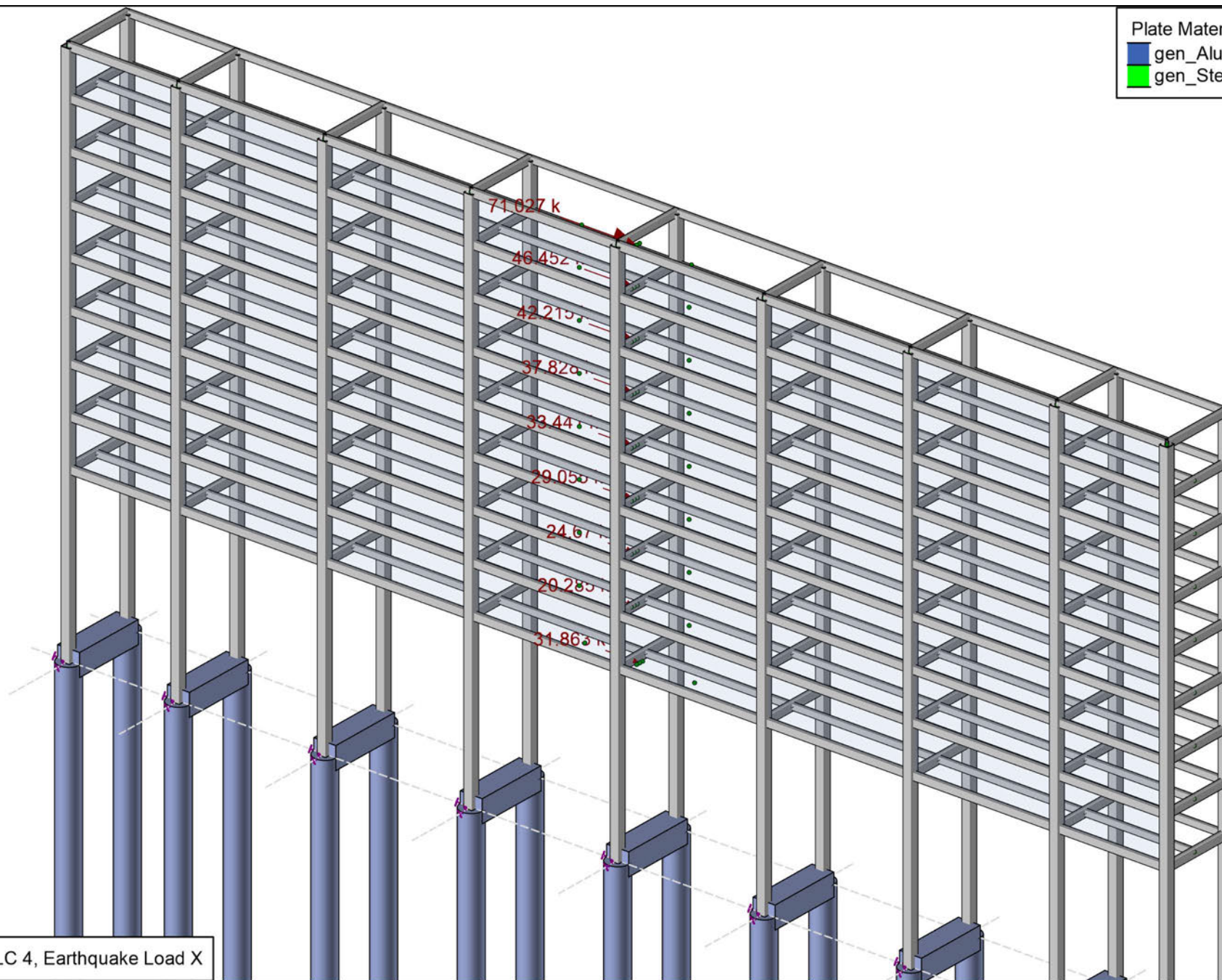
SK-4

Mar 28, 2025 at 02:59 PM

Signboard_box sections_Rev3.r3d



Plate Material Sets
gen_Alum
gen_Steel



Loads: BLC 4, Earthquake Load X



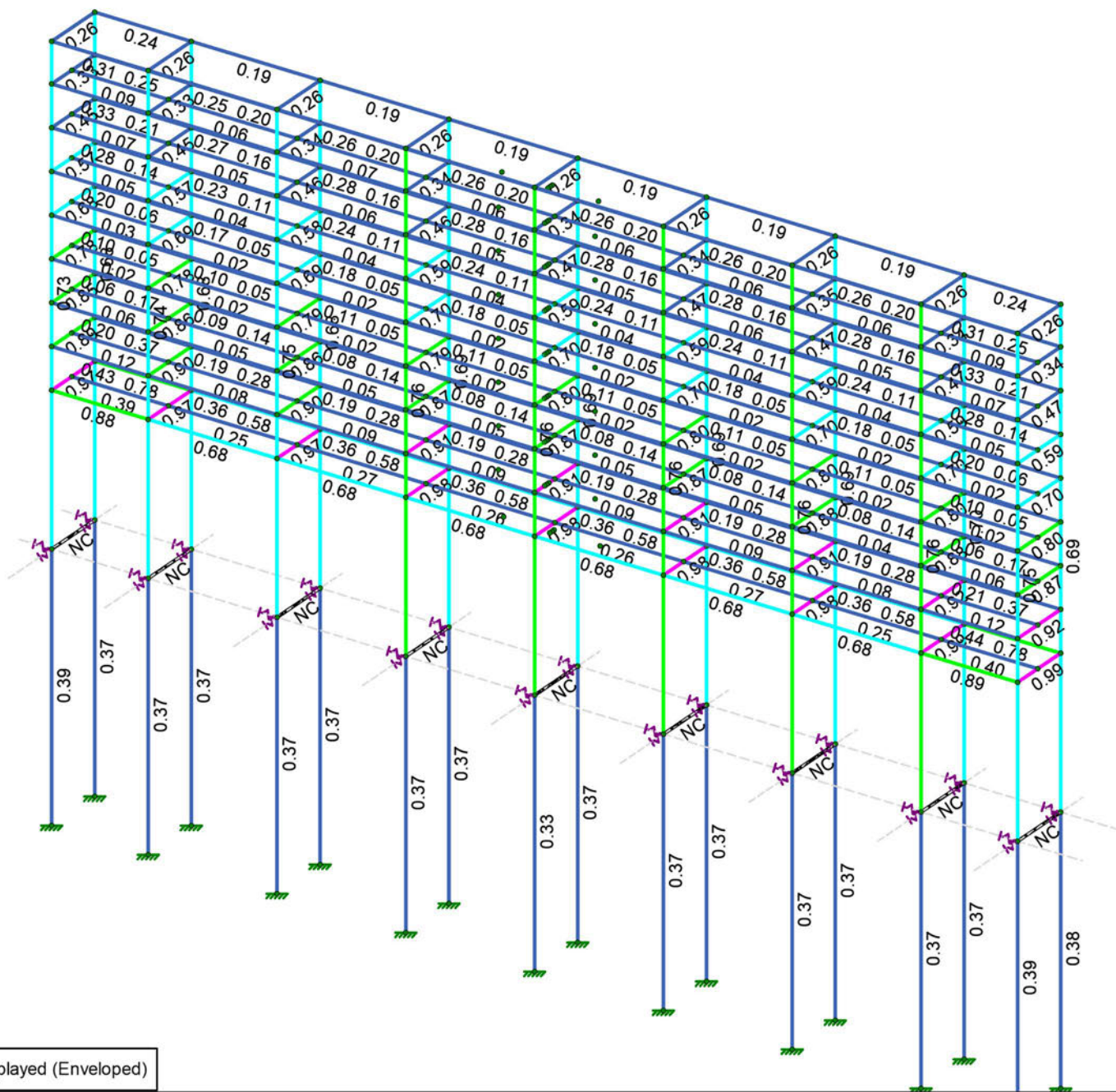
GMU Geotechnical
sbohin
24-130-00

Signboard Box Sections

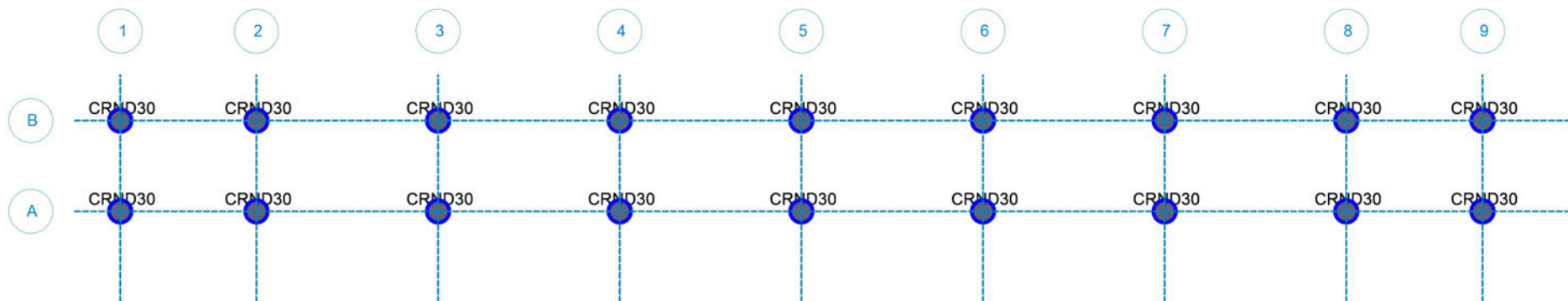
SK-5

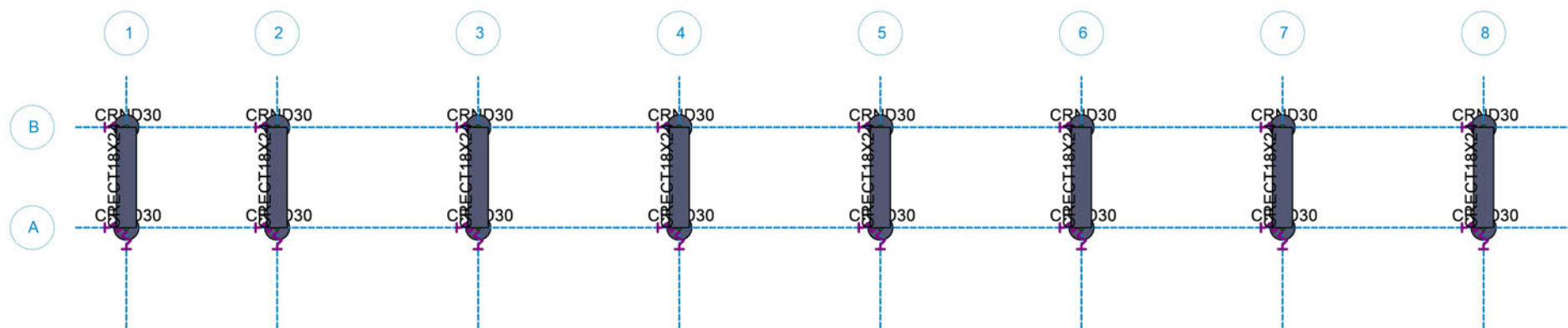
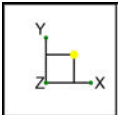
Mar 28, 2025 at 03:00 PM

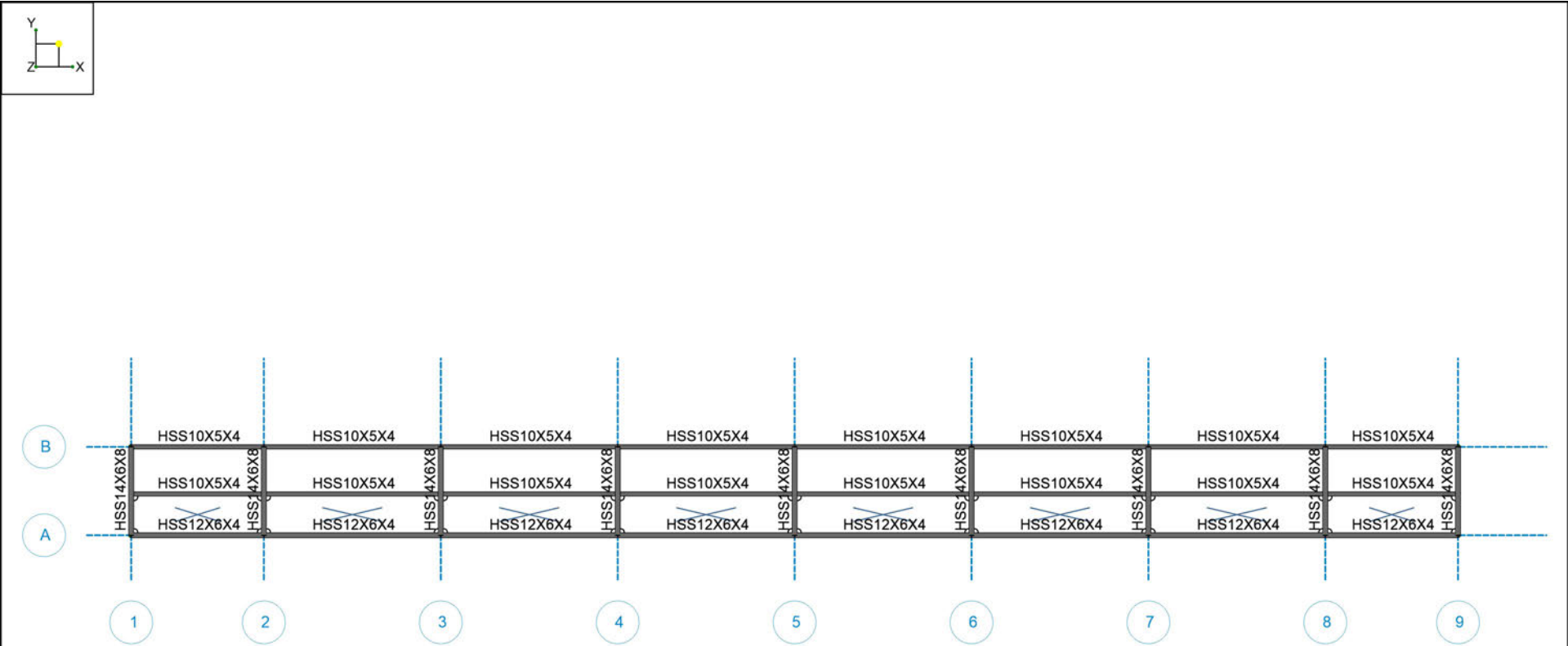
Signboard_box sections_Rev3.r3d

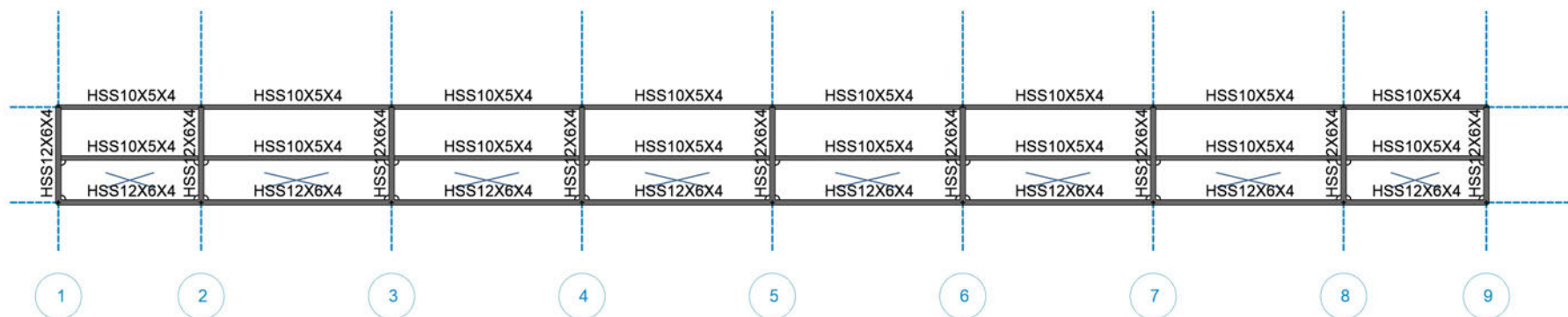


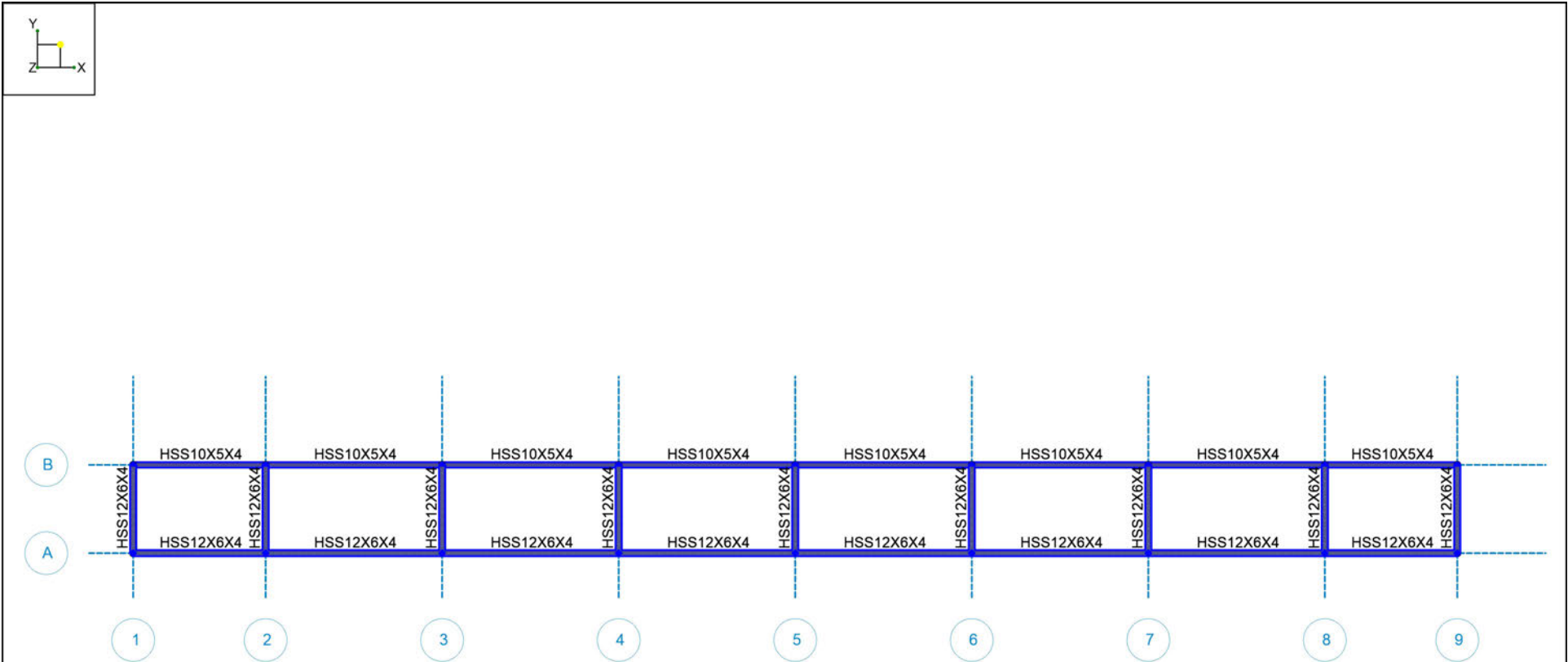
Member Code Checks Displayed (Enveloped)





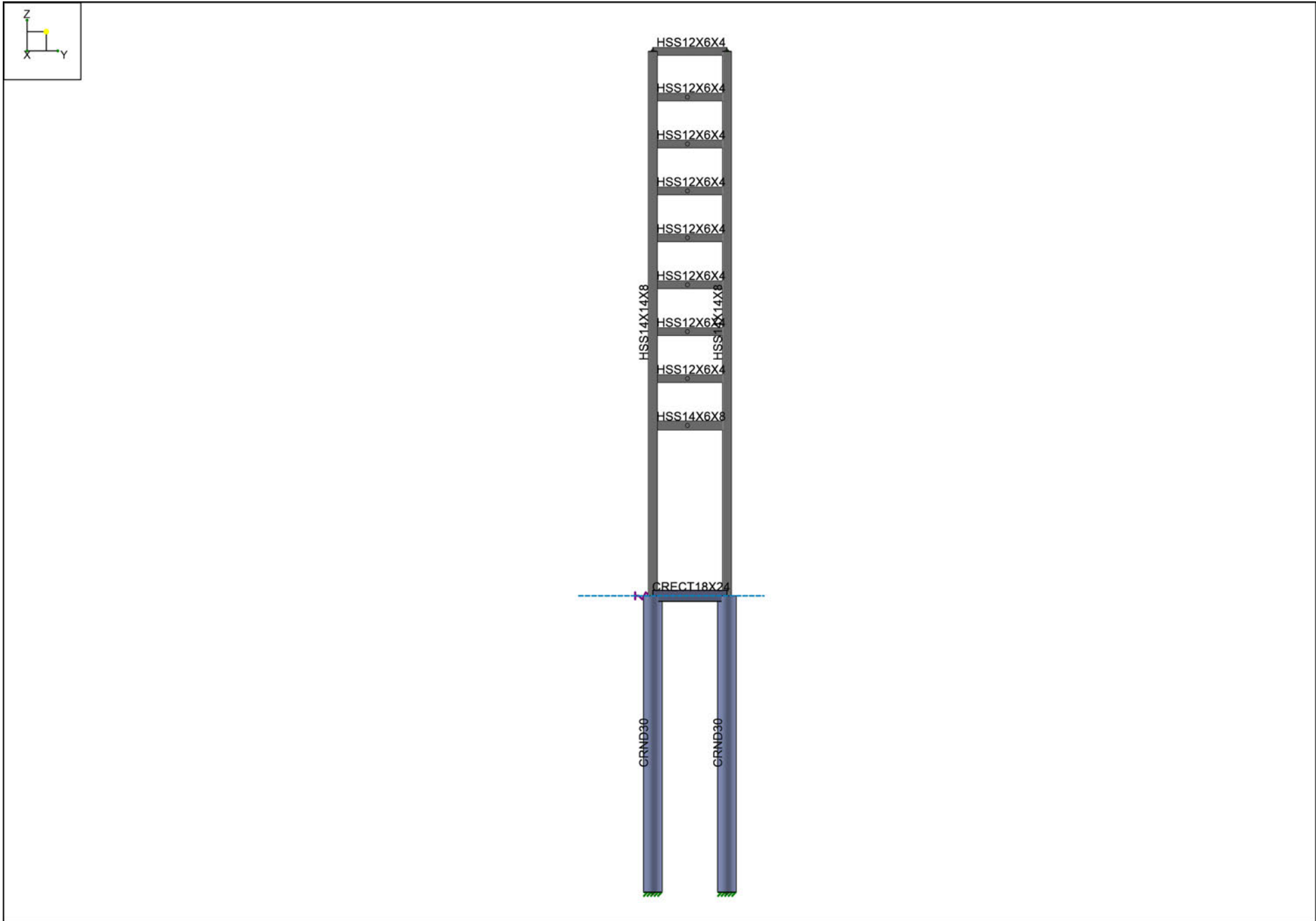




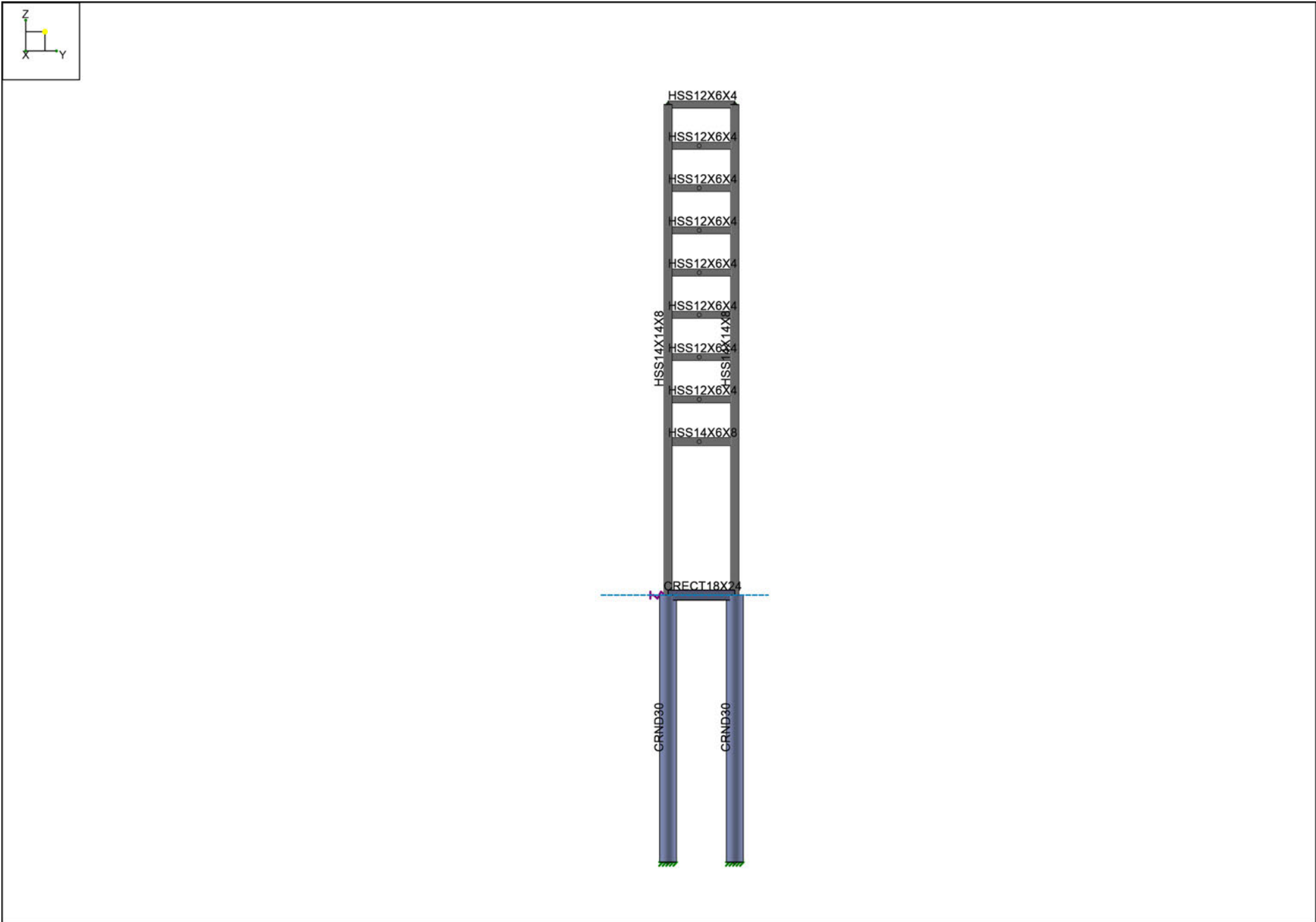




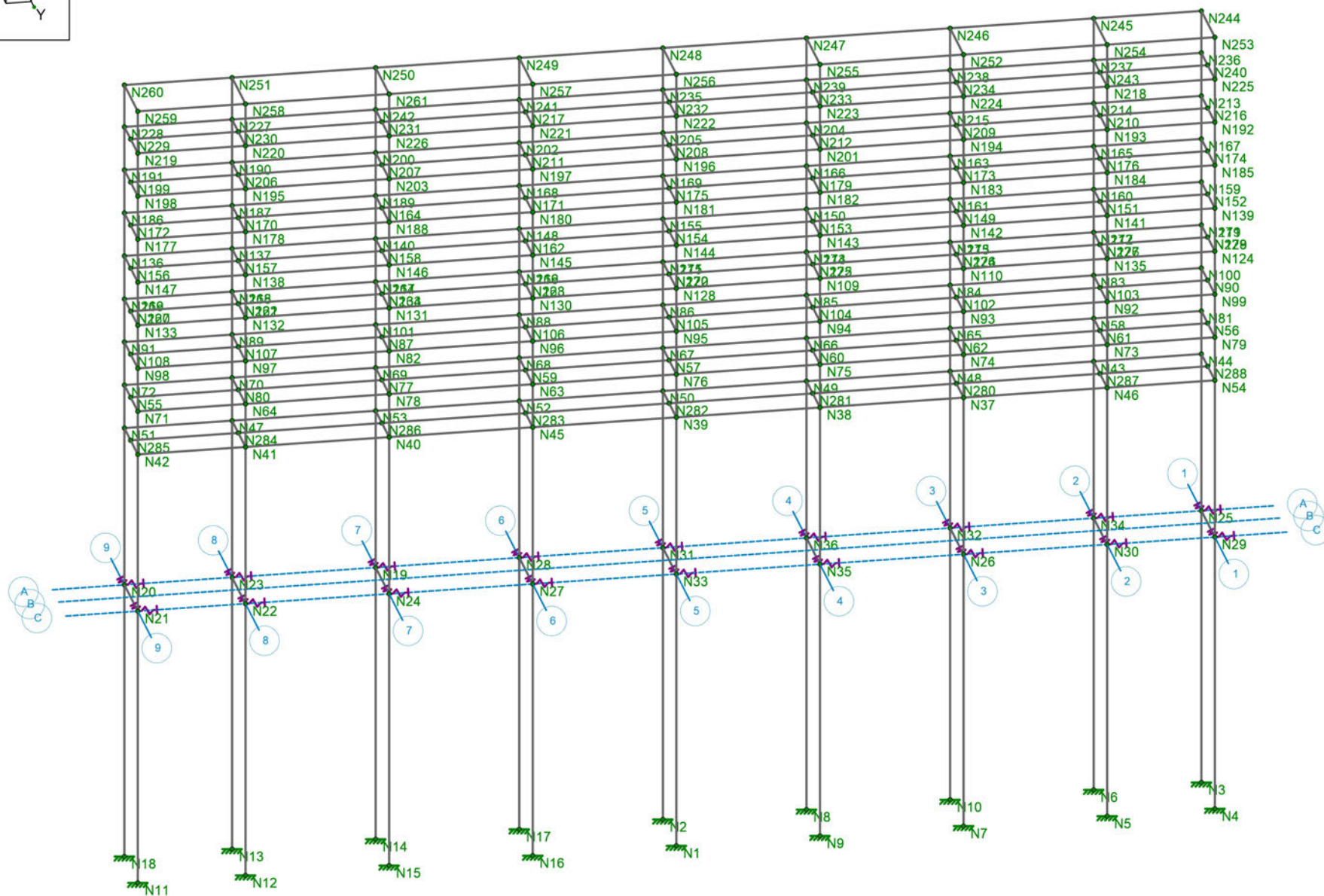
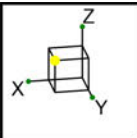




	GMU Geotechnical	Signboard Box Sections	SK-7
	sbolin		Signboard_box sections_Rev3.r3d
	24-130-00		



	GMU Geotechnical	Signboard Box Sections	SK-10
	sbolin		Signboard_box sections_Rev3.r3d
	24-130-00		

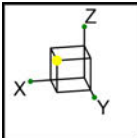


GMU Geotechnical
sboin
24-130-00

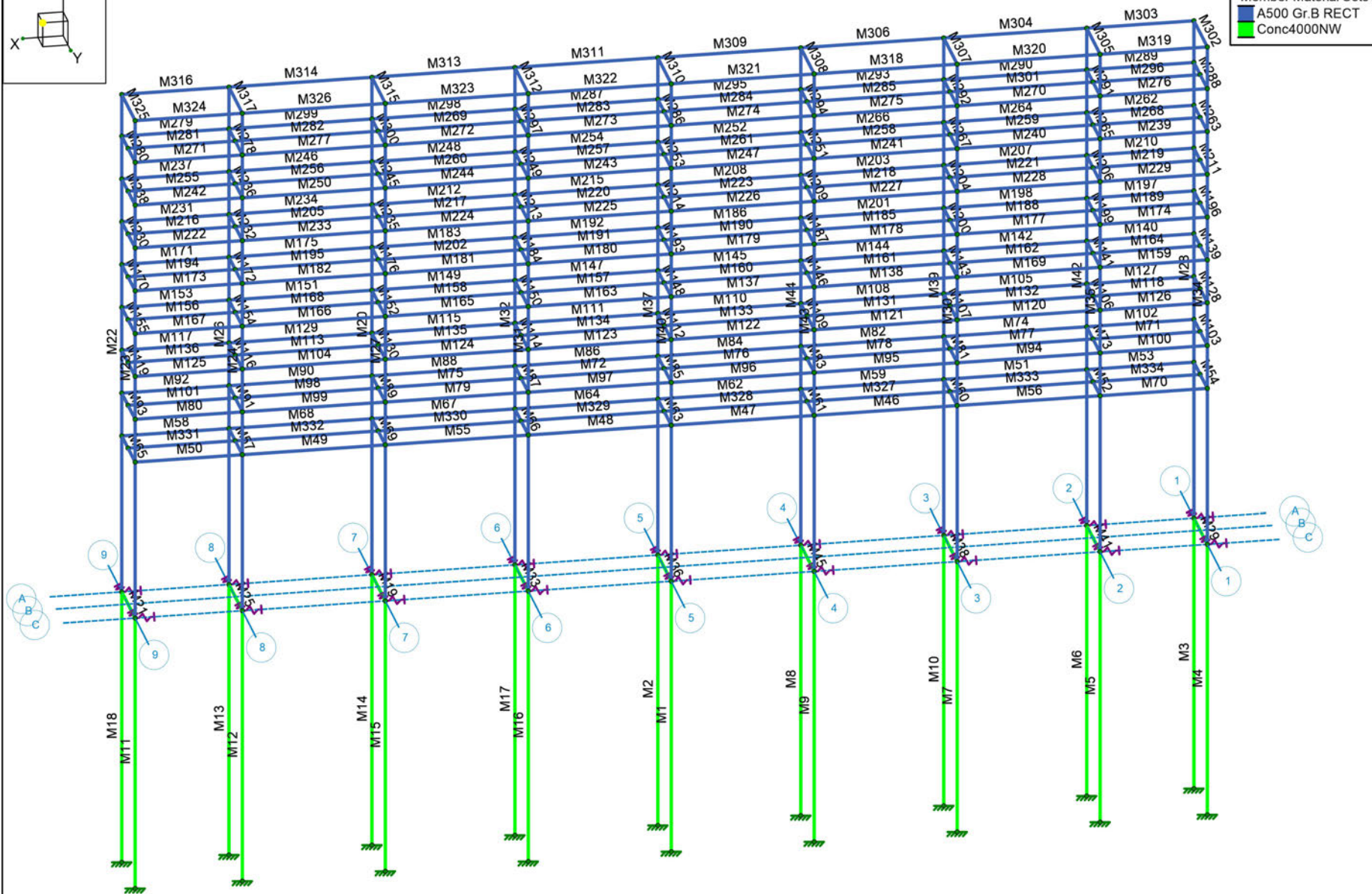
Signboard Box Sections

SK-3

Signboard_box sections_Rev3.r3d



Member Material Sets
 A500 Gr.B RECT
 Conc4000NW



GMU Geotechnical
 sbolin
 24-130-00

Signboard Box Sections

SK-4

Signboard_box sections_Rev3.r3d

61. **Main Display (50' x 150')**
- A. Loading
 - B. Wind Loading
 - C. FEA Model Definition Sketches
 - D. Envelope Member Forces**
 - E. Envelope Reactions
 - F. Envelope Code Check
 - G. Baseplate + Anchor Bolts
 - H. Caisson & Foundation Design
-

Element Force Summary

Member	Level	Max/Min	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	MaxMz[k-ft]
C. Col	Caisson	Max	299.293	1.246	8.382	251.709	47.189
C. Col	Caisson	Min	-179.102	-1.016	-8.375	-251.602	-53.419
C. Beam	Ground	Max	1.935	49.435	0.255	1.351	217.622
C. Beam	Ground	Min	0.015	-50.304	-0.270	-1.351	-207.117
Stl Col	L2-L10	Max	201.393	19.322	19.929	255.150	255.385
Stl Col	L2-L10	Min	-145.277	-19.344	-19.933	-255.098	-256.564
Stl Beam	L2-L10	Max	0.000	13.352	0.000	0.000	95.058
Stl Beam	L2-L10	Min	0.000	-13.342	0.000	0.000	-89.165
Stl Girder	L2-L10	Max		50.375	0.000	0.000	251.242
Stl Girder	L2-L10	Min	-0.008	-50.557	0.000	0.000	-249.678
Stl Girder	L2	Max	0.006	50.375	0.000	0.000	251.242
Stl Girder	L2	Min	-0.006	-50.557	0.000	0.000	-249.678
Stl Girder	L3-L10	Max	0.008	19.724	0.000	0.000	98.238
Stl Girder	L3-L10	Min	-0.008	-19.887	0.000	0.000	-97.201

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Beam	2	M327	max	0.000	2.146	0.000	0.000	19.581
			min	0.000	-2.143	0.000	0.000	-17.770
		M328	max	0.000	2.130	0.000	0.000	19.366
			min	0.000	-2.130	0.000	0.000	-17.591
		M329	max	0.000	2.130	0.000	0.000	19.370
			min	0.000	-2.130	0.000	0.000	-17.592
		M330	max	0.000	2.146	0.000	0.000	19.613
			min	0.000	-2.148	0.000	0.000	-17.809
		M331	max	0.000	3.761	0.000	0.000	29.051
			min	0.000	-3.710	0.000	0.000	-28.395
		M332	max	0.000	1.997	0.000	0.000	18.612
			min	0.000	-1.987	0.000	0.000	-16.799
		M333	max	0.000	1.997	0.000	0.000	18.685
			min	0.000	-2.005	0.000	0.000	-16.892
		M334	max	0.000	3.703	0.000	0.000	29.012
			min	0.000	-3.757	0.000	0.000	-28.374
		M46	max	0.000	4.482	0.000	0.000	42.882
			min	0.000	-4.481	0.000	0.000	-40.991
		M47	max	0.000	4.481	0.000	0.000	42.865
			min	0.000	-4.480	0.000	0.000	-40.985
		M48	max	0.000	4.481	0.000	0.000	42.865
			min	0.000	-4.480	0.000	0.000	-40.984
		M49	max	0.000	4.440	0.000	0.000	42.606
			min	0.000	-4.440	0.000	0.000	-40.738
		M50	max	0.000	7.658	0.000	0.000	57.057
			min	0.000	-7.669	0.000	0.000	-55.889
		M51	max	0.000	8.413	0.000	0.000	72.897
			min	0.000	-8.408	0.000	0.000	-62.605
		M53	max	0.000	13.302	0.000	0.000	94.898
			min	0.000	-13.342	0.000	0.000	-89.085
		M55	max	0.000	4.482	0.000	0.000	42.884
			min	0.000	-4.482	0.000	0.000	-41.000
		M56	max	0.000	4.443	0.000	0.000	42.625
			min	0.000	-4.441	0.000	0.000	-40.767
		M58	max	0.000	13.352	0.000	0.000	95.058
			min	0.000	-13.324	0.000	0.000	-89.165
		M59	max	0.000	8.499	0.000	0.000	73.454
			min	0.000	-8.486	0.000	0.000	-63.005
		M62	max	0.000	8.497	0.000	0.000	73.416
			min	0.000	-8.494	0.000	0.000	-63.007
		M64	max	0.000	8.496	0.000	0.000	73.418
			min	0.000	-8.497	0.000	0.000	-63.012
		M67	max	0.000	8.494	0.000	0.000	73.481
			min	0.000	-8.501	0.000	0.000	-63.026

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Beam	2	M68	max	0.000	8.381	0.000	0.000	72.620
			min	0.000	-8.376	0.000	0.000	-62.245
		M70	max	0.000	7.668	0.000	0.000	57.054
			min	0.000	-7.657	0.000	0.000	-55.884
	3	M100	max	0.000	3.721	0.000	0.000	26.868
			min	0.000	-3.700	0.000	0.000	-25.698
		M101	max	0.000	1.279	0.000	0.000	8.881
			min	0.000	-1.214	0.000	0.000	-8.399
		M102	max	0.000	7.065	0.000	0.000	46.670
			min	0.000	-7.057	0.000	0.000	-40.790
		M71	max	0.000	1.208	0.000	0.000	8.855
			min	0.000	-1.275	0.000	0.000	-8.381
		M72	max	0.000	0.821	0.000	0.000	6.277
			min	0.000	-0.821	0.000	0.000	-4.559
		M74	max	0.000	5.072	0.000	0.000	39.109
			min	0.000	-5.058	0.000	0.000	-28.970
		M75	max	0.000	0.827	0.000	0.000	6.395
			min	0.000	-0.830	0.000	0.000	-4.652
		M76	max	0.000	0.822	0.000	0.000	6.276
			min	0.000	-0.822	0.000	0.000	-4.560
		M77	max	0.000	0.777	0.000	0.000	6.123
			min	0.000	-0.788	0.000	0.000	-4.380
		M78	max	0.000	0.827	0.000	0.000	6.352
			min	0.000	-0.824	0.000	0.000	-4.610
		M79	max	0.000	2.284	0.000	0.000	20.900
			min	0.000	-2.284	0.000	0.000	-19.131
		M80	max	0.000	3.701	0.000	0.000	26.868
			min	0.000	-3.721	0.000	0.000	-25.700
		M82	max	0.000	5.049	0.000	0.000	38.929
			min	0.000	-5.039	0.000	0.000	-28.700
		M84	max	0.000	5.053	0.000	0.000	38.980
			min	0.000	-5.051	0.000	0.000	-28.750
		M86	max	0.000	5.053	0.000	0.000	38.986
			min	0.000	-5.054	0.000	0.000	-28.758
		M88	max	0.000	5.047	0.000	0.000	38.957
			min	0.000	-5.051	0.000	0.000	-28.728
		M90	max	0.000	5.029	0.000	0.000	38.758
			min	0.000	-5.032	0.000	0.000	-28.592
		M92	max	0.000	7.068	0.000	0.000	46.799
			min	0.000	-7.083	0.000	0.000	-40.871
		M94	max	0.000	2.288	0.000	0.000	20.924
			min	0.000	-2.284	0.000	0.000	-19.175
		M95	max	0.000	2.284	0.000	0.000	20.898
			min	0.000	-2.283	0.000	0.000	-19.130

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Beam	3	M96	max	0.000	2.285	0.000	0.000	20.908
			min	0.000	-2.284	0.000	0.000	-19.138
		M97	max	0.000	2.285	0.000	0.000	20.908
			min	0.000	-2.285	0.000	0.000	-19.138
		M98	max	0.000	0.781	0.000	0.000	6.056
			min	0.000	-0.768	0.000	0.000	-4.296
		M99	max	0.000	2.282	0.000	0.000	20.887
			min	0.000	-2.284	0.000	0.000	-19.139
	4	M104	max	0.000	1.207	0.000	0.000	10.145
			min	0.000	-1.209	0.000	0.000	-8.455
		M105	max	0.000	3.191	0.000	0.000	20.292
			min	0.000	-3.178	0.000	0.000	-10.268
		M108	max	0.000	3.169	0.000	0.000	20.141
			min	0.000	-3.161	0.000	0.000	-10.002
		M110	max	0.000	3.174	0.000	0.000	20.187
			min	0.000	-3.171	0.000	0.000	-10.053
		M111	max	0.000	3.174	0.000	0.000	20.192
			min	0.000	-3.174	0.000	0.000	-10.061
		M113	max	0.000	0.513	0.000	0.000	3.252
			min	0.000	-0.500	0.000	0.000	-1.508
		M115	max	0.000	3.168	0.000	0.000	20.180
			min	0.000	-3.173	0.000	0.000	-10.038
		M117	max	0.000	3.772	0.000	0.000	22.083
			min	0.000	-3.787	0.000	0.000	-16.287
		M118	max	0.000	0.637	0.000	0.000	4.103
			min	0.000	-0.704	0.000	0.000	-3.649
		M120	max	0.000	1.214	0.000	0.000	10.174
			min	0.000	-1.210	0.000	0.000	-8.496
		M121	max	0.000	1.212	0.000	0.000	10.179
			min	0.000	-1.211	0.000	0.000	-8.464
		M122	max	0.000	1.213	0.000	0.000	10.185
			min	0.000	-1.212	0.000	0.000	-8.470
		M123	max	0.000	1.213	0.000	0.000	10.185
			min	0.000	-1.212	0.000	0.000	-8.471
		M124	max	0.000	1.212	0.000	0.000	10.181
			min	0.000	-1.212	0.000	0.000	-8.466
		M125	max	0.000	1.818	0.000	0.000	12.788
			min	0.000	-1.841	0.000	0.000	-11.667
		M126	max	0.000	1.841	0.000	0.000	12.787
			min	0.000	-1.817	0.000	0.000	-11.659
		M127	max	0.000	3.772	0.000	0.000	21.976
			min	0.000	-3.763	0.000	0.000	-16.215
		M129	max	0.000	3.149	0.000	0.000	19.955
			min	0.000	-3.151	0.000	0.000	-9.888

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Beam	4	M131	max	0.000	0.530	0.000	0.000	3.363
			min	0.000	-0.527	0.000	0.000	-1.642
		M132	max	0.000	0.510	0.000	0.000	3.320
			min	0.000	-0.520	0.000	0.000	-1.592
		M133	max	0.000	0.529	0.000	0.000	3.347
			min	0.000	-0.529	0.000	0.000	-1.648
		M134	max	0.000	0.529	0.000	0.000	3.346
			min	0.000	-0.528	0.000	0.000	-1.644
		M135	max	0.000	0.531	0.000	0.000	3.409
			min	0.000	-0.533	0.000	0.000	-1.681
		M136	max	0.000	0.708	0.000	0.000	4.127
			min	0.000	-0.643	0.000	0.000	-3.667
	5	M137	max	0.000	0.543	0.000	0.000	3.485
			min	0.000	-0.542	0.000	0.000	-1.799
		M138	max	0.000	0.542	0.000	0.000	3.477
			min	0.000	-0.541	0.000	0.000	-1.792
		M140	max	0.000	1.780	0.000	0.000	6.874
			min	0.000	-1.766	0.000	0.000	-2.290
		M142	max	0.000	2.072	0.000	0.000	9.149
			min	0.000	-2.059	0.000	0.000	-3.395
		M144	max	0.000	2.040	0.000	0.000	8.847
			min	0.000	-2.033	0.000	0.000	-3.370
		M145	max	0.000	2.046	0.000	0.000	8.910
			min	0.000	-2.043	0.000	0.000	-3.369
		M147	max	0.000	2.046	0.000	0.000	8.917
			min	0.000	-2.047	0.000	0.000	-3.369
		M149	max	0.000	2.040	0.000	0.000	8.898
			min	0.000	-2.045	0.000	0.000	-3.369
		M151	max	0.000	2.029	0.000	0.000	8.749
			min	0.000	-2.032	0.000	0.000	-3.395
		M153	max	0.000	1.775	0.000	0.000	6.961
			min	0.000	-1.792	0.000	0.000	-2.309
		M156	max	0.000	0.354	0.000	0.000	1.413
			min	0.000	-0.290	0.000	0.000	-0.737
		M157	max	0.000	0.350	0.000	0.000	1.554
			min	0.000	-0.349	0.000	0.000	-0.568
		M158	max	0.000	0.349	0.000	0.000	1.577
			min	0.000	-0.351	0.000	0.000	-0.562
		M159	max	0.000	0.660	0.000	0.000	3.867
			min	0.000	-0.633	0.000	0.000	-2.880
		M160	max	0.000	0.350	0.000	0.000	1.560
			min	0.000	-0.350	0.000	0.000	-0.568
		M161	max	0.000	0.347	0.000	0.000	1.529
			min	0.000	-0.345	0.000	0.000	-0.564

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Beam	5	M162	max	0.000	0.347	0.000	0.000	1.611
			min	0.000	-0.358	0.000	0.000	-0.611
		M163	max	0.000	0.543	0.000	0.000	3.485
			min	0.000	-0.543	0.000	0.000	-1.800
		M164	max	0.000	0.285	0.000	0.000	1.368
			min	0.000	-0.350	0.000	0.000	-0.733
		M165	max	0.000	0.542	0.000	0.000	3.481
			min	0.000	-0.542	0.000	0.000	-1.795
		M166	max	0.000	0.540	0.000	0.000	3.480
			min	0.000	-0.543	0.000	0.000	-1.801
		M167	max	0.000	0.634	0.000	0.000	3.869
			min	0.000	-0.660	0.000	0.000	-2.884
		M168	max	0.000	0.351	0.000	0.000	1.541
			min	0.000	-0.338	0.000	0.000	-0.612
		M169	max	0.000	0.547	0.000	0.000	3.525
			min	0.000	-0.543	0.000	0.000	-1.844
	6	M171	max	0.000	2.333	0.000	0.000	11.168
			min	0.000	-2.348	0.000	0.000	-5.337
		M173	max	0.000	0.671	0.000	0.000	4.165
			min	0.000	-0.699	0.000	0.000	-3.114
		M174	max	0.000	0.700	0.000	0.000	4.172
			min	0.000	-0.671	0.000	0.000	-3.121
		M175	max	0.000	2.295	0.000	0.000	11.398
			min	0.000	-2.299	0.000	0.000	-3.854
		M177	max	0.000	0.548	0.000	0.000	3.533
			min	0.000	-0.544	0.000	0.000	-1.817
		M178	max	0.000	0.551	0.000	0.000	3.570
			min	0.000	-0.550	0.000	0.000	-1.843
		M179	max	0.000	0.550	0.000	0.000	3.558
			min	0.000	-0.549	0.000	0.000	-1.832
		M180	max	0.000	0.549	0.000	0.000	3.553
			min	0.000	-0.549	0.000	0.000	-1.828
		M181	max	0.000	0.550	0.000	0.000	3.561
			min	0.000	-0.550	0.000	0.000	-1.835
		M182	max	0.000	0.548	0.000	0.000	3.566
			min	0.000	-0.552	0.000	0.000	-1.852
		M183	max	0.000	2.286	0.000	0.000	11.366
			min	0.000	-2.292	0.000	0.000	-3.791
		M185	max	0.000	0.376	0.000	0.000	1.833
			min	0.000	-0.374	0.000	0.000	-0.616
		M186	max	0.000	2.288	0.000	0.000	11.324
			min	0.000	-2.285	0.000	0.000	-3.778
		M188	max	0.000	0.349	0.000	0.000	1.668
			min	0.000	-0.360	0.000	0.000	-0.632

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Beam	6	M189	max	0.000	0.355	0.000	0.000	1.892
			min	0.000	-0.420	0.000	0.000	-1.187
		M190	max	0.000	0.369	0.000	0.000	1.756
			min	0.000	-0.369	0.000	0.000	-0.597
		M191	max	0.000	0.370	0.000	0.000	1.757
			min	0.000	-0.370	0.000	0.000	-0.594
		M192	max	0.000	2.284	0.000	0.000	11.302
			min	0.000	-2.285	0.000	0.000	-3.770
		M194	max	0.000	0.415	0.000	0.000	1.834
			min	0.000	-0.351	0.000	0.000	-1.168
		M195	max	0.000	0.369	0.000	0.000	1.761
			min	0.000	-0.357	0.000	0.000	-0.648
		M197	max	0.000	2.356	0.000	0.000	11.223
			min	0.000	-2.343	0.000	0.000	-5.403
		M198	max	0.000	2.268	0.000	0.000	11.089
			min	0.000	-2.255	0.000	0.000	-3.757
		M201	max	0.000	2.299	0.000	0.000	11.437
			min	0.000	-2.292	0.000	0.000	-3.810
		M202	max	0.000	0.370	0.000	0.000	1.790
			min	0.000	-0.373	0.000	0.000	-0.593
	7	M203	max	0.000	3.057	0.000	0.000	19.021
			min	0.000	-3.052	0.000	0.000	-8.846
		M205	max	0.000	0.479	0.000	0.000	2.912
			min	0.000	-0.466	0.000	0.000	-1.206
		M207	max	0.000	3.022	0.000	0.000	18.607
			min	0.000	-3.009	0.000	0.000	-8.546
		M208	max	0.000	3.046	0.000	0.000	18.905
			min	0.000	-3.043	0.000	0.000	-8.742
		M210	max	0.000	3.689	0.000	0.000	21.311
			min	0.000	-3.680	0.000	0.000	-15.507
		M212	max	0.000	3.044	0.000	0.000	18.951
			min	0.000	-3.050	0.000	0.000	-8.782
		M215	max	0.000	3.042	0.000	0.000	18.884
			min	0.000	-3.044	0.000	0.000	-8.721
		M216	max	0.000	0.650	0.000	0.000	3.622
			min	0.000	-0.586	0.000	0.000	-3.151
		M217	max	0.000	0.492	0.000	0.000	3.015
			min	0.000	-0.494	0.000	0.000	-1.289
		M218	max	0.000	0.498	0.000	0.000	3.059
			min	0.000	-0.496	0.000	0.000	-1.339
		M219	max	0.000	0.590	0.000	0.000	3.637
			min	0.000	-0.655	0.000	0.000	-3.168
		M220	max	0.000	0.490	0.000	0.000	2.958
			min	0.000	-0.490	0.000	0.000	-1.262

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Beam	7	M221	max	0.000	0.459	0.000	0.000	2.816
			min	0.000	-0.469	0.000	0.000	-1.145
		M222	max	0.000	1.455	0.000	0.000	10.097
			min	0.000	-1.486	0.000	0.000	-8.976
		M223	max	0.000	0.489	0.000	0.000	2.957
			min	0.000	-0.489	0.000	0.000	-1.263
		M224	max	0.000	0.997	0.000	0.000	8.037
			min	0.000	-0.998	0.000	0.000	-6.306
		M225	max	0.000	0.997	0.000	0.000	8.028
			min	0.000	-0.997	0.000	0.000	-6.298
		M226	max	0.000	0.997	0.000	0.000	8.033
			min	0.000	-0.997	0.000	0.000	-6.302
		M227	max	0.000	0.999	0.000	0.000	8.046
			min	0.000	-0.998	0.000	0.000	-6.313
		M228	max	0.000	0.995	0.000	0.000	7.992
			min	0.000	-0.990	0.000	0.000	-6.285
		M229	max	0.000	1.486	0.000	0.000	10.103
			min	0.000	-1.456	0.000	0.000	-8.983
		M231	max	0.000	3.673	0.000	0.000	21.261
			min	0.000	-3.682	0.000	0.000	-15.457
		M233	max	0.000	0.995	0.000	0.000	8.028
			min	0.000	-0.998	0.000	0.000	-6.322
		M234	max	0.000	3.050	0.000	0.000	18.967
			min	0.000	-3.053	0.000	0.000	-8.872
	8	M237	max	0.000	4.844	0.000	0.000	30.036
			min	0.000	-4.840	0.000	0.000	-24.318
		M239	max	0.000	2.175	0.000	0.000	15.302
			min	0.000	-2.144	0.000	0.000	-14.115
		M240	max	0.000	1.385	0.000	0.000	11.885
			min	0.000	-1.380	0.000	0.000	-10.193
		M241	max	0.000	1.390	0.000	0.000	11.961
			min	0.000	-1.389	0.000	0.000	-10.228
		M242	max	0.000	2.143	0.000	0.000	15.296
			min	0.000	-2.174	0.000	0.000	-14.109
		M243	max	0.000	1.388	0.000	0.000	11.943
			min	0.000	-1.388	0.000	0.000	-10.212
		M244	max	0.000	1.389	0.000	0.000	11.952
			min	0.000	-1.389	0.000	0.000	-10.220
		M246	max	0.000	3.704	0.000	0.000	25.524
			min	0.000	-3.706	0.000	0.000	-15.421
		M247	max	0.000	1.389	0.000	0.000	11.947
			min	0.000	-1.388	0.000	0.000	-10.216
		M248	max	0.000	3.702	0.000	0.000	25.529
			min	0.000	-3.708	0.000	0.000	-15.359

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Beam	8	M250	max	0.000	1.385	0.000	0.000	11.926
			min	0.000	-1.389	0.000	0.000	-10.232
		M252	max	0.000	3.703	0.000	0.000	25.478
			min	0.000	-3.701	0.000	0.000	-15.314
		M254	max	0.000	3.699	0.000	0.000	25.458
			min	0.000	-3.701	0.000	0.000	-15.294
		M255	max	0.000	0.857	0.000	0.000	5.355
			min	0.000	-0.791	0.000	0.000	-4.893
		M256	max	0.000	0.573	0.000	0.000	3.912
			min	0.000	-0.561	0.000	0.000	-2.164
		M257	max	0.000	0.594	0.000	0.000	4.004
			min	0.000	-0.594	0.000	0.000	-2.298
		M258	max	0.000	0.604	0.000	0.000	4.128
			min	0.000	-0.602	0.000	0.000	-2.405
		M259	max	0.000	0.554	0.000	0.000	3.812
			min	0.000	-0.563	0.000	0.000	-2.085
		M260	max	0.000	0.598	0.000	0.000	4.083
			min	0.000	-0.600	0.000	0.000	-2.349
		M261	max	0.000	0.594	0.000	0.000	4.003
			min	0.000	-0.594	0.000	0.000	-2.298
		M262	max	0.000	4.847	0.000	0.000	30.081
			min	0.000	-4.849	0.000	0.000	-24.353
		M264	max	0.000	3.674	0.000	0.000	25.101
			min	0.000	-3.661	0.000	0.000	-15.084
		M266	max	0.000	3.715	0.000	0.000	25.598
			min	0.000	-3.710	0.000	0.000	-15.423
		M268	max	0.000	0.795	0.000	0.000	5.371
			min	0.000	-0.862	0.000	0.000	-4.909
	9	M269	max	0.000	0.666	0.000	0.000	4.771
			min	0.000	-0.669	0.000	0.000	-3.038
		M270	max	0.000	1.633	0.000	0.000	14.370
			min	0.000	-1.628	0.000	0.000	-12.675
		M271	max	0.000	2.572	0.000	0.000	18.524
			min	0.000	-2.606	0.000	0.000	-17.352
		M272	max	0.000	1.636	0.000	0.000	14.421
			min	0.000	-1.636	0.000	0.000	-12.692
		M273	max	0.000	1.635	0.000	0.000	14.412
			min	0.000	-1.635	0.000	0.000	-12.684
		M274	max	0.000	1.636	0.000	0.000	14.416
			min	0.000	-1.635	0.000	0.000	-12.687
		M275	max	0.000	1.637	0.000	0.000	14.429
			min	0.000	-1.636	0.000	0.000	-12.699
		M276	max	0.000	2.606	0.000	0.000	18.529
			min	0.000	-2.573	0.000	0.000	-17.357

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Beam	9	M277	max	0.000	1.633	0.000	0.000	14.409
			min	0.000	-1.637	0.000	0.000	-12.715
		M279	max	0.000	5.613	0.000	0.000	35.782
			min	0.000	-5.607	0.000	0.000	-30.081
		M281	max	0.000	0.989	0.000	0.000	6.450
			min	0.000	-0.923	0.000	0.000	-5.988
		M282	max	0.000	0.635	0.000	0.000	4.563
			min	0.000	-0.624	0.000	0.000	-2.817
		M283	max	0.000	0.662	0.000	0.000	4.681
			min	0.000	-0.662	0.000	0.000	-2.976
		M284	max	0.000	0.661	0.000	0.000	4.679
			min	0.000	-0.661	0.000	0.000	-2.976
		M285	max	0.000	0.672	0.000	0.000	4.817
			min	0.000	-0.671	0.000	0.000	-3.098
		M287	max	0.000	4.134	0.000	0.000	29.810
			min	0.000	-4.136	0.000	0.000	-19.650
		M289	max	0.000	5.613	0.000	0.000	35.822
			min	0.000	-5.616	0.000	0.000	-30.099
		M290	max	0.000	4.110	0.000	0.000	29.474
			min	0.000	-4.096	0.000	0.000	-19.443
		M293	max	0.000	4.150	0.000	0.000	29.947
			min	0.000	-4.147	0.000	0.000	-19.781
		M295	max	0.000	4.138	0.000	0.000	29.829
			min	0.000	-4.136	0.000	0.000	-19.669
		M296	max	0.000	0.927	0.000	0.000	6.465
			min	0.000	-0.993	0.000	0.000	-6.002
		M298	max	0.000	4.137	0.000	0.000	29.881
			min	0.000	-4.143	0.000	0.000	-19.716
		M299	max	0.000	4.140	0.000	0.000	29.887
			min	0.000	-4.144	0.000	0.000	-19.795
		M301	max	0.000	0.616	0.000	0.000	4.460
			min	0.000	-0.625	0.000	0.000	-2.735
	10	M303	max	0.000	5.215	0.000	0.000	33.131
			min	0.000	-5.301	0.000	0.000	-27.993
		M304	max	0.000	3.849	0.000	0.000	27.058
			min	0.000	-3.851	0.000	0.000	-16.965
		M306	max	0.000	3.921	0.000	0.000	27.667
			min	0.000	-3.919	0.000	0.000	-17.501
		M309	max	0.000	3.907	0.000	0.000	27.521
			min	0.000	-3.906	0.000	0.000	-17.376
		M311	max	0.000	3.904	0.000	0.000	27.506
			min	0.000	-3.906	0.000	0.000	-17.359
		M313	max	0.000	3.907	0.000	0.000	27.590
			min	0.000	-3.914	0.000	0.000	-17.430

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Beam	10	M314	max	0.000	3.894	0.000	0.000	27.487
			min	0.000	-3.882	0.000	0.000	-17.310
		M316	max	0.000	5.299	0.000	0.000	33.088
			min	0.000	-5.208	0.000	0.000	-27.978
		M318	max	0.000	1.574	0.000	0.000	13.804
			min	0.000	-1.574	0.000	0.000	-12.078
		M319	max	0.000	2.507	0.000	0.000	17.899
			min	0.000	-2.482	0.000	0.000	-16.750
		M320	max	0.000	1.561	0.000	0.000	13.681
			min	0.000	-1.558	0.000	0.000	-11.996
		M321	max	0.000	1.573	0.000	0.000	13.788
			min	0.000	-1.573	0.000	0.000	-12.065
		M322	max	0.000	1.572	0.000	0.000	13.785
			min	0.000	-1.573	0.000	0.000	-12.062
		M323	max	0.000	1.573	0.000	0.000	13.795
			min	0.000	-1.574	0.000	0.000	-12.071
		M324	max	0.000	2.481	0.000	0.000	17.894
			min	0.000	-2.506	0.000	0.000	-16.744
		M326	max	0.000	1.563	0.000	0.000	13.732
			min	0.000	-1.565	0.000	0.000	-12.036
C.Beam	1	M19	max	1.935	48.873	0.041	0.942	216.082
			min	0.080	-49.991	-0.188	-0.942	-205.524
		M21	max	1.909	49.435	0.018	1.161	217.622
			min	0.015	-50.304	-0.232	-1.161	-207.117
		M25	max	1.932	49.111	0.021	1.351	216.574
			min	0.051	-50.090	-0.270	-1.351	-206.023
		M29	max	1.823	48.366	0.221	1.104	212.234
			min	0.016	-49.226	-0.017	-1.104	-201.728
		M33	max	1.929	48.702	0.082	0.731	215.610
			min	0.086	-49.896	-0.146	-0.731	-205.053
		M36	max	1.919	48.549	0.119	0.593	214.985
			min	0.088	-49.771	-0.108	-0.593	-204.427
		M38	max	1.875	48.379	0.207	1.035	213.474
			min	0.080	-49.469	-0.027	-1.035	-202.915
		M41	max	1.841	48.374	0.255	1.276	212.372
			min	0.052	-49.249	-0.046	-1.276	-201.822
		M45	max	1.907	48.409	0.158	0.790	214.229
			min	0.086	-49.620	-0.069	-0.790	-203.671
C.Col	0	M1	max	269.612	1.244	8.286	248.661	39.062
			min	-172.531	-0.720	-8.287	-248.665	-53.273
		M10	max	294.143	0.882	8.281	249.136	46.140
			min	-152.287	-0.990	-8.324	-249.832	-43.432
		M11	max	266.881	1.198	8.183	245.248	39.430
			min	-179.102	-0.723	-8.171	-245.189	-52.399

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
C.Col	0	M12	max	270.056	1.232	8.332	250.148	39.785
			min	-175.776	-0.738	-8.336	-250.278	-53.178
		M13	max	295.465	0.896	8.382	251.709	47.189
			min	-158.741	-1.016	-8.320	-250.552	-44.156
		M14	max	298.893	0.906	8.319	249.740	46.897
			min	-156.127	-1.008	-8.287	-249.214	-44.338
		M15	max	270.676	1.244	8.281	248.498	39.547
			min	-174.111	-0.733	-8.287	-248.692	-53.419
		M16	max	270.240	1.246	8.285	248.619	39.259
			min	-173.298	-0.725	-8.289	-248.715	-53.383
		M17	max	299.293	0.906	8.313	249.680	46.578
			min	-154.024	-0.999	-8.299	-249.462	-44.302
		M18	max	286.046	0.865	8.242	246.797	46.877
			min	-158.367	-1.002	-8.142	-245.029	-43.427
		M2	max	299.069	0.904	8.305	249.545	46.370
			min	-152.944	-0.994	-8.308	-249.599	-44.192
		M3	max	281.266	0.842	8.145	245.075	45.824
			min	-154.727	-0.981	-8.237	-246.720	-42.306
		M4	max	261.403	1.175	8.172	245.183	38.361
			min	-173.885	-0.702	-8.182	-245.246	-51.249
		M5	max	265.328	1.195	8.337	250.282	38.807
			min	-171.535	-0.717	-8.331	-250.168	-51.785
		M6	max	288.123	0.862	8.324	250.628	46.262
			min	-155.089	-0.996	-8.375	-251.602	-42.837
		M7	max	267.816	1.220	8.287	248.700	38.774
			min	-171.259	-0.714	-8.283	-248.519	-52.501
		M8	max	298.366	0.901	8.296	249.397	46.256
			min	-152.763	-0.992	-8.316	-249.742	-44.027
		M9	max	268.792	1.241	8.288	248.708	38.941
			min	-171.814	-0.718	-8.286	-248.621	-53.109
Col	2	M20	max	200.821	19.101	19.571	252.838	252.421
			min	-121.999	-19.209	-19.592	-252.566	-254.832
		M22	max	187.413	19.225	18.874	249.116	253.995
			min	-123.904	-19.344	-19.019	-247.724	-256.564
		M23	max	167.379	19.322	18.232	242.929	255.385
			min	-145.277	-19.247	-18.274	-242.494	-255.170
		M24	max	170.769	19.267	18.857	246.708	254.675
			min	-142.258	-19.175	-18.876	-246.552	-254.311
		M26	max	197.155	19.160	19.837	255.150	253.212
			min	-124.500	-19.282	-19.933	-254.277	-255.773
		M27	max	171.487	19.210	18.665	245.401	253.895
			min	-140.811	-19.100	-18.669	-245.340	-253.357
		M28	max	183.701	18.735	19.013	247.745	247.552
			min	-121.332	-18.852	-18.875	-249.061	-250.069

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Col	2	M30	max	169.149	18.955	18.671	245.313	250.530
			min	-138.452	-18.845	-18.663	-245.429	-249.969
		M31	max	171.145	19.151	18.674	245.429	253.104
			min	-140.157	-19.032	-18.675	-245.415	-252.465
		M32	max	201.393	19.043	19.593	252.869	251.631
			min	-119.998	-19.140	-19.602	-252.762	-253.939
		M34	max	162.979	18.832	18.272	242.513	248.943
			min	-141.123	-18.755	-18.233	-242.905	-248.677
		M35	max	166.881	18.878	18.873	246.576	249.547
			min	-138.761	-18.793	-18.859	-246.673	-249.232
		M37	max	201.322	18.980	19.598	252.794	250.798
			min	-119.046	-19.073	-19.596	-252.835	-253.063
		M39	max	196.566	18.847	19.600	252.523	249.056
			min	-118.674	-18.953	-19.569	-252.922	-251.445
		M40	max	170.643	19.088	18.675	245.411	252.271
			min	-139.539	-18.965	-18.674	-245.429	-251.589
		M42	max	190.550	18.771	19.929	254.334	248.084
			min	-121.669	-18.899	-19.843	-255.098	-250.695
		M43	max	169.974	19.022	18.676	245.394	251.401
			min	-138.963	-18.900	-18.673	-245.450	-250.726
		M44	max	200.759	18.914	19.605	252.710	249.928
			min	-119.013	-19.008	-19.589	-252.912	-252.200
		Girder	max	0.000	49.368	0.000	0.000	245.641
			min	0.000	-49.523	0.000	0.000	-243.329
		M54	max	0.000	49.144	0.000	0.000	245.070
			min	0.000	-49.324	0.000	0.000	-243.496
		M57	max	0.005	50.230	0.000	0.000	250.477
			min	-0.005	-50.491	0.000	0.000	-248.163
		M60	max	0.002	49.433	0.000	0.000	246.980
			min	-0.002	-49.806	0.000	0.000	-244.558
		M61	max	0.003	49.482	0.000	0.000	247.846
			min	-0.003	-49.977	0.000	0.000	-245.435
		M63	max	0.004	49.645	0.000	0.000	248.714
			min	-0.004	-50.151	0.000	0.000	-246.303
		M65	max	0.006	50.375	0.000	0.000	251.242
			min	-0.006	-50.557	0.000	0.000	-249.678
		M66	max	0.004	49.818	0.000	0.000	249.433
			min	-0.004	-50.295	0.000	0.000	-247.024
		M69	max	0.004	50.013	0.000	0.000	249.985
			min	-0.004	-50.407	0.000	0.000	-247.561
	3	M103	max	0.000	19.216	0.000	0.000	95.860
			min	0.000	-19.333	0.000	0.000	-94.841
		M73	max	0.000	19.413	0.000	0.000	96.387
			min	0.000	-19.517	0.000	0.000	-94.562

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Girder	3	M81	max	0.000	19.437	0.000	0.000	97.039
			min	0.000	-19.660	0.000	0.000	-95.048
		M83	max	0.000	19.445	0.000	0.000	97.392
			min	0.000	-19.729	0.000	0.000	-95.416
		M85	max	0.003	19.507	0.000	0.000	97.730
			min	-0.003	-19.797	0.000	0.000	-95.753
		M87	max	0.000	19.572	0.000	0.000	97.987
			min	0.000	-19.848	0.000	0.000	-96.013
		M89	max	0.000	19.652	0.000	0.000	98.161
			min	0.000	-19.884	0.000	0.000	-96.167
		M91	max	0.000	19.724	0.000	0.000	98.238
			min	0.000	-19.887	0.000	0.000	-96.387
		M93	max	0.000	19.676	0.000	0.000	98.212
			min	0.000	-19.803	0.000	0.000	-97.201
	4	M106	max	0.000	18.516	0.000	0.000	92.111
			min	0.000	-18.663	0.000	0.000	-90.350
		M107	max	0.000	18.549	0.000	0.000	92.781
			min	0.000	-18.809	0.000	0.000	-90.845
		M109	max	0.000	18.572	0.000	0.000	93.153
			min	0.000	-18.882	0.000	0.000	-91.203
		M112	max	0.004	18.630	0.000	0.000	93.486
			min	-0.004	-18.949	0.000	0.000	-91.532
		M114	max	0.000	18.693	0.000	0.000	93.741
			min	0.000	-18.999	0.000	0.000	-91.800
		M116	max	0.000	18.832	0.000	0.000	93.969
			min	0.000	-19.035	0.000	0.000	-92.190
		M119	max	0.000	18.751	0.000	0.000	93.818
			min	0.000	-18.925	0.000	0.000	-92.820
		M128	max	0.000	18.308	0.000	0.000	91.492
			min	0.000	-18.460	0.000	0.000	-90.482
		M130	max	0.000	18.770	0.000	0.000	93.919
			min	0.000	-19.037	0.000	0.000	-91.987
	5	M139	max	0.000	16.683	0.000	0.000	83.407
			min	0.000	-16.843	0.000	0.000	-82.437
		M141	max	0.000	16.904	0.000	0.000	84.077
			min	0.000	-17.056	0.000	0.000	-82.363
		M143	max	0.000	16.943	0.000	0.000	84.776
			min	0.000	-17.208	0.000	0.000	-82.885
		M146	max	0.000	16.977	0.000	0.000	85.169
			min	0.000	-17.285	0.000	0.000	-83.267
		M148	max	0.004	17.033	0.000	0.000	85.498
			min	-0.004	-17.351	0.000	0.000	-83.593
		M150	max	0.000	17.095	0.000	0.000	85.748
			min	0.000	-17.401	0.000	0.000	-83.856

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Girder	5	M152	max	0.000	17.171	0.000	0.000	85.919
			min	0.000	-17.437	0.000	0.000	-84.036
		M154	max	0.000	17.224	0.000	0.000	85.938
			min	0.000	-17.428	0.000	0.000	-84.210
		M155	max	0.000	17.115	0.000	0.000	85.706
			min	0.000	-17.302	0.000	0.000	-84.747
	6	M170	max	0.000	15.022	0.000	0.000	75.272
			min	0.000	-15.215	0.000	0.000	-74.340
		M172	max	0.000	15.167	0.000	0.000	75.564
			min	0.000	-15.353	0.000	0.000	-73.881
		M176	max	0.000	15.122	0.000	0.000	75.570
			min	0.000	-15.367	0.000	0.000	-73.733
		M184	max	0.000	15.048	0.000	0.000	75.408
			min	0.000	-15.333	0.000	0.000	-73.560
		M187	max	0.000	14.933	0.000	0.000	74.838
			min	0.000	-15.219	0.000	0.000	-72.983
		M193	max	0.003	14.988	0.000	0.000	75.164
			min	-0.003	-15.284	0.000	0.000	-73.303
		M196	max	0.000	14.601	0.000	0.000	73.009
			min	0.000	-14.764	0.000	0.000	-72.068
		M199	max	0.000	14.842	0.000	0.000	73.705
			min	0.000	-14.981	0.000	0.000	-72.032
		M200	max	0.000	14.889	0.000	0.000	74.427
			min	0.000	-15.138	0.000	0.000	-72.577
	7	M204	max	0.001	12.514	0.000	0.000	62.412
			min	-0.001	-12.735	0.000	0.000	-60.601
		M206	max	0.001	12.460	0.000	0.000	61.673
			min	-0.001	-12.575	0.000	0.000	-60.036
		M209	max	0.000	12.570	0.000	0.000	62.843
			min	0.000	-12.820	0.000	0.000	-61.030
		M211	max	0.001	12.193	0.000	0.000	60.977
			min	-0.001	-12.357	0.000	0.000	-60.055
		M213	max	0.000	12.681	0.000	0.000	63.398
			min	0.000	-12.931	0.000	0.000	-61.592
		M214	max	0.004	12.623	0.000	0.000	63.162
			min	-0.004	-12.884	0.000	0.000	-61.343
		M230	max	0.001	12.602	0.000	0.000	63.192
			min	-0.001	-12.799	0.000	0.000	-62.275
		M232	max	0.001	12.789	0.000	0.000	63.521
			min	-0.001	-12.944	0.000	0.000	-61.877
		M235	max	0.001	12.754	0.000	0.000	63.549
			min	-0.001	-12.963	0.000	0.000	-61.753
	8	M236	max	0.000	10.197	0.000	0.000	50.357
			min	0.000	-10.312	0.000	0.000	-48.745

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Girder	8	M238	max	0.000	9.963	0.000	0.000	50.011
			min	0.000	-10.163	0.000	0.000	-49.100
		M245	max	0.000	10.174	0.000	0.000	50.407
			min	0.000	-10.334	0.000	0.000	-48.647
		M249	max	0.000	10.103	0.000	0.000	50.272
			min	0.000	-10.305	0.000	0.000	-48.502
		M251	max	0.000	9.997	0.000	0.000	49.741
			min	0.000	-10.199	0.000	0.000	-47.965
		M253	max	0.008	10.047	0.000	0.000	50.049
			min	-0.008	-10.261	0.000	0.000	-48.267
		M263	max	0.000	9.573	0.000	0.000	47.883
			min	0.000	-9.739	0.000	0.000	-46.970
		M265	max	0.000	9.870	0.000	0.000	48.551
			min	0.000	-9.950	0.000	0.000	-46.942
		M267	max	0.000	9.931	0.000	0.000	49.297
			min	0.000	-10.112	0.000	0.000	-47.518
	9	M278	max	0.000	7.579	0.000	0.000	36.965
			min	0.000	-7.634	0.000	0.000	-35.393
		M280	max	0.000	7.284	0.000	0.000	36.619
			min	0.000	-7.485	0.000	0.000	-35.700
		M286	max	0.007	7.454	0.000	0.000	36.762
			min	-0.007	-7.605	0.000	0.000	-35.024
		M288	max	0.001	7.093	0.000	0.000	35.138
			min	-0.001	-7.189	0.000	0.000	-34.230
		M291	max	0.000	7.371	0.000	0.000	35.456
			min	0.000	-7.331	0.000	0.000	-33.881
		M292	max	0.000	7.379	0.000	0.000	36.025
			min	0.000	-7.459	0.000	0.000	-34.288
		M294	max	0.000	7.409	0.000	0.000	36.478
			min	0.000	-7.548	0.000	0.000	-34.748
		M297	max	0.000	7.505	0.000	0.000	36.955
			min	0.000	-7.643	0.000	0.000	-35.230
		M300	max	0.001	7.571	0.000	0.000	37.053
			min	-0.001	-7.664	0.000	0.000	-35.340
	10	M302	max	0.000	5.588	0.000	0.000	27.836
			min	0.000	-5.689	0.000	0.000	-27.333
		M305	max	0.000	5.688	0.000	0.000	27.840
			min	0.000	-5.660	0.000	0.000	-27.296
		M307	max	0.000	5.683	0.000	0.000	28.025
			min	0.000	-5.725	0.000	0.000	-27.547
		M308	max	0.000	5.704	0.000	0.000	28.166
			min	0.000	-5.753	0.000	0.000	-27.685
		M310	max	0.000	5.700	0.000	0.000	28.185
			min	0.000	-5.757	0.000	0.000	-27.700

Member Forces

Type	Level	Member	Abs	Max Axial[k]	Max Vy[k]	Max Vz[k]	Max My[k-ft]	Max Mx[k-ft]
Girder	10	M312	max	0.000	5.703	0.000	0.000	28.132
			min	0.000	-5.746	0.000	0.000	-27.655
		M315	max	0.000	5.716	0.000	0.000	27.990
			min	0.000	-5.718	0.000	0.000	-27.540
		M317	max	0.000	5.702	0.000	0.000	27.909
			min	0.000	-5.680	0.000	0.000	-27.369
		M325	max	0.000	5.566	0.000	0.000	27.826
			min	0.000	-5.687	0.000	0.000	-27.316

61. Main Display (50' x 150')
- A. Loading
 - B. Wind Loading
 - C. FEA Model Definition Sketches
 - D. Envelope Member Forces
 - E. Envelope Reactions**
 - F. Envelope Code Check
 - G. Baseplate + Anchor Bolts
 - H. Caisson & Foundation Design
-

Reaction Summary

Front Caisson	Max of Pz [k]	Max of Vx [k]	Max of Vy [k]	Max of My [k-ft]	Max of Mz [k-ft]
Max	299.293	8.424	0.982	83.571	1.753
Min	-194.102	-8.412	-0.982	-83.379	-1.681

Back Caisson	Max of Pz [k]	Max of Vx [k]	Max of Vy [k]	Max of My [k-ft]	Max of Mz [k-ft]
Max	270.676	8.358	0.802	83.187	1.753
Min	-142.204	-8.356	-1.206	-83.152	-1.681

Ground/Front	Max of Pz [k]	Max of Vx [k]	Max of Vy [k]	Max of My [k-ft]	Max of Mz [k-ft]
Max	See Element Axial	27.869	20.086	0.000	0.000
Min	See Element Axial	-27.819	-19.838	0.000	0.000

Ground/Back	Max of Pz [k]	Max of Vx [k]	Max of Vy [k]	Max of My [k-ft]	Max of Mz [k-ft]
Max	See Element Axial	27.193	20.093	0.000	0.000
Min	See Element Axial	-27.156	-19.832	0.000	0.000

Envelope Node Reactions

Level	Location	Node Label	max/min	Max of Pz [k]	Max of Vx [k]	Max of Vy [k]	Max of My [k-ft]	Max of Mz [k-ft]
0	Front	N13	max	295.465	8.424	0.982	83.571	1.753
			min	-194.102	-8.335	-0.967	-82.231	-1.410
		N14	max	298.893	8.356	0.976	83.006	1.377
			min	-194.085	-8.309	-0.980	-82.249	-1.290
		N17	max	299.293	8.346	0.968	82.821	1.182
			min	-193.072	-8.327	-0.982	-82.516	-1.299
		N18	max	286.046	8.289	0.968	82.893	1.578
			min	-189.890	-8.146	-0.933	-80.634	-1.038
		N06	max	288.123	8.342	0.964	82.345	0.723
			min	-188.951	-8.412	-0.928	-83.379	-1.681
		N02	max	299.069	8.334	0.963	82.636	1.006
			min	-192.372	-8.339	-0.980	-82.717	-1.299
		N08	max	298.366	8.321	0.961	82.424	0.829
			min	-191.975	-8.352	-0.976	-82.917	-1.298
		N10	max	294.143	8.301	0.959	82.114	0.634
			min	-189.920	-8.363	-0.954	-83.124	-1.459
		N03	max	281.266	8.151	0.949	80.720	0.159
			min	-185.836	-8.282	-0.907	-82.777	-1.523
		N12	max	270.056	8.348	0.802	83.112	1.753
			min	-138.878	-8.356	-1.191	-83.152	-1.410
		N15	max	270.676	8.299	0.796	82.757	1.377
			min	-137.213	-8.307	-1.204	-82.800	-1.290
		N16	max	270.240	8.303	0.788	82.782	1.182
			min	-136.400	-8.308	-1.206	-82.827	-1.299
		N11	max	266.881	8.201	0.786	82.087	1.578
			min	-142.204	-8.186	-1.157	-81.658	-1.038
		N01	max	269.612	8.305	0.783	82.793	1.006
			min	-135.633	-8.306	-1.205	-82.819	-1.299
		N09	max	268.792	8.307	0.780	82.798	0.829
			min	-134.916	-8.304	-1.202	-82.813	-1.298
		N05	max	265.328	8.358	0.778	83.187	0.723
			min	-134.637	-8.347	-1.156	-83.066	-1.681
		N07	max	267.816	8.306	0.776	82.763	0.634
			min	-134.361	-8.301	-1.181	-82.801	-1.459
		N04	max	261.403	8.187	0.762	81.684	0.159
			min	-136.987	-8.200	-1.136	-82.053	-1.523
1	Back	N21	max	0.000	26.491	20.093	0.000	0.000

Envelope Node Reactions

Level	Location	Node Label	max/min	Max of Pz [k]	Max of Vx [k]	Max of Vy [k]	Max of My [k-ft]	Max of Mz [k-ft]
1	Back	N21	min	0.000	-26.227	-19.832	0.000	0.000
		N22	max	0.000	27.173	19.985	0.000	0.000
			min	0.000	-27.156	-19.776	0.000	0.000
		N24	max	0.000	26.885	19.895	0.000	0.000
			min	0.000	-26.850	-19.695	0.000	0.000
		N27	max	0.000	26.875	19.822	0.000	0.000
			min	0.000	-26.873	-19.620	0.000	0.000
		N33	max	0.000	26.864	19.752	0.000	0.000
			min	0.000	-26.879	-19.551	0.000	0.000
		N35	max	0.000	26.854	19.684	0.000	0.000
			min	0.000	-26.892	-19.487	0.000	0.000
		N26	max	0.000	26.828	19.630	0.000	0.000
			min	0.000	-26.912	-19.423	0.000	0.000
		N30	max	0.000	27.193	19.589	0.000	0.000
			min	0.000	-27.151	-19.380	0.000	0.000
		N29	max	0.000	26.249	19.580	0.000	0.000
			min	0.000	-26.472	-19.339	0.000	0.000
		Front						
		N20	max	0.000	27.113	20.086	0.000	0.000
			min	0.000	-26.204	-19.838	0.000	0.000
		N23	max	0.000	27.869	19.978	0.000	0.000
			min	0.000	-27.365	-19.783	0.000	0.000
		N19	max	0.000	27.419	19.888	0.000	0.000
			min	0.000	-27.093	-19.701	0.000	0.000
		N28	max	0.000	27.324	19.815	0.000	0.000
			min	0.000	-27.195	-19.626	0.000	0.000
		N31	max	0.000	27.237	19.745	0.000	0.000
			min	0.000	-27.273	-19.557	0.000	0.000
		N36	max	0.000	27.152	19.677	0.000	0.000
			min	0.000	-27.363	-19.493	0.000	0.000
		N32	max	0.000	27.045	19.623	0.000	0.000
			min	0.000	-27.482	-19.429	0.000	0.000
		N34	max	0.000	27.457	19.582	0.000	0.000
			min	0.000	-27.819	-19.386	0.000	0.000
		N25	max	0.000	26.255	19.573	0.000	0.000
			min	0.000	-27.071	-19.345	0.000	0.000

61. **Main Display (50' x 150')**
- A. Loading
 - B. Wind Loading
 - C. FEA Model Definition Sketches
 - D. Envelope Member Forces
 - E. Envelope Reactions
 - F. Envelope Code Check**
 - G. Baseplate + Anchor Bolts
 - H. Caisson & Foundation Design
-

Load Cases

Description	Solve	P-Delta	SRSS	BLC	Factor	BLC2	Factor3	BLC4	Factor5	BLC6	Factor7
Dead	TRUE	Y		DL	1						
Live	TRUE	Y		LL	1						
Wind-y	TRUE	Y		WLY	1						
Deflection 1	TRUE			DL	1						
Deflection 2	TRUE			LL	1						
Deflection 3	TRUE			DL	1	LL	1				
EQ-x Reaction	TRUE			ELX	1						
EQ-y Reaction	TRUE			ELY	1						
Wind Reaction	TRUE			WLY	1						
IBC 21/ASCE Strength 1	TRUE	Y		DL	1.4						
IBC 21/ASCE Strength 2 (a)	TRUE	Y		DL	1.2	LL	1.6	LLS	1.6		
IBC 21/ASCE Strength 3 (b) (a)	TRUE	Y		DL	1.2	WLX	0.5				
IBC 21/ASCE Strength 3 (b) (b)	TRUE	Y		DL	1.2	WLY	0.5				
IBC 21/ASCE Strength 3 (b) (c)	TRUE	Y		DL	1.2	WLX	-0.5				
IBC 21/ASCE Strength 3 (b) (d)	TRUE	Y		DL	1.2	WLY	-0.5				
IBC 21/ASCE Strength 4 (a) (a)	TRUE	Y		DL	1.2	WLX	1	LL	0.5	LLS	1
IBC 21/ASCE Strength 4 (a) (b)	TRUE	Y		DL	1.2	WLY	1	LL	0.5	LLS	1
IBC 21/ASCE Strength 4 (a) (c)	TRUE	Y		DL	1.2	WLX	-1	LL	0.5	LLS	1
IBC 21/ASCE Strength 4 (a) (d)	TRUE	Y		DL	1.2	WLY	-1	LL	0.5	LLS	1
IBC 21/ASCE Strength 5 (a)	TRUE	Y		DL	0.9	WLX	1				
IBC 21/ASCE Strength 5 (b)	TRUE	Y		DL	0.9	WLY	1				
IBC 21/ASCE Strength 5 (c)	TRUE	Y		DL	0.9	WLX	-1				
IBC 21/ASCE Strength 5 (d)	TRUE	Y		DL	0.9	WLY	-1				
IBC 21/ASCE Strength 6 (a)	TRUE	Y		DL	1.2	ELX	1	LL	0.5	LLS	1
IBC 21/ASCE Strength 6 (b)	TRUE	Y		DL	1.2	ELY	1	LL	0.5	LLS	1
IBC 21/ASCE Strength 6 (c)	TRUE	Y		DL	1.2	ELX	-1	LL	0.5	LLS	1
IBC 21/ASCE Strength 6 (d)	TRUE	Y		DL	1.2	ELY	-1	LL	0.5	LLS	1
IBC 21/ASCE Strength 7 (a)	TRUE	Y		DL	0.9	ELX	1				
IBC 21/ASCE Strength 7 (b)	TRUE	Y		DL	0.9	ELY	1				
IBC 21/ASCE Strength 7 (c)	TRUE	Y		DL	0.9	ELX	-1				
IBC 21/ASCE Strength 7 (d)	TRUE	Y		DL	0.9	ELY	-1				

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Type	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
1	M20	HSS14X14X8	Col	0.764	0	27	0.069	22.969	z	24	859.517	1,018.440	427.800	427.800	1.000	H1-1a
2	M22	HSS14X14X8	Col	0.751	0	27	0.067	22.969	y	27	859.517	1,018.440	427.800	427.800	1.000	H1-1a
3	M23	HSS14X14X8	Col	0.695	0	25	0.067	22.969	y	25	859.517	1,018.440	427.800	427.800	2.993	H1-1b
4	M24	HSS14X14X8	Col	0.695	0	25	0.067	22.969	y	25	859.517	1,018.440	427.800	427.800	2.991	H1-1b
5	M26	HSS14X14X8	Col	0.761	0	27	0.070	22.969	z	24	859.517	1,018.440	427.800	427.800	1.000	H1-1a
6	M27	HSS14X14X8	Col	0.694	0	25	0.066	22.969	y	25	859.517	1,018.440	427.800	427.800	2.989	H1-1b
7	M28	HSS14X14X8	Col	0.734	0	27	0.067	22.969	z	26	859.517	1,018.440	427.800	427.800	1.000	H1-1a
8	M30	HSS14X14X8	Col	0.685	0	25	0.066	22.969	z	26	859.517	1,018.440	427.800	427.800	2.993	H1-1b
9	M31	HSS14X14X8	Col	0.692	0	25	0.066	22.969	y	25	859.517	1,018.440	427.800	427.800	2.989	H1-1b
10	M32	HSS14X14X8	Col	0.762	0	27	0.069	22.969	z	24	859.517	1,018.440	427.800	427.800	1.000	H1-1a
11	M34	HSS14X14X8	Col	0.677	0	25	0.065	22.969	y	25	859.517	1,018.440	427.800	427.800	3.000	H1-1b
12	M35	HSS14X14X8	Col	0.681	0	25	0.066	22.969	z	26	859.517	1,018.440	427.800	427.800	2.997	H1-1b
13	M37	HSS14X14X8	Col	0.760	0	27	0.069	22.969	z	26	859.517	1,018.440	427.800	427.800	1.000	H1-1a
14	M39	HSS14X14X8	Col	0.752	0	27	0.069	22.969	z	26	859.517	1,018.440	427.800	427.800	1.000	H1-1a
15	M40	HSS14X14X8	Col	0.690	0	25	0.066	22.969	y	25	859.517	1,018.440	427.800	427.800	2.990	H1-1b
16	M42	HSS14X14X8	Col	0.743	0	27	0.070	22.969	z	26	859.517	1,018.440	427.800	427.800	1.000	H1-1a
17	M43	HSS14X14X8	Col	0.687	0	25	0.066	22.969	y	25	859.517	1,018.440	427.800	427.800	2.991	H1-1b
18	M44	HSS14X14X8	Col	0.758	0	27	0.069	22.969	z	26	859.517	1,018.440	427.800	427.800	1.000	H1-1a
19	M46	HSS10X5X4	Beam	0.584	0	26	0.042	20.000	y	24	114.221	274.482	38.070	73.485	2.282	H1-1b
20	M47	HSS10X5X4	Beam	0.583	0	26	0.042	20.000	y	24	114.221	274.482	38.070	73.485	2.282	H1-1b
21	M48	HSS10X5X4	Beam	0.583	0	26	0.042	0.000	y	26	114.221	274.482	38.070	73.485	2.282	H1-1b
22	M49	HSS10X5X4	Beam	0.580	0	26	0.041	0.000	y	26	114.221	274.482	38.070	73.485	2.293	H1-1b
23	M50	HSS10X5X4	Beam	0.776	15	24	0.072	15.000	y	24	167.622	274.482	38.070	73.485	2.288	H1-1b
24	M51	HSS12X6X4	Beam	0.679	20	24	0.065	20.000	y	24	180.896	332.442	51.128	107.295	2.321	H1-1b
25	M52	HSS14X6X8	Girder	0.967	10	25	0.171	10.000	y	25	607.599	712.080	139.380	253.920	2.271	H1-1b
26	M53	HSS12X6X4	Beam	0.884	0	26	0.102	15.000	y	24	222.411	332.442	51.128	107.295	2.338	H1-1b
27	M54	HSS14X6X8	Girder	0.965	10	25	0.171	10.000	y	25	607.599	712.080	139.380	253.920	2.272	H1-1b
28	M55	HSS10X5X4	Beam	0.584	20	24	0.042	0.000	y	26	114.221	274.482	38.070	73.485	2.283	H1-1b
29	M56	HSS10X5X4	Beam	0.580	20	24	0.041	20.000	y	24	114.221	274.482	38.070	73.485	2.293	H1-1b
30	M57	HSS14X6X8	Girder	0.986	10	25	0.174	10.000	y	25	607.599	712.080	139.380	253.920	2.271	H1-1b
31	M58	HSS12X6X4	Beam	0.886	15	24	0.102	0.000	y	26	222.411	332.442	51.128	107.295	2.338	H1-1b
32	M59	HSS12X6X4	Beam	0.685	0	26	0.065	0.000	y	26	180.896	332.442	51.128	107.295	2.306	H1-1b
33	M60	HSS14X6X8	Girder	0.973	10	25	0.171	10.000	y	25	607.599	712.080	139.380	253.920	2.271	H1-1b
34	M61	HSS14X6X8	Girder	0.976	10	25	0.172	10.000	y	25	607.599	712.080	139.380	253.920	2.271	H1-1b
35	M62	HSS12X6X4	Beam	0.684	0	26	0.065	0.000	y	26	180.896	332.442	51.128	107.295	2.306	H1-1b
36	M63	HSS14X6X8	Girder	0.979	10	25	0.173	10.000	y	25	607.599	712.080	139.380	253.920	2.271	H1-1b
37	M64	HSS12X6X4	Beam	0.684	20	24	0.065	20.000	y	24	180.896	332.442	51.128	107.295	2.306	H1-1b
38	M65	HSS14X6X8	Girder	0.989	10	25	0.175	10.000	y	25	607.599	712.080	139.380	253.920	2.273	H1-1b
39	M66	HSS14X6X8	Girder	0.982	10	25	0.173	10.000	y	25	607.599	712.080	139.380	253.920	2.271	H1-1b
40	M67	HSS12X6X4	Beam	0.685	20	24	0.065	20.000	y	24	180.896	332.442	51.128	107.295	2.307	H1-1b
41	M68	HSS12X6X4	Beam	0.677	0	26	0.065	0.000	y	26	180.896	332.442	51.128	107.295	2.321	H1-1b
42	M69	HSS14X6X8	Girder	0.985	10	25	0.173	10.000	y	25	607.599	712.080	139.380	253.920	2.271	H1-1b
43	M70	HSS10X5X4	Beam	0.776	0	26	0.072	0.000	y	26	167.622	274.482	38.070	73.485	2.288	H1-1b
44	M71	HSS10X5X4	Beam	0.121	0	26	0.013	15.000	y	24	167.622	274.482	38.070	73.485	2.362	H1-1b

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Type	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
45	M72	HSS10X5X4	Beam	0.085	0	26	0.008	0.000	y	26	114.221	274.482	38.070	73.485	2.340	H1-1b
46	M73	HSS12X6X4	Girder	0.898	10	25	0.151	10.000	y	25	257.353	332.442	51.128	107.295	2.271	H1-1b
47	M74	HSS12X6X4	Beam	0.365	0	26	0.040	0.000	y	26	180.896	332.442	51.128	107.295	2.331	H1-1b
48	M75	HSS10X5X4	Beam	0.087	20	24	0.008	0.000	y	26	114.221	274.482	38.070	73.485	2.356	H1-1b
49	M76	HSS10X5X4	Beam	0.085	20	24	0.008	20.000	y	24	114.221	274.482	38.070	73.485	2.339	H1-1b
50	M77	HSS10X5X4	Beam	0.083	20	24	0.008	20.000	y	24	114.221	274.482	38.070	73.485	2.439	H1-1b
51	M78	HSS10X5X4	Beam	0.086	0	26	0.008	20.000	y	24	114.221	274.482	38.070	73.485	2.350	H1-1b
52	M79	HSS10X5X4	Beam	0.284	0	26	0.022	20.000	y	24	114.221	274.482	38.070	73.485	2.292	H1-1b
53	M80	HSS10X5X4	Beam	0.366	15	24	0.035	15.000	y	24	167.622	274.482	38.070	73.485	2.287	H1-1b
54	M81	HSS12X6X4	Girder	0.904	10	25	0.151	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
55	M82	HSS12X6X4	Beam	0.363	0	26	0.040	0.000	y	26	180.896	332.442	51.128	107.295	2.335	H1-1b
56	M83	HSS12X6X4	Girder	0.908	10	25	0.151	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
57	M84	HSS12X6X4	Beam	0.363	0	26	0.040	0.000	y	26	180.896	332.442	51.128	107.295	2.336	H1-1b
58	M85	HSS12X6X4	Girder	0.911	10	25	0.152	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
59	M86	HSS12X6X4	Beam	0.363	20	24	0.040	20.000	y	24	180.896	332.442	51.128	107.295	2.336	H1-1b
60	M87	HSS12X6X4	Girder	0.913	10	25	0.152	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
61	M88	HSS12X6X4	Beam	0.363	20	24	0.040	20.000	y	24	180.896	332.442	51.128	107.295	2.336	H1-1b
62	M89	HSS12X6X4	Girder	0.915	10	25	0.152	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
63	M90	HSS12X6X4	Beam	0.361	0	26	0.039	20.000	y	24	180.896	332.442	51.128	107.295	2.337	H1-1b
64	M91	HSS12X6X4	Girder	0.916	10	25	0.153	10.000	y	25	257.353	332.442	51.128	107.295	2.271	H1-1b
65	M92	HSS12X6X4	Beam	0.436	15	24	0.055	15.000	y	24	222.411	332.442	51.128	107.295	2.313	H1-1b
66	M93	HSS12X6X4	Girder	0.915	10	25	0.153	10.000	y	25	257.353	332.442	51.128	107.295	2.273	H1-1b
67	M94	HSS10X5X4	Beam	0.285	0	26	0.022	0.000	y	26	114.221	274.482	38.070	73.485	2.290	H1-1b
68	M95	HSS10X5X4	Beam	0.284	0	26	0.022	20.000	y	24	114.221	274.482	38.070	73.485	2.292	H1-1b
69	M96	HSS10X5X4	Beam	0.285	0	26	0.022	20.000	y	24	114.221	274.482	38.070	73.485	2.292	H1-1b
70	M97	HSS10X5X4	Beam	0.285	0	26	0.022	20.000	y	24	114.221	274.482	38.070	73.485	2.292	H1-1b
71	M98	HSS10X5X4	Beam	0.082	0	26	0.008	0.000	y	26	114.221	274.482	38.070	73.485	2.441	H1-1b
72	M99	HSS10X5X4	Beam	0.284	0	26	0.022	20.000	y	24	114.221	274.482	38.070	73.485	2.293	H1-1b
73	M100	HSS10X5X4	Beam	0.366	0	26	0.035	0.000	y	26	167.622	274.482	38.070	73.485	2.287	H1-1b
74	M101	HSS10X5X4	Beam	0.121	15	24	0.013	0.000	y	26	167.622	274.482	38.070	73.485	2.363	H1-1b
75	M102	HSS12X6X4	Beam	0.435	0	26	0.055	0.000	y	26	222.411	332.442	51.128	107.295	2.313	H1-1b
76	M103	HSS12X6X4	Girder	0.893	10	25	0.150	10.000	y	25	257.353	332.442	51.128	107.295	2.273	H1-1b
77	M104	HSS10X5X4	Beam	0.138	0	26	0.012	20.000	y	24	114.221	274.482	38.070	73.485	2.317	H1-1b
78	M105	HSS12X6X4	Beam	0.189	0	26	0.026	0.000	y	26	180.896	332.442	51.128	107.295	2.387	H1-1b
79	M106	HSS12X6X4	Girder	0.858	10	25	0.144	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
80	M107	HSS12X6X4	Girder	0.865	10	25	0.144	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
81	M108	HSS12X6X4	Beam	0.188	0	26	0.025	0.000	y	26	180.896	332.442	51.128	107.295	2.398	H1-1b
82	M109	HSS12X6X4	Girder	0.868	10	25	0.145	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
83	M110	HSS12X6X4	Beam	0.188	0	26	0.025	0.000	y	26	180.896	332.442	51.128	107.295	2.397	H1-1b
84	M111	HSS12X6X4	Beam	0.188	20	24	0.025	20.000	y	24	180.896	332.442	51.128	107.295	2.397	H1-1b
85	M112	HSS12X6X4	Girder	0.871	10	25	0.145	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
86	M113	HSS10X5X4	Beam	0.044	0	26	0.005	0.000	y	26	114.221	274.482	38.070	73.485	2.467	H1-1b
87	M114	HSS12X6X4	Girder	0.874	10	25	0.146	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
88	M115	HSS12X6X4	Beam	0.188	20	24	0.025	20.000	y	24	180.896	332.442	51.128	107.295	2.398	H1-1b

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Type	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
89	M116	HSS12X6X4	Girder	0.876	10	25	0.146	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
90	M117	HSS12X6X4	Beam	0.206	15	24	0.030	15.000	y	24	222.411	332.442	51.128	107.295	2.360	H1-1b
91	M118	HSS10X5X4	Beam	0.056	0	26	0.007	15.000	y	24	167.622	274.482	38.070	73.485	2.532	H1-1b
92	M119	HSS12X6X4	Girder	0.874	10	25	0.146	10.000	y	25	257.353	332.442	51.128	107.295	2.273	H1-1b
93	M120	HSS10X5X4	Beam	0.138	0	26	0.012	0.000	y	26	114.221	274.482	38.070	73.485	2.307	H1-1b
94	M121	HSS10X5X4	Beam	0.139	0	26	0.012	20.000	y	24	114.221	274.482	38.070	73.485	2.313	H1-1b
95	M122	HSS10X5X4	Beam	0.139	0	26	0.012	20.000	y	24	114.221	274.482	38.070	73.485	2.313	H1-1b
96	M123	HSS10X5X4	Beam	0.139	0	26	0.012	20.000	y	24	114.221	274.482	38.070	73.485	2.313	H1-1b
97	M124	HSS10X5X4	Beam	0.139	20	24	0.012	20.000	y	24	114.221	274.482	38.070	73.485	2.313	H1-1b
98	M125	HSS10X5X4	Beam	0.174	15	24	0.018	15.000	y	24	167.622	274.482	38.070	73.485	2.308	H1-1b
99	M126	HSS10X5X4	Beam	0.174	0	26	0.018	0.000	y	26	167.622	274.482	38.070	73.485	2.308	H1-1b
100	M127	HSS12X6X4	Beam	0.205	0	26	0.030	0.000	y	26	222.411	332.442	51.128	107.295	2.362	H1-1b
101	M128	HSS12X6X4	Girder	0.853	10	25	0.143	10.000	y	25	257.353	332.442	51.128	107.295	2.273	H1-1b
102	M129	HSS12X6X4	Beam	0.186	0	26	0.025	20.000	y	24	180.896	332.442	51.128	107.295	2.402	H1-1b
103	M130	HSS12X6X4	Girder	0.875	10	25	0.146	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
104	M131	HSS10X5X4	Beam	0.046	0	26	0.005	20.000	y	24	114.221	274.482	38.070	73.485	2.407	H1-1b
105	M132	HSS10X5X4	Beam	0.045	20	24	0.005	20.000	y	24	114.221	274.482	38.070	73.485	2.463	H1-1b
106	M133	HSS10X5X4	Beam	0.046	0	26	0.005	20.000	y	24	114.221	274.482	38.070	73.485	2.399	H1-1b
107	M134	HSS10X5X4	Beam	0.046	0	26	0.005	0.000	y	26	114.221	274.482	38.070	73.485	2.400	H1-1b
108	M135	HSS10X5X4	Beam	0.046	20	24	0.005	0.000	y	26	114.221	274.482	38.070	73.485	2.418	H1-1b
109	M136	HSS10X5X4	Beam	0.056	15	24	0.007	0.000	y	26	167.622	274.482	38.070	73.485	2.533	H1-1b
110	M137	HSS10X5X4	Beam	0.047	0	26	0.006	20.000	y	24	114.221	274.482	38.070	73.485	2.394	H1-1b
111	M138	HSS10X5X4	Beam	0.047	0	26	0.006	20.000	y	24	114.221	274.482	38.070	73.485	2.394	H1-1b
112	M139	HSS12X6X4	Girder	0.777	10	25	0.131	10.000	y	25	257.353	332.442	51.128	107.295	2.273	H1-1b
113	M140	HSS12X6X4	Beam	0.064	0	26	0.015	0.000	y	26	222.411	332.442	51.128	107.295	2.497	H1-1b
114	M141	HSS12X6X4	Girder	0.784	10	25	0.132	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
115	M142	HSS12X6X4	Beam	0.085	0	26	0.017	0.000	y	26	180.896	332.442	51.128	107.295	2.558	H1-1b
116	M143	HSS12X6X4	Girder	0.790	10	25	0.132	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
117	M144	HSS12X6X4	Beam	0.082	0	26	0.017	0.000	y	26	180.896	332.442	51.128	107.295	2.578	H1-1b
118	M145	HSS12X6X4	Beam	0.083	0	26	0.017	0.000	y	26	180.896	332.442	51.128	107.295	2.577	H1-1b
119	M146	HSS12X6X4	Girder	0.794	10	25	0.133	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
120	M147	HSS12X6X4	Beam	0.083	20	24	0.017	20.000	y	24	180.896	332.442	51.128	107.295	2.576	H1-1b
121	M148	HSS12X6X4	Girder	0.797	10	25	0.133	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
122	M149	HSS12X6X4	Beam	0.083	20	24	0.017	20.000	y	24	180.896	332.442	51.128	107.295	2.577	H1-1b
123	M150	HSS12X6X4	Girder	0.799	10	25	0.133	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
124	M151	HSS12X6X4	Beam	0.082	20	24	0.017	20.000	y	24	180.896	332.442	51.128	107.295	2.572	H1-1b
125	M152	HSS12X6X4	Girder	0.801	10	25	0.134	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
126	M153	HSS12X6X4	Beam	0.065	15	24	0.015	15.000	y	24	222.411	332.442	51.128	107.295	2.492	H1-1b
127	M154	HSS12X6X4	Girder	0.801	10	25	0.134	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
128	M155	HSS12X6X4	Girder	0.799	10	25	0.134	10.000	y	25	257.353	332.442	51.128	107.295	2.273	H1-1b
129	M156	HSS10X5X4	Beam	0.019	0	26	0.004	0.000	y	26	167.622	274.482	38.070	73.485	2.136	H1-1b
130	M157	HSS10X5X4	Beam	0.021	0	26	0.004	0.000	y	26	114.221	274.482	38.070	73.485	2.559	H1-1b
131	M158	HSS10X5X4	Beam	0.021	20	24	0.004	0.000	y	26	114.221	274.482	38.070	73.485	2.581	H1-1b
132	M159	HSS10X5X4	Beam	0.053	0	26	0.007	0.000	y	26	167.622	274.482	38.070	73.485	2.342	H1-1b

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Type	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
133	M160	HSS10X5X4	Beam	0.021	0	26	0.004	20.000	y	24	114.221	274.482	38.070	73.485	2.569	H1-1b
134	M161	HSS10X5X4	Beam	0.021	0	26	0.004	20.000	y	24	114.221	274.482	38.070	73.485	2.559	H1-1b
135	M162	HSS10X5X4	Beam	0.022	20	24	0.003	20.000	y	24	114.221	274.482	38.070	73.485	2.496	H1-1b
136	M163	HSS10X5X4	Beam	0.047	0	26	0.006	20.000	y	24	114.221	274.482	38.070	73.485	2.394	H1-1b
137	M164	HSS10X5X4	Beam	0.019	15	24	0.004	15.000	y	24	167.622	274.482	38.070	73.485	2.106	H1-1b
138	M165	HSS10X5X4	Beam	0.047	20	24	0.006	20.000	y	24	114.221	274.482	38.070	73.485	2.394	H1-1b
139	M166	HSS10X5X4	Beam	0.047	20	24	0.006	20.000	y	24	114.221	274.482	38.070	73.485	2.389	H1-1b
140	M167	HSS10X5X4	Beam	0.053	15	24	0.007	15.000	y	24	167.622	274.482	38.070	73.485	2.342	H1-1b
141	M168	HSS10X5X4	Beam	0.021	0	26	0.004	0.000	y	26	114.221	274.482	38.070	73.485	2.507	H1-1b
142	M169	HSS10X5X4	Beam	0.048	0	26	0.006	0.000	y	26	114.221	274.482	38.070	73.485	2.388	H1-1b
143	M170	HSS12X6X4	Girder	0.702	10	25	0.118	10.000	y	25	257.353	332.442	51.128	107.295	2.273	H1-1b
144	M171	HSS12X6X4	Beam	0.104	15	26	0.019	15.000	y	26	222.411	332.442	51.128	107.295	2.416	H1-1b
145	M172	HSS12X6X4	Girder	0.704	10	25	0.118	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
146	M173	HSS10X5X4	Beam	0.057	15	26	0.008	15.000	y	26	167.622	274.482	38.070	73.485	2.341	H1-1b
147	M174	HSS10X5X4	Beam	0.057	0	24	0.008	0.000	y	24	167.622	274.482	38.070	73.485	2.340	H1-1b
148	M175	HSS12X6X4	Beam	0.106	0	24	0.019	20.000	y	26	180.896	332.442	51.128	107.295	2.502	H1-1b
149	M176	HSS12X6X4	Girder	0.704	10	25	0.118	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
150	M177	HSS10X5X4	Beam	0.048	0	24	0.006	0.000	y	24	114.221	274.482	38.070	73.485	2.385	H1-1b
151	M178	HSS10X5X4	Beam	0.049	0	24	0.006	0.000	y	24	114.221	274.482	38.070	73.485	2.391	H1-1b
152	M179	HSS10X5X4	Beam	0.048	0	24	0.006	0.000	y	24	114.221	274.482	38.070	73.485	2.391	H1-1b
153	M180	HSS10X5X4	Beam	0.048	0	24	0.006	0.000	y	24	114.221	274.482	38.070	73.485	2.391	H1-1b
154	M181	HSS10X5X4	Beam	0.048	20	26	0.006	20.000	y	26	114.221	274.482	38.070	73.485	2.391	H1-1b
155	M182	HSS10X5X4	Beam	0.049	20	26	0.006	20.000	y	26	114.221	274.482	38.070	73.485	2.384	H1-1b
156	M183	HSS12X6X4	Beam	0.106	20	26	0.019	20.000	y	26	180.896	332.442	51.128	107.295	2.504	H1-1b
157	M184	HSS12X6X4	Girder	0.703	10	25	0.117	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
158	M185	HSS10X5X4	Beam	0.025	0	24	0.004	0.000	y	24	114.221	274.482	38.070	73.485	2.547	H1-1b
159	M186	HSS12X6X4	Beam	0.106	0	24	0.019	0.000	y	24	180.896	332.442	51.128	107.295	2.505	H1-1b
160	M187	HSS12X6X4	Girder	0.698	10	25	0.117	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
161	M188	HSS10X5X4	Beam	0.023	20	26	0.003	20.000	y	26	114.221	274.482	38.070	73.485	2.569	H1-1b
162	M189	HSS10X5X4	Beam	0.026	15	26	0.005	15.000	y	26	167.622	274.482	38.070	73.485	2.144	H1-1b
163	M190	HSS10X5X4	Beam	0.024	20	26	0.004	0.000	y	24	114.221	274.482	38.070	73.485	2.536	H1-1b
164	M191	HSS10X5X4	Beam	0.024	0	24	0.004	20.000	y	26	114.221	274.482	38.070	73.485	2.527	H1-1b
165	M192	HSS12X6X4	Beam	0.105	20	26	0.019	20.000	y	26	180.896	332.442	51.128	107.295	2.505	H1-1b
166	M193	HSS12X6X4	Girder	0.701	10	25	0.117	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
167	M194	HSS10X5X4	Beam	0.025	0	24	0.005	0.000	y	24	167.622	274.482	38.070	73.485	2.114	H1-1b
168	M195	HSS10X5X4	Beam	0.024	0	24	0.004	20.000	y	26	114.221	274.482	38.070	73.485	2.549	H1-1b
169	M196	HSS12X6X4	Girder	0.680	10	25	0.115	10.000	y	25	257.353	332.442	51.128	107.295	2.272	H1-1b
170	M197	HSS12X6X4	Beam	0.105	0	24	0.019	0.000	y	24	222.411	332.442	51.128	107.295	2.414	H1-1b
171	M198	HSS12X6X4	Beam	0.103	0	24	0.019	0.000	y	24	180.896	332.442	51.128	107.295	2.497	H1-1b
172	M199	HSS12X6X4	Girder	0.687	10	25	0.116	10.000	y	25	257.353	332.442	51.128	107.295	2.270	H1-1b
173	M200	HSS12X6X4	Girder	0.694	10	25	0.116	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
174	M201	HSS12X6X4	Beam	0.107	0	24	0.019	0.000	y	24	180.896	332.442	51.128	107.295	2.503	H1-1b
175	M202	HSS10X5X4	Beam	0.024	20	26	0.004	20.000	y	26	114.221	274.482	38.070	73.485	2.532	H1-1b
176	M203	HSS12X6X4	Beam	0.177	0	24	0.025	0.000	y	24	180.896	332.442	51.128	107.295	2.406	H1-1b

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Type	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
177	M204	HSS12X6X4	Girder	0.582	10	25	0.098	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
178	M205	HSS10X5X4	Beam	0.040	0	24	0.005	20.000	y	26	114.221	274.482	38.070	73.485	2.498	H1-1b
179	M206	HSS12X6X4	Girder	0.575	10	25	0.098	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
180	M207	HSS12X6X4	Beam	0.173	0	24	0.025	0.000	y	24	180.896	332.442	51.128	107.295	2.398	H1-1b
181	M208	HSS12X6X4	Beam	0.176	0	24	0.025	0.000	y	24	180.896	332.442	51.128	107.295	2.406	H1-1b
182	M209	HSS12X6X4	Girder	0.586	10	25	0.098	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
183	M210	HSS12X6X4	Beam	0.199	0	24	0.030	0.000	y	24	222.411	332.442	51.128	107.295	2.358	H1-1b
184	M211	HSS12X6X4	Girder	0.568	10	25	0.097	10.000	y	25	257.353	332.442	51.128	107.295	2.272	H1-1b
185	M212	HSS12X6X4	Beam	0.177	20	26	0.025	20.000	y	26	180.896	332.442	51.128	107.295	2.406	H1-1b
186	M213	HSS12X6X4	Beam	0.591	10	25	0.099	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
187	M214	HSS12X6X4	Girder	0.589	10	25	0.099	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
188	M215	HSS12X6X4	Beam	0.176	20	26	0.025	20.000	y	26	180.896	332.442	51.128	107.295	2.406	H1-1b
189	M216	HSS10X5X4	Beam	0.049	15	26	0.007	0.000	y	24	167.622	274.482	38.070	73.485	2.586	H1-1b
190	M217	HSS10X5X4	Beam	0.041	20	26	0.005	20.000	y	26	114.221	274.482	38.070	73.485	2.428	H1-1b
191	M218	HSS10X5X4	Beam	0.042	0	24	0.005	0.000	y	24	114.221	274.482	38.070	73.485	2.438	H1-1b
192	M219	HSS10X5X4	Beam	0.049	0	24	0.007	15.000	y	26	167.622	274.482	38.070	73.485	2.586	H1-1b
193	M220	HSS10X5X4	Beam	0.040	0	24	0.005	20.000	y	26	114.221	274.482	38.070	73.485	2.419	H1-1b
194	M221	HSS10X5X4	Beam	0.038	20	26	0.004	20.000	y	26	114.221	274.482	38.070	73.485	2.507	H1-1b
195	M222	HSS10X5X4	Beam	0.137	15	26	0.015	15.000	y	26	167.622	274.482	38.070	73.485	2.309	H1-1b
196	M223	HSS10X5X4	Beam	0.040	20	26	0.005	0.000	y	24	114.221	274.482	38.070	73.485	2.424	H1-1b
197	M224	HSS10X5X4	Beam	0.109	20	26	0.011	20.000	y	26	114.221	274.482	38.070	73.485	2.324	H1-1b
198	M225	HSS10X5X4	Beam	0.109	20	26	0.011	0.000	y	24	114.221	274.482	38.070	73.485	2.324	H1-1b
199	M226	HSS10X5X4	Beam	0.109	0	24	0.011	0.000	y	24	114.221	274.482	38.070	73.485	2.324	H1-1b
200	M227	HSS10X5X4	Beam	0.109	0	24	0.011	0.000	y	24	114.221	274.482	38.070	73.485	2.324	H1-1b
201	M228	HSS10X5X4	Beam	0.109	0	24	0.010	0.000	y	24	114.221	274.482	38.070	73.485	2.318	H1-1b
202	M229	HSS10X5X4	Beam	0.137	0	24	0.015	0.000	y	24	167.622	274.482	38.070	73.485	2.309	H1-1b
203	M230	HSS12X6X4	Girder	0.589	10	25	0.100	10.000	y	25	257.353	332.442	51.128	107.295	2.272	H1-1b
204	M231	HSS12X6X4	Beam	0.198	15	26	0.030	15.000	y	26	222.411	332.442	51.128	107.295	2.359	H1-1b
205	M232	HSS12X6X4	Girder	0.592	10	25	0.100	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
206	M233	HSS10X5X4	Beam	0.109	20	26	0.011	20.000	y	26	114.221	274.482	38.070	73.485	2.318	H1-1b
207	M234	HSS12X6X4	Beam	0.177	0	24	0.025	20.000	y	26	180.896	332.442	51.128	107.295	2.409	H1-1b
208	M235	HSS12X6X4	Girder	0.592	10	25	0.099	10.000	y	25	257.353	332.442	51.128	107.295	2.269	H1-1b
209	M236	HSS12X6X4	Girder	0.469	10	25	0.080	10.000	y	25	257.353	332.442	51.128	107.295	2.268	H1-1b
210	M237	HSS12X6X4	Beam	0.280	15	26	0.039	0.000	y	24	222.411	332.442	51.128	107.295	2.342	H1-1b
211	M238	HSS12X6X4	Girder	0.466	10	25	0.080	10.000	y	25	257.353	332.442	51.128	107.295	2.272	H1-1b
212	M239	HSS10X5X4	Beam	0.208	0	24	0.021	0.000	y	24	167.622	274.482	38.070	73.485	2.303	H1-1b
213	M240	HSS10X5X4	Beam	0.162	0	24	0.014	0.000	y	24	114.221	274.482	38.070	73.485	2.301	H1-1b
214	M241	HSS10X5X4	Beam	0.163	0	24	0.014	0.000	y	24	114.221	274.482	38.070	73.485	2.307	H1-1b
215	M242	HSS10X5X4	Beam	0.208	15	26	0.021	15.000	y	26	167.622	274.482	38.070	73.485	2.303	H1-1b
216	M243	HSS10X5X4	Beam	0.163	20	26	0.014	0.000	y	24	114.221	274.482	38.070	73.485	2.307	H1-1b
217	M244	HSS10X5X4	Beam	0.163	20	26	0.014	20.000	y	26	114.221	274.482	38.070	73.485	2.307	H1-1b
218	M245	HSS12X6X4	Girder	0.470	10	25	0.079	10.000	y	25	257.353	332.442	51.128	107.295	2.268	H1-1b
219	M246	HSS12X6X4	Beam	0.238	0	24	0.030	20.000	y	26	180.896	332.442	51.128	107.295	2.375	H1-1b
220	M247	HSS10X5X4	Beam	0.163	0	24	0.014	0.000	y	24	114.221	274.482	38.070	73.485	2.307	H1-1b

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Type	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
221	M248	HSS12X6X4	Beam	0.238	20	26	0.030	20.000	y	26	180.896	332.442	51.128	107.295	2.370	H1-1b
222	M249	HSS12X6X4	Girder	0.469	10	25	0.079	10.000	y	25	257.353	332.442	51.128	107.295	2.268	H1-1b
223	M250	HSS10X5X4	Beam	0.162	0	24	0.014	20.000	y	26	114.221	274.482	38.070	73.485	2.311	H1-1b
224	M251	HSS12X6X4	Girder	0.464	10	25	0.078	10.000	y	25	257.353	332.442	51.128	107.295	2.268	H1-1b
225	M252	HSS12X6X4	Beam	0.237	0	24	0.030	0.000	y	24	180.896	332.442	51.128	107.295	2.370	H1-1b
226	M253	HSS12X6X4	Girder	0.466	10	25	0.079	10.000	y	25	257.353	332.442	51.128	107.295	2.268	H1-1b
227	M254	HSS12X6X4	Beam	0.237	20	26	0.030	20.000	y	26	180.896	332.442	51.128	107.295	2.370	H1-1b
228	M255	HSS10X5X4	Beam	0.073	15	26	0.009	0.000	y	24	167.622	274.482	38.070	73.485	2.458	H1-1b
229	M256	HSS10X5X4	Beam	0.053	0	24	0.006	20.000	y	26	114.221	274.482	38.070	73.485	2.481	H1-1b
230	M257	HSS10X5X4	Beam	0.054	0	24	0.006	20.000	y	26	114.221	274.482	38.070	73.485	2.380	H1-1b
231	M258	HSS10X5X4	Beam	0.056	0	24	0.006	0.000	y	24	114.221	274.482	38.070	73.485	2.398	H1-1b
232	M259	HSS10X5X4	Beam	0.052	20	26	0.005	20.000	y	26	114.221	274.482	38.070	73.485	2.486	H1-1b
233	M260	HSS10X5X4	Beam	0.056	20	26	0.006	20.000	y	26	114.221	274.482	38.070	73.485	2.391	H1-1b
234	M261	HSS10X5X4	Beam	0.054	20	26	0.006	0.000	y	24	114.221	274.482	38.070	73.485	2.384	H1-1b
235	M262	HSS12X6X4	Beam	0.280	0	24	0.039	15.000	y	26	222.411	332.442	51.128	107.295	2.341	H1-1b
236	M263	HSS12X6X4	Girder	0.446	10	25	0.077	10.000	y	25	257.353	332.442	51.128	107.295	2.272	H1-1b
237	M264	HSS12X6X4	Beam	0.234	20	26	0.030	0.000	y	24	180.896	332.442	51.128	107.295	2.377	H1-1b
238	M265	HSS12X6X4	Girder	0.453	10	25	0.078	10.000	y	25	257.353	332.442	51.128	107.295	2.268	H1-1b
239	M266	HSS12X6X4	Beam	0.239	0	24	0.030	0.000	y	24	180.896	332.442	51.128	107.295	2.370	H1-1b
240	M267	HSS12X6X4	Girder	0.459	10	25	0.078	10.000	y	25	257.353	332.442	51.128	107.295	2.268	H1-1b
241	M268	HSS10X5X4	Beam	0.073	0	24	0.009	15.000	y	26	167.622	274.482	38.070	73.485	2.458	H1-1b
242	M269	HSS10X5X4	Beam	0.065	20	26	0.007	20.000	y	26	114.221	274.482	38.070	73.485	2.375	H1-1b
243	M270	HSS10X5X4	Beam	0.196	0	24	0.016	0.000	y	24	114.221	274.482	38.070	73.485	2.297	H1-1b
244	M271	HSS10X5X4	Beam	0.252	15	26	0.025	15.000	y	26	167.622	274.482	38.070	73.485	2.297	H1-1b
245	M272	HSS10X5X4	Beam	0.196	20	26	0.016	20.000	y	26	114.221	274.482	38.070	73.485	2.301	H1-1b
246	M273	HSS10X5X4	Beam	0.196	20	26	0.016	20.000	y	26	114.221	274.482	38.070	73.485	2.301	H1-1b
247	M274	HSS10X5X4	Beam	0.196	0	24	0.016	0.000	y	24	114.221	274.482	38.070	73.485	2.301	H1-1b
248	M275	HSS10X5X4	Beam	0.196	0	24	0.016	0.000	y	24	114.221	274.482	38.070	73.485	2.301	H1-1b
249	M276	HSS10X5X4	Beam	0.252	0	24	0.025	0.000	y	24	167.622	274.482	38.070	73.485	2.297	H1-1b
250	M277	HSS10X5X4	Beam	0.196	20	26	0.017	20.000	y	26	114.221	274.482	38.070	73.485	2.297	H1-1b
251	M278	HSS12X6X4	Girder	0.345	10	25	0.078	0.000	y	24	257.353	332.442	51.128	107.295	2.267	H1-1b
252	M279	HSS12X6X4	Beam	0.333	15	26	0.045	0.000	y	24	222.411	332.442	51.128	107.295	2.330	H1-1b
253	M280	HSS12X6X4	Girder	0.341	10	25	0.059	10.000	y	25	257.353	332.442	51.128	107.295	2.272	H1-1b
254	M281	HSS10X5X4	Beam	0.088	15	26	0.011	0.000	y	24	167.622	274.482	38.070	73.485	2.416	H1-1b
255	M282	HSS10X5X4	Beam	0.062	0	24	0.006	0.000	y	24	114.221	274.482	38.070	73.485	2.471	H1-1b
256	M283	HSS10X5X4	Beam	0.064	0	24	0.006	20.000	y	26	114.221	274.482	38.070	73.485	2.364	H1-1b
257	M284	HSS10X5X4	Beam	0.064	20	26	0.006	0.000	y	24	114.221	274.482	38.070	73.485	2.368	H1-1b
258	M285	HSS10X5X4	Beam	0.066	0	24	0.007	0.000	y	24	114.221	274.482	38.070	73.485	2.382	H1-1b
259	M286	HSS12X6X4	Girder	0.343	10	25	0.064	0.000	y	24	257.353	332.442	51.128	107.295	2.266	H1-1b
260	M287	HSS12X6X4	Beam	0.278	20	26	0.033	20.000	y	26	180.896	332.442	51.128	107.295	2.356	H1-1b
261	M288	HSS12X6X4	Girder	0.327	10	17	0.060	10.000	y	24	257.353	332.442	51.128	107.295	2.272	H1-1b
262	M289	HSS12X6X4	Beam	0.334	0	24	0.045	15.000	y	26	222.411	332.442	51.128	107.295	2.330	H1-1b
263	M290	HSS12X6X4	Beam	0.275	0	24	0.033	0.000	y	24	180.896	332.442	51.128	107.295	2.349	H1-1b
264	M291	HSS12X6X4	Girder	0.330	0	19	0.079	0.000	y	26	257.353	332.442	51.128	107.295	2.273	H1-1b

Envelope AISC 15th (360-16): LRFD Steel Code Checks

ID	Member	Shape	Type	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]2	Dir	LC3	ϕ Pnc [k]	ϕ Pnt [k]	ϕ Mn y-y [k-ft]	ϕ Mn z-z [k-ft]	Cb	Eqn
265	M292	HSS12X6X4	Girder	0.336	10	25	0.068	0.000	y	26	257.353	332.442	51.128	107.295	2.265	H1-1b
266	M293	HSS12X6X4	Beam	0.279	0	24	0.033	0.000	y	24	180.896	332.442	51.128	107.295	2.355	H1-1b
267	M294	HSS12X6X4	Girder	0.340	10	25	0.067	0.000	y	26	257.353	332.442	51.128	107.295	2.266	H1-1b
268	M295	HSS12X6X4	Beam	0.278	0	24	0.033	0.000	y	24	180.896	332.442	51.128	107.295	2.356	H1-1b
269	M296	HSS10X5X4	Beam	0.088	0	24	0.011	15.000	y	26	167.622	274.482	38.070	73.485	2.417	H1-1b
270	M297	HSS12X6X4	Girder	0.344	10	25	0.068	0.000	y	24	257.353	332.442	51.128	107.295	2.266	H1-1b
271	M298	HSS12X6X4	Beam	0.278	20	26	0.033	20.000	y	26	180.896	332.442	51.128	107.295	2.355	H1-1b
272	M299	HSS12X6X4	Beam	0.279	0	24	0.033	20.000	y	26	180.896	332.442	51.128	107.295	2.360	H1-1b
273	M300	HSS12X6X4	Girder	0.345	10	25	0.070	0.000	y	24	257.353	332.442	51.128	107.295	2.266	H1-1b
274	M301	HSS10X5X4	Beam	0.061	20	26	0.006	20.000	y	26	114.221	274.482	38.070	73.485	2.475	H1-1b
275	M302	HSS12X6X4	Girder	0.259	10	17	0.044	10.000	y	17	257.353	332.442	51.128	107.295	2.275	H1-1b
276	M303	HSS12X6X4	Beam	0.309	0	24	0.042	15.000	y	26	222.411	332.442	51.128	107.295	2.362	H1-1b
277	M304	HSS12X6X4	Beam	0.252	20	26	0.031	0.000	y	24	180.896	332.442	51.128	107.295	2.376	H1-1b
278	M305	HSS12X6X4	Girder	0.259	0	19	0.044	0.000	y	19	257.353	332.442	51.128	107.295	2.276	H1-1b
279	M306	HSS12X6X4	Beam	0.258	0	24	0.031	0.000	y	24	180.896	332.442	51.128	107.295	2.363	H1-1b
280	M307	HSS12X6X4	Girder	0.261	10	17	0.044	10.000	y	17	257.353	332.442	51.128	107.295	2.276	H1-1b
281	M308	HSS12X6X4	Girder	0.263	10	17	0.044	10.000	y	17	257.353	332.442	51.128	107.295	2.276	H1-1b
282	M309	HSS12X6X4	Beam	0.256	0	24	0.031	0.000	y	24	180.896	332.442	51.128	107.295	2.363	H1-1b
283	M310	HSS12X6X4	Girder	0.263	10	17	0.044	10.000	y	17	257.353	332.442	51.128	107.295	2.276	H1-1b
284	M311	HSS12X6X4	Beam	0.256	20	26	0.031	20.000	y	26	180.896	332.442	51.128	107.295	2.363	H1-1b
285	M312	HSS12X6X4	Girder	0.262	10	17	0.044	10.000	y	17	257.353	332.442	51.128	107.295	2.276	H1-1b
286	M313	HSS12X6X4	Beam	0.257	20	26	0.031	20.000	y	26	180.896	332.442	51.128	107.295	2.363	H1-1b
287	M314	HSS12X6X4	Beam	0.256	0	24	0.031	0.000	y	24	180.896	332.442	51.128	107.295	2.375	H1-1b
288	M315	HSS12X6X4	Girder	0.261	10	17	0.044	10.000	y	17	257.353	332.442	51.128	107.295	2.276	H1-1b
289	M316	HSS12X6X4	Beam	0.308	15	26	0.042	0.000	y	24	222.411	332.442	51.128	107.295	2.363	H1-1b
290	M317	HSS12X6X4	Girder	0.260	0	19	0.044	0.000	y	19	257.353	332.442	51.128	107.295	2.276	H1-1b
291	M318	HSS10X5X4	Beam	0.188	0	24	0.016	0.000	y	24	114.221	274.482	38.070	73.485	2.302	H1-1b
292	M319	HSS10X5X4	Beam	0.244	0	24	0.025	0.000	y	24	167.622	274.482	38.070	73.485	2.317	H1-1b
293	M320	HSS10X5X4	Beam	0.186	20	26	0.016	0.000	y	24	114.221	274.482	38.070	73.485	2.311	H1-1b
294	M321	HSS10X5X4	Beam	0.188	0	24	0.016	0.000	y	24	114.221	274.482	38.070	73.485	2.302	H1-1b
295	M322	HSS10X5X4	Beam	0.188	20	26	0.016	20.000	y	26	114.221	274.482	38.070	73.485	2.302	H1-1b
296	M323	HSS10X5X4	Beam	0.188	20	26	0.016	20.000	y	26	114.221	274.482	38.070	73.485	2.302	H1-1b
297	M324	HSS10X5X4	Beam	0.244	15	26	0.025	15.000	y	26	167.622	274.482	38.070	73.485	2.317	H1-1b
298	M325	HSS12X6X4	Girder	0.259	10	17	0.044	10.000	y	17	257.353	332.442	51.128	107.295	2.275	H1-1b
299	M326	HSS10X5X4	Beam	0.187	0	24	0.016	20.000	y	26	114.221	274.482	38.070	73.485	2.311	H1-1b
300	M327	HSS10X5X4	Beam	0.266	0	26	0.021	20.000	y	24	114.221	274.482	38.070	73.485	2.303	H1-1b
301	M328	HSS10X5X4	Beam	0.264	20	24	0.020	20.000	y	24	114.221	274.482	38.070	73.485	2.294	H1-1b
302	M329	HSS10X5X4	Beam	0.264	0	26	0.020	0.000	y	26	114.221	274.482	38.070	73.485	2.295	H1-1b
303	M330	HSS10X5X4	Beam	0.267	20	24	0.021	0.000	y	26	114.221	274.482	38.070	73.485	2.304	H1-1b
304	M331	HSS10X5X4	Beam	0.395	15	24	0.036	0.000	y	26	167.622	274.482	38.070	73.485	2.279	H1-1b
305	M332	HSS10X5X4	Beam	0.253	0	26	0.019	0.000	y	26	114.221	274.482	38.070	73.485	2.372	H1-1b
306	M333	HSS10X5X4	Beam	0.254	20	24	0.019	20.000	y	24	114.221	274.482	38.070	73.485	2.371	H1-1b
307	M334	HSS10X5X4	Beam	0.395	0	26	0.036	15.000	y	24	167.622	274.482	38.070	73.485	2.278	H1-1b

Envelope Concrete Beam Design Results

ID	Member	Shape	Type	UC Max Top	Loc[ft]	UC LC	UC Max Bot	Loc[ft]2	UC LC3	Shear UC	Loc[ft]4	UC LC5	ϕMnz Top[k-ft]	ϕMnz Bot[k-ft]	ϕVny[k]
1	M19	RECT18X24	Conc Col	0.778	8.75	6	0.764	1.25	6	0.498	6.146	6	75.857	75.857	32.303
2	M21	RECT18X24	Conc Col	0.730	8.75	6	0.716	1.25	6	0.492	7.604	19	75.857	75.857	32.301
3	M25	RECT18X24	Conc Col	0.752	8.75	6	0.738	1.25	6	0.498	7.083	19	75.857	75.857	32.303
4	M29	RECT18X24	Conc Col	0.728	8.75	6	0.714	1.25	6	0.492	7.604	19	75.857	75.857	32.303
5	M33	RECT18X24	Conc Col	0.794	8.75	6	0.780	1.25	6	0.498	5.417	6	75.857	75.857	32.303
6	M36	RECT18X24	Conc Col	0.799	8.75	6	0.785	1.25	6	0.497	5.104	6	75.857	75.857	32.303
7	M38	RECT18X24	Conc Col	0.778	8.75	6	0.764	1.25	6	0.498	6.146	6	75.857	75.857	32.302
8	M41	RECT18X24	Conc Col	0.752	8.75	6	0.737	1.25	6	0.497	7.083	19	75.857	75.857	32.302
9	M45	RECT18X24	Conc Col	0.794	8.75	6	0.780	1.25	6	0.498	5.417	6	75.857	75.857	32.303

Envelope Concrete Column Design Results (By Combination)

ID	Column	Shape	Type	UC Max	Loc[ft]	UC LC	Shear UC	LC	Loc[ft]2	Dir	ϕ	Pn[k]	Mny[k-ft]	Mnz[k-ft]	Vny[k]	Vnz[k]
1	M1	CRND36	Conc Col	0.368	38.333	31	0.054	26	38.333	z	0.9	-516.391		147.990	203.835	203.835
2	M2	CRND36	Conc Col	0.327	38.333	29	0.053	26	38.333	z	0.9	-514.470		150.350	209.252	209.252
3	M3	CRND36	Conc Col	0.385	38.333	28	0.051	26	38.333	z	0.9	-48.332		665.140	215.800	215.800
4	M4	CRND36	Conc Col	0.368	38.333	31	0.054	26	38.333	z	0.9	-520.556		142.887	203.386	203.386
5	M5	CRND36	Conc Col	0.369	38.333	26	0.054	24	38.333	z	0.9	-520.556		711.760	204.625	204.625
6	M6	CRND36	Conc Col	0.370	38.333	24	0.053	26	38.333	z	0.9	-520.556		711.760	212.067	212.067
7	M7	CRND36	Conc Col	0.367	38.333	26	0.054	24	38.333	z	0.9	-520.556		711.760	203.982	203.982
8	M8	CRND36	Conc Col	0.366	38.333	28	0.053	26	38.333	z	0.9	-520.556		711.760	211.032	211.032
9	M9	CRND36	Conc Col	0.367	38.333	26	0.054	24	38.333	z	0.9	-520.556		711.760	203.915	203.915
10	M10	CRND36	Conc Col	0.367	38.333	24	0.052	26	38.333	z	0.9	-520.556		711.760	212.975	212.975
11	M11	CRND36	Conc Col	0.379	38.333	31	0.054	24	38.333	z	0.9	-521.244		142.048	203.562	203.562
12	M12	CRND36	Conc Col	0.374	38.333	31	0.054	26	38.333	z	0.9	-518.133		145.858	204.436	204.436
13	M13	CRND36	Conc Col	0.370	38.333	26	0.052	24	38.333	z	0.9	-518.133		711.760	213.851	213.851
14	M14	CRND36	Conc Col	0.368	38.333	26	0.052	24	38.333	z	0.9	-518.133		711.760	211.948	211.948
15	M15	CRND36	Conc Col	0.371	38.333	31	0.054	26	38.333	z	0.9	-516.909		147.362	204.159	204.159
16	M16	CRND36	Conc Col	0.369	38.333	31	0.054	26	38.333	z	0.9	-516.595		147.745	204.042	204.042
17	M17	CRND36	Conc Col	0.366	38.333	30	0.053	24	38.333	z	0.9	-516.595		711.760	210.163	210.163
18	M18	CRND36	Conc Col	0.392	38.333	30	0.051	24	38.333	z	0.9	-516.595		652.598	216.858	216.858

61. **Main Display (50' x 150')**
- A. Loading
 - B. Wind Loading
 - C. FEA Model Definition Sketches
 - D. Envelope Member Forces
 - E. Envelope Reactions
 - F. Envelope Code Check
 - G. Baseplate + Anchor Bolts**
 - H. Caisson & Foundation Design
-



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: 50 x 150 Video Board

Location:

Design name: Ontario Sports Park - 150x50 Sign Front

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19

Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place

Material: AB_H

Diameter (inch): 1.250

Effective Embedment depth, h_{ef} (inch): 18.000

Anchor category: -

Anchor ductility: Yes

h_{min} (inch): 21.00

C_{min} (inch): 7.50

S_{min} (inch): 7.50

Base Material

Concrete: Normal-weight

Concrete thickness, h (inch): 36.00

State: Uncracked

Compressive strength, f'_c (psi): 4000

$\Psi_{c,v}$: 1.4

Reinforcement condition: A tension, A shear

Supplemental edge reinforcement: Yes

Reinforcement provided at corners: Yes

Ignore concrete breakout in tension: Yes

Ignore concrete breakout in shear: No

Ignore 6do requirement: No

Build-up grout pad: Yes

Base Plate

Length x Width x Thickness (inch): 24.00 x 24.00 x 2.00

Yield stress: 50000 psi

Profile type/size: 14X14X1/2

Recommended Anchor

Anchor Name: PAB Pre-Assembled Anchor Bolt - PAB10H (1 1/4"Ø)



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Column design: No
Anchors subjected to sustained tension: Not applicable

Apply entire shear load at front row: No

Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: -202600

V_{uax} [lb]:	0
-----------------	---

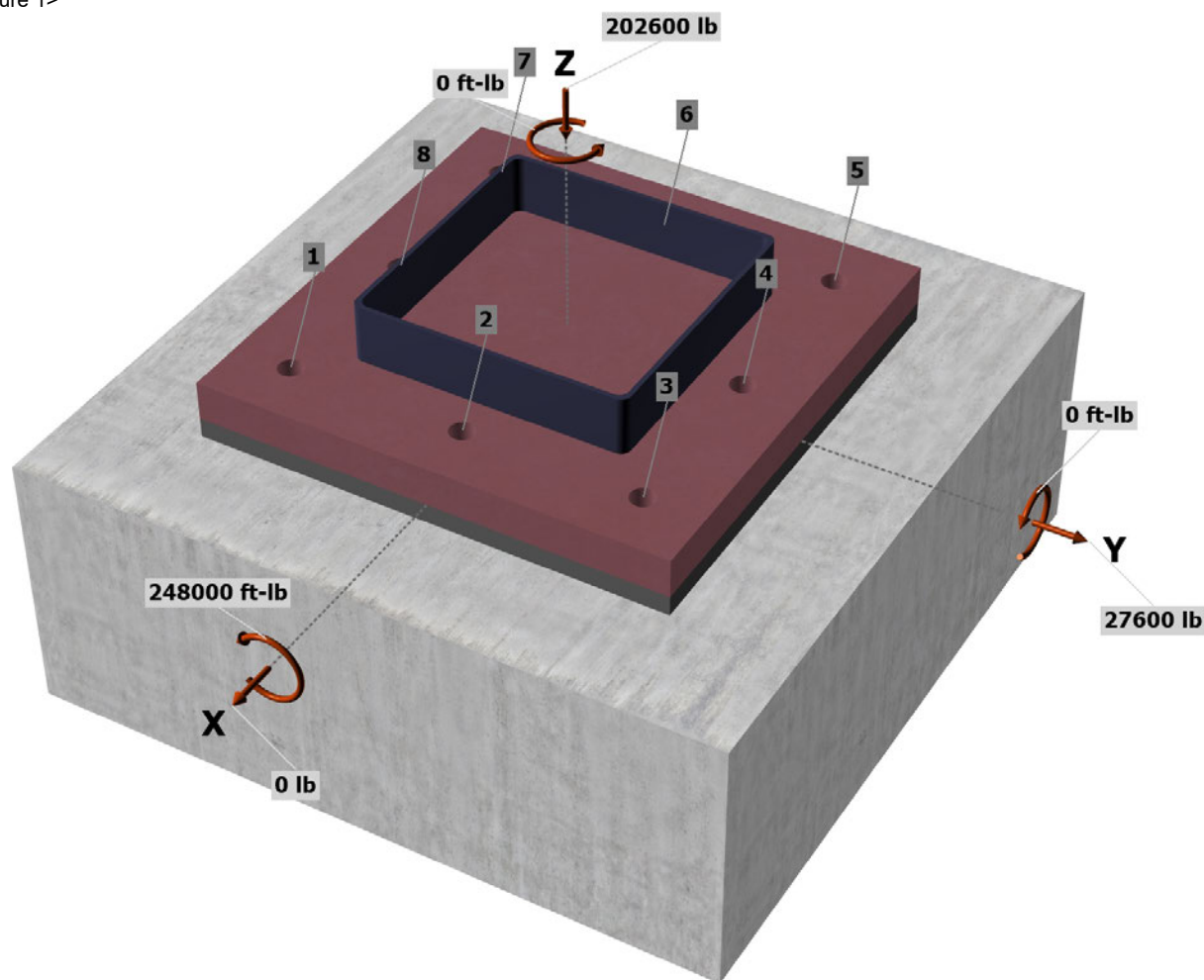
 $V_{uay} [lb]: 27600$

M_{ux} [ft-lb]: 248000

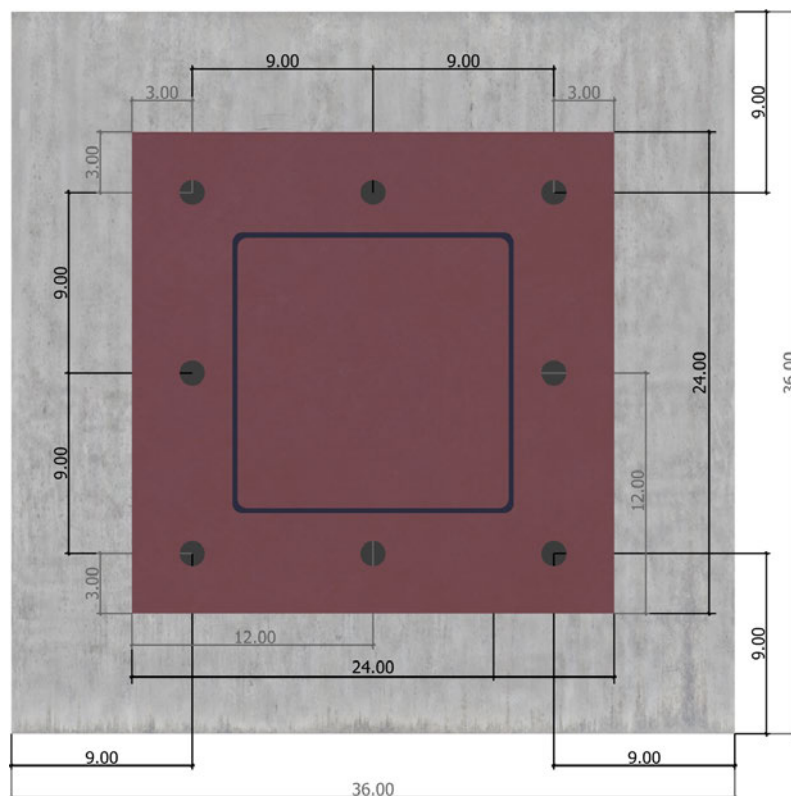
M_{uy} [ft-lb]: 0

M_{uz} [ft-lb]: 0

<Figure 1>



<Figure 2>

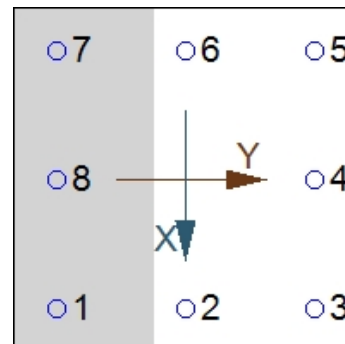


3. Resulting Anchor Forces

Anchor	Tension load, N _{ua} (lb)	Shear load x, V _{uax} (lb)	Shear load y, V _{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	0.0	0.0	3450.0	3450.0
2	4251.8	0.0	3450.0	3450.0
3	21178.8	0.0	3450.0	3450.0
4	21178.8	0.0	3450.0	3450.0
5	21178.8	0.0	3450.0	3450.0
6	4251.8	0.0	3450.0	3450.0
7	0.0	0.0	3450.0	3450.0
8	0.0	0.0	3450.0	3450.0
Sum	72039.9	0.0	27600.0	27600.0

Maximum concrete compression strain (‰): 0.54
Maximum concrete compression stress (psi): 2350
Resultant tension force (lb): 72040
Resultant compression force (lb): 274640
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 2.54
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>





Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
121125	0.75	90844

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \psi_{c,P} N_p = \phi \psi_{c,P} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\psi_{c,P}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	8.39	4000	0.70	263236



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
72675	0.8	0.65	37791

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.7.2)

Shear perpendicular to edge in y-direction:

$$V_{by} = \min[7(l_e/d_a)^{0.2}\sqrt{d_a\lambda_a}\sqrt{f'_c c_{a1}^{1.5}}; 9\lambda_a\sqrt{f'_c c_{a1}^{1.5}}] \text{ (Eq. 17.7.2.2.1a \& Eq. 17.7.2.2.1b)}$$

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
10.00	1.250	1.00	4000	24.00	66925

$$\phi V_{cbgy} = \phi (A_{vc}/A_{vco}) \Psi_{ec,v} \Psi_{ed,v} \Psi_{c,v} \Psi_{h,v} V_{by} \text{ (Sec. 17.5.1.2 \& Eq. 17.7.2.1b)}$$

A_{vc} (in ²)	A_{vco} (in ²)	$\Psi_{ec,v}$	$\Psi_{ed,v}$	$\Psi_{c,v}$	$\Psi_{h,v}$	V_{by} (lb)	ϕ	ϕV_{cbgy} (lb)
1296.00	2592.00	1.000	0.775	1.400	1.000	66925	0.75	27230

Shear parallel to edge in x-direction:

$$V_{by} = \min[7(l_e/d_a)^{0.2}\sqrt{d_a\lambda_a}\sqrt{f'_c c_{a1}^{1.5}}; 9\lambda_a\sqrt{f'_c c_{a1}^{1.5}}] \text{ (Eq. 17.7.2.2.1a \& Eq. 17.7.2.2.1b)}$$

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
10.00	1.250	1.00	4000	9.00	15369

$$\phi V_{cbgx} = \phi (2)(A_{vc}/A_{vco}) \Psi_{ec,v} \Psi_{ed,v} \Psi_{c,v} \Psi_{h,v} V_{by} \text{ (Sec. 17.5.1.2, 17.7.2.1(c) \& Eq. 17.7.2.1b)}$$

A_{vc} (in ²)	A_{vco} (in ²)	$\Psi_{ec,v}$	$\Psi_{ed,v}$	$\Psi_{c,v}$	$\Psi_{h,v}$	V_{by} (lb)	ϕ	ϕV_{cbgx} (lb)
486.00	364.50	1.000	1.000	1.400	1.000	15369	0.75	43032

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$$\phi V_{cpq} = \phi k_{cp} N_{cbg} = \phi k_{cp} (A_{Nc}/A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b \text{ (Sec. 17.5.1.2 \& Eq. 17.7.3.1b)}$$

k_{cp}	A_{Nc} (in ²)	A_{Nco} (in ²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cpq} (lb)
2.0	1296.00	324.00	1.000	1.000	1.250	1.000	20048	0.70	140335

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	21179	90844	0.23	Pass (Governs)
Pullout	21179	263236	0.08	Pass
Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	3450	37791	0.09	Pass
T Concrete breakout y+	27600	27230	1.01	Fail (Governs)
|| Concrete breakout x-	10350	43032	0.24	Pass (Governs)
Pryout	27600	140335	0.20	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Utilization Ratio	Permissible	Status
Sec. 17.8.3	0.23	1.01	103.9%	1.0	Fail

FAIL! Selected anchor type and embedment do not meet the selected design criteria.



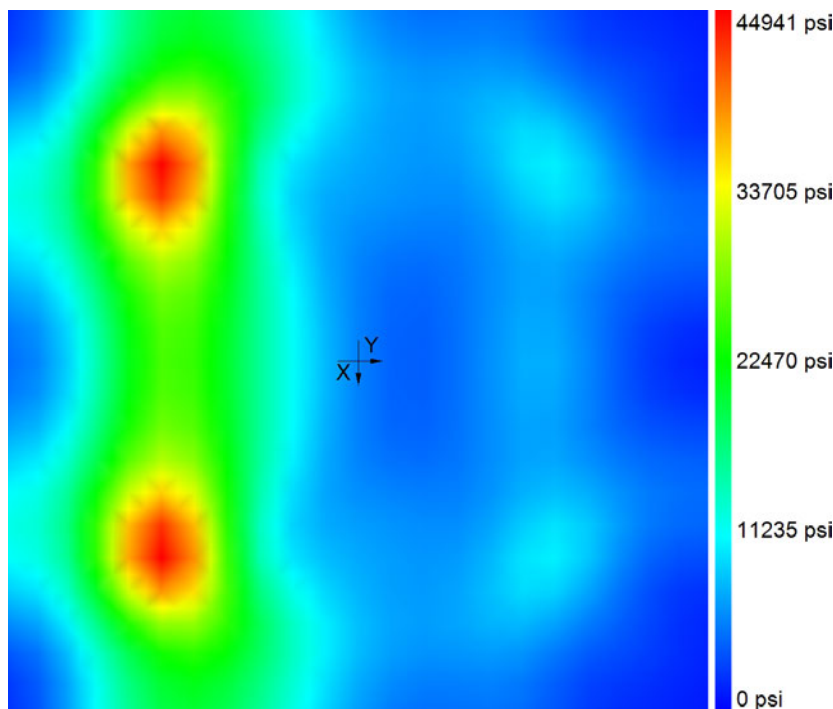
Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel	50000 psi
Maximum stress	44941 psi
Calculated plate thickness	1.937 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$

12. Warnings

- Calculated concrete compression stress exceeds the permissible bearing stress of $\Phi 0.85f'_c$ per ACI 318 Section 22.8.3.
- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	18637	160	0	777	0	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	15974	137	0	666	0	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	15974	137	0	666	0	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	43290	5537	0	39102	0	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	70605	10937	0	77537	0	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	41469	5189	0	36543	0	0	-	-	-
U = 0.9D + 1.0W	66612	10903	0	77370	0	0	-	-	-
U = 0.9D + 1.0E	37476	5155	0	36376	0	0	-	-	-

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	1
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

1. Project information

Project description: 50 x 150 Video Board

Location:

Design name: Ontario Sports Park - 150x50 Sign Front

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19

Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place

Material: AB_H

Diameter (inch): 1.250

Effective Embedment depth, h_{ef} (inch): 18.000

Anchor category: -

Anchor ductility: Yes

h_{min} (inch): 21.00

C_{min} (inch): 7.50

S_{min} (inch): 7.50

Base Material

Concrete: Normal-weight

Concrete thickness, h (inch): 36.00

State: Uncracked

Compressive strength, f'_c (psi): 4000

$\Psi_{c,v}$: 1.4

Reinforcement condition: A tension, A shear

Supplemental edge reinforcement: Yes

Reinforcement provided at corners: Yes

Ignore concrete breakout in tension: Yes

Ignore concrete breakout in shear: Yes

Ignore 6do requirement: No

Build-up grout pad: Yes

Base Plate

Length x Width x Thickness (inch): 24.00 x 24.00 x 2.00

Yield stress: 50000 psi

Profile type/size: 14X14X1/2

Recommended Anchor

Anchor Name: PAB Pre-Assembled Anchor Bolt - PAB10H (1 1/4"Ø)





Anchor Designer™ for Concrete Software

Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	2
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

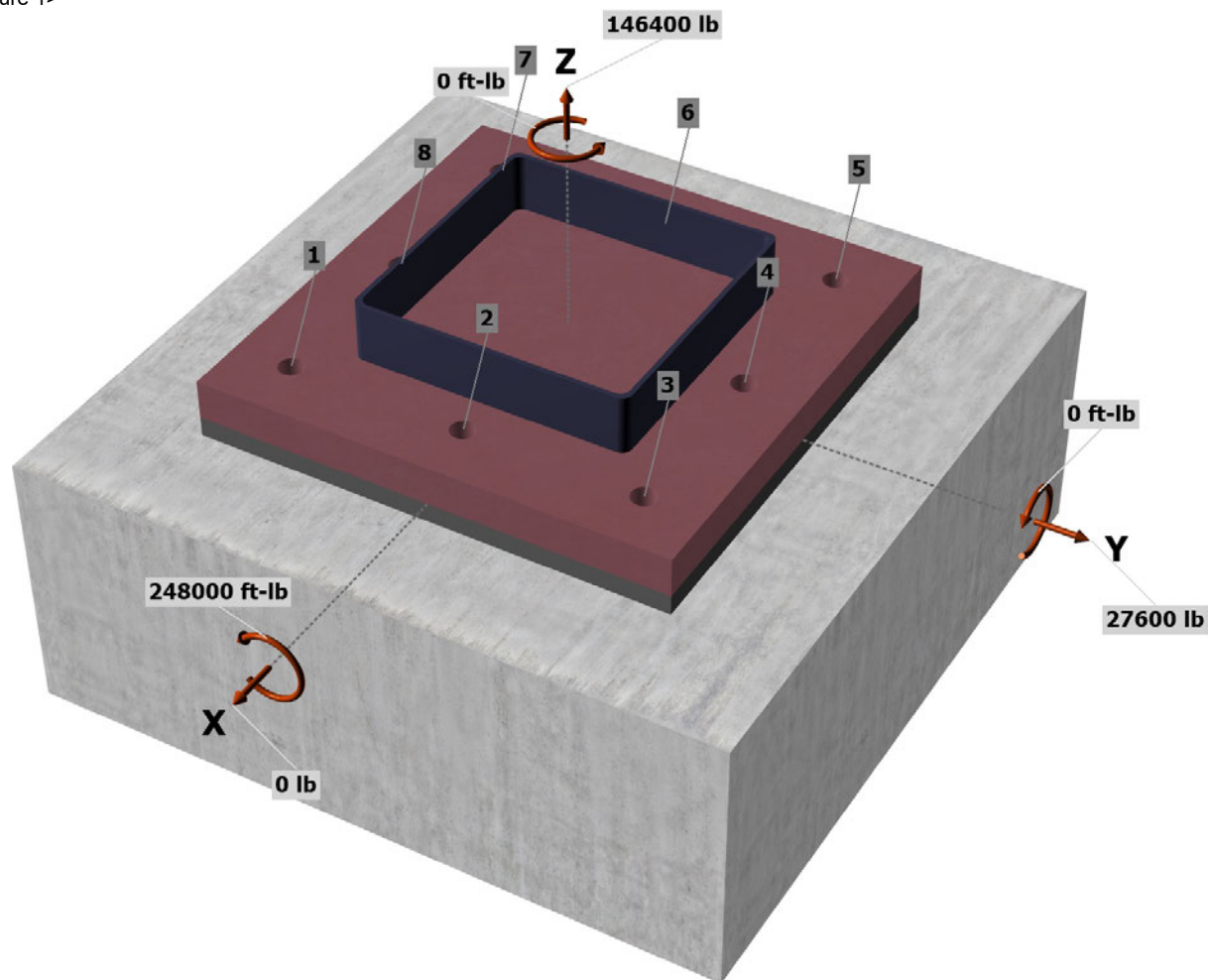
Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 146400
 V_{uax} [lb]: 0
 V_{uay} [lb]: 27600
 M_{ux} [ft-lb]: 248000
 M_{uy} [ft-lb]: 0
 M_{uz} [ft-lb]: 0

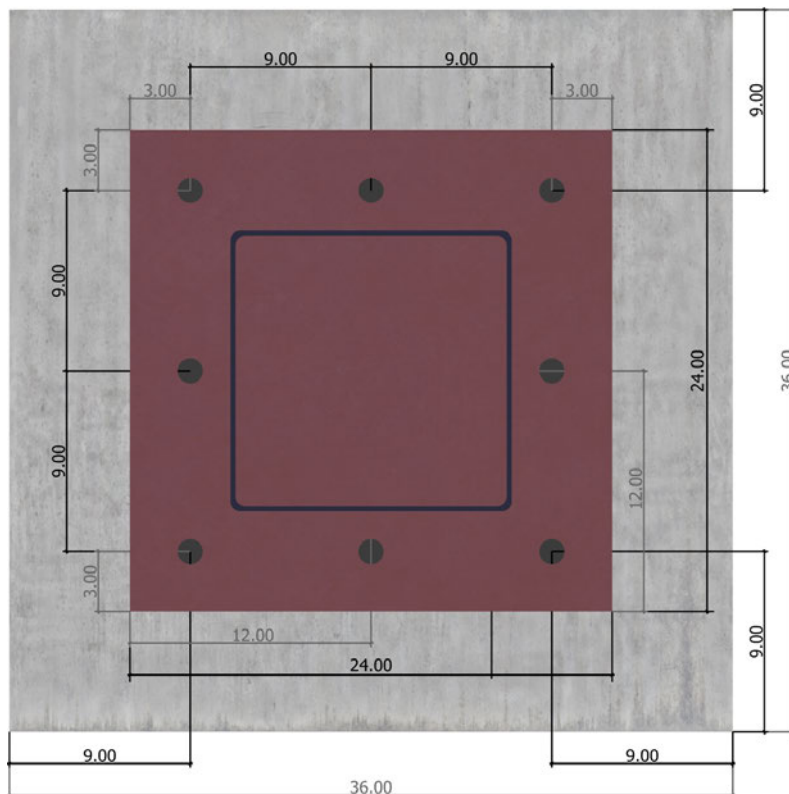
<Figure 1>



Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com

<Figure 2>

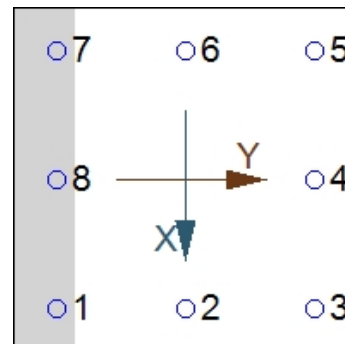


3. Resulting Anchor Forces

Anchor	Tension load, N _{ua} (lb)	Shear load x, V _{uax} (lb)	Shear load y, V _{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	0.0	0.0	3450.0	3450.0
2	30464.7	0.0	3450.0	3450.0
3	66084.1	0.0	3450.0	3450.0
4	66084.1	0.0	3450.0	3450.0
5	66084.1	0.0	3450.0	3450.0
6	30464.7	0.0	3450.0	3450.0
7	0.0	0.0	3450.0	3450.0
8	0.0	0.0	3450.0	3450.0
Sum	259181.7	0.0	27600.0	27600.0

Maximum concrete compression strain (‰): 0.50
Maximum concrete compression stress (psi): 2184
Resultant tension force (lb): 259182
Resultant compression force (lb): 112782
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 1.48
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>





Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	4
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
121125	0.75	90844

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$\phi N_{pn} = \phi \psi_{c,P} N_p = \phi \psi_{c,P} 8 A_{brg} f'_c$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & 17.6.3.2.2a)

$\psi_{c,P}$	A_{brg} (in ²)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.4	8.39	4000	0.70	263236



Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	5
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
72675	0.8	0.65	37791

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cp} = \phi k_{cp} N_{cbg} = \phi k_{cp} (A_{Nc} / A_{Nco}) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1b)

k_{cp}	A_{Nc} (in ²)	A_{Nco} (in ²)	$\psi_{ec,N}$	$\psi_{ed,N}$	$\psi_{c,N}$	$\psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	1296.00	324.00	1.000	1.000	1.250	1.000	20048	0.70	140335

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.8)

Tension	Factored Load, N _{ua} (lb)	Design Strength, ϕN _n (lb)	Ratio	Status	
Steel	66084	90844	0.73	Pass (Governs)	
Pullout	66084	263236	0.25	Pass	
Shear	Factored Load, V _{ua} (lb)	Design Strength, ϕV _n (lb)	Ratio	Status	
Steel	3450	37791	0.09	Pass	
Pryout	27600	140335	0.20	Pass (Governs)	
Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Utilization Ratio	Permissible	Status
Sec. R17.8	0.59	0.07	65.5%	1.0	Pass

PAB10H (1 1/4"Ø) with hef = 18.000 inch meets the selected design criteria.



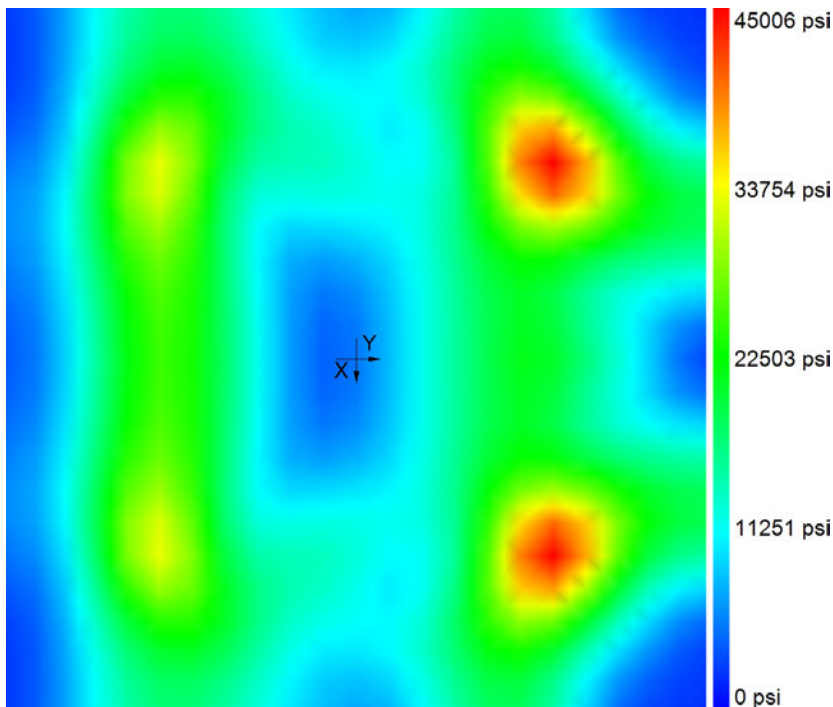
Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	6
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

Base Plate Thickness

Required base plate thickness: 0.5 inches

Steel	50000 psi
Maximum stress	45006 psi
Calculated plate thickness	1.765 inch

Stress distribution



For ACI and CSA design methods, maximum base plate stress is limited to 0.9 times yield stress.

For ETAG and EN-1992-4 design method, maximum base plate stress is limited to yield stress divide by 1.5.

Plate stress is derived using Von Mises theory.

$$\sigma_{xx} = \frac{F_{xx}}{t} + \frac{6M_{xx}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xx} = \frac{F_{xx}}{t} - \frac{6M_{xx}}{t^2} (@ \text{ top})$$

$$\sigma_{yy} = \frac{F_{yy}}{t} + \frac{6M_{yy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{yy} = \frac{F_{yy}}{t} - \frac{6M_{yy}}{t^2} (@ \text{ top})$$

$$\sigma_{xy} = \frac{F_{xy}}{t} + \frac{6M_{xy}}{t^2} (@ \text{ bottom}) \text{ or } \sigma_{xy} = \frac{F_{xy}}{t} - \frac{6M_{xy}}{t^2} (@ \text{ top})$$

$$\sigma_{xz} = \frac{V_x}{t}$$

$$\sigma_{yz} = \frac{V_y}{t}$$

$\sigma_{xx}, \sigma_{yy}, \sigma_{xy}$ as follows:

$$S_1 = \frac{\sigma_{xx} + \sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_2 = \frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \sigma_{xy}^2}$$

$$S_3 = 0$$

$$\sigma_{\text{Von Mises}} = \sqrt{\frac{(S_1 - S_2)^2 + (S_1 - S_3)^2 + (S_2 - S_3)^2}{2}}$$



**Anchor Designer™ for
Concrete Software**
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	7
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

12. Warnings

- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.5.2.1 for conditions where calculations of the concrete breakout strength may not be required.
- Designer must exercise own judgement to determine if this design is suitable.



Anchor Designer™ for
Concrete Software
Version 3.3.2501.2

Company:	GMU Engineers & Geologists	Date:	1/22/2025
Engineer:	SB	Page:	8
Project:	Ontario Sports Park		
Address:			
Phone:			
E-mail:			

13. Design result for all load combinations

Seismic design: No

Anchors subjected to sustained tension: No

Anchors only resisting wind and/or seismic loads: No

	N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (lb)	M _{uy} (lb)	M _{uz} (lb)	N ratio	V ratio	Utilization Ratio
U = 1.4(D + F)	18637	160	0	777	0	0	-	-	-
U = 1.2(D + F) + 1.6(L) + 0.5(Lr or S or R)	15974	137	0	666	0	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 1.0L	15974	137	0	666	0	0	-	-	-
U = 1.2D + 1.6(Lr or S or R) + 0.5W	43290	5537	0	39102	0	0	-	-	-
U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)	70605	10937	0	77537	0	0	-	-	-
U = 1.2D + 1.0E + 1.0L + 0.2S	41469	5189	0	36543	0	0	-	-	-
U = 0.9D + 1.0W	66612	10903	0	77370	0	0	-	-	-
U = 0.9D + 1.0E	37476	5155	0	36376	0	0	-	-	-

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com

61. Main Display (50' x 150')
- A. Loading
 - B. Wind Loading
 - C. FEA Model Definition Sketches
 - D. Envelope Member Forces
 - E. Envelope Reactions
 - F. Envelope Code Check
 - G. Baseplate + Anchor Bolts
 - H. Caisson & Foundation Design
-

OSE, Video Board Caisson Shear Capacity Check

Circular Column Shear Capacity Check

36" Diameter Caisson, with #4 Ties, (Spiral), maximum spacing = 6"

$$A_{v,(\min)} = \text{Max} \left[\left(0.75 \sqrt{f'_c} \frac{b_w}{f_{yt}} \right), \left(50 \frac{b_w}{f_{yt}} \right) \right]$$

$$(0.75)(\sqrt{4,500 \text{ psi}}) \left(\frac{36 \text{ in}}{60,000 \text{ psi}} \right) = 0.030$$

$$(50) \left(\frac{36 \text{ in}}{60,000 \text{ psi}} \right) = 0.030$$

$$\#4 \text{ Ties at } 6" \text{ max spacing, } \frac{A_v}{S} = 0.02(\min), \quad = \frac{0.196}{6} = 0.032, (OK)$$

$$V_n = V_c + V_s$$

$$V_c = (2)(\lambda) \sqrt{f'_c} (A_c), \text{ where } A_c = 0.8A_g, \text{ Per ACI 318 - 19 for circular columns}$$

$$A_c = 0.8(1,017.9 \text{ in}^2) = 814.3 \text{ in}^2$$

$$\lambda = 1.0 \text{ for normal weight concrete}$$

$$f'_c = 4,500 \text{ psi}$$

$$V_c = [(2)(1.0)(\sqrt{4,500 \text{ psi}})(814.3 \text{ in}^2)] = 109,250.0 \text{ lbs} = 109.2 \text{ kips}$$

$$V_s = \frac{A_v f_{yt} d}{S}$$

$$f_{yt} = 60,000 \text{ psi}$$

$$d = (0.8)(\text{dia.}) = 28.8 \text{ in}$$

#4 ties at 6" spacing:

$$V_s = \frac{(0.196 \text{ in}^2)(60,000 \text{ psi})(28.8 \text{ in})}{6 \text{ in}} = 56,448 \text{ lbs} = 56.5 \text{ kips}$$

$$\phi V_n = \phi (V_c + V_s)$$

$$\phi V_n = 0.75(109.2 \text{ kips} + 56.5 \text{ kips}) = \mathbf{124.3 \text{ kips}}, (\#4 \text{ ties at } 6" \text{ O.C. \& } 4,500 \text{ psi concrete})$$

OSE, Video Board Caisson Uplift Capacity

Uplift Capacity Per Coyle and Castello's Method

Caisson Characteristics

$$B = 36'' = (3'-0'') = \text{Diameter}$$

$$D = 40'-0'' = \text{Length}$$

$$W_f = 42.4 \text{ kips} = \text{Caisson Self Weight}$$

$$A_s = \text{Skin friction area} = 330 \text{ ft}^2$$

(ignore upper 5'-0" from grade due to possible disturbance during drilling)

Uplift Capacity

$$F = \text{Factor of Safety} = 2.5$$

$$\emptyset = \text{Friction Angle of soil} = 37^\circ$$

$$f_s = 1,200 \text{ psf}, 1.2 \text{ ksf, with } z/b = 11, \emptyset = 37^\circ,$$

(Using Figure 13.13, unit skin friction resistance in cohesionless soils, Coyle and Castellom 1981)

$$D/B = 40'/2.5' = 16, \quad (> 6) \therefore R = 1$$

$$P_a(\text{uplift}) = 0.9W_f + \frac{R \sum f_s A_s}{F} = 0.9(42.4 \text{ kips}) + \frac{(1) \left(1.2 \frac{\text{kips}}{\text{ft}^2} \right) (330 \text{ ft}^2)}{2.5} = 196.6 \text{ kips}$$

OSE, Video Board Caisson Bearing Capacity

Caisson Characteristics

$$B = 36" = (3'-0") = \text{Diameter}$$

$$D = 40'-0" = \text{Length}$$

$$A_s = \text{Skin friction area} = 377 \text{ ft}^2$$

$$A_e = \text{end bearing area} = 7.07 \text{ ft}^2$$

Bearing Capacity

$$F = \text{Factor of Safety} = 2.5$$

$$\emptyset = \text{Friction Angle of soil} = 37^\circ$$

$$f_s = 1,200 \text{ psf}, 1.2 \text{ ksf} = \text{Nominal unit skin friction resistance}$$

$$f_s/F = 1,200 \text{ psf} / 2.5 = 480 \text{ psf}, (\text{Use } 500 \text{ psf per soils report for allowable skin friction})$$

Use 5,000psf end bearing per soils report

$$P_{a(\text{Bearing})} = P_e + P_s = (A_e)(q_e) + (A_s)(f_s) = 223.9 \text{ kips}$$

OSE, Video Board Caisson Maximum Reactions (Footing Demands),

From RISA 3D design output the following are the maximum reactions from enveloped loading, maximum loading primarily from center columns of structure, front and back. These loads were entered into L-Pile for caisson analysis.

$$M_u = 249.7 \text{ ft} - \text{kips}, \quad 249,700 \text{ ft} - \text{lbs}, \quad 2,996,400 \text{ in} - \text{lbs}$$

$$V_u = 28.3 \text{ kips}, \quad 28,300 \text{ lbs}$$

$$P_u(\text{Bearing}) = 202.7 \text{ kips}, \quad 202,700 \text{ lbs} (\text{Bearing}),$$

$$P_u(\text{Uplift}) = 146.2 \text{ kips}, \quad 141,200 \text{ lbs} (\text{Uplift})$$

OSE, Video Board Caisson Maximum Caisson Loading, (From L-Pile Analysis)

$$M_u = 4,613,100 \text{ in} - \text{lbs}, (@8' \text{ below top of caisson}), \quad 384,425 \text{ ft} - \text{lbs}, \quad 384.4 \text{ ft} - \text{kips}$$

$$V_u = 32,391 \text{ lbs}, (@16' \text{ below top of caisson}), \quad 32.4 \text{ kips}$$

$$Y = \text{Lateral Deflection.} (@ \text{ caisson head}) = 0.58 \text{ inches}$$

$$M_n = 11,035 \text{ in} - \text{kips}, \quad 942.1 \text{ ft} - \text{kips},$$

OSE, Video Board Caisson Design Summary

Shear

$$V_u = 32.4 \text{ kips}, \quad \phi V_n = 124.3 \text{ kips}, \quad (OK)$$

Moment

$$M_u = 384.4 \text{ ft-kips}, \quad \phi M_n = 659.5 \text{ ft-kips}, \quad (OK)$$

Deflection

$$Y = 0.58 \text{ in}, \quad (OK)$$

Bearing

$$P_u(\text{Bearing}) = 202.7 \text{ kips}, \quad P_a = 223.9 \text{ kips}, \quad (OK)$$

Uplift

$$P_u(\text{Uplift}) = 146.2 \text{ kips}, \quad P_a(\text{Uplift}) = 196.6 \text{ kips}, \quad (OK)$$

References:

RMA Group Report, "Geotechnical Investigation for Ontario Sports Complex SE Corner of East Riverside Dr. and Ontario Ave Ontario, CA." Dated October 18, 2023, Updated August 8, 2024.

=====

LPILE for Windows, Version 2019-11.002

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
© 1985-2019 by Ensoft, Inc.
All Rights Reserved

=====

This copy of LPILE is being used by:

GMU Geotechnical
Rancho Santa Margarita
Serial Number of Security Device: 425725340

This copy of LPILE is licensed for exclusive use by:

GMU Geotechnical, Rancho Santa M

Use of this program by any entity other than GMU Geotechnical, Rancho Santa M
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations on this computer:
\\2024\\24-130-00 Ontario Sports Complex_Structural\\L-Pile\\Video Board Caisson Design\\

Name of the input data file:
Design 1.lp11

Name of the output report file:
Design 1.lp11

Name of the plot output file:
Design 1.lp11

Name of the runtime message file:
Design 1.lp11

Date and Time of Analysis

Date: March 28, 2025

Time: 17:28:42

Problem Title

Project Name: OSE, Video Board Caissons

Job Number: 24-130-00

Client: RJM Design Group

Engineer: M. Farrington

Description: Caisson Structural Design Envelope Loading

Program Options and Settings

Computational Options:

- Conventional Analysis

Engineering Units Used for Data Input and Computations:

- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- | | | |
|--|---|---------------|
| - Maximum number of iterations allowed | = | 500 |
| - Deflection tolerance for convergence | = | 1.0000E-05 in |
| - Maximum allowable deflection | = | 100.0000 in |
| - Number of pile increments | = | 100 |

Loading Type and Number of Cycles of Loading:

- Static loading specified
- Use of p-y modification factors for p-y curves not selected
- Analysis uses layering correction (Method of Georgiadis)

- No distributed lateral loads are entered
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Input of moment resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

- Output files use decimal points to denote decimal symbols.
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1
- No p-y curves to be computed and reported for user-specified depths
- Print using narrow report formats
(Note: Some output information is omitted from the narrow report formats)

Pile Structural Properties and Geometry

Number of pile sections defined	=	1
Total length of pile	=	100.000 ft
Depth of ground surface below top of pile	=	0.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	36.0000
2	100.000	36.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile	
Length of section	= 100.000000 ft
Shaft Diameter	= 36.000000 in
Shear capacity of section	= 0.0000 lbs

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	2.000 degrees
	=	0.035 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	0.0000 ft
Distance from top of pile to bottom of layer	=	10.000000 ft
Effective unit weight at top of layer	=	120.000000 pcf
Effective unit weight at bottom of layer	=	120.000000 pcf
Friction angle at top of layer	=	30.000000 deg.
Friction angle at bottom of layer	=	30.000000 deg.
Subgrade k at top of layer	=	25.000000 pci
Subgrade k at bottom of layer	=	25.000000 pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	10.000000 ft
Distance from top of pile to bottom of layer	=	20.000000 ft
Effective unit weight at top of layer	=	120.000000 pcf
Effective unit weight at bottom of layer	=	120.000000 pcf
Friction angle at top of layer	=	35.000000 deg.
Friction angle at bottom of layer	=	35.000000 deg.
Subgrade k at top of layer	=	90.000000 pci
Subgrade k at bottom of layer	=	90.000000 pci

Layer 3 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	20.000000 ft
Distance from top of pile to bottom of layer	=	100.000000 ft
Effective unit weight at top of layer	=	120.000000 pcf

Effective unit weight at bottom of layer	=	120.000000 pcf
Friction angle at top of layer	=	35.000000 deg.
Friction angle at bottom of layer	=	35.000000 deg.
Subgrade k at top of layer	=	225.000000 pci
Subgrade k at bottom of layer	=	225.000000 pci

(Depth of the lowest soil layer extends 0.000 ft below the pile tip)

----- Static Loading Type -----

Static loading criteria were used when computing p-y curves for all analyses.

----- Pile-head Loading and Pile-head Fixity Conditions -----

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 28300. lbs	M = 2996400. in-lbs	202700.

V = shear force applied normal to pile axis

M = bending moment applied to pile head

y = lateral deflection normal to pile axis

S = pile slope relative to original pile batter angle

R = rotational stiffness applied to pile head

Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).

Thrust force is assumed to be acting axially for all pile batter angles.

----- Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness -----

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	100.000000 ft
Shaft Diameter	=	36.000000 in
Concrete Cover Thickness (to edge of long. rebar)	=	3.000000 in
Number of Reinforcing Bars	=	13 bars
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shaft	=	1018. sq. in.
Total Area of Reinforcing Steel	=	10.270000 sq. in.
Area Ratio of Steel Reinforcement	=	1.01 percent
Edge-to-Edge Bar Spacing	=	5.940154 in
Maximum Concrete Aggregate Size	=	0.625000 in
Ratio of Bar Spacing to Aggregate Size	=	9.50
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in
Confined Section		
Type: Spiral		
Number of Transverse Bars (per spacing)	=	1
Spacing of Transverse Bars	=	6.000000 in
Yield Stress of Transverse Bars	=	60000. psi
Total Area of Confinement Steel	=	0.200000 sq. in.
rho_s	=	0.004372
ke	=	0.839604
f'cc	=	5221. psi
f'l	=	110.111955 psi
Epsilon cc	=	0.003603
Epsilon cu	=	0.010330
r	=	1.610284

Axial Structural Capacities:

Nom. Axial Structural Capacity = $0.85 F_c A_c + F_y A_s$	=	4470.293 kips
Tensile Load for Cracking of Concrete	=	-477.966 kips
Nominal Axial Tensile Capacity	=	-616.200 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
-----	-----	-----	-----	-----
1	1.000000	0.790000	14.500000	0.000000
2	1.000000	0.790000	12.839112	6.738486
3	1.000000	0.790000	8.236939	11.933266
4	1.000000	0.790000	1.747782	14.394279
5	1.000000	0.790000	-5.141771	13.557736

6	1.000000	0.790000	-10.853406	9.615279
7	1.000000	0.790000	-14.078656	3.470077
8	1.000000	0.790000	-14.078656	-3.470077
9	1.000000	0.790000	-10.853406	-9.615279
10	1.000000	0.790000	-5.141771	-13.557736
11	1.000000	0.790000	1.747782	-14.394279
12	1.000000	0.790000	8.236939	-11.933266
13	1.000000	0.790000	12.839112	-6.738486

(13) # 8 vertical bars

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 5.940 inches
between bars 10 and 11.

Ratio of bar spacing to maximum aggregate size = 9.50

Concrete Properties:

Compressive Strength of Concrete	=	4500. psi
Modulus of Elasticity of Concrete	=	3823676. psi
Modulus of Rupture of Concrete	=	-503.115295 psi
Compression Strain at Peak Stress	=	0.002001
Tensile Strain at Fracture of Concrete	=	-0.0001152
Maximum Coarse Aggregate Size	=	0.625000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
-----	-----
1	202.700

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.

Y = stress in reinforcing steel has reached yield stress.

T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318, Section 10.3.4.

Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.

Position of neutral axis is measured from edge of compression side of pile.

Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force = 202.700 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Run Msg
-----	-----	-----	-----	---
0.000006250	231.1669135446	369867062.	92.0541916783	
0.0000012500	462.7188250032	370175060.	55.0405465131	
0.0000018750	694.2533475365	370268452.	42.7082315384	
0.0000025000	925.7606724955	370304269.	36.5462408113	
0.0000031250	1157.	370301907.	32.8522075426	
0.0000037500	1389.	370479278.	30.3956650414	
0.0000043750	1623.	370962180.	28.6505938577	
0.0000050000	1857.	371489053.	27.3483900122	
0.0000056250	2092.	371941102.	26.3397307950	
0.0000062500	2327.	372286154.	25.5355374993	
0.0000068750	2561.	372521147.	24.8793632880	
0.0000075000	2795.	372654374.	24.3337408985	
0.0000081250	3028.	372700530.	23.8729664861	
0.0000087500	3028.	346079063.	20.9618010154	C
0.0000100000	3028.	302819180.	19.8836124456	C
0.0000112500	3028.	269172605.	18.9998109690	C
0.0000125000	3028.	242255344.	18.2598174119	C
0.0000137500	3028.	220232131.	17.6291020565	C
0.0000150000	3028.	201879454.	17.0855442370	C
0.0000162500	3028.	186350265.	16.6090726699	C
0.0000175000	3028.	173039532.	16.1893999758	C
0.0000187500	3066.	163542954.	15.8161869065	C
0.0000200000	3166.	158289786.	15.4817847423	C
0.0000212500	3264.	153582102.	15.1804544464	C
0.0000225000	3360.	149343241.	14.9078474999	C
0.0000237500	3455.	145493566.	14.6584197586	C
0.0000250000	3550.	141990807.	14.4302070872	C
0.0000262500	3644.	138800949.	14.2221087644	C
0.0000275000	3736.	135856881.	14.0278417111	C
0.0000300000	3920.	130658247.	13.6836541907	C
0.0000325000	4101.	126196772.	13.3860072213	C
0.0000350000	4282.	122328878.	13.1267973066	C
0.0000375000	4460.	118929003.	12.8964829011	C
0.0000400000	4637.	115930528.	12.6932416489	C
0.0000425000	4814.	113259174.	12.5115305651	C
0.0000450000	4989.	110865840.	12.3486068883	C
0.0000475000	5163.	108704519.	12.2009603572	C
0.0000500000	5338.	106751315.	12.0689433001	C
0.0000525000	5511.	104962843.	11.9464659733	C
0.0000575000	5855.	101829938.	11.7352310407	C

0.0000625000	6197.	99157872.	11.5555686320	C
0.0000675000	6538.	96855047.	11.4041808930	C
0.0000725000	6876.	94842059.	11.2738529263	C
0.0000775000	7212.	93063260.	11.1607519977	C
0.0000825000	7547.	91480374.	11.0637973171	C
0.0000875000	7880.	90059436.	10.9802742341	C
0.0000925000	8211.	88769161.	10.9051326288	C
0.0000975000	8522.	87404521.	10.8327878097	CY
0.0001025000	8757.	85436072.	10.7414479184	CY
0.0001075000	8957.	83324639.	10.6474622132	CY
0.0001125000	9116.	81032840.	10.5447928796	CY
0.0001175000	9268.	78880573.	10.4489629759	CY
0.0001225000	9399.	76730415.	10.3537482544	CY
0.0001275000	9507.	74567152.	10.2579229909	CY
0.0001325000	9613.	72547192.	10.1658349959	CY
0.0001375000	9717.	70667752.	10.0813933936	CY
0.0001425000	9807.	68817880.	9.9976608636	CY
0.0001475000	9879.	66973735.	9.9129795064	CY
0.0001525000	9947.	65224710.	9.8301089557	CY
0.0001575000	10014.	63581999.	9.7526638448	CY
0.0001625000	10081.	62037115.	9.6807957624	CY
0.0001675000	10147.	60581096.	9.6140046974	CY
0.0001725000	10209.	59180062.	9.5496393515	CY
0.0001775000	10258.	57789285.	9.4811325504	CY
0.0001825000	10299.	56432660.	9.4128952270	CY
0.0001875000	10339.	55141093.	9.3484652113	CY
0.0001925000	10379.	53914469.	9.2880264947	CY
0.0001975000	10418.	52747820.	9.2312844780	CY
0.0002025000	10456.	51636466.	9.1778411093	CY
0.0002075000	10494.	50571795.	9.1244171622	CY
0.0002125000	10531.	49555313.	9.0741231737	CY
0.0002175000	10567.	48583646.	9.0267506402	CY
0.0002225000	10602.	47647819.	8.9813433412	CY
0.0002275000	10632.	46735505.	8.9363957342	CY
0.0002325000	10659.	45847059.	8.8922392854	CY
0.0002375000	10681.	44973300.	8.8475170345	CY
0.0002425000	10702.	44130076.	8.8036370674	CY
0.0002475000	10720.	43314423.	8.7599206621	CY
0.0002525000	10739.	42530036.	8.7183789005	CY
0.0002725000	10810.	39668242.	8.5723287092	CY
0.0002925000	10875.	37180829.	8.4525827411	CY
0.0003125000	10935.	34991714.	8.3460640234	CY
0.0003325000	10982.	33028732.	8.2505373643	CY
0.0003525000	11013.	31242245.	8.1591927615	CY
0.0003725000	11037.	29628512.	8.0744293222	CY
0.0003925000	11057.	28171339.	7.9959997823	CY
0.0004125000	11077.	26853518.	7.9270545042	CY
0.0004325000	11096.	25654722.	7.8670032550	CY
0.0004525000	11113.	24559772.	7.8142431398	CY
0.0004725000	11130.	23555694.	7.7677527746	CY

0.0004925000	11144.	22628245.	7.7274780765	CY
0.0005125000	11144.	21745192.	7.7300259234	CY
0.0005325000	11144.	20928471.	7.7671682835	CY
0.0005525000	11144.	20170879.	7.8249294218	CY
0.0005725000	11144.	19466220.	7.9038764648	CY
0.0005925000	11144.	18809132.	7.8771627447	CY
0.0006125000	11144.	18194957.	7.9758739673	CY
0.0006325000	11144.	17619622.	8.0937496926	CY
0.0006525000	11144.	17079557.	8.2108562096	CY
0.0006725000	11144.	16571615.	8.1877099176	CY
0.0006925000	11144.	16093012.	8.3171781758	CY
0.0007125000	11144.	15641278.	8.4408097240	CY
0.0007325000	11144.	15214213.	8.4147818390	CY
0.0007525000	11144.	14809848.	8.5045052227	CY
0.0007725000	11144.	14426422.	8.4838401738	CY
0.0007925000	11144.	14062348.	8.4647076650	CY
0.0008125000	11144.	13716198.	8.5387550727	CY
0.0008325000	11144.	13386680.	8.5223292873	CY
0.0008525000	11144.	13072623.	8.5053415152	CY
0.0008725000	11144.	12772964.	8.5771196610	CY
0.0008925000	11144.	12486735.	8.5596931198	CY
0.0009125000	11144.	12213053.	8.5434754156	CY
0.0009325000	11144.	11951111.	8.6165724121	CY
0.0009525000	11144.	11700169.	8.6023061970	CY
0.0009725000	11144.	11459548.	8.5889874951	CY
0.0009925000	11144.	11228626.	8.5765555605	CY
0.0010125000	11144.	11006826.	8.6484564880	CY
0.0010325000	11144.	10793618.	8.6364558603	CY
0.0010525000	11144.	10588514.	8.6251576284	CY
0.0011725000	11144.	9504828.	8.6492945524	CY
0.0012925000	11144.	8622368.	8.6849526787	CY

Summary of Results for Nominal Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain
-----	-----	-----	-----
1	202.700	11035.228	0.00300000

Note that the values of moment capacity in the table above are not
factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether
the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

$$\text{Nominal Moment Capacity} = (0.7)(11035 \text{ in-kips}) = 7,724.7 \text{ in-kips} = 643.7 \text{ ft-kips}$$

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318, Section 9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding bending stiffnesses computed for common resistance factor values used for reinforced concrete sections.

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in ²
1	0.65	11035.	131.755000	7173.	93272179.
1	0.75	11035.	141.890000	8276.	88482556.
1	0.90	11035.	152.025000	9932.	65611339.

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.00	0.00	N.A.	No	0.00	165468.
2	10.0000	8.2921	Yes	No	165468.	737739.
3	20.0000	18.2904	Yes	No	903207.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head	=	28300.0 lbs
Applied moment at pile head	=	2996400.0 in-lbs
Axial thrust load on pile head	=	202700.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Soil Res. p lb/inch	Bending Stiffness in-lb^2
-----	-----	-----	-----	-----	-----
0.000	0.58582	2996400.	28300.	0.000	3.727E+11
1.00000	0.51568	3350218.	27372.	-154.70393	3.727E+11
2.00000	0.44683	3681497.	24835.	-268.09750	1.376E+11
3.00000	0.38183	3973388.	21164.	-343.64918	1.293E+11
4.00000	0.32126	4214897.	16790.	-385.51438	1.237E+11
5.00000	0.26560	4399897.	12086.	-398.39760	1.200E+11
6.00000	0.21521	4526458.	7371.	-387.38484	1.178E+11
7.00000	0.17036	4596113.	2900.	-357.76522	1.166E+11
8.00000	0.13119	4613100.	-1135.	-314.85967	1.163E+11
9.00000	0.09773	4583589.	-4608.	-263.87014	1.168E+11
10.00000	0.06992	4514935.	-10722.	-755.12453	1.180E+11
11.00000	0.04762	4336426.	-18647.	-565.72501	1.212E+11
12.00000	0.03047	4075409.	-24411.	-394.91364	1.268E+11
13.00000	0.01795	3756586.	-28292.	-252.04447	1.352E+11
14.00000	0.009432	3400658.	-30660.	-142.61301	1.477E+11
15.00000	0.004228	3023521.	-31927.	-68.50081	2.921E+11
16.00000	0.000516	2636218.	-32391.	-8.90816	3.726E+11
17.00000	-0.002178	2247426.	-32205.	39.99704	3.722E+11
18.00000	-0.004003	1864217.	-31498.	77.81711	3.715E+11
19.00000	-0.005105	1492067.	-30403.	104.75029	3.707E+11
20.00000	-0.005627	1134884.	-27951.	303.86111	3.703E+11
21.00000	-0.005708	821367.	-24186.	323.64366	3.703E+11
22.00000	-0.005470	554390.	-20295.	324.88998	3.702E+11
23.00000	-0.005015	334154.	-16477.	311.45769	3.701E+11
24.00000	-0.004431	158741.	-12885.	287.14732	3.699E+11
25.00000	-0.003785	24665.	-9629.	255.51095	3.699E+11
26.00000	-0.003130	-72619.	-6778.	219.71238	3.699E+11
27.00000	-0.002503	-138259.	-4365.	182.43497	3.699E+11
28.00000	-0.001929	-177618.	-2395.	145.83974	3.699E+11
29.00000	-0.001425	-195962.	-850.74296	111.56252	3.699E+11
30.00000	-0.000997	-198225.	303.08360	80.74191	3.699E+11
31.00000	-0.000646	-188845.	1112.	54.06965	3.699E+11
32.00000	-0.000369	-171665.	1628.	31.85534	3.699E+11
33.00000	-0.000158	-149884.	1903.	14.09856	3.699E+11
34.00000	-6.124E-06	-126061.	1991.	0.56219	3.699E+11
35.00000	9.691E-05	-102147.	1940.	-9.15756	3.699E+11
36.00000	0.000160	-79544.	1791.	-15.56814	3.699E+11
37.00000	0.000192	-59176.	1582.	-19.22654	3.699E+11
38.00000	0.000202	-41573.	1343.	-20.69551	3.699E+11
39.00000	0.000195	-26946.	1096.	-20.51012	3.699E+11
40.00000	0.000177	-15270.	857.74348	-19.15430	3.699E+11

41.00000	0.000154	-6352.	640.54013	-17.04626	3.699E+11
42.00000	0.000128	112.82512	451.07286	-14.53162	3.699E+11
43.00000	0.000102	4485.	292.58800	-11.88253	3.699E+11
44.00000	7.830E-05	7145.	165.48349	-9.30156	3.699E+11
45.00000	5.703E-05	8465.	68.10197	-6.92870	3.699E+11
46.00000	3.905E-05	8787.	-2.57214	-4.85032	3.699E+11
47.00000	2.450E-05	8410.	-50.32831	-3.10904	3.699E+11
48.00000	1.322E-05	7585.	-79.26377	-1.71353	3.699E+11
49.00000	4.896E-06	6512.	-93.43181	-0.64781	3.699E+11
50.00000	-8.934E-07	5345.	-96.59495	0.12062	3.699E+11
51.00000	-4.602E-06	4196.	-92.06883	0.63374	3.699E+11
52.00000	-6.678E-06	3137.	-82.64112	0.93755	3.699E+11
53.00000	-7.532E-06	2213.	-70.54901	1.07780	3.699E+11
54.00000	-7.524E-06	1444.	-57.49979	1.09707	3.699E+11
55.00000	-6.955E-06	832.68926	-44.72053	1.03281	3.699E+11
56.00000	-6.061E-06	370.22426	-33.02486	0.91647	3.699E+11
57.00000	-5.023E-06	39.70110	-22.88740	0.77311	3.699E+11
58.00000	-3.970E-06	-179.49725	-14.51835	0.62173	3.699E+11
59.00000	-2.987E-06	-309.15222	-7.93320	0.47580	3.699E+11
60.00000	-2.124E-06	-370.26823	-3.01413	0.34405	3.699E+11
61.00000	-1.405E-06	-381.81200	0.43847	0.23138	3.699E+11
62.00000	-8.347E-07	-360.00634	2.66510	0.13972	3.699E+11
63.00000	-4.046E-07	-318.05237	3.91636	0.06882	3.699E+11
64.00000	-9.836E-08	-266.16305	4.43126	0.01700	3.699E+11
65.00000	1.043E-07	-211.80534	4.42345	-0.01830	3.699E+11
66.00000	2.244E-07	-160.06569	4.07373	-0.03999	3.699E+11
67.00000	2.822E-07	-114.07189	3.52745	-0.05106	3.699E+11
68.00000	2.957E-07	-75.42131	2.89541	-0.05428	3.699E+11
69.00000	2.797E-07	-44.58155	2.25704	-0.05211	3.699E+11
70.00000	2.464E-07	-21.24229	1.66494	-0.04657	3.699E+11
71.00000	2.048E-07	-4.60783	1.14989	-0.03927	3.699E+11
72.00000	1.615E-07	6.37225	0.72592	-0.03139	3.699E+11
73.00000	1.206E-07	12.83136	0.39495	-0.02377	3.699E+11
74.00000	8.471E-08	15.86658	0.15078	-0.01693	3.699E+11
75.00000	5.500E-08	16.46332	-0.01760	-0.01114	3.699E+11
76.00000	3.170E-08	15.45494	-0.12345	-0.006505	3.699E+11
77.00000	1.442E-08	13.50865	-0.18046	-0.002997	3.699E+11
78.00000	2.392E-09	11.12972	-0.20147	-0.000504	3.699E+11
79.00000	-5.300E-09	8.67739	-0.19771	0.001130	3.699E+11
80.00000	-9.613E-09	6.38715	-0.17847	0.002076	3.699E+11
81.00000	-1.144E-08	4.39541	-0.15100	0.002502	3.699E+11
82.00000	-1.155E-08	2.76356	-0.12064	0.002558	3.699E+11
83.00000	-1.059E-08	1.49985	-0.09105	0.002374	3.699E+11
84.00000	-9.048E-09	0.57786	-0.06449	0.002052	3.699E+11
85.00000	-7.278E-09	-0.04867	-0.04216	0.001670	3.699E+11
86.00000	-5.527E-09	-0.43467	-0.02444	0.001283	3.699E+11
87.00000	-3.946E-09	-0.63582	-0.01117	0.000927	3.699E+11
88.00000	-2.611E-09	-0.70346	-0.001891	0.000620	3.699E+11
89.00000	-1.551E-09	-0.68169	0.004068	0.000373	3.699E+11
90.00000	-7.563E-10	-0.60620	0.007407	0.000184	3.699E+11

91.00000	-1.974E-10	-0.50420	0.008801	4.850E-05	3.699E+11
92.00000	1.652E-10	-0.39517	0.008846	-4.102E-05	3.699E+11
93.00000	3.739E-10	-0.29202	0.008036	-9.388E-05	3.699E+11
94.00000	4.689E-10	-0.20236	0.006759	-0.000119	3.699E+11
95.00000	4.851E-10	-0.12982	0.005298	-0.000124	3.699E+11
96.00000	4.508E-10	-0.07520	0.003851	-0.000117	3.699E+11
97.00000	3.872E-10	-0.03739	0.002541	-0.000101	3.699E+11
98.00000	3.091E-10	-0.01418	0.001442	-8.179E-05	3.699E+11
99.00000	2.254E-10	-0.002753	0.000590	-6.026E-05	3.699E+11
100.00000	1.407E-10	0.000	0.000	-3.799E-05	3.699E+11

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.58582481 inches
Computed slope at pile head	=	-0.00589366 radians
Maximum bending moment	=	4613100. inch-lbs
Maximum shear force	=	-32391. lbs
Depth of maximum bending moment	=	8.00000000 feet below pile head
Depth of maximum shear force	=	16.00000000 feet below pile head
Number of iterations	=	66
Number of zero deflection points	=	6

Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
 Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
 Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
 Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
 Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	1	0.585825	-0.005894	-32391.	4613100.

Maximum pile-head deflection = 0.5858248140 inches
 Maximum pile-head rotation = -0.0058936595 radians = -0.337682 deg.

The analysis ended normally.

