JOHNSTON BURKHOLDER ASSOCIATES
consulting structural engineers

STRUCTURAL CALCULATIONS

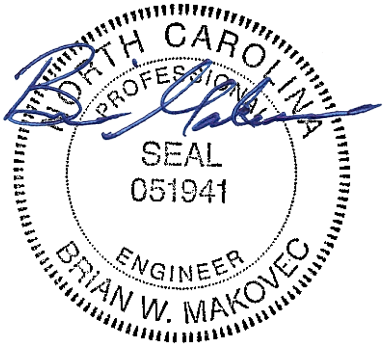
FOR

Circle K

Erwin, NC

08/20/26

JBA Project #26194



08/21/26

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Johnston Burkholder Associates
930 Central St
Kansas City, MO 64105
816-421-4200

JOB TITLE	Circle K Erwin, NC		
JOB NO.	26194	**SHEET NO.**	
CALCULATED BY	SMK	**DATE**	
CHECKED BY		**DATE**	

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www.struware.com

Code Search

Code: 2018 North Carolina Building Code

Occupancy:

Occupancy Group = B Business

Risk Category & Importance Factors:

Risk Category =	II
Wind Factor =	1.00
Importance Factor	1.00
Seismic Importance factor =	1.00

Type of Construction:

Fire Rating:

Roof =	0.0 hr
Floor =	0.0 hr

Building Geometry:

Roof angle (θ)	0.25 / 12	1.2 deg
Building length	92.0 ft	
Least width	43.0 ft	
Mean Roof Ht (h)	17.3 ft	
Parapet ht above grd	22.0 ft	
Minimum parapet ht	2.0 ft	
hb for Elevated bldg	0.0 ft	

Live Loads:

Roof
0 to 200 sf: 20 psf
200 to 600 sf: 24 - 0.02Area, but not less than 12 psf
over 600 sf: 12 psf

Roofs used for roof gardens	100 psf

Floor:

Typical Floor	50 psf
Partitions	15 psf
Corridors above first floor	80 psf
Lobbies & first floor corridors	100 psf
Stairs and exit ways	100 psf

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Wind Loads - Other Structures: ASCE 7 - 10 Ultimate Wind Pressures

Wind Factor =	1.00			
Gust Effect Factor (G) =	0.85	Ultimate Wind Speed =	120	mph
Kzt =	1.00	Exposure =	C	

A. Solid Freestanding Walls & Solid Signs (& open signs with less than 30% open)

		s/h =	1.00		**Case A & B**	
Dist to sign top (h)	6.0 ft	B/s =	4.33		C_f =	1.35
Height (s)	6.0 ft	Lr/s =	2.33		F = qh G Cf As =	**30.5 As**
Width (B)	26.0 ft	Kz =	0.849		As =	10.0 sf
Wall Return (Lr) =	14.0 ft	qh =	26.6 psf		F =	305 lbs
Directionality (Kd)	0.85					
Percent of open area		Open reduction			**CaseC**	
to gross area	0.0%	factor =	1.00	Horiz dist from windward edge	Cf	F=qhGCfAs (psf)
		Case C reduction factors		0 to s	2.37	53.7 **As**
		Factor if s/h>0.8 =	0.80	s to 2s	1.55	35.0 **As**
		Wall return factor		2s to 3s	1.08	24.4 **As**
		for Cf at 0 to s =	1.00	3s to 10s	0.87	19.6 **As**

Project Title: Circle K
Engineer: KSH
Project ID:
Project Descr: Service Building / Conv-Store

Pole Footing Embedded in Soil

Project File: Circle K - erwin, NC.ec6

LIC# : KW-06015958, Build:20.26.07.20 JOHNSTON - BURKHOLDER (c) ENERCALC, LLC 1982-2026

DESCRIPTION: Light Pole footing

With Southern Nevada Ammendments

Code References

Governing Code : IBC 2024 1807.3
Load Combinations Used : IBC 2018

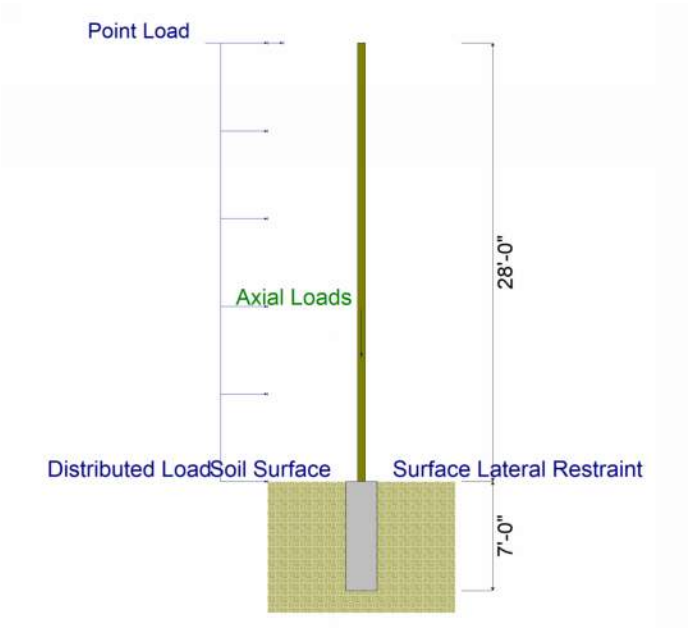
Rho (or Omega) = 1.00

General Information

Pole Footing Shape	Circular
Pole Footing Diameter	24.0 in
Find Lateral Pressure for Given Depth	
Lateral Restraint at Ground Surface	
Allow Passive	100.0 pcf
Max Passive	psf
Embedment Depth of Footing	7.0 ft

Controlling Values

Governing Load Combinatior	+0.60W
Lateral Load	3.557 k
Moment	50.215 k-ft
Restraint @ Ground Surface	
Pressure at Depth	
Actual	**2,177.70** psf
Allowable	**700.0** psf
Surface Restraint Force	18,801.3 lbs
Footing Base Area	3.142 ft^2
Maximum Soil Pressure	0.005730 ksf



Applied Loads

	Lateral Concentrated Load (k)	Lateral Distributed Loads (k	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	k	k/ft	k-ft	k
S : Snow	k	k/ft	k-ft	k
W : Wind	0.0490 k	0.210 k/ft	k-ft	0.030 k
E : Earthquake	k	k/ft	k-ft	k
H : Lateral Earth	k	k/ft	k-ft	k
Load distance above ground surface	28.0 ft	TOP of Load above ground surface 28.0 ft		
		BOTTOM of Load above ground surface ft		

Load Combination Results

	Forces @ Ground Surface		Pressure at Depth		Soil Increase
Load Combination	Loads - (k)	Moments - (ft-k)	Actual - (psf)	Allow - (psf)	Factor
	0.000	0.000	0.0	700.0	1.000
+0.60W	3.557	50.215	2,177.7	700.0	1.000
+0.450W	2.668	37.661	1,633.3	700.0	1.000

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Cantilevered Retaining Wall

Project File: Circle K - erwin, NC.ec6

LIC# : KW-06015958, Build:20.26.07.20 JOHNSTON - BURKHOLDER (c) ENERCALC, LLC 1982-2026

DESCRIPTION: CMU Trash Enclosure screen wall

With Southern Nevada Ammendments

Code References

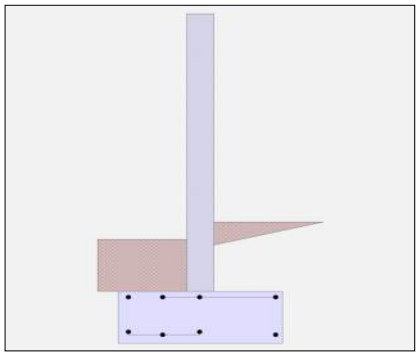
Governing Code : IBC 2024
Referenced Design Standard(s) : ACI 318-19 , TMS 402-22

Criteria

Retained Height	=	2.00 ft
Wall height above soil	=	6.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	18.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	36.0 psf/ft
	=	
Passive Pressure	=	125.0 psf/ft
Soil Density, Heel	=	120.00 pcf
Soil Density, Toe	=	120.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
NOT Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
NOT 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 (Strength Level)	=	30.5 psf

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		Line Load
Base Above/Below Soil at Back of Wall	=	0.000 ft
Poisson's Ratio	=	0.300

Stem Weight Seismic Load

F_p / W_p Weight Multiplier = 0.200 g

Added seismic base force 61.6 lbs

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Design Summary

Wall Stability Ratios

Overturning	=	3.20	OK
Sliding	=	3.36	OK
Global Stability	=	5.79	

Service Level Soil Pressures

Total Bearing Load	=	2,040 lbs	
...resultant ecc.	=	7.02 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	957 psf	OK
Soil Pressure @ Heel	=	63 psf	OK
Allowable	=	2,500 psf	
Soil Pressure Less Than Allowable			

Factored Soil Pressures

ACI Factored @ Toe	=	1,340 psf	
ACI Factored @ Heel	=	88 psf	
Footing Shear @ Toe	=	5.0 psi	OK
Footing Shear @ Heel	=	1.9 psi	OK
Allowable	=	75.0 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

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Masonry		
Design Method	=	ASD	SD	SD
Thickness	=	8.00		
Rebar Size	=	# 6		
Rebar Spacing	=	24.00		
Rebar Placed at	=	Center		
Design Data				
fb/Fb (+ fa/Fa for Masonry)	=	**0.466**		
Total Force @ Section				
Service Level	lbs =	243.4		
Strength Level	lbs =			
Moment....Actual				
Service Level	ft-# =	843.4		
Strength Level	ft-# =			
Moment.....Allowable	=	1,888.9		
Shear.....Actual				
Service Level	psi =	4.7		
Strength Level	psi =			
Shear.....Allowable	psi =	52.5		
Anet (Masonry)	in2 =	51.30		
Wall Weight	psf =	55.0		
Rebar Depth 'd'	in =	3.81		
Masonry Data				
f'm	psi =	2,000		
Fs	psi =	32,000		
Solid Grouting	=	No		
Modular Ratio 'n'	=	16.11		
Equiv. Solid Thick.	in =	4.81		
Masonry Block Type	=	Normal Weight		
Masonry Design Method	=	ASD		
Concrete Data				
f'c	psi =			
β1	=			
Fy	psi =			

Summary of Sliding Forces

	FS = 1.0	FS = 1.5
Lateral Force @ Base of Footing	391.90 lbs	587.85 lbs
less 100% Passive Force	- 500.0 lbs	- 500.0 lbs
less 100% Friction Force	- 816.00 lbs	- 816.00 lbs
Added Resisting Force Required	0.0 lbs	
Added Resisting Force Required for 1.5 Factor of Safety		0.00 lbs

Sliding Factor of Safety = 3.358: 1.00

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With Southern Nevada Ammendments

Footing Data

Toe Width	=	1.67 ft
Heel Width	=	2.33
Total Footing Width	=	4.00
Footing Thickness	=	18.00 in

f'c = 2,500 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

		Toe	Heel	
Factored Pressure	=	1,340	88	psf
Mu' : Upward	=	1,620	363	ft-#
Mu' : Downward	=	810	930	ft-#
Mu: Design	=	810	567	ft-#
Toe Reinforcing	=	# 5 @ 9.56 in		
Heel Reinforcing	=	# 5 @ 9.56 in		

Mu:Design @ Toe	809.97 ft-#	OK
phiMn Toe	24,916 ft-#	
As min req'd 0.0018bh : 0.0018(12)(18) :	0.3888 in2/ft	OK
As provided #5@9.560 in o.c.	0.3891 in2/ft	
As Max :	1.9643 in2/ft	OK
Mu:Design @ Heel	566.64 ft-#	OK
phiMn Heel	26,667 ft-#	
As min req'd 0.0018bh : 0.0018(12)(18) :	0.3888 in2/ft	OK
As provided #5@9.56 in o.c.	0.3891 in2/ft	
As Max :	2.0998 in2/ft	OK

Footing T&S Reinforcing Options

Min footing T&S reinf Area = 1.56 in2
Min footing T&S reinf Area per foot = 0.39 in2/ft

If one layer of horizontal bars:	If two layers of of horizontal bars:
#4@ 6.17 in	#4@ 12.35 in
#5@ 9.57 in	#5@ 19.14 in
#6@ 13.58 in	#6@ 27.16 in

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Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	=	220.5	1.17	257.3
HL Act Pres (be water tbl)	=			
Hydrostatic Force	=			
Buoyant Force	=			
Surcharge over Heel	=			
Surcharge Over Toe	=			
Adjacent Footing Load	=			
Added Lateral Load	=			
Load @ Stem Above Soil	=	109.8	6.50	713.7
Seismic Stem Self Wt		61.6	5.50	338.8
			O.T.M. =	1,309.8

Item		.....RESISTING FOR OTM..... Force lbs	Distance ft	Moment ft-#	.....RESISTING FOR SOIL BEARING..... Force lbs	Distance ft	Moment ft-#
Soil Over HL (ab. water tbl)	=	400.0	3.17	1,266.7	400.0	3.17	1,266.7
Soil Over HL (bel. water tbl)	=						
Water Table	=						
Sloped Soil Over Heel	=						
Surcharge Over Heel	=						
Adjacent Footing Load	=						
Axial Dead Load on Stem	=						
* Axial Live Load on Stem	=						
Soil Over Toe	=	300.0	0.83	250.0	300.0	0.83	250.0
Surcharge Over Toe	=						
Stem Weight(s)	=	440.0	2.00	880.0	440.0	2.00	880.0
Earth @ Stem Transitions	=						
Footing Weight	=	900.0	2.00	1,800.0	900.0	2.00	1,800.0
Key Weight	=						
Vert. Component	=						
Total =		2,040.0 lbs	**R.M. =**	4,196.7	**Total =** 2,040.0 lbs	**R.M. =**	4,196.7

* Axial live load is EXCLUDED from total displayed above for Resisting Moment in the overturning analysis, but it is INCLUDED in the Resisting Moment in the Soil Pressure analysis

Resisting/Overturning Ratio = **3.20**

Vertical Loads used for OT Analysis = 2,040.0 lbs

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	150.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.089	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.

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Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing
Calculated Rebar Stress, fs = 13526.04 psi

Lap Splice length for #6 bar specified in this stem design segment (IBC Eq. 21-1) =	48.00 in
Development length for #6 bar specified in this stem design segment =	48.00 in
Hooked embedment length into footing for #6 bar specified in this stem design segment =	10.86 in
As Provided =	0.2200 in2/ft
As Required =	0.0934 in2/ft
Ψ r: Confining Reinforcement Factor =	1.00
Ψ o: Location Factor =	1.00
Ψ c: Concrete Strength Factor =	0.77

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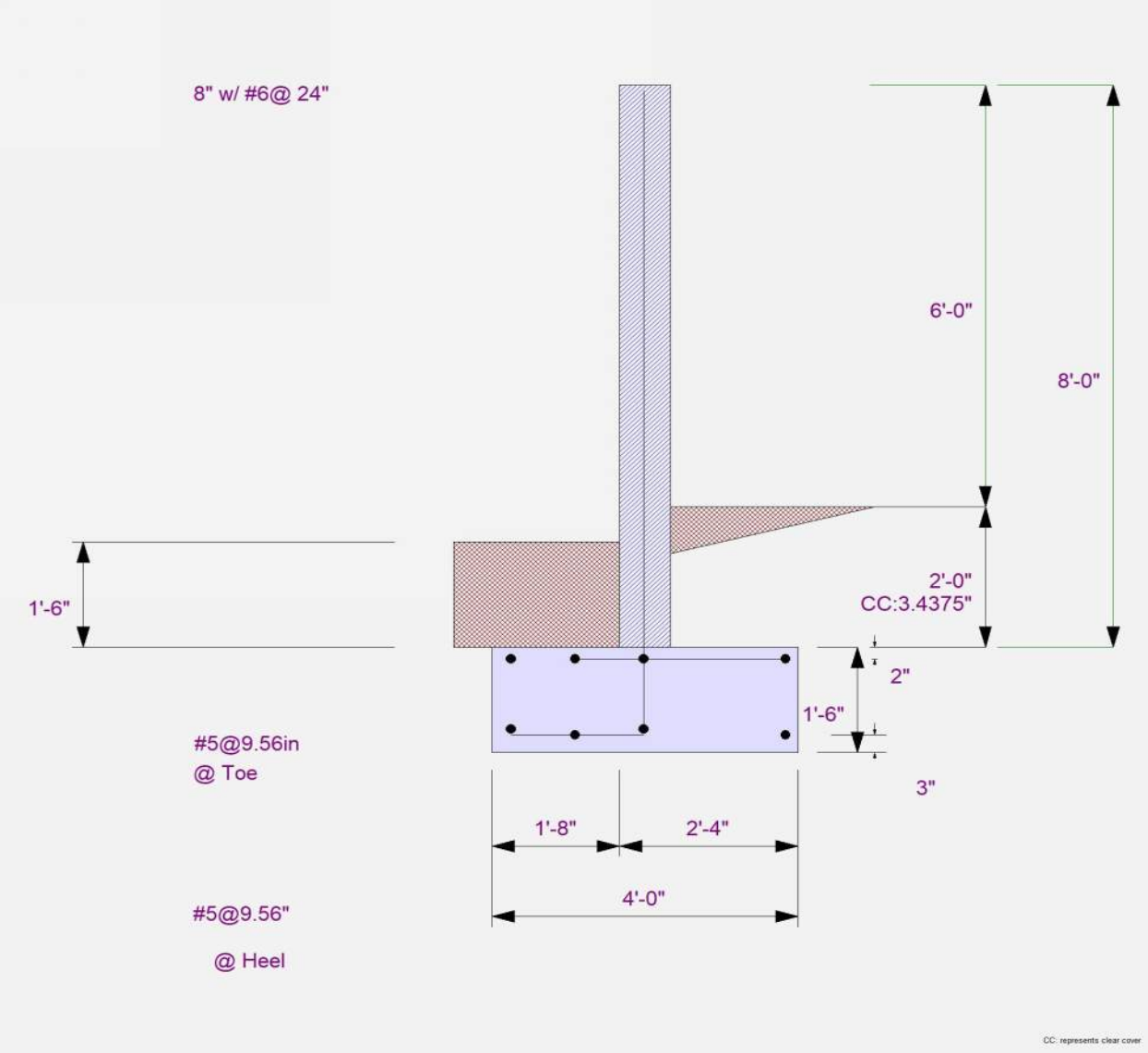
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