AMERICAN TOWER®
CORPORATION

Structural Analysis Report

Structure	:	44 ft Monopole
ATC Asset Name	:	CSP Schriever CO
ATC Asset Number	:	419744
Engineering Number	:	14424215_C3_02
Proposed Carrier	:	VERIZON WIRELESS
Carrier Site Name	:	SCHRIEVER
Carrier Site Number	:	5000339793
Site Location	:	1100 Enoch Road Colorado Springs, CO 80930-9327 38.817° N, 104.5379° W
County	:	El Paso
Date	:	November 1, 2023
Max Usage	:	62%
Analysis Result	:	Pass

Created By:

Josh Yoder
Structural Engineer

Josh Yoder

COLORADO LICENSED
MICHAEL EVAN DEESE
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PROFESSIONAL ENGINEER

Michael Deese

Digitally signed by Michael Deese
Date: 2023.11.01 15:13:21 -04'00'

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Introduction

The purpose of this report is to summarize results of a structural analysis performed on the 44 ft Monopole tower to reflect the change in loading by VERIZON WIRELESS.

Supporting Documents

Tower:	Sabre Job #102335, dated May 6, 2014
Foundation:	Sabre Job #102335, dated May 6, 2014
Geotechnical:	Yeh and Associates Project #214-044, dated April 15, 2014

Analysis

The tower was analyzed using American Tower Corporation's tower analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/TIA-222.

Basic Wind Speed:	90 mph (3-second gust, Vasd) / 115 mph (3-second gust, Vult)
Basic Wind Speed w/ Ice:	No Ice Considered
Code(s):	ANSI/TIA-222-G / 2015 IBC
Structure Class:	II
Exposure Category:	C
Topographic Category:	1
Crest Height:	0 ft
Spectral Response:	Ss = 0.16, S_1 = 0.06
Site Class:	D - Stiff Soil - Default

Conclusion

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report.

If you have any questions or require additional information, please reach out to your American Tower contact. If you do not have an American Tower contact and have an Engineering question, please contact **Engineering@americantower.com** Please include the American Tower asset name, asset number, and engineering number in the subject line for any questions.

Structure Usages

Structural Component	Usage	Control	Result
Pole Shaft	51.9%	1.2D + 1.6W	Pass
Serviceability Usage	15.6%	1.0D + 1.0W	Pass
Base Plate @ 0.0 ft	62.0%	Rods	Pass
Pier	49.4%	Moment [Soil]	Pass

Maximum Reactions

Foundation	Moment (k-ft)	Axial (k)	Shear (k)
Monopole Base	320.5	8.7	8.2

Reactions shown reflect the results from the Load Case with maximum Moment

Structure base reactions were analyzed using available geotechnical and foundation information.

VERIZON WIRELESS Final Loading

Elev (ft)	Qty	Equipment	Lines
43.0	1	Commscope RC3DC-3315-PF-48	(3) 1 1/4" Hybriflex Cable
	1	Ericsson Air6419	
	1	Raycap RVZDC-6627-PF-48 (29.5")	
	3	Commscope NHH-65C-R2B	
	3	Commscope NHHSS-65C-R2BT4	
	3	Ericsson RRUS 4490	
	3	Ericsson RRUS 4890	
	3	Ericsson Radio 4408	
	3	Mount Reinforcement	
	3	T-Arm	
42.0	1	Unused Reserve (19609.8900 sqin)	-

Install proposed lines inside the pole shaft.

Other Existing/Reserved Loading

No loading was considered in addition to the VERIZON WIRELESS Final Loading.

Standard Conditions

All engineering services performed by ATC Tower Services LLC are prepared on the basis that the information used is current and correct. This information may consist of, but is not limited to the following:

- Information supplied by the client regarding antenna, mounts, and feed line loading
- Information from drawings, design and analysis documents, and field notes in the possession of ATC Tower Services LLC

It is the responsibility of the client to ensure that the information provided to ATC Tower Services LLC and used in the performance of our engineering services is correct and complete.

All assets of American Tower Corporation, its affiliates, and subsidiaries (collectively "American Tower") are inspected at regular intervals. Based upon these inspections and in the absence of information to the contrary, American Tower assumes that all structures were constructed in accordance with the drawings and specifications.

Unless explicitly agreed by both the client and ATC Tower Services LLC, all services will be performed in accordance with the current revision of ANSI/TIA-222.

All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. ATC Tower Services LLC is not responsible for the conclusions, opinions and recommendations made by others based on the information supplied herein.

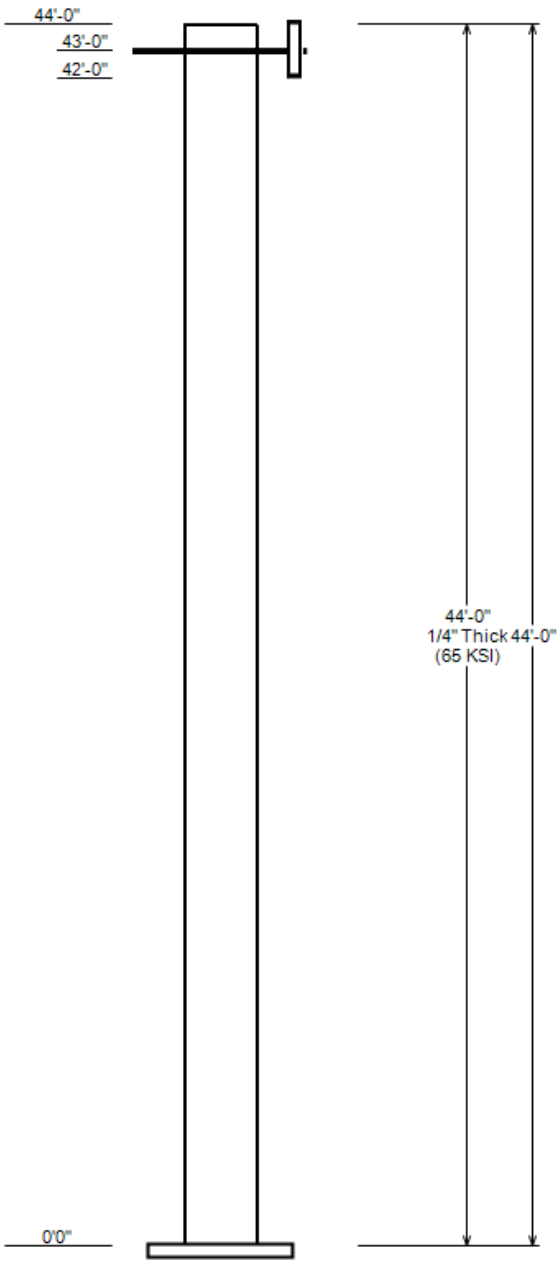
ASSET:	419744, CSP Schriever CO	CODE:	ANSI/TIA-222-G
CUSTOMER:	VERIZON WIRELESS	PROJECT:	14424215

ANALYSIS PARAMETERS

Nominal Wind:	90 mph	**Ice Wind:**	50 mph w/ 0" ice	**Service Wind:**	60 mph
Structure Class:	II	**Exposure:**	C	**S_s:** 0.162	**S_1:** 0.057
Topo Category:	1				
Structure Height:	44 ft	**Base Elevation:**	0.00 ft	**Structure Type:**	Stepped
Base Diameter:	23 in	**Base Rotation:**	0°	**Taper:**	0.0000 (in/ft)

POLE SECTION PROPERTIES

Section	Length (ft)	Flat Diameter (in) Top	Flat Diameter (in) Bottom	Thick (in)	Joint Type	Joint Length (in)	Pole Shape	Yield Strength (ksi)
1	44.000	23.00	23.00	0.250		0.000	18 Sides	65



DISCRETE APPURTENANCE

Elev (ft)	Description
43.0	(3) Ericsson Radio 4408
43.0	(1) Ericsson Air6419
43.0	(3) Ericsson RRUS 4490
43.0	(3) Ericsson RRUS 4890
43.0	(1) Commscope RC3DC-3315-PF-48
43.0	(1) Raycap RVZDC-6627-PF-48 (29.5"
43.0	(3) Generic Mount Reinforcement
43.0	(3) Generic Round T-Arm
43.0	(3) Commscope NHHSS-65C-R2BT4
43.0	(3) Commscope NHH-65C-R2B
42.0	(1) Unused Reserve (19609.8900 sqi

LINEAR APPURTENANCE

Elev To (ft)	Description
43.0	(3) 1 1/4" Hybriflex Cable

GLOBAL BASE REACTIONS

Load Case	Moment (kip-ft)	Axial (kip)	Shear (kip)
1.2D + 1.6W	320.48	8.71	8.18
0.9D + 1.6W	319.09	6.53	8.17
1.2D + 1.0Di + 1.0Wi	68.52	7.91	1.86
(1.2 + 0.2Sds) * DL + E ELFM	20.89	8.59	0.52
(1.2 + 0.2Sds) * DL + E EMAM	45.49	8.59	1.09
(0.9 - 0.2Sds) * DL + E ELFM	20.79	6.02	0.52
(0.9 - 0.2Sds) * DL + E EMAM	45.25	6.02	1.09
1.0D + 1.0W	79.43	7.28	2.03

ANALYSIS PARAMETERS

Location:	El Paso County,CO	**Height:**	44 ft
Type and Shape:	Stepped, 18 Sides	**Base Diameter:**	23.00 in
Manufacturer:	Sabre	**Top Diameter:**	23.00 in
		Taper:	0.0000 in/ft
		Rotation:	0.000º

ICE & WIND PARAMETERS

Structure Class:	II	**Design Wind Speed:**	90 mph
Exposure Category:	C	**Design Wind Speed w/ Ice:**	50 mph
Topographic Category:	1	**Design Ice Thickness:**	0.00 in
Crest Height:	0 ft	**Service Wind Speed:**	60 mph

SEISMIC PARAMETERS

Analysis Method:	Equivalent Modal Analysis & Equivalent Lateral Force Methods				
Site Class:	D - Stiff Soil		**Period Based on Rayleigh Method (sec):**		0.84
T_L (sec):	6	**P:**	1	**$C_{s:}$**	0.072
$S_{s:}$	0.162	**$S_{1:}$**	0.057	**C_s Max:**	0.072
$F_{a:}$	1.600	**$F_{v:}$**	2.400	**C_s Min:**	0.030
$S_{ds:}$	0.173	**$S_{d1:}$**	0.091		

LOAD CASES

1.2D + 1.6W	90 mph Wind with No Ice
0.9D + 1.6W	90 mph Wind with No Ice (Reduced DL)
1.2D + 1.0Di + 1.0Wi	50 mph Wind with 0" Radial Ice
(1.2 + 0.2Sds) * DL + E EMAM	Seismic
(1.2 + 0.2Sds) * DL + E ELFM	Seismic
(0.9 - 0.2Sds) * DL + E EMAM	Seismic (Reduced DL)
(0.9 - 0.2Sds) * DL + E ELFM	Seismic (Reduced DL)
1.0D + 1.0W	60 mph Wind with No Ice

SHAFT SECTION PROPERTIES

Section	Length (ft)	Thick (in)	Fy (ksi)	Joint Type	Joint Len (in)	Weight (lb)	Bottom Dia (in)	Bottom Elev (ft)	Bottom Area (in²)	Bottom Ix (in⁴)	Bottom W/t Ratio	Bottom D/t Ratio	Top Dia (in)	Top Elev (ft)	Top Area (in²)	Top Ix (in⁴)	Top W/t Ratio	Top D/t Ratio	Taper (in/ft)
1-18	44.00	0.2500	65		0.00	2,703	23.00	0.000	18.05	1,180.4	14.81	92.00	23.00	44.00	18.05	1,180.4	14.81	92.00	0.0000
			Total Shaft Weight			**2,703**													

DISCRETE APPURTENANCE PROPERTIES

Attach Elev (ft)	Description	Qty	Ka	Vert Ecc (ft)	No Ice Weight (lb)	No Ice EPAa (sf)	No Ice Orientation Factor	Ice Weight (lb)	Ice EPAa (sf)	Ice Orientation Factor
43.00	Commscope RC3DC-3315-PF-48	1	0.80	0.000	32.00	3.781	1.00	32.00	3.781	1.00
43.00	Ericsson Radio 4408	3	0.80	0.000	10.10	0.553	0.50	10.10	0.553	0.50
43.00	Ericsson Air6419	1	0.80	0.000	66.10	2.530	1.00	66.10	2.530	1.00
43.00	Ericsson RRUS 4890	3	0.80	0.000	69.50	2.695	0.67	69.50	2.695	0.67
43.00	Ericsson RRUS 4490	3	0.80	0.000	68.40	2.695	0.67	68.40	2.695	0.67
43.00	Commscope NHH-65C-R2B	3	0.80	0.000	51.60	11.389	0.70	51.60	11.389	0.70
43.00	Raycap RVZDC-6627-PF-48 (29.5"	1	0.80	0.000	32.00	4.056	1.00	32.00	4.056	1.00
43.00	Generic Mount Reinforcement	3	0.75	0.000	200.00	4.980	0.67	200.00	4.980	0.67
43.00	Generic Round T-Arm	3	0.75	0.000	450.00	9.700	0.67	450.00	9.700	0.67
43.00	Commscope NHHSS-65C-R2BT4	3	0.80	0.000	62.00	11.389	0.70	62.00	11.389	0.70
42.00	Unused Reserve (19609.8900 sqi	1	0.80	0.000	1585.10	136.180	0.90	1585.10	136.180	0.90
Totals	**Row Count: 11**	**25**			**4,450.00**			**4,450.00**		

LINEAR APPURTENANCE PROPERTIES

Load Case Azimuth (deg): 0.00

Elev From (ft)	Elev To (ft)	Qty	Description	Diameter (in)	Weight (lb/ft)	Flat	Max/ Row	Distance Between Rows(in)	Distance Between Cols(in)	Azimuth (deg)	Distance From Face (in)	Exposed To Wind	Carrier
0.00	43.00	3	1 1/4" Hybriflex Cabl	1.54	1	N	0	0	0	0	0	N	VERIZON WIRELESS

SEGMENT PROPERTIES

Seg Top Elev (ft)	Description *(Max Length: 5 ft)*	Thick (in)	Flat Dia (in)	Area (in²)	Ix (in⁴)	W/t Ratio	D/t Ratio	F'y (ksi)	S (in³)	Z (in³)	Weight (lb)
0.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	0.0
5.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	307.1
10.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	307.1
15.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	307.1
20.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	307.1
25.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	307.1
30.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	307.1
35.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	307.1
40.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	307.1
42.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	122.9
43.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	61.4
44.00		0.2500	23.000	18.051	1,180.40	14.81	92.00	82.6	101.1	0.0	61.4
										Total:	**2,702.5**

CALCULATED FORCES

Load Case: 1.2D + 1.6W — 90 mph Wind with No Ice — 16 Iterations

Gust Response Factor: 1.10
Dead load Factor: 1.20
Wind Load Factor: 1.60

Wind Importance Factor 1.00

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (ft-kips)	Phi Mn (ft-kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-8.71	-8.18	0	-320.48	0.00	320.48	1,341.13	670.57	1,249.81	625.84	0	0	0.519
5.00	-8.28	-8.04	0	-279.58	0.00	279.58	1,341.13	670.57	1,249.81	625.84	0.2	-0.36	0.453
10.00	-7.85	-7.89	0	-239.37	0.00	239.37	1,341.13	670.57	1,249.81	625.84	0.74	-0.67	0.388
15.00	-7.44	-7.73	0	-199.91	0.00	199.91	1,341.13	670.57	1,249.81	625.84	1.59	-0.94	0.325
20.00	-7.03	-7.55	0	-161.26	0.00	161.26	1,341.13	670.57	1,249.81	625.84	2.7	-1.16	0.263
25.00	-6.63	-7.35	0	-123.53	0.00	123.53	1,341.13	670.57	1,249.81	625.84	4	-1.33	0.202

30.00	-6.23	-7.14	0	-86.78	0.00	86.78	1,341.13	670.57	1,249.81	625.84	5.47	-1.45	0.143
35.00	-5.85	-6.91	0	-51.10	0.00	51.10	1,341.13	670.57	1,249.81	625.84	7.04	-1.54	0.086
40.00	-5.46	-6.74	0	-16.54	0.00	16.54	1,341.13	670.57	1,249.81	625.84	8.68	-1.58	0.031
42.00	-3.51	-3.03	0	-3.06	0.00	3.06	1,341.13	670.57	1,249.81	625.84	9.34	-1.58	0.008
43.00	-0.07	-0.03	0	-0.03	0.00	0.03	1,341.13	670.57	1,249.81	625.84	9.67	-1.58	0.000
44.00	0.00	-0.02	0	0.00	0.00	0.00	1,341.13	670.57	1,249.81	625.84	10	-1.58	0.000

CALCULATED FORCES

Load Case: 0.9D + 1.6W — 90 mph Wind with No Ice (Reduced DL) — 16 Iterations

Gust Response Factor: 1.10
Dead load Factor: 0.90
Wind Load Factor: 1.60

Wind Importance Factor 1.00

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (ft-kips)	Phi Mn (ft-kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-6.53	-8.17	0	-319.09	0.00	319.09	1,341.13	670.57	1,249.81	625.84	0	0	0.515
5.00	-6.19	-8.02	0	-278.23	0.00	278.23	1,341.13	670.57	1,249.81	625.84	0.19	-0.36	0.449
10.00	-5.86	-7.86	0	-238.11	0.00	238.11	1,341.13	670.57	1,249.81	625.84	0.74	-0.67	0.385
15.00	-5.54	-7.69	0	-198.79	0.00	198.79	1,341.13	670.57	1,249.81	625.84	1.59	-0.93	0.322
20.00	-5.23	-7.51	0	-160.33	0.00	160.33	1,341.13	670.57	1,249.81	625.84	2.68	-1.15	0.260
25.00	-4.93	-7.31	0	-122.79	0.00	122.79	1,341.13	670.57	1,249.81	625.84	3.98	-1.32	0.200
30.00	-4.63	-7.09	0	-86.25	0.00	86.25	1,341.13	670.57	1,249.81	625.84	5.44	-1.45	0.141
35.00	-4.34	-6.87	0	-50.78	0.00	50.78	1,341.13	670.57	1,249.81	625.84	7	-1.53	0.084
40.00	-4.05	-6.70	0	-16.44	0.00	16.44	1,341.13	670.57	1,249.81	625.84	8.63	-1.57	0.029
42.00	-2.61	-3.01	0	-3.03	0.00	3.03	1,341.13	670.57	1,249.81	625.84	9.29	-1.58	0.007
43.00	-0.05	-0.02	0	-0.02	0.00	0.02	1,341.13	670.57	1,249.81	625.84	9.62	-1.58	0.000
44.00	0.00	-0.02	0	0.00	0.00	0.00	1,341.13	670.57	1,249.81	625.84	9.95	-1.58	0.000

CALCULATED FORCES

Load Case: 1.2D + 1.0Di + 1.0Wi — 50 mph Wind with 0" Radial Ice — 15 Iterations

Gust Response Factor: 1.10
Dead load Factor: 1.20
Wind Load Factor: 1.00
Ice Dead Load Factor: 1.00
Wind Importance Factor: 1.00
Ice Importance Factor: 1.00

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (ft-kips)	Phi Mn (ft-kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-7.91	-1.86	0	-68.52	0.00	68.52	1,341.13	670.57	1,249.81	625.84	0	0	0.115
5.00	-7.53	-1.80	0	-59.24	0.00	59.24	1,341.13	670.57	1,249.81	625.84	0.04	-0.08	0.100
10.00	-7.14	-1.74	0	-50.25	0.00	50.25	1,341.13	670.57	1,249.81	625.84	0.16	-0.14	0.086
15.00	-6.75	-1.68	0	-41.56	0.00	41.56	1,341.13	670.57	1,249.81	625.84	0.34	-0.2	0.071
20.00	-6.36	-1.61	0	-33.17	0.00	33.17	1,341.13	670.57	1,249.81	625.84	0.57	-0.24	0.058
25.00	-5.98	-1.54	0	-25.13	0.00	25.13	1,341.13	670.57	1,249.81	625.84	0.85	-0.28	0.045
30.00	-5.59	-1.46	0	-17.45	0.00	17.45	1,341.13	670.57	1,249.81	625.84	1.15	-0.3	0.032
35.00	-5.20	-1.38	0	-10.15	0.00	10.15	1,341.13	670.57	1,249.81	625.84	1.48	-0.32	0.020
40.00	-4.82	-1.32	0	-3.25	0.00	3.25	1,341.13	670.57	1,249.81	625.84	1.82	-0.33	0.009
42.00	-2.92	-0.59	0	-0.60	0.00	0.60	1,341.13	670.57	1,249.81	625.84	1.96	-0.33	0.003
43.00	-0.07	-0.01	0	-0.01	0.00	0.01	1,341.13	670.57	1,249.81	625.84	2.03	-0.33	0.000
44.00	0.00	-0.01	0	0.00	0.00	0.00	1,341.13	670.57	1,249.81	625.84	2.1	-0.33	0.000

CALCULATED FORCES

Load Case: 1.0D + 1.0W — 60 mph Wind with No Ice — 15 Iterations

Gust Response Factor: 1.10
Dead load Factor: 1.00
Wind Load Factor: 1.00
Wind Importance Factor 1.00

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (ft-kips)	Phi Mn (ft-kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-7.28	-2.03	0	-79.43	0.00	79.43	1,341.13	670.57	1,249.81	625.84	0	0	0.132
5.00	-6.96	-2.00	0	-69.27	0.00	69.27	1,341.13	670.57	1,249.81	625.84	0.05	-0.09	0.116
10.00	-6.63	-1.96	0	-59.29	0.00	59.29	1,341.13	670.57	1,249.81	625.84	0.18	-0.17	0.100
15.00	-6.31	-1.92	0	-49.51	0.00	49.51	1,341.13	670.57	1,249.81	625.84	0.4	-0.23	0.084
20.00	-5.98	-1.87	0	-39.93	0.00	39.93	1,341.13	670.57	1,249.81	625.84	0.67	-0.29	0.068
25.00	-5.66	-1.82	0	-30.59	0.00	30.59	1,341.13	670.57	1,249.81	625.84	0.99	-0.33	0.053
30.00	-5.34	-1.77	0	-21.49	0.00	21.49	1,341.13	670.57	1,249.81	625.84	1.35	-0.36	0.038
35.00	-5.02	-1.71	0	-12.65	0.00	12.65	1,341.13	670.57	1,249.81	625.84	1.74	-0.38	0.024
40.00	-4.69	-1.67	0	-4.10	0.00	4.10	1,341.13	670.57	1,249.81	625.84	2.15	-0.39	0.010
42.00	-2.99	-0.75	0	-0.76	0.00	0.76	1,341.13	670.57	1,249.81	625.84	2.31	-0.39	0.003
43.00	-0.06	-0.01	0	-0.01	0.00	0.01	1,341.13	670.57	1,249.81	625.84	2.4	-0.39	0.000
44.00	0.00	-0.01	0	0.00	0.00	0.00	1,341.13	670.57	1,249.81	625.84	2.48	-0.39	0.000

EQUIVALENT LATERAL FORCES METHOD ANALYSIS

(Based on ASCE7-10 Chapters 11, 12 and 15)

Spectral Response Acceleration for Short Period (S_S):	0.162
Spectral Response Acceleration at 1.0 Second Period (S_1):	0.057
Long-Period Transition Period (T_L – Seconds):	6
Importance Factor (I_e):	1.000
Site Coefficient F_a:	1.600
Site Coefficient F_v:	2.400
Response Modification Coefficient (R):	1.500
Design Spectral Response Acceleration at Short Period (S_{ds}):	0.173
Design Spectral Response Acceleration at 1.0 Second Period (S_{d1}):	0.091
Seismic Response Coefficient (C_s):	0.072
Upper Limit C_S:	0.072
Lower Limit C_S:	0.030
Period based on Rayleigh Method (sec):	0.840
Redundancy Factor (p):	1.000
Seismic Force Distribution Exponent (k):	1.170
Total Unfactored Dead Load:	7.280 k
Seismic Base Shear (E):	0.520 k

SEISMIC FORCES

(1.2 + 0.2Sds) * DL + E ELFM **Seismic**

Segment	Height Above Base (ft)	Weight (lb)	W_z (lb-ft)	C_{vx}	Horizontal Force (lb)	Vertical Force (lb)
11	43.5	61	5	0.011	6	76
10	42.5	64	5	0.011	6	80
9	41	129	10	0.021	11	159
8	37.5	322	23	0.048	25	398
7	32.5	322	19	0.040	21	398
6	27.5	322	16	0.033	17	398
5	22.5	322	12	0.026	14	398
4	17.5	322	9	0.020	10	398
3	12.5	322	6	0.013	7	398
2	7.5	322	3	0.007	4	398
1	2.5	322	1	0.002	1	398
Ericsson Radio 4408	43	30	2	0.005	3	37
Ericsson Air6419	43	66	5	0.012	6	82
Ericsson RRUS 4890	43	208	17	0.036	19	257
Ericsson RRUS 4490	43	205	17	0.036	19	253
Commscope RC3DC-3315-PF-48	43	32	3	0.006	3	40
Raycap RVZDC-6627-PF-48 (29.5")	43	32	3	0.006	3	40
Generic Mount Reinforcement	43	600	49	0.104	55	741
Generic Round T-Arm	43	1,350	111	0.235	123	1,667
Commscope NHHSS-65C-R2BT4	43	186	15	0.032	17	230
Commscope NHH-65C-R2B	43	155	13	0.027	14	191
Unused Reserve (19609.8900 sqin)	42	1,585	127	0.268	141	1,957
	Totals:	**7,282**	**472**	**1.000**	**524**	**8,990**

SEISMIC FORCES

(0.9 - 0.2Sds) * DL + E ELFM **Seismic (Reduced DL)**

Segment	Height Above Base (ft)	Weight (lb)	W_z (lb-ft)	C_{vx}	Horizontal Force (lb)	Vertical Force (lb)
11	43.5	61	5	0.011	6	53
10	42.5	64	5	0.011	6	56
9	41	129	10	0.021	11	112
8	37.5	322	23	0.048	25	279
7	32.5	322	19	0.040	21	279
6	27.5	322	16	0.033	17	279
5	22.5	322	12	0.026	14	279
4	17.5	322	9	0.020	10	279
3	12.5	322	6	0.013	7	279
2	7.5	322	3	0.007	4	279
1	2.5	322	1	0.002	1	279

Ericsson Radio 4408	43	30	2	0.005	3	26
Ericsson Air6419	43	66	5	0.012	6	57
Ericsson RRUS 4890	43	208	17	0.036	19	180
Ericsson RRUS 4490	43	205	17	0.036	19	178
Commscope RC3DC-3315-PF-48	43	32	3	0.006	3	28
Raycap RVZDC-6627-PF-48 (29.5")	43	32	3	0.006	3	28
Generic Mount Reinforcement	43	600	49	0.104	55	519
Generic Round T-Arm	43	1,350	111	0.235	123	1,168
Commscope NHHSS-65C-R2BT4	43	186	15	0.032	17	161
Commscope NHH-65C-R2B	43	155	13	0.027	14	134
Unused Reserve (19609.8900 sqin)	42	1,585	127	0.268	141	1,372
	Totals:	**7,282**	**472**	**1.000**	**524**	**6,302**

(1.2 + 0.2Sds) * DL + E ELFM **Seismic**

CALCULATED FORCES

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (fr-kips)	Mu Mx (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (kips)	Phi Mn (kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-8.59	-0.52	0.00	-20.89	0.00	20.89	1,341.13	670.57	1,250	625.84	0.00	0.00	0.04
5.00	-8.19	-0.52	0.00	-18.27	0.00	18.27	1,341.13	670.57	1,250	625.84	0.01	-0.02	0.04
10.00	-7.80	-0.52	0.00	-15.65	0.00	15.65	1,341.13	670.57	1,250	625.84	0.05	-0.04	0.03
15.00	-7.40	-0.51	0.00	-13.05	0.00	13.05	1,341.13	670.57	1,250	625.84	0.10	-0.06	0.03
20.00	-7.00	-0.50	0.00	-10.50	0.00	10.50	1,341.13	670.57	1,250	625.84	0.18	-0.08	0.02
25.00	-6.60	-0.48	0.00	-8.01	0.00	8.01	1,341.13	670.57	1,250	625.84	0.26	-0.09	0.02
30.00	-6.21	-0.46	0.00	-5.60	0.00	5.60	1,341.13	670.57	1,250	625.84	0.36	-0.09	0.01
35.00	-5.81	-0.44	0.00	-3.30	0.00	3.30	1,341.13	670.57	1,250	625.84	0.46	-0.10	0.01
40.00	-5.65	-0.42	0.00	-1.12	0.00	1.12	1,341.13	670.57	1,250	625.84	0.57	-0.10	0.01
42.00	-3.61	-0.27	0.00	-0.27	0.00	0.27	1,341.13	670.57	1,250	625.84	0.61	-0.10	0.00
43.00	0.00	0.00	0.00	0.00	0.00	0.00	1,341.13	670.57	1,250	625.84	0.63	-0.10	0.00
44.00	0.00	0.00	0.00	0.00	0.00	0.00	1,341.13	670.57	1,250	625.84	0.65	-0.10	0.00

(1.2 + 0.2Sds) * DL + E EMAM **Seismic**

CALCULATED FORCES

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (fr-kips)	Mu Mx (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (kips)	Phi Mn (kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-8.59	-1.09	0.00	-45.49	0.00	45.49	1,341.13	670.57	1,250	625.84	0.00	0.00	0.08
5.00	-8.19	-1.09	0.00	-40.04	0.00	40.04	1,341.13	670.57	1,250	625.84	0.03	-0.05	0.07
10.00	-7.79	-1.09	0.00	-34.58	0.00	34.58	1,341.13	670.57	1,250	625.84	0.11	-0.10	0.06
15.00	-7.40	-1.08	0.00	-29.13	0.00	29.13	1,341.13	670.57	1,250	625.84	0.23	-0.13	0.05
20.00	-7.00	-1.08	0.00	-23.71	0.00	23.71	1,341.13	670.57	1,250	625.84	0.39	-0.17	0.04
25.00	-6.60	-1.07	0.00	-18.34	0.00	18.34	1,341.13	670.57	1,250	625.84	0.58	-0.19	0.03
30.00	-6.20	-1.05	0.00	-13.01	0.00	13.01	1,341.13	670.57	1,250	625.84	0.79	-0.21	0.03
35.00	-5.80	-1.02	0.00	-7.75	0.00	7.75	1,341.13	670.57	1,250	625.84	1.02	-0.22	0.02
40.00	-5.65	-1.00	0.00	-2.66	0.00	2.66	1,341.13	670.57	1,250	625.84	1.25	-0.23	0.01
42.00	-3.61	-0.67	0.00	-0.67	0.00	0.67	1,341.13	670.57	1,250	625.84	1.35	-0.23	0.00
43.00	0.00	0.00	0.00	0.00	0.00	0.00	1,341.13	670.57	1,250	625.84	1.40	-0.23	0.00
44.00	0.00	0.00	0.00	0.00	0.00	0.00	1,341.13	670.57	1,250	625.84	1.45	-0.23	0.00

(0.9 - 0.2Sds) * DL + E ELFM **Seismic (Reduced DL)**

CALCULATED FORCES

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (fr-kips)	Mu Mx (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (kips)	Phi Mn (kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-6.02	-0.52	0.00	-20.79	0.00	20.79	1,341.13	670.57	1,250	625.84	0.00	0.00	0.04
5.00	-5.74	-0.52	0.00	-18.17	0.00	18.17	1,341.13	670.57	1,250	625.84	0.01	-0.02	0.03
10.00	-5.47	-0.52	0.00	-15.55	0.00	15.55	1,341.13	670.57	1,250	625.84	0.05	-0.04	0.03
15.00	-5.19	-0.51	0.00	-12.97	0.00	12.97	1,341.13	670.57	1,250	625.84	0.10	-0.06	0.03
20.00	-4.91	-0.50	0.00	-10.43	0.00	10.43	1,341.13	670.57	1,250	625.84	0.18	-0.08	0.02
25.00	-4.63	-0.48	0.00	-7.95	0.00	7.95	1,341.13	670.57	1,250	625.84	0.26	-0.09	0.02
30.00	-4.35	-0.46	0.00	-5.56	0.00	5.56	1,341.13	670.57	1,250	625.84	0.35	-0.09	0.01
35.00	-4.07	-0.43	0.00	-3.27	0.00	3.27	1,341.13	670.57	1,250	625.84	0.46	-0.10	0.01
40.00	-3.96	-0.42	0.00	-1.11	0.00	1.11	1,341.13	670.57	1,250	625.84	0.56	-0.10	0.01

CALCULATED FORCES

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (fr-kips)	Mu Mx (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (kips)	Phi Mn (kips)	Total Deflect (in)	Rotation (deg)	Ratio
42.00	-2.53	-0.27	0.00	-0.27	0.00	0.27	1,341.13	670.57	1,250	625.84	0.61	-0.10	0.00
43.00	0.00	0.00	0.00	0.00	0.00	0.00	1,341.13	670.57	1,250	625.84	0.63	-0.10	0.00
44.00	0.00	0.00	0.00	0.00	0.00	0.00	1,341.13	670.57	1,250	625.84	0.65	-0.10	0.00

(0.9 - 0.2Sds) * DL + E EMAM **Seismic (Reduced DL)**

CALCULATED FORCES

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (fr-kips)	Mu Mx (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (kips)	Phi Mn (kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-6.02	-1.09	0.00	-45.25	0.00	45.25	1,341.13	670.57	1,250	625.84	0.00	0.00	0.08
5.00	-5.74	-1.09	0.00	-39.81	0.00	39.81	1,341.13	670.57	1,250	625.84	0.03	-0.05	0.07
10.00	-5.46	-1.08	0.00	-34.37	0.00	34.37	1,341.13	670.57	1,250	625.84	0.11	-0.10	0.06
15.00	-5.18	-1.08	0.00	-28.95	0.00	28.95	1,341.13	670.57	1,250	625.84	0.23	-0.13	0.05
20.00	-4.90	-1.07	0.00	-23.56	0.00	23.56	1,341.13	670.57	1,250	625.84	0.38	-0.17	0.04
25.00	-4.63	-1.06	0.00	-18.21	0.00	18.21	1,341.13	670.57	1,250	625.84	0.57	-0.19	0.03
30.00	-4.35	-1.04	0.00	-12.92	0.00	12.92	1,341.13	670.57	1,250	625.84	0.78	-0.21	0.02
35.00	-4.07	-1.01	0.00	-7.70	0.00	7.70	1,341.13	670.57	1,250	625.84	1.01	-0.22	0.02
40.00	-3.96	-0.99	0.00	-2.64	0.00	2.64	1,341.13	670.57	1,250	625.84	1.25	-0.23	0.01
42.00	-2.53	-0.66	0.00	-0.66	0.00	0.66	1,341.13	670.57	1,250	625.84	1.34	-0.23	0.00
43.00	0.00	0.00	0.00	0.00	0.00	0.00	1,341.13	670.57	1,250	625.84	1.39	-0.23	0.00
44.00	0.00	0.00	0.00	0.00	0.00	0.00	1,341.13	670.57	1,250	625.84	1.44	-0.23	0.00

ANALYSIS SUMMARY

	Base Reactions						Max Usage	
Load Case	Shear FX (kips)	Shear FZ (kips)	Axial FY (kips)	Moment MX (ft-kips)	Moment MY (ft-kips)	Moment MZ (ft-kips)	Elev (ft)	Interaction Ratio
1.2D + 1.6W	8.18	0.00	8.71	0.00	0.00	320.48	0.00	0.52
0.9D + 1.6W	8.17	0.00	6.53	0.00	0.00	319.09	0.00	0.51
1.2D + 1.0Di + 1.0Wi	1.86	0.00	7.91	0.00	0.00	68.52	0.00	0.12
(1.2 + 0.2Sds) * DL + E ELFM	0.52	0.00	8.59	0.00	0.00	20.89	0.00	0.04
(1.2 + 0.2Sds) * DL + E EMAM	1.09	0.00	8.59	0.00	0.00	45.49	0.00	0.08
(0.9 - 0.2Sds) * DL + E ELFM	0.52	0.00	6.02	0.00	0.00	20.79	0.00	0.04
(0.9 - 0.2Sds) * DL + E EMAM	1.09	0.00	6.02	0.00	0.00	45.25	0.00	0.08
1.0D + 1.0W	2.03	0.00	7.28	0.00	0.00	79.43	0.00	0.13

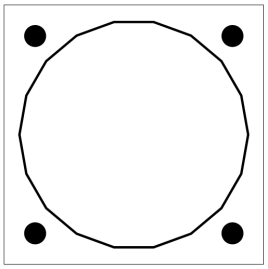
BASE PLATE ANALYSIS @ 0 FT

APPLIED REACTIONS

Moment (k-ft)	Axial (k)	Shear (k)
320.48	8.71	8.18

PLATE PARAMETERS (ID# 27215)

Width:	26.5	in
Shape:	Square	
Thickness:	1.75	in
Grade:	A572-60	
Yield Strength:	60	ksi
Tensile Strength:	75	ksi
Clip Length:		in
Rod Detail Type:	d	
Clear Distance	2.5	in
Base Weld Size:	0.125	in
Orientation Offset:	-	°
Analysis Type:	Plastic	
Neutral Axis:	135	°



ANCHOR ROD PARAMETERS

Class	Arrangement	Quantity	Diameter (in)	Circle (in)	Grade	F_y (ksi)	F_u (ksi)	Spacing (in)	Offset (°)
Original [ID#27925]	Radial	4	2.25	28.5	A615-75	75	100	-	45

COMPONENT PROPERTIES

Component	ID	Gross Area (in^2)	Net Area (in^2)	Individual Inertia (in^4)	Moment of Inertia (in^4)	Threads/in
Pole	23"ø x 0.25" (18 Sides)	17.7772	-	-	1150.48	-
Bolt Group	Original (4) 2.25"ø	3.9761	3.2477	0.8393	1090.55	4.5

REACTION DISTRIBUTION

Component	ID	Moment M_u (k-ft)	Axial Load P_u (k)	Shear V_u (k)	Moment Factor
Pole	23"ø x 0.25" (18 Sides)	320.5	8.71	8.18	1.000
Bolt Group	Original (4) 2.25"ø	320.5	-	8.18	1.000

BASE PLATE BEND LINE ANALYSIS @ 0 FT

POLE PROPERTIES

Flat-to-Flat Diameter:	23.25	in	Flat Width:	4.100	in
Point-to-Point Diameter:	23.61	in	Flat Radians:	0.349	rad
Orientation Offset:	-	°			

PLATE PROPERTIES

Neutral Axis:	135	°

Bend Line	Chord Length (in)	Additional Length (in)	Section Modulus (in^3)	Applied Moment M_u (k-in)	Moment Capacity ΦM_n (k-in)	Flexure Result $M_u/\Phi M_n$
Flats	14.227	0.00	10.892	197.3	588.2	33.5%
Corners	13.868	0.00	10.618	170.4	573.4	29.7%

PLASTIC ANCHOR ROD ANALYSIS

Class	Group Quantity	Rod Diameter (in)	Applied Axial Load P_u (k)	Applied Shear Load V_u (k)	Compressive Capacity ΦP_n (k)	Interaction Result
Original	4	2.25	153.0	4.1	259.8	62.0%

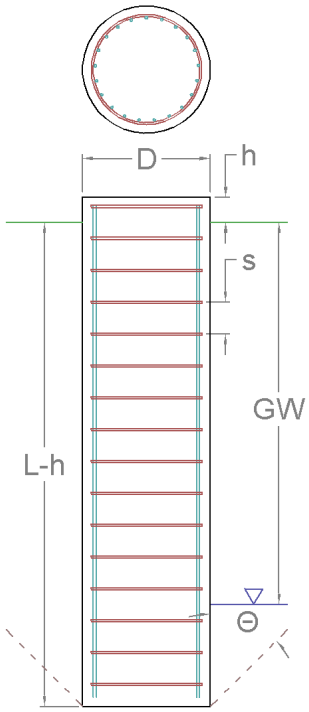
PIER FOUNDATION ANALYSIS

GLOBAL REACTIONS

Moment (k-ft)	Axial (k)	Shear (k)
320.48	8.71	8.18

FOUNDATION PARAMETERS

Pier Diameter:	D	4.00	ft
Pier Embedment Depth:	L-h	16.0	ft
Pier Height above Grade:	h	0.50	ft
Concrete Compressive Strength:		4,000	psi
Vertical Rebar:		(16) #7 bars [60 ksi]	
Tie Rebar:	s	#5 bars @ 12.0" c/c [60 ksi]	
Rebar Clear Cover:		3.00	in



SOIL PARAMETERS

Water Table Depth [BGL]: GW - ft

Layer Depth (ft) Top	Layer Depth (ft) Bottom	Unit Weight pcf	Cohesion psf	Friction Angle °	Ultimate Skin Friction psf	Ultimate Net Bearing psf
0	2	120	500	0	300	0
2	6	120	500	0	300	0
6	17	125	0	0	300	13,600

SOIL STRENGTH ANALYSIS

Volume of Concrete (ft^3)	Buoyant Weight of Concrete (k)	Skin Friction Resistance (k)	Inflection Point [BGL] (ft)
207.35	31.10	60.32	7.96

SOIL MOMENT ANALYSIS

Total Lateral Resistance (k)	Moment at Inflection Point, M_u (k-ft)	Additional Resistance (k-ft)	Nominal Moment Capacity, ΦM_n (k-ft)	Soil Moment Usage, $M_u / \Phi M_n$
241.76	389.65	0.00	788.08	**49.4%**

SOIL COMPRESSION ANALYSIS

Compressive Bearing Resistance (k)	Compressive Force, P_u (k)	Additional Resistance (k)	Nominal Compressive Capacity, ΦP_n (k)	Soil Compressive Usage, $P_u / \Phi P_n$
170.90	15.19	0.00	173.42	**8.8%**

REINFORCING STEEL STRENGTH ANALYSIS

Rebar Cage Diameter (in)	Steel Elastic Modulus, E (ksi)	Strength Bending/Tension Reduction Factor, Φ_b	Strength Shear Reduction Factor, Φ_v	Strength Compression Reduction Factor, Φ_c
39.875	29,000	0.9	0.75	0.65

PIER REINFORCING MOMENT ANALYSIS

Design Moment, M_u (k-ft)	Nominal Moment Capacity, $\Phi_b M_n$ (k-ft)	Bending Reinforcement Ratio	Pier Rebar Flexure Usage, $M_u/\Phi_b M_n$
324.57	845.60	0.01	**38.4%**

PIER REINFORCING COMPRESSION ANALYSIS

Buoyant Weight of Concrete (k)	Design Compression, P_u (k)	Nominal Compressive Capacity, $\Phi_p P_n$ (k)	Pier Rebar Compressive Usage, $P_u / \Phi_p P_n$
31.10	15.19	3,481.84	**0.4%**

PIER REINFORCING SHEAR ANALYSIS

Design Shear, V_u (k)	Nominal Shear Capacity, $\Phi_v V_n$ (k)	Pier Rebar Shear Usage, $V_u / \Phi_v V_n$
37.26	261.36	**14.3%**