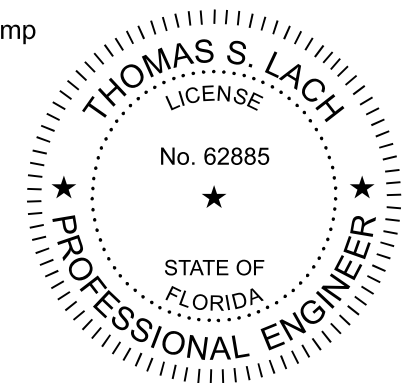




LACH ENGINEERING, LLC.
 539 SILICON DR.
 STE. 100
 SOUTHLAKE, TX, 76092
 (817) 416-9999
www.lachengineering.com

Project Name
FONROCHE LIGHTING
BVIE SMARTLIGHTS
BRITISH VIRGIN ISLANDS
25' LIGHTING POLE FOUNDATION
4' ARM ASSEMBLY
 QUANTITY: 20
 LOADING: 2.36 SQ. FT. EPA /
 113.00 LBS
 WIND VELOCITY: 150 MPH

Stamp



Project Information

Project Number: 10226

Date: 12/15/2023

Sheet Information

Sheet Name: 10226-1

Drawing Scale: NTS

Drawn By: DHG

Sheet

S - 1

OF 1

NOTES: FOUNDATION

1. ALL CONCRETE SHALL HAVE MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS. CONCRETE SHALL HAVE MAXIMUM WATER/CEMENT RATIO OF 0.50. FOUNDATION INSTALLATION SHALL BE IN ACCORDANCE WITH ACI 336, "STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF DRILLED PIERS", LATEST EDITION.

2. ALL CONCRETE REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60. ALL REINFORCING DETAILS SHALL CONFORM TO "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", ACI 315, LATEST EDITION, UNLESS DETAILED OTHERWISE ON THE DRAWING.

3. MINIMUM CONCRETE COVER FOR REINFORCING SHALL BE 3.0" MIN.

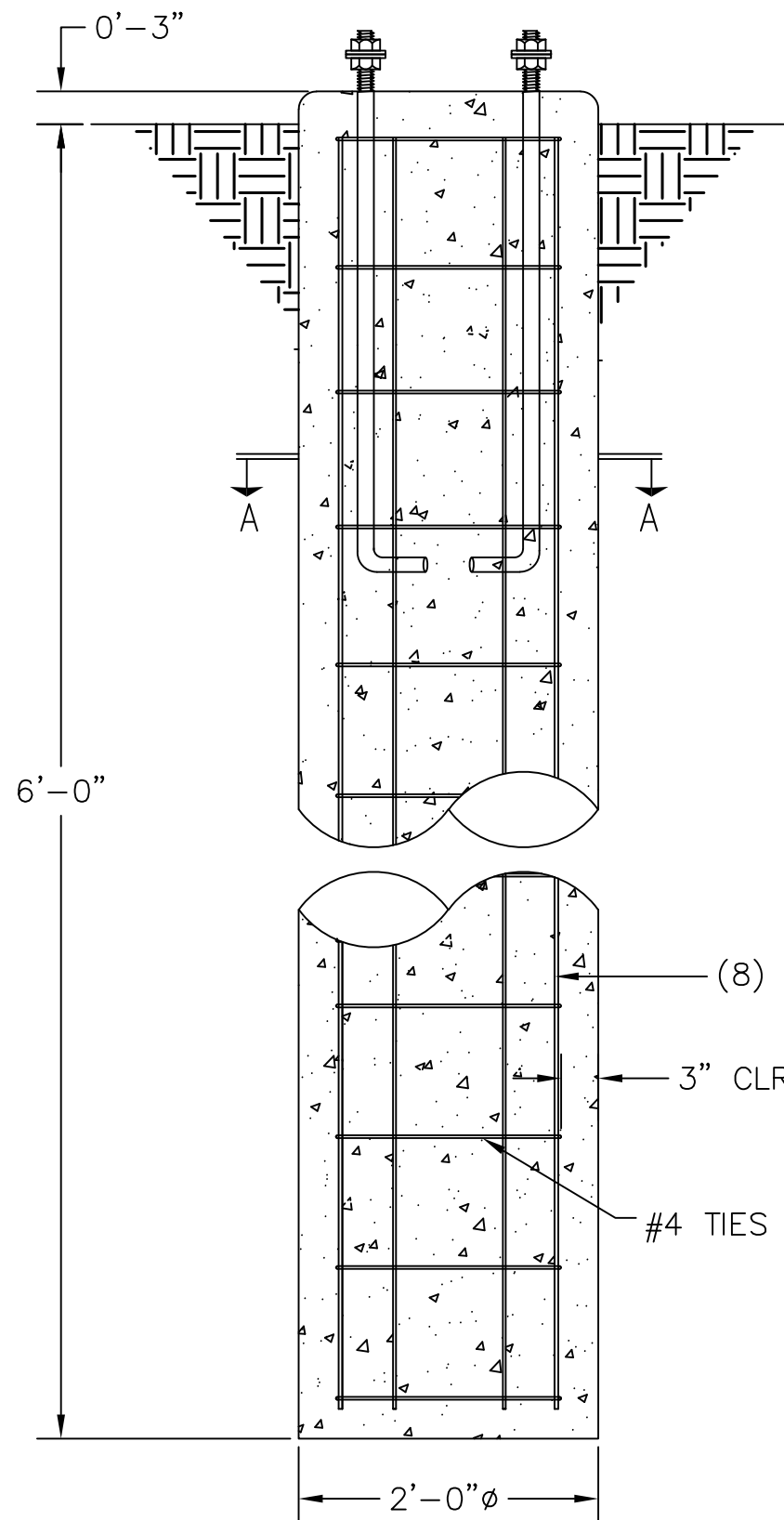
4. SEE STRUCTURE DRAWING FOR ANCHOR BOLT QUANTITY, SIZE, LENGTH, BOLT CIRCLE, MATERIAL GRADE & ORIENTATION.

5. SOIL PARAMETERS ARE BASED UPON ASSUMED SOILS. REFER TO PAGE 2 OF 14 FOR SOIL PARAMETERS USED IN THE DESIGN. UPON CONSTRUCTION, IF SOIL PARAMETERS DO NOT MEET OR EXCEED THOSE CONTAINED HEREIN, OR IF WATER IS ENCOUNTERED, DO NOT SET POLES AND CONTACT DESIGNER IMMEDIATELY.

6. FOUNDATION IS DESIGNED TO SUPPORT THE FOLLOWING LOADS:

AXIAL:	0.36 K
SHEAR:	0.48 K
MOMENT:	8.29 K-FT

7. GROUND SLOPE WAS ASSUMED TO NOT EXCEED 7H:1V. IF ACTUAL CONDITIONS VARY FROM THIS ASSUMPTION, PLEASE CONTACT ENGINEER BEFORE CONSTRUCTION.



(8) - #6 VERT BARS

3" CLR. TYP.

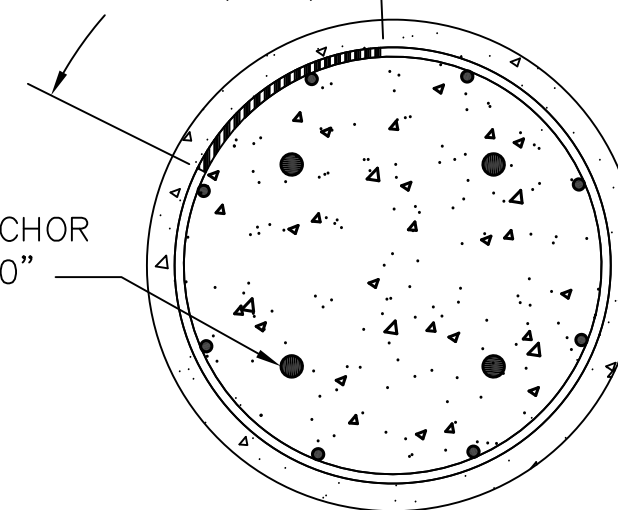
#4 TIES @ 12" O.C.

2'-0" ϕ

FOUNDATION

24" SPLICE
ALTERNATE
SPLICES (TYP.)

(4) 1.00" ϕ ANCHOR
BOLTS ON 9.50"
BOLT CIRCLE



SECTION A - A

Dimensional Solutions	Shaft3D	Product Version	22.1.3193.401	Date	12/15/2023 10:24:20 AM
Workspace Name	10226-1	Designed By	DHG	Checked By:	NHT

REPORT - 10226-1

PROJECT INFORMATION

Client Name: FONROCHE LIGHTING
Project Name: 25' LIGHTING POLE FOUNDATION (QTY: 20)
Project Number: 10226-1

DESIGN CODE **ACI_318_2014** **INPUT UNITS** **English** **OUTPUT UNITS** **English**

CONCRETE PARAMETERS:

Compressive Strength 3000 psi
Unit Weight 150 pcf
Pier Side Cover 3 in

REINFORCING STEEL PARAMETERS:

Yield Strength 60 ksi
Unit Weight 490 pcf
Modulus Of Elasticity 29000 ksi
Pier Min Long Bar Spacing 3 in
Consider Pier Long Bar Spacing Limit False

SOIL PARAMETERS:

Unit Weight 115 pcf
Soil Type Cohesive
Soil Subtype Clay
Ultimate Cohesion c 1 ksf
Ultimate Adhesion Ad 1 ksf
Passive Pressure Coefficient Ppc 1
Angle of Internal Friction 0
Modulus of Subgrade Reaction Method Constant
Constant Modulus 378 kcf
Coefficient A 0
Coefficient B 0
Coefficient n 0
Allowable Increase In Soil Pressure
 Dead 0
 Live 0
 Wind 0
 Earthquake 0
 Erec 0
 Oper 0
 Test 0

REBAR PARAMETERS:

Max Pier Long Bar Size 8
Min Pier Long BarSize 6
Max Pier Tie Bar Size 4
Min Pier Tie Bar Size 3

Axial Capacity Parameters

Shaft Type Drilled
Boundary Condition Trans & Rot at Top
Axial Capacity Method Use Soil Parameters
Tip Cohesion 1 ksf
Tip Angle of Internal Friction 0
Tip Soil Unit Weight 115 pcf
Consider End Bearing True
Percent End Bearing 100
Consider Skin Resistance True
Percent Skin Resistance 100
Safety Factor - End Bearing 2
Safety Factor - Skin Resistance 2
Safety Factor - Pullout 2
Safety Factor - Cohesion 2

BUOYANCY CRITERIA:

Consider Buoyancy: No
Water Table Below Grade 50 ft

CODE SPECIFIC OPTIONS

Consider Size Effect: No

Soil Profile

No.	Name	Depth	Soil Type	Cohesion	Angle of Int Friction	Unit Weight	Subgrade Modulus	Alpha Factor	Beta Factor	Blow Count
		ft		ksf		pcf	kcf			
1	L1	20	Clay	1	0	115	378	0	0	0

Shaft Geometry

Shaft Name	S	
Design Type	Concrete Drilled Shaft	
Shape Factor	1	
Grade Elevation	0	ft
Diameter	2	ft
Top Above Grade	0.25	ft
Neglected Soil Resistance Zone Length	0	ft
Length Below Neglected Soil Resistance	6	ft
Bell Diameter	0	ft
Bell Length	0	ft
Casing Length	0	ft
Consider Type Dependent Moment of Inertia	True	
Moment of Inertia	0.78539816	ft^4
Min Reinf Ratio	0.005	

LOAD ELEMENT GEOMETRY AND APPLIED LOADS

Shaft Element - S - Load Element - S

Geometry	Shape	X Dim	Z Dim	Length	Offset - X	Offset - Z	Min Reinf Ratio
		ft	ft	ft	ft	ft	
	Circle	2	2	6.25	0	0	0.005
Load Case		Axial Load	Shear-X	Mom-Z	Shear-Z	Mom-X	
		kips	kips	kip-ft	kips	kip-ft	
1 - Dead		0.356	0	0	0	0	
2 - Live		0	0	0	0	0	
3 - Wind		0	0.48	8.288	0	0	
4 - Earthquake		0	0	0	0	0	

ALLOWABLE LOAD COMBINATIONS

Shaft Element - S - Load Element - S

Load Combination	Axial Load	Shear-X	Mom-Z	Shear-Z	Mom-X
	kips	kips	kip-ft	kips	kip-ft
1 - Dead	0.356	0	0	0	0
2 - Dead + Wind	0.356	0.48	8.288	0	0
3 - 0.6 Dead + Wind	0.213	0.48	8.288	0	0

ULTIMATE LOAD COMBINATIONS

Shaft Element - S - Load Element - S

Load Combination	Axial Load	Shear-X	Mom-Z	Shear-Z	Mom-X
	kips	kips	kip-ft	kips	kip-ft
1 - 1.4 Dead	0.498	0	0	0	0
2 - 1.2 Dead + 1.6 Wind	0.427	0.768	13.261	0	0
3 - 1.2 Dead + 0.8 Wind	0.427	0.384	6.63	0	0
4 - 0.9 Dead + 1.6 Wind	0.32	0.768	13.261	0	0

Shaft Element - S

SELF WEIGHTS AND APPLIED EXTERNAL LOAD - Allowable Load Combinations

Load Combination	Load Element Weight kips	Soil Weight kips	Footing Weight kips	App Axial Load kips	Total Axial Load kips	Buoyant Load kips
1 - Dead	2.9452	0	0	0.3555	3.3007	
2 - Dead + Wind	2.9452	0	0	0.3555	3.3007	
3 - 0.6 Dead + Wind	2.9452	0	0	0.2133	3.1585	

Base Shears and Moments - Allowable Load Combinations

Load Combination	Shear-X kips	Mom-Z kip-ft	Shear-Z kips	Mom-X kip-ft
1 - Dead	0	0	0	0
2 - Dead + Wind	0.4801	11.2887	0	0
3 - 0.6 Dead + Wind	0.4801	11.2887	0	0

SELF WEIGHTS AND APPLIED EXTERNAL LOAD - Ultimate Load Combinations

Load Combination	Load Element Weight kips	Soil Weight kips	Footing Weight kips	App Axial Load kips	Total Axial Load kips	Buoyant Load kips
1 - 1.4 Dead	4.1233	0	0	0.4977	4.621	
2 - 1.2 Dead + 1.6 Wind	3.5343	0	0	0.4266	3.9609	
3 - 1.2 Dead + 0.8 Wind	3.5343	0	0	0.4266	3.9609	
4 - 0.9 Dead + 1.6 Wind	3.5343	0	0	0.32	3.8542	

Base Shears and Moments - Ultimate Load Combinations

Load Combination	Shear-X kips	Mom-Z kip-ft	Shear-Z kips	Mom-X kip-ft
1 - 1.4 Dead	0	0	0	0
2 - 1.2 Dead + 1.6 Wind	0.7682	18.062	0	0
3 - 1.2 Dead + 0.8 Wind	0.3841	9.031	0	0
4 - 0.9 Dead + 1.6 Wind	0.7682	18.062	0	0

Axial Capacity - Allowable Load Combinations

Shaft Element - S

Load Combination	App Axial Load kips	All Axial Load kips	Net Uplift Load kips	All Pullout Load kips	Vertical Settlement in	Max Bear Pressure ksf	All Bearing Pressure ksf
1 - Dead	0.3555	21.007	0	-7.6159	0	0	5.2
2 - Dead + Wind	0.3555	21.007	0	-7.6159	0	0	5.2
3 - 0.6 Dead + Wind	0.2133	21.007	0	-7.6159	0	0	5.2

Rigid Analysis - Ultimate Load Combinations

Shaft Element - S

Load Combination	Max Mom Location ft	Max Mom Value kip-ft	Crossover Location ft
1 - 1.4 Dead	0.25	0	6.25
2 - 1.2 Dead + 1.6 Wind	0.626	13.5984	4.0707
3 - 1.2 Dead + 0.8 Wind	0.44	6.7631	2.8366
4 - 0.9 Dead + 1.6 Wind	0.626	13.5984	4.0707

Finite Element Analysis - Deflections - Allowable Load Combinations

LC #1 : Dead

LC #2 : Dead + Wind

Finite Element Analysis - Deflections - X Dir - Allowable Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 ft	LC #2 ft	LC #3 ft
1	-0.2500	0.0000	0.0023	0.0023
2	0.0000	0.0000	0.0021	0.0021
3	0.1875	0.0000	0.0020	0.0020
4	0.3750	0.0000	0.0018	0.0018
5	0.5625	0.0000	0.0017	0.0017
6	0.7500	0.0000	0.0016	0.0016
7	1.1250	0.0000	0.0013	0.0013
8	1.5000	0.0000	0.0010	0.0010
9	1.8750	0.0000	0.0008	0.0008
10	2.2500	0.0000	0.0005	0.0005
11	2.6250	0.0000	0.0003	0.0003
12	3.0000	0.0000	0.0000	0.0000
13	3.7500	0.0000	-0.0004	-0.0004
14	4.5000	0.0000	-0.0009	-0.0009
15	5.2500	0.0000	-0.0014	-0.0014
16	6.0000	0.0000	-0.0019	-0.0019

Finite Element Analysis - Deflections - Z Dir - Allowable Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 ft	LC #2 ft	LC #3 ft
1	-0.2500	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000
3	0.1875	0.0000	0.0000	0.0000
4	0.3750	0.0000	0.0000	0.0000
5	0.5625	0.0000	0.0000	0.0000
6	0.7500	0.0000	0.0000	0.0000
7	1.1250	0.0000	0.0000	0.0000
8	1.5000	0.0000	0.0000	0.0000
9	1.8750	0.0000	0.0000	0.0000
10	2.2500	0.0000	0.0000	0.0000
11	2.6250	0.0000	0.0000	0.0000
12	3.0000	0.0000	0.0000	0.0000
13	3.7500	0.0000	0.0000	0.0000
14	4.5000	0.0000	0.0000	0.0000
15	5.2500	0.0000	0.0000	0.0000
16	6.0000	0.0000	0.0000	0.0000

Finite Element Analysis - Deflections - Ultimate Load Combinations

LC #1 : 1.4 Dead

LC #2 : 1.2 Dead + 1.6 Wind

LC #3 : 1.2 Dead + 0.8 Wind

Finite Element Analysis - Deflections - X Dir - Ultimate Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 ft	LC #2 ft	LC #3 ft	LC #4 ft
1	-0.2500	0.0000	0.0036	0.0018	0.0036
2	0.0000	0.0000	0.0034	0.0017	0.0034
3	0.1875	0.0000	0.0031	0.0016	0.0031
4	0.3750	0.0000	0.0029	0.0015	0.0029
5	0.5625	0.0000	0.0027	0.0014	0.0027
6	0.7500	0.0000	0.0025	0.0013	0.0025
7	1.1250	0.0000	0.0021	0.0010	0.0021
8	1.5000	0.0000	0.0017	0.0008	0.0017
9	1.8750	0.0000	0.0013	0.0006	0.0013
10	2.2500	0.0000	0.0009	0.0004	0.0009
11	2.6250	0.0000	0.0005	0.0002	0.0005
12	3.0000	0.0000	0.0001	0.0000	0.0001
13	3.7500	0.0000	-0.0007	-0.0004	-0.0007
14	4.5000	0.0000	-0.0015	-0.0007	-0.0015
15	5.2500	0.0000	-0.0023	-0.0011	-0.0023
16	6.0000	0.0000	-0.0031	-0.0015	-0.0031

Finite Element Analysis - Deflections - Z Dir - Ultimate Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 ft	LC #2 ft	LC #3 ft	LC #4 ft
1	-0.2500	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.1875	0.0000	0.0000	0.0000	0.0000
4	0.3750	0.0000	0.0000	0.0000	0.0000
5	0.5625	0.0000	0.0000	0.0000	0.0000
6	0.7500	0.0000	0.0000	0.0000	0.0000
7	1.1250	0.0000	0.0000	0.0000	0.0000
8	1.5000	0.0000	0.0000	0.0000	0.0000
9	1.8750	0.0000	0.0000	0.0000	0.0000
10	2.2500	0.0000	0.0000	0.0000	0.0000
11	2.6250	0.0000	0.0000	0.0000	0.0000
12	3.0000	0.0000	0.0000	0.0000	0.0000
13	3.7500	0.0000	0.0000	0.0000	0.0000
14	4.5000	0.0000	0.0000	0.0000	0.0000
15	5.2500	0.0000	0.0000	0.0000	0.0000
16	6.0000	0.0000	0.0000	0.0000	0.0000

Finite Element Analysis - Soil Pressure - Allowable Load Combinations

LC #1 : Dead

LC #2 : Dead + Wind

Finite Element Analysis - Soil Pressure - X Dir - Allowable Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 ksf	LC #2 ksf	LC #3 ksf
1	-0.2500	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.7937	0.7937
3	0.1875	0.0000	0.7430	0.7430
4	0.3750	0.0000	0.6927	0.6927
5	0.5625	0.0000	0.6427	0.6427
6	0.7500	0.0000	0.5930	0.5930
7	1.1250	0.0000	0.4944	0.4944
8	1.5000	0.0000	0.3969	0.3969
9	1.8750	0.0000	0.3004	0.3004
10	2.2500	0.0000	0.2049	0.2049
11	2.6250	0.0000	0.1102	0.1102
12	3.0000	0.0000	0.0163	0.0163
13	3.7500	0.0000	-0.1698	-0.1698
14	4.5000	0.0000	-0.3543	-0.3543
15	5.2500	0.0000	-0.5380	-0.5380
16	6.0000	0.0000	-0.7213	-0.7213

Finite Element Analysis - Soil Pressure - Z Dir - Allowable Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 ksf	LC #2 ksf	LC #3 ksf
1	-0.2500	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000
3	0.1875	0.0000	0.0000	0.0000
4	0.3750	0.0000	0.0000	0.0000
5	0.5625	0.0000	0.0000	0.0000
6	0.7500	0.0000	0.0000	0.0000
7	1.1250	0.0000	0.0000	0.0000
8	1.5000	0.0000	0.0000	0.0000
9	1.8750	0.0000	0.0000	0.0000
10	2.2500	0.0000	0.0000	0.0000
11	2.6250	0.0000	0.0000	0.0000
12	3.0000	0.0000	0.0000	0.0000
13	3.7500	0.0000	0.0000	0.0000
14	4.5000	0.0000	0.0000	0.0000
15	5.2500	0.0000	0.0000	0.0000
16	6.0000	0.0000	0.0000	0.0000

Finite Element Analysis - Soil Pressure - Ultimate Load Combinations

LC #1 : 1.4 Dead

LC #2 : 1.2 Dead + 1.6 Wind

LC #3 : 1.2 Dead + 0.8 Wind

Finite Element Analysis - Soil Pressure - X Dir - Ultimate Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 ksf	LC #2 ksf	LC #3 ksf	LC #4 ksf
1	-0.2500	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	1.2699	0.6349	1.2699
3	0.1875	0.0000	1.1889	0.5944	1.1889
4	0.3750	0.0000	1.1084	0.5542	1.1084
5	0.5625	0.0000	1.0283	0.5142	1.0283
6	0.7500	0.0000	0.9488	0.4744	0.9488
7	1.1250	0.0000	0.7910	0.3955	0.7910
8	1.5000	0.0000	0.6350	0.3175	0.6350
9	1.8750	0.0000	0.4807	0.2403	0.4807
10	2.2500	0.0000	0.3278	0.1639	0.3278
11	2.6250	0.0000	0.1763	0.0882	0.1763
12	3.0000	0.0000	0.0260	0.0130	0.0260
13	3.7500	0.0000	-0.2717	-0.1359	-0.2717
14	4.5000	0.0000	-0.5669	-0.2835	-0.5669
15	5.2500	0.0000	-0.8607	-0.4304	-0.8607
16	6.0000	0.0000	-1.1541	-0.5771	-1.1541

Finite Element Analysis - Soil Pressure - Z Dir - Ultimate Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 ksf	LC #2 ksf	LC #3 ksf	LC #4 ksf
1	-0.2500	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.1875	0.0000	0.0000	0.0000	0.0000
4	0.3750	0.0000	0.0000	0.0000	0.0000
5	0.5625	0.0000	0.0000	0.0000	0.0000
6	0.7500	0.0000	0.0000	0.0000	0.0000
7	1.1250	0.0000	0.0000	0.0000	0.0000
8	1.5000	0.0000	0.0000	0.0000	0.0000
9	1.8750	0.0000	0.0000	0.0000	0.0000
10	2.2500	0.0000	0.0000	0.0000	0.0000
11	2.6250	0.0000	0.0000	0.0000	0.0000
12	3.0000	0.0000	0.0000	0.0000	0.0000
13	3.7500	0.0000	0.0000	0.0000	0.0000
14	4.5000	0.0000	0.0000	0.0000	0.0000
15	5.2500	0.0000	0.0000	0.0000	0.0000
16	6.0000	0.0000	0.0000	0.0000	0.0000

Finite Element Analysis - Shear Forces - Allowable Load Combinations

LC #1 : Dead

LC #2 : Dead + Wind

Finite Element Analysis - Shear Forces - X Dir - Allowable Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 kips	LC #2 kips	LC #3 kips
1	-0.2500	0.0000	-0.4801	-0.4801
2	0.0000	0.0000	-0.4083	-0.4083
3	0.1875	0.0000	-0.1272	-0.1272
4	0.3750	0.0000	0.1514	0.1514
5	0.5625	0.0000	0.4112	0.4112
6	0.7500	0.0000	0.6522	0.6522
7	1.1250	0.0000	0.9858	0.9858
8	1.5000	0.0000	1.3565	1.3565
9	1.8750	0.0000	1.6542	1.6542
10	2.2500	0.0000	1.8795	1.8795
11	2.6250	0.0000	2.0332	2.0332
12	3.0000	0.0000	2.1158	2.1158
13	3.7500	0.0000	2.1341	2.1341
14	4.5000	0.0000	1.8794	1.8794
15	5.2500	0.0000	1.3479	1.3479
16	6.0000	0.0000	0.5410	0.5410

Finite Element Analysis - Shear Forces - Z Dir - Allowable Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 kips	LC #2 kips	LC #3 kips
1	-0.2500	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000
3	0.1875	0.0000	0.0000	0.0000
4	0.3750	0.0000	0.0000	0.0000
5	0.5625	0.0000	0.0000	0.0000
6	0.7500	0.0000	0.0000	0.0000
7	1.1250	0.0000	0.0000	0.0000
8	1.5000	0.0000	0.0000	0.0000
9	1.8750	0.0000	0.0000	0.0000
10	2.2500	0.0000	0.0000	0.0000
11	2.6250	0.0000	0.0000	0.0000
12	3.0000	0.0000	0.0000	0.0000
13	3.7500	0.0000	0.0000	0.0000
14	4.5000	0.0000	0.0000	0.0000
15	5.2500	0.0000	0.0000	0.0000
16	6.0000	0.0000	0.0000	0.0000

Finite Element Analysis - Shear Forces - Ultimate Load Combinations

LC #1 : 1.4 Dead

LC #2 : 1.2 Dead + 1.6 Wind

LC #3 : 1.2 Dead + 0.8 Wind

Finite Element Analysis - Shear Forces - X Dir - Ultimate Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 kips	LC #2 kips	LC #3 kips	LC #4 kips
1	-0.2500	0.0000	-0.7682	-0.3841	-0.7682
2	0.0000	0.0000	-0.6533	-0.3266	-0.6533
3	0.1875	0.0000	-0.2035	-0.1018	-0.2035
4	0.3750	0.0000	0.2423	0.1211	0.2423
5	0.5625	0.0000	0.6579	0.3290	0.6579
6	0.7500	0.0000	1.0435	0.5218	1.0435
7	1.1250	0.0000	1.5772	0.7886	1.5772
8	1.5000	0.0000	2.1705	1.0852	2.1705
9	1.8750	0.0000	2.6467	1.3234	2.6467
10	2.2500	0.0000	3.0072	1.5036	3.0072
11	2.6250	0.0000	3.2531	1.6265	3.2531
12	3.0000	0.0000	3.3853	1.6927	3.3853
13	3.7500	0.0000	3.4146	1.7073	3.4146
14	4.5000	0.0000	3.0071	1.5035	3.0071
15	5.2500	0.0000	2.1567	1.0783	2.1567
16	6.0000	0.0000	0.8656	0.4328	0.8656

Finite Element Analysis - Shear Forces - Z Dir - Ultimate Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 kips	LC #2 kips	LC #3 kips	LC #4 kips
1	-0.2500	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.1875	0.0000	0.0000	0.0000	0.0000
4	0.3750	0.0000	0.0000	0.0000	0.0000
5	0.5625	0.0000	0.0000	0.0000	0.0000
6	0.7500	0.0000	0.0000	0.0000	0.0000
7	1.1250	0.0000	0.0000	0.0000	0.0000
8	1.5000	0.0000	0.0000	0.0000	0.0000
9	1.8750	0.0000	0.0000	0.0000	0.0000
10	2.2500	0.0000	0.0000	0.0000	0.0000
11	2.6250	0.0000	0.0000	0.0000	0.0000
12	3.0000	0.0000	0.0000	0.0000	0.0000
13	3.7500	0.0000	0.0000	0.0000	0.0000
14	4.5000	0.0000	0.0000	0.0000	0.0000
15	5.2500	0.0000	0.0000	0.0000	0.0000
16	6.0000	0.0000	0.0000	0.0000	0.0000

Finite Element Analysis - Bending Moments - Allowable Load Combinations

LC #1 : Dead

LC #2 : Dead + Wind

Finite Element Analysis - Bending Moments - X Dir - Allowable Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 kip-ft	LC #2 kip-ft	LC #3 kip-ft
1	-0.2500	0.0000	-8.2881	-8.2881
2	0.0000	0.0000	-8.3902	-8.3902
3	0.1875	0.0000	-8.4140	-8.4140
4	0.3750	0.0000	-8.3856	-8.3856
5	0.5625	0.0000	-8.3085	-8.3085
6	0.7500	0.0000	-8.1862	-8.1862
7	1.1250	0.0000	-7.8166	-7.8166
8	1.5000	0.0000	-7.3079	-7.3079
9	1.8750	0.0000	-6.6876	-6.6876
10	2.2500	0.0000	-5.9827	-5.9827
11	2.6250	0.0000	-5.2203	-5.2203
12	3.0000	0.0000	-4.4269	-4.4269
13	3.7500	0.0000	-2.8263	-2.8263
14	4.5000	0.0000	-1.4167	-1.4167
15	5.2500	0.0000	-0.4057	-0.4057
16	6.0000	0.0000	0.0000	0.0000

Finite Element Analysis - Bending Moments - Z Dir - Allowable Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 kip-ft	LC #2 kip-ft	LC #3 kip-ft
1	-0.2500	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000
3	0.1875	0.0000	0.0000	0.0000
4	0.3750	0.0000	0.0000	0.0000
5	0.5625	0.0000	0.0000	0.0000
6	0.7500	0.0000	0.0000	0.0000
7	1.1250	0.0000	0.0000	0.0000
8	1.5000	0.0000	0.0000	0.0000
9	1.8750	0.0000	0.0000	0.0000
10	2.2500	0.0000	0.0000	0.0000
11	2.6250	0.0000	0.0000	0.0000
12	3.0000	0.0000	0.0000	0.0000
13	3.7500	0.0000	0.0000	0.0000
14	4.5000	0.0000	0.0000	0.0000
15	5.2500	0.0000	0.0000	0.0000
16	6.0000	0.0000	0.0000	0.0000

Finite Element Analysis - Bending Moments - Ultimate Load Combinations

LC #1 : 1.4 Dead

LC #2 : 1.2 Dead + 1.6 Wind

LC #3 : 1.2 Dead + 0.8 Wind

Finite Element Analysis - Bending Moments - X Dir - Ultimate Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 kip-ft	LC #2 kip-ft	LC #3 kip-ft	LC #4 kip-ft
1	-0.2500	0.0000	-13.2610	-6.6305	-13.2610
2	0.0000	0.0000	-13.4243	-6.7121	-13.4243
3	0.1875	0.0000	-13.4624	-6.7312	-13.4624
4	0.3750	0.0000	-13.4170	-6.7085	-13.4170
5	0.5625	0.0000	-13.2937	-6.6468	-13.2937
6	0.7500	0.0000	-13.0980	-6.5490	-13.0980
7	1.1250	0.0000	-12.5065	-6.2533	-12.5065
8	1.5000	0.0000	-11.6926	-5.8463	-11.6926
9	1.8750	0.0000	-10.7001	-5.3500	-10.7001
10	2.2500	0.0000	-9.5724	-4.7862	-9.5724
11	2.6250	0.0000	-8.3525	-4.1762	-8.3525
12	3.0000	0.0000	-7.0830	-3.5415	-7.0830
13	3.7500	0.0000	-4.5220	-2.2610	-4.5220
14	4.5000	0.0000	-2.2667	-1.1334	-2.2667
15	5.2500	0.0000	-0.6492	-0.3246	-0.6492
16	6.0000	0.0000	0.0000	0.0000	0.0000

Finite Element Analysis - Bending Moments - Z Dir - Ultimate Load Combinations

Shaft Element - S

Node No	Depth ft	LC #1 kip-ft	LC #2 kip-ft	LC #3 kip-ft	LC #4 kip-ft
1	-0.2500	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.1875	0.0000	0.0000	0.0000	0.0000
4	0.3750	0.0000	0.0000	0.0000	0.0000
5	0.5625	0.0000	0.0000	0.0000	0.0000
6	0.7500	0.0000	0.0000	0.0000	0.0000
7	1.1250	0.0000	0.0000	0.0000	0.0000
8	1.5000	0.0000	0.0000	0.0000	0.0000
9	1.8750	0.0000	0.0000	0.0000	0.0000
10	2.2500	0.0000	0.0000	0.0000	0.0000
11	2.6250	0.0000	0.0000	0.0000	0.0000
12	3.0000	0.0000	0.0000	0.0000	0.0000
13	3.7500	0.0000	0.0000	0.0000	0.0000
14	4.5000	0.0000	0.0000	0.0000	0.0000
15	5.2500	0.0000	0.0000	0.0000	0.0000
16	6.0000	0.0000	0.0000	0.0000	0.0000

PIER DESIGN - Ultimate Load Combinations

Modulus of Elasticity of Concrete - Section 19.2

Concrete Stress Distribution - Section 22.2.2

Design Axial Strength - Section 22.4

Shaft Element - S

Load Element - S

Geometry

Shape	Circle	
X Dim	2	ft
Z Dim	2	ft
Height	6.25	ft
Offset - X	0	ft
Offset - Z	0	ft

Longitudinal/Vertical Rebar Parameters

Rebar Size	6	
Total number of bars	8	
Bar spacing	6.4795	in
Area Provided	3.5343	sq in
Provided Reinforcement Ratio	0.0078	
Requested Reinforcement Ratio	0.005	

Pier Concrete Capacity

Load Combination	Applied	Allowable	Applied	Allowable	Capacity Ratio
	Axial Load Load kips	Axial Load Load kips	Moment Resultant kip-ft	Moment Resultant kip-ft	
1 - 1.4 Dead	0.4977	458.5436	0	0.0459	921.3253
2 - 1.2 Dead + 1.6 Wind	0.4266	4.5177	13.5984	144.0068	10.59
3 - 1.2 Dead + 0.8 Wind	0.4266	9.3022	6.7631	147.4722	21.8054
4 - 0.9 Dead + 1.6 Wind	0.32	3.3545	13.5984	142.5699	10.4843

Tie Rebar Parameters

Tie bar size	4	
Number of upper tie bars	0	
Upper tie bar spacing	0	in
Number of lower tie bars	0	
Lower tie bar spacing	0	in
Number of remaining tie bars	7	
Remaining spacing	12	in
Number of total tie bars	7	
Provided tie bar area - X Dir	2.7489	sq in
Required tie bar area - X Dir	0	sq in
Provided tie bar area - Z Dir	2.7489	sq in
Required tie bar area - Z Dir	0	
No. of internal ties specified- X Dir	0	
No. of internal ties specified- Z Dir	0	