Sabre Industries™
Towers and Poles

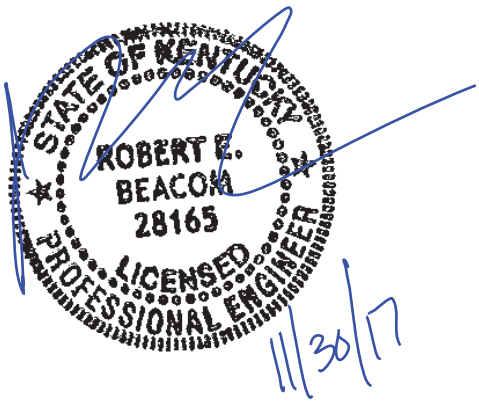
Structural Design Report

195' Monopole
Site: Cane Ridge, KY
Site Number: KYL05247

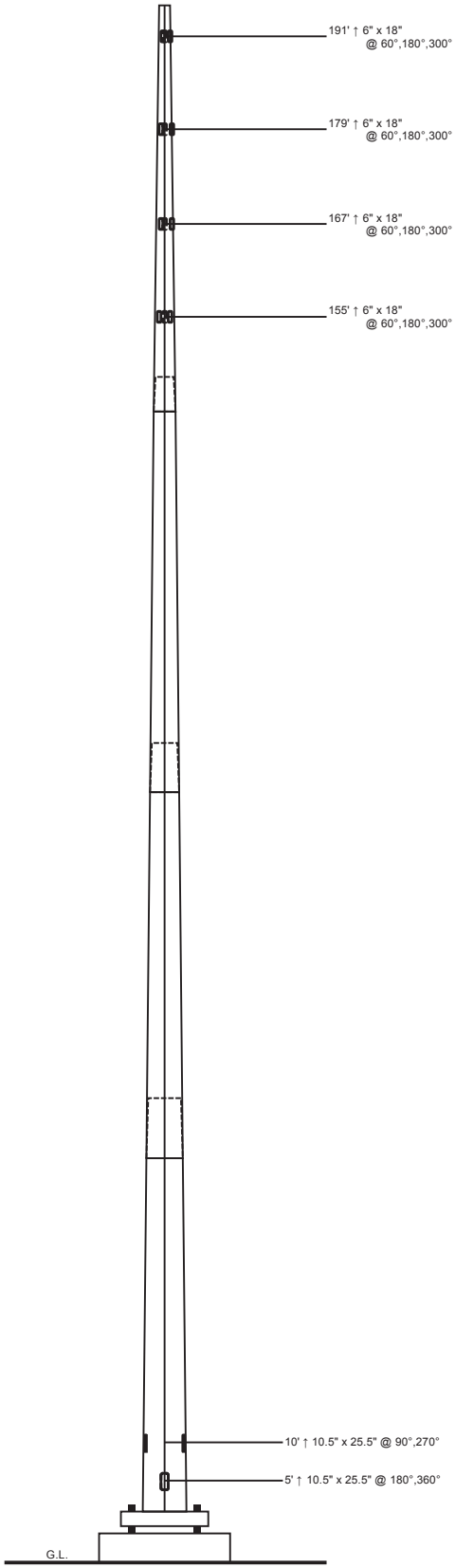
Prepared for: AT&T
by: Sabre Towers & Poles ™

Job Number: 175104

November 29, 2017



Length (ft)	53'-3"	53'-6"	53'-6"	52'-3"
Number Of Sides		18		
Thickness (in)	9/16"	1/2"		3/8"
Lap Splice (ft)		7' - 9"	6' - 3"	A
Top Diameter (in)	53.28"		42"	30.32"	18.25"
Bottom Diameter (in)	67.57"		56.36"	44.68"	32.27"
Taper (in/ft)	0.2684			
Grade	A572-65			
Weight (lbs)	23054		14899	11321	6086
Overall Steel Height (ft)	194			



Designed Appurtenance Loading

Elev	Description	Tx-Line
193	(1) 278 Sq. FT. EPA 6000# (No Ice)	(18) 1 5/8"
181	(1) 208 sq. ft. EPA 4000# (no ice)	(18) 1 5/8"
169	(1) 208 sq. ft. EPA 4000# (no ice)	(18) 1 5/8"
157	(1) 208 sq. ft. EPA 4000# (no ice)	(18) 1 5/8"

Load Case Reactions

Description	Axial (kips)	Shear (kips)	Moment (ft-k)	Deflection (ft)	Sway (deg)
3s Gusted Wind	96.39	61.72	9952.91	19.78	12.32
3s Gusted Wind 0.9 Dead	72.26	61.78	9740.97	19.21	11.91
3s Gusted Wind&Ice	145.54	10.1	1808.9	3.86	2.36
Service Loads	80.42	15.73	2529.19	5.18	3.17

Base Plate Dimensions

Shape	Diameter	Thickness	Bolt Circle	Bolt Qty	Bolt Diameter
Round	80.75"	2.75"	75"	26	2.25"

Anchor Bolt Dimensions

Length	Diameter	Hole Diameter	Weight	Type	Finish
84"	2.25"	2.625"	3148.6	A615-75	Galv

Material List

Display	Value
A	4' - 6"

Notes

1) Antenna Feed Lines Run Inside Pole
2) All dimensions are above ground level, unless otherwise specified.
3) Weights shown are estimates. Final weights may vary.
4) The Monopole was designed for a basic wind speed of 89 mph with 0" of radial ice, and 30 mph with 3/4" of radial ice, in accordance with ANSI/TIA-222-G, Structure Class II, Exposure Category C, Topographic Category 1.
5) The tower design meets the requirements for an Ultimate Wind Speed of 115 mph (Risk Category II), in accordance with the 2012 International Building Code.
6) Full Height Step Bolts
7) Tower Rating: 99.9%

Sabre Industries™ Towers and Poles

Sabre Communications Corporation
7101 Southbridge Drive
P.O. Box 658
Sioux City, IA 51102-0658
Phone: (712) 258-6690
Fax: (712) 279-0814

Job:	**175104**
Customer:	AT&T
Site Name:	Cane Ridge, KY KYL05247
Description:	195' Monopole
Date:	11/29/2017 By: NM

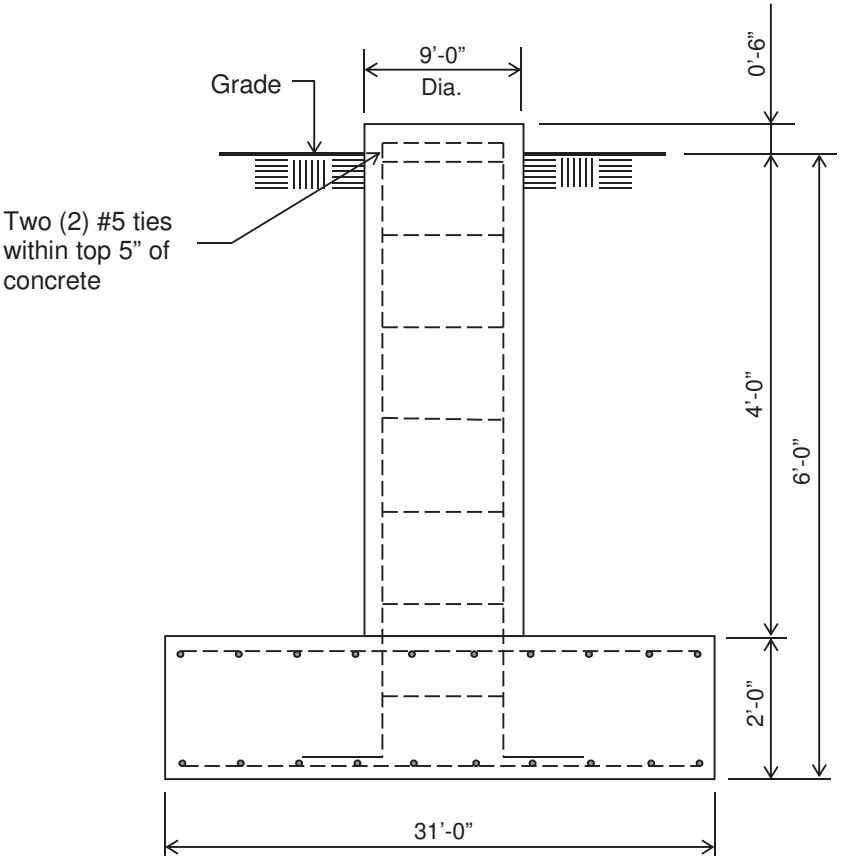
Sabre Industries™
Towers and Poles

No.: 175104

Date: 11/29/17
By: NM

Customer: AT&T
Site: Cane Ridge, KY KYL05247

195' Monopole at
89 mph Wind with no ice and 30 mph Wind with 0.75 in. Ice per ANSI/TIA-222-G.
Antenna Loading per Page 1



ELEVATION VIEW
(81.79 Cu. Yds.)
(1 REQUIRED; NOT TO SCALE)

Notes:

1) Concrete shall have a minimum 28-day compressive strength of 4,500 psi, in accordance with ACI 318-11.

2) Rebar to conform to ASTM specification A615 Grade 60.

3) All rebar to have a minimum of 3" concrete cover.

4) All exposed concrete corners to be chamfered 3/4".

5) The foundation design is based on the geotechnical report by Power of Design Group, LLC., Project No. 17-12791 dated: August 18th, 2017.

6) See the geotechnical report for compaction requirements, if specified.

7) 4 ft of soil cover is required over the entire area of the foundation slab.

8) The foundation is based on the following factored loads:
   Moment (kip-ft) = 9952.91
   Axial (kips) = 96.39
   Shear (kips) = 61.72

Rebar Schedule for Pad and Pier	
Pier	(62) #8 vertical rebar w/ hooks at bottom w/ #5 ties, two within top 5" of pier, then 12" C/C
Pad	(69) #9 horizontal rebar evenly spaced each way top and bottom (276 total)

7101 Southbridge Drive - P.O. Box 658 - Sioux City, IA 51102-0658 - Phone 712.258.6690 - Fax 712.279.0814

(USA 222-G) - Monopole Spatial Analysis (c)2015 Guymast Inc.

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195' Monopole / Cane Ridge, KY

* All pole diameters shown on the following pages are across corners.
See profile drawing for widths across flats.

POLE GEOMETRY

ELEV ft	SECTION NAME	No. SIDE	OUTSIDE DIAM in	THICK -NESS in	RESISTANCES ϕ*Pn kip	RESISTANCES ϕ*Mn ft-kip	SPLICE TYPE	...OVERLAP... LENGTH ft	...OVERLAP... RATIO	w/t
194.0										
			18.53	0.375	1580.7	573.9				
	A	18								6.8
			31.53	0.375	2713.0	1704.8				
146.2										
			31.53	0.375	2713.0	1704.8				
	A/B	18					SLIP	4.50	1.71	
			32.02	0.500	3659.2	2317.4				
141.7										
			32.02	0.500	3659.2	2317.4				
	B	18								9.4
			43.65	0.500	5009.0	4360.4				
99.0										
			43.65	0.500	5009.0	4360.4				
	B/C	18					SLIP	6.25	1.72	
			44.36	0.500	5092.4	4507.8				
92.7										
			44.36	0.500	5092.4	4507.8				
	C	18								13.6
			55.10	0.500	6217.3	6865.6				
53.2										
			55.10	0.500	6217.3	6865.6				
	C/D	18					SLIP	7.75	1.68	
			56.23	0.562	7270.2	8177.2				
45.5										
			56.23	0.562	7270.2	8177.2				
	D	18								15.6
			68.61	0.562	8458.6	11652.2				
0.0										

POLE ASSEMBLY

SECTION NAME	BASE ELEV ft	BOLTS AT BASE OF SECTION... NUMBER	TYPE	DIAM in	STRENGTH ksi	THREADS IN SHEAR PLANE	CALC BASE ELEV ft
A	141.750	0	A325	0.00	92.0	0	141.750
B	92.750	0	A325	0.00	92.0	0	92.750
C	45.500	0	A325	0.00	92.0	0	45.500
D	0.000	0	A325	0.00	92.0	0	0.000

POLE SECTIONS

SECTION NAME	No.of SIDES	LENGTH ft	OUTSIDE.DIAMETER BOT * in	OUTSIDE.DIAMETER TOP * in	THICK-NESS in	MAT-ERIAL ID	FLANGE.ID BOT	FLANGE.ID TOP	FLANGE.WELD ..GROUP.ID.. BOT	FLANGE.WELD ..GROUP.ID.. TOP
A	18	52.25	32.77	18.53	0.375	1	0	0	0	0
B	18	53.50	45.36	30.78	0.500	2	0	0	0	0
C	18	53.50	57.23	42.65	0.500	3	0	0	0	0
D	18	53.25	68.61	54.10	0.562	4	0	0	0	0

* - Diameter of circumscribed circle

MATERIAL TYPES

TYPE OF SHAPE	TYPE NO	NO OF ELEM.	ORIENT & deg	HEIGHT in	WIDTH in	.THICKNESS. WEB in	FLANGE in	IRREGULARITY .PROJECTION. % OF AREA	ORIENT deg
PL	1	1	0.0	32.77	0.38	0.375	0.375	0.00	0.0
PL	2	1	0.0	45.36	0.50	0.500	0.500	0.00	0.0
PL	3	1	0.0	57.23	0.50	0.500	0.500	0.00	0.0
PL	4	1	0.0	68.61	0.56	0.562	0.562	0.00	0.0

& - With respect to vertical

MATERIAL PROPERTIES

MATERIAL TYPE NO.	ELASTIC MODULUS ksi	UNIT WEIGHT pcf	.. STRENGTH .. Fu ksi	Fy ksi	THERMAL COEFFICIENT /deg
1	29000.0	490.0	80.0	65.0	0.00001170
2	29000.0	490.0	80.0	65.0	0.00001170
3	29000.0	490.0	80.0	65.0	0.00001170
4	29000.0	490.0	80.0	65.0	0.00001170

* Only 3 condition(s) shown in full
* Some concentrated wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A

89 mph wind with no ice. Wind Azimuth: 0

LOADS ON POLE

LOAD TYPE	ELEV ft	APPLY..LOAD..AT RADIUS ft	AZI	LOAD AZI	.....FORCES..... HORIZ kip	DOWN kip	.....MOMENTS..... VERTICAL ft-kip	TORSNAL ft-kip
C	192.000	0.00	0.0	0.0	0.0000	4.3131	0.0000	0.0000
C	192.000	0.00	0.0	0.0	13.7000	7.2000	0.0000	0.0000
C	180.000	0.00	0.0	0.0	0.0000	4.0435	0.0000	0.0000
C	180.000	0.00	0.0	0.0	10.1128	4.8000	0.0000	0.0000
C	168.000	0.00	0.0	0.0	0.0000	3.7740	0.0000	0.0000
C	168.000	0.00	0.0	0.0	9.9678	4.8000	0.0000	0.0000
C	156.000	0.00	0.0	0.0	0.0000	3.5044	0.0000	0.0000
C	156.000	0.00	0.0	0.0	9.8144	4.8000	0.0000	0.0000
D	194.000	0.00	180.0	0.0	0.0549	0.0976	0.0000	0.0000
D	178.083	0.00	180.0	0.0	0.0549	0.0976	0.0000	0.0000
D	178.083	0.00	180.0	0.0	0.0652	0.1181	0.0000	0.0000
D	162.167	0.00	180.0	0.0	0.0652	0.1181	0.0000	0.0000
D	162.167	0.00	180.0	0.0	0.0749	0.1385	0.0000	0.0000
D	146.250	0.00	180.0	0.0	0.0749	0.1385	0.0000	0.0000
D	146.250	0.00	180.0	0.0	0.0808	0.3494	0.0000	0.0000
D	141.750	0.00	180.0	0.0	0.0808	0.3494	0.0000	0.0000
D	141.750	0.00	180.0	0.0	0.0841	0.2138	0.0000	0.0000
D	127.500	0.00	180.0	0.0	0.0841	0.2138	0.0000	0.0000
D	127.500	0.00	180.0	0.0	0.0916	0.2383	0.0000	0.0000
D	113.250	0.00	180.0	0.0	0.0916	0.2383	0.0000	0.0000
D	113.250	0.00	180.0	0.0	0.0984	0.2627	0.0000	0.0000
D	99.000	0.00	180.0	0.0	0.0984	0.2627	0.0000	0.0000
D	99.000	0.00	180.0	0.0	0.1028	0.5551	0.0000	0.0000
D	92.750	0.00	180.0	0.0	0.1028	0.5551	0.0000	0.0000
D	92.750	0.00	180.0	0.0	0.1042	0.2915	0.0000	0.0000
D	79.583	0.00	180.0	0.0	0.1042	0.2915	0.0000	0.0000

D	79.583	0.00	180.0	0.0	0.1085	0.3142	0.0000	0.0000
D	66.417	0.00	180.0	0.0	0.1085	0.3142	0.0000	0.0000
D	66.417	0.00	180.0	0.0	0.1116	0.3369	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1116	0.3369	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1130	0.7472	0.0000	0.0000
D	45.500	0.00	180.0	0.0	0.1130	0.7472	0.0000	0.0000
D	45.500	0.00	180.0	0.0	0.1112	0.4109	0.0000	0.0000
D	34.125	0.00	180.0	0.0	0.1112	0.4109	0.0000	0.0000
D	34.125	0.00	180.0	0.0	0.1082	0.4329	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.1036	0.4770	0.0000	0.0000

LOADING CONDITION M

89 mph wind with no ice. Wind Azimuth: 0◆

LOADS ON POLE

LOAD TYPE	ELEV	APPLY..LOAD..AT RADIUS	AZI	LOAD AZI	.....FORCES..... HORIZ	DOWN	.....MOMENTS..... VERTICAL	TORSNAL
	ft	ft			kip	kip	ft-kip	ft-kip
C	192.000	0.00	0.0	0.0	0.0000	3.2348	0.0000	0.0000
C	192.000	0.00	0.0	0.0	13.7000	5.4000	0.0000	0.0000
C	180.000	0.00	0.0	0.0	0.0000	3.0326	0.0000	0.0000
C	180.000	0.00	0.0	0.0	10.1128	3.6000	0.0000	0.0000
C	168.000	0.00	0.0	0.0	0.0000	2.8305	0.0000	0.0000
C	168.000	0.00	0.0	0.0	9.9678	3.6000	0.0000	0.0000
C	156.000	0.00	0.0	0.0	0.0000	2.6283	0.0000	0.0000
C	156.000	0.00	0.0	0.0	9.8144	3.6000	0.0000	0.0000
D	194.000	0.00	180.0	0.0	0.0549	0.0732	0.0000	0.0000
D	178.083	0.00	180.0	0.0	0.0549	0.0732	0.0000	0.0000
D	178.083	0.00	180.0	0.0	0.0652	0.0886	0.0000	0.0000
D	162.167	0.00	180.0	0.0	0.0652	0.0886	0.0000	0.0000
D	162.167	0.00	180.0	0.0	0.0749	0.1039	0.0000	0.0000
D	146.250	0.00	180.0	0.0	0.0749	0.1039	0.0000	0.0000
D	146.250	0.00	180.0	0.0	0.0808	0.2620	0.0000	0.0000
D	141.750	0.00	180.0	0.0	0.0808	0.2620	0.0000	0.0000
D	141.750	0.00	180.0	0.0	0.0841	0.1604	0.0000	0.0000
D	127.500	0.00	180.0	0.0	0.0841	0.1604	0.0000	0.0000
D	127.500	0.00	180.0	0.0	0.0916	0.1787	0.0000	0.0000
D	113.250	0.00	180.0	0.0	0.0916	0.1787	0.0000	0.0000
D	113.250	0.00	180.0	0.0	0.0984	0.1971	0.0000	0.0000
D	99.000	0.00	180.0	0.0	0.0984	0.1971	0.0000	0.0000
D	99.000	0.00	180.0	0.0	0.1028	0.4164	0.0000	0.0000
D	92.750	0.00	180.0	0.0	0.1028	0.4164	0.0000	0.0000
D	92.750	0.00	180.0	0.0	0.1042	0.2186	0.0000	0.0000
D	79.583	0.00	180.0	0.0	0.1042	0.2186	0.0000	0.0000
D	79.583	0.00	180.0	0.0	0.1085	0.2356	0.0000	0.0000
D	66.417	0.00	180.0	0.0	0.1085	0.2356	0.0000	0.0000
D	66.417	0.00	180.0	0.0	0.1116	0.2526	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1116	0.2526	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1130	0.5604	0.0000	0.0000
D	45.500	0.00	180.0	0.0	0.1130	0.5604	0.0000	0.0000
D	45.500	0.00	180.0	0.0	0.1112	0.3082	0.0000	0.0000
D	34.125	0.00	180.0	0.0	0.1112	0.3082	0.0000	0.0000
D	34.125	0.00	180.0	0.0	0.1082	0.3247	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.1036	0.3578	0.0000	0.0000

LOADING CONDITION Y

30 mph wind with 0.75 ice. Wind Azimuth: 0◆

LOADS ON POLE

LOAD TYPE	ELEV	APPLY..LOAD..AT RADIUS	AZI	LOAD AZI	.....FORCES..... HORIZ	DOWN	.....MOMENTS..... VERTICAL	TORSNAL
	ft	ft			kip	kip	ft-kip	ft-kip
C	192.000	0.00	0.0	0.0	0.0000	4.3131	0.0000	0.0000

C	192.000	0.00	0.0	0.0	1.6744	17.9386	0.0000	0.0000
C	180.000	0.00	0.0	0.0	0.0000	4.0435	0.0000	0.0000
C	180.000	0.00	0.0	0.0	1.9952	11.9132	0.0000	0.0000
C	168.000	0.00	0.0	0.0	0.0000	3.7740	0.0000	0.0000
C	168.000	0.00	0.0	0.0	1.9580	11.8646	0.0000	0.0000
C	156.000	0.00	0.0	0.0	0.0000	3.5044	0.0000	0.0000
C	156.000	0.00	0.0	0.0	1.9189	11.8128	0.0000	0.0000
D	194.000	0.00	180.0	0.0	0.0084	0.1466	0.0000	0.0000
D	178.083	0.00	180.0	0.0	0.0084	0.1466	0.0000	0.0000
D	178.083	0.00	180.0	0.0	0.0098	0.1760	0.0000	0.0000
D	162.167	0.00	180.0	0.0	0.0098	0.1760	0.0000	0.0000
D	162.167	0.00	180.0	0.0	0.0110	0.2051	0.0000	0.0000
D	146.250	0.00	180.0	0.0	0.0110	0.2051	0.0000	0.0000
D	146.250	0.00	180.0	0.0	0.0117	0.4214	0.0000	0.0000
D	141.750	0.00	180.0	0.0	0.0117	0.4214	0.0000	0.0000
D	141.750	0.00	180.0	0.0	0.0122	0.2891	0.0000	0.0000
D	127.500	0.00	180.0	0.0	0.0122	0.2891	0.0000	0.0000
D	127.500	0.00	180.0	0.0	0.0131	0.3208	0.0000	0.0000
D	113.250	0.00	180.0	0.0	0.0131	0.3208	0.0000	0.0000
D	113.250	0.00	180.0	0.0	0.0139	0.3522	0.0000	0.0000
D	99.000	0.00	180.0	0.0	0.0139	0.3522	0.0000	0.0000
D	99.000	0.00	180.0	0.0	0.0145	0.6494	0.0000	0.0000
D	92.750	0.00	180.0	0.0	0.0145	0.6494	0.0000	0.0000
D	92.750	0.00	180.0	0.0	0.0146	0.3880	0.0000	0.0000
D	79.583	0.00	180.0	0.0	0.0146	0.3880	0.0000	0.0000
D	79.583	0.00	180.0	0.0	0.0152	0.4162	0.0000	0.0000
D	66.417	0.00	180.0	0.0	0.0152	0.4162	0.0000	0.0000
D	66.417	0.00	180.0	0.0	0.0155	0.4438	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0155	0.4438	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0156	0.8576	0.0000	0.0000
D	45.500	0.00	180.0	0.0	0.0156	0.8576	0.0000	0.0000
D	45.500	0.00	180.0	0.0	0.0154	0.5222	0.0000	0.0000
D	11.375	0.00	180.0	0.0	0.0143	0.5682	0.0000	0.0000
D	11.375	0.00	180.0	0.0	0.0142	0.5838	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.0142	0.5838	0.0000	0.0000

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(USA 222-G) - Monopole Spatial Analysis (c)2015 Guymast Inc.

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195' Monopole / Cane Ridge, KY

MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

MAST ELEV ft	DEFLECTIONS (ft) HORIZONTAL ALONG	DEFLECTIONS (ft) HORIZONTAL ACROSS	DEFLECTIONS (ft) DOWN	ROTATIONS (deg) TILT ALONG	ROTATIONS (deg) TILT ACROSS	ROTATIONS (deg) TWIST
194.0	19.78K	-0.07Q	2.95I	12.32I	-0.03Q	0.00F
178.1	16.54K	-0.06Q	2.26I	12.00I	-0.03Q	0.00F
162.2	13.45K	-0.05Q	1.64I	11.03K	-0.03Q	0.00F
146.2	10.66K	-0.04Q	1.13I	9.62K	-0.03Q	0.00K
141.7	9.94K	-0.04Q	1.02I	9.28K	-0.03Q	0.00K
127.5	7.83K	-0.03Q	0.70I	8.09K	-0.03Q	0.00K
113.2	6.00K	-0.03Q	0.46I	6.91K	-0.03Q	0.00K
99.0	4.44K	-0.02Q	0.28I	5.80K	-0.02Q	0.00K
92.7	3.83K	-0.02Q	0.23I	5.34K	-0.02Q	0.00K
79.6	2.73K	-0.01Q	0.13I	4.35K	-0.02Q	0.00K

66.4	1.84K	-0.01Q	0.07I	3.44K	-0.02Q	0.00K
53.2	1.15K	-0.01Q	0.03I	2.60K	-0.01Q	0.00K
45.5	0.83K	0.00Q	0.02I	2.18K	-0.01Q	0.00K
34.1	0.45K	0.00Q	0.01I	1.58K	-0.01Q	0.00K
22.7	0.20K	0.00Q	0.00E	1.02K	0.00Q	0.00K
11.4	0.05K	0.00Q	0.00E	0.49K	0.00Q	0.00K
0.0	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A

MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

MAST ELEV ft	TOTAL AXIAL kip	SHEAR.w.r.t.WIND.DIR ALONG kip	ACROSS kip	MOMENT.w.r.t.WIND.DIR ALONG ft-kip	ACROSS ft-kip	TORSION ft-kip
194.0	0.02 A	0.00 D	0.00 Q	0.02 U	-0.01 Q	0.00 L
	40.54 AI	24.67 M	0.00 Q	-246.03 I	-0.07 B	-0.07 B
178.1	40.54 AA	24.67 Q	0.00 F	-246.04 D	-0.07 B	-0.07 B
	58.98 AA	35.66 Q	0.00 F	-767.10 L	-0.27 B	-0.22 B
162.2	58.98 AI	35.66 I	0.01 H	-767.11 L	-0.28 B	-0.21 B
	77.56 AI	46.65 I	0.01 H	-1525.46 I	-0.48 B	-0.44 B
146.2	77.56 AJ	46.92 O	0.16 C	-1525.77 K	-0.59 B	-0.45 B
	79.46 AJ	47.27 O	0.16 C	-1762.25 I	-0.97 C	-0.58 B
141.7	79.46 AC	47.28 K	-0.27 Q	-1762.25 I	-0.95 T	-0.56 B
	83.58 AC	48.46 K	-0.27 Q	-2524.20 K	4.41 Q	-0.88 B
127.5	83.57 AA	48.47 I	-0.30 Q	-2524.21 K	4.41 Q	-0.89 B
	88.14 AA	49.76 I	-0.30 Q	-3300.95 K	8.74 Q	1.09 F
113.2	88.14 AA	49.76 I	-0.32 Q	-3300.89 K	8.73 Q	1.10 F
	93.16 AA	51.16 I	-0.32 Q	-4092.98 I	13.41 Q	1.51 K
99.0	93.16 AA	51.15 K	-0.33 Q	-4093.05 I	13.29 Q	1.52 K
	97.22 AA	51.79 K	-0.33 Q	-4444.82 I	15.38 Q	1.69 K
92.7	97.22 AI	51.81 X	-0.35 Q	-4445.03 I	15.31 Q	1.69 K
	102.33 AI	53.18 X	-0.35 Q	-5195.43 K	19.95 Q	2.05 K
79.6	102.33 AI	53.12 X	-0.31 Q	-5195.42 K	19.93 Q	2.05 K
	107.81 AI	54.54 X	-0.31 Q	-5956.52 K	24.07 Q	2.31 K
66.4	107.81 AI	54.52 X	-0.30 Q	-5956.48 K	24.08 Q	2.31 K
	113.65 AI	55.99 X	-0.30 Q	-6728.09 K	28.14 Q	2.50 K
53.2	113.65 AI	56.02 X	-0.37 Q	-6728.15 K	28.11 Q	2.51 K
	120.30 AI	56.89 X	-0.37 Q	-7187.76 K	31.00 Q	2.60 K
45.5	120.30 AI	56.88 X	-0.36 Q	-7187.69 K	30.98 Q	2.60 K
	126.32 AI	58.15 X	-0.36 Q	-7869.73 K	35.14 Q	2.71 K
34.1	126.32 AI	58.16 X	-0.35 Q	-7869.74 K	35.14 Q	2.71 K
	132.53 AI	59.39 X	-0.35 Q	-8558.43 K	39.14 Q	2.79 K

22.7	132.53 AI	59.39 X	-0.35 Q	-8558.42 K	39.14 Q	2.79 K
	138.90 AI	60.59 X	-0.35 Q	-9253.09 K	43.16 Q	2.83 K
11.4	138.90 AI	60.59 X	-0.35 Q	-9253.08 K	43.16 Q	2.83 K
	145.54 AI	61.78 X	-0.35 Q	-9952.91 K	47.19 Q	2.85 K
base reaction	145.54 AI	-61.78 X	0.35 Q	9952.91 K	-47.19 Q	-2.85 K

COMPLIANCE WITH 4.8.2 & 4.5.4

ELEV ft	AXIAL	BENDING	SHEAR + TORSIONAL	TOTAL	SATISFIED	D/t(w/t)	MAX ALLOWED
194.00	0.00A	0.00U	0.00D	0.00U	YES	6.82A	45.2
	0.02AI	0.28I	0.03M	0.29L	YES	8.83A	45.2
178.08	0.02AA	0.28D	0.03Q	0.29I	YES	8.83A	45.2
	0.03AA	0.61L	0.03Q	0.62L	YES	10.84A	45.2
162.17	0.03AI	0.61L	0.03I	0.62L	YES	10.84A	45.2
	0.03AI	0.89I	0.03I	0.91I	YES	12.84A	45.2
146.25	0.02AJ	0.68K	0.03O	0.69K	YES	9.19A	45.2
	0.02AJ	0.73I	0.03O	0.74I	YES	9.62A	45.2
141.75	0.02AC	0.76I	0.03K	0.77I	YES	9.35A	45.2
	0.02AC	0.86K	0.02K	0.87K	YES	10.70A	45.2
127.50	0.02AA	0.86K	0.02I	0.87K	YES	10.70A	45.2
	0.02AA	0.91K	0.02I	0.93K	YES	12.05A	45.2
113.25	0.02AA	0.91K	0.02I	0.93K	YES	12.05A	45.2
	0.02AA	0.94I	0.02I	0.95I	YES	13.40A	45.2
99.00	0.02AA	0.94I	0.02K	0.95I	YES	13.40A	45.2
	0.02AA	0.94I	0.02K	0.95I	YES	13.99A	45.2
92.75	0.02AI	0.99I	0.02X	1.00I	YES	13.64A	45.2
	0.02AI	0.98K	0.02X	1.00K	YES	14.89A	45.2
79.58	0.02AI	0.98K	0.02K	1.00K	YES	14.89A	45.2
	0.02AI	0.98K	0.02K	0.99K	YES	16.13A	45.2
66.42	0.02AI	0.98K	0.02K	0.99K	YES	16.13A	45.2
	0.02AI	0.98K	0.02K	0.99K	YES	17.38A	45.2
53.25	0.02AI	0.86K	0.02K	0.87K	YES	15.25A	45.2
	0.02AI	0.85K	0.02K	0.86K	YES	15.90A	45.2
45.50	0.02AI	0.88K	0.02K	0.89K	YES	15.59A	45.2
	0.02AI	0.87K	0.02K	0.88K	YES	16.55A	45.2
34.12	0.02AI	0.87K	0.02K	0.88K	YES	16.55A	45.2
	0.02AI	0.87K	0.02K	0.88K	YES	17.50A	45.2
22.75	0.02AI	0.87K	0.02K	0.88K	YES	17.50A	45.2

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                                                  175104
            0.02AI    0.86K     0.01K     0.87K     YES      18.46A       45.2
 11.37  ..............................................................................
            0.02AI    0.86K     0.01K     0.87K     YES      18.46A       45.2

            0.02AI    0.85K     0.01K     0.87K     YES      19.42A       45.2
  0.00  ..............................................................................
```

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)
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DOWN	SHEAR.w.r.t.WIND.DIR ALONG	ACROSS	MOMENT.w.r.t.WIND.DIR ALONG	ACROSS	TORSION
kip	kip	kip	ft-kip	ft-kip	ft-kip
145.54	61.78	-0.35	-9952.91	47.19	2.85
AI	X	Q	K	Q	K

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195' Monopole / Cane Ridge, KY

****
********** Service Load Condition **********
****

* Only 1 condition(s) shown in full
* Some concentrated wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A ==========

60 mph wind with no ice. Wind Azimuth: 0

LOADS ON POLE
==========

LOAD TYPE	ELEV	APPLY..LOAD..AT RADIUS	AZI	LOAD AZI	.....FORCES..... HORIZ	DOWN	.....MOMENTS..... VERTICAL	TORSNAL
	ft	ft			kip	kip	ft-kip	ft-kip
C	192.000	0.00	0.0	0.0	0.0000	3.5942	0.0000	0.0000
C	192.000	0.00	0.0	0.0	3.4819	6.0000	0.0000	0.0000
C	180.000	0.00	0.0	0.0	0.0000	3.3696	0.0000	0.0000
C	180.000	0.00	0.0	0.0	2.5702	4.0000	0.0000	0.0000
C	168.000	0.00	0.0	0.0	0.0000	3.1450	0.0000	0.0000
C	168.000	0.00	0.0	0.0	2.5334	4.0000	0.0000	0.0000
C	156.000	0.00	0.0	0.0	0.0000	2.9203	0.0000	0.0000
C	156.000	0.00	0.0	0.0	2.4944	4.0000	0.0000	0.0000
D	194.000	0.00	180.0	0.0	0.0140	0.0814	0.0000	0.0000
D	178.083	0.00	180.0	0.0	0.0140	0.0814	0.0000	0.0000
D	178.083	0.00	180.0	0.0	0.0166	0.0984	0.0000	0.0000
D	162.167	0.00	180.0	0.0	0.0166	0.0984	0.0000	0.0000
D	162.167	0.00	180.0	0.0	0.0190	0.1155	0.0000	0.0000
D	146.250	0.00	180.0	0.0	0.0190	0.1155	0.0000	0.0000
D	146.250	0.00	180.0	0.0	0.0205	0.2912	0.0000	0.0000
D	141.750	0.00	180.0	0.0	0.0205	0.2912	0.0000	0.0000
D	141.750	0.00	180.0	0.0	0.0214	0.1782	0.0000	0.0000
D	127.500	0.00	180.0	0.0	0.0214	0.1782	0.0000	0.0000
D	127.500	0.00	180.0	0.0	0.0233	0.1986	0.0000	0.0000
D	113.250	0.00	180.0	0.0	0.0233	0.1986	0.0000	0.0000
D	113.250	0.00	180.0	0.0	0.0250	0.2189	0.0000	0.0000
D	99.000	0.00	180.0	0.0	0.0250	0.2189	0.0000	0.0000

D	99.000	0.00	180.0	0.0	0.0261	0.4626	0.0000	0.0000
D	92.750	0.00	180.0	0.0	0.0261	0.4626	0.0000	0.0000
D	92.750	0.00	180.0	0.0	0.0265	0.2429	0.0000	0.0000
D	79.583	0.00	180.0	0.0	0.0265	0.2429	0.0000	0.0000
D	79.583	0.00	180.0	0.0	0.0276	0.2618	0.0000	0.0000
D	66.417	0.00	180.0	0.0	0.0276	0.2618	0.0000	0.0000
D	66.417	0.00	180.0	0.0	0.0284	0.2807	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0284	0.2807	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0287	0.6227	0.0000	0.0000
D	45.500	0.00	180.0	0.0	0.0287	0.6227	0.0000	0.0000
D	45.500	0.00	180.0	0.0	0.0283	0.3424	0.0000	0.0000
D	34.125	0.00	180.0	0.0	0.0283	0.3424	0.0000	0.0000
D	34.125	0.00	180.0	0.0	0.0275	0.3608	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.0263	0.3975	0.0000	0.0000

MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

MAST ELEV ft	DEFLECTIONS (ft) HORIZONTAL ALONG	HORIZONTAL ACROSS	DOWN	ROTATIONS (deg) TILT ALONG	TILT ACROSS	TWIST
194.0	5.18E	-0.01L	0.20E	3.17E	0.00L	0.00L
178.1	4.31E	-0.01L	0.16E	3.09E	0.00L	0.00L
162.2	3.49E	-0.01L	0.11E	2.83E	0.00L	0.00L
146.2	2.75E	-0.01L	0.08E	2.46E	0.00L	0.00L
141.7	2.56E	-0.01L	0.07E	2.38E	0.00L	0.00L
127.5	2.01F	-0.01L	0.05E	2.07E	0.00L	0.00L
113.2	1.54F	0.00L	0.03E	1.76E	0.00L	0.00L
99.0	1.13F	0.00L	0.02E	1.48E	0.00L	0.00L
92.7	0.98F	0.00L	0.02E	1.36E	0.00L	0.00L
79.6	0.70F	0.00L	0.01E	1.11F	0.00L	0.00L
66.4	0.47F	0.00L	0.01E	0.87F	0.00L	0.00L
53.2	0.29F	0.00L	0.00E	0.66F	0.00L	0.00L
45.5	0.21F	0.00L	0.00E	0.56F	0.00L	0.00L
34.1	0.12F	0.00L	0.00E	0.40F	0.00L	0.00L
22.7	0.05F	0.00L	0.00D	0.26F	0.00L	0.00L
11.4	0.01F	0.00L	0.00A	0.12F	0.00L	0.00L
0.0	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A

MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

MAST ELEV ft	TOTAL AXIAL kip	SHEAR.w.r.t.WIND.DIR ALONG kip	SHEAR.w.r.t.WIND.DIR ACROSS kip	MOMENT.w.r.t.WIND.DIR ALONG ft-kip	MOMENT.w.r.t.WIND.DIR ACROSS ft-kip	TORSION ft-kip
194.0	0.00 C	0.00 L	0.00 L	0.00 K	0.00 L	0.00 L
	18.26 D	6.27 L	0.00 L	-63.64 D	-0.02 C	-0.01 C
178.1	18.26 I	6.28 L	0.00 F	-63.64 D	-0.02 C	-0.01 C
	26.97 I	9.07 L	0.00 F	-197.91 D	-0.06 C	-0.02 C
162.2	26.97 I	9.07 F	0.00 F	-197.92 D	-0.06 C	-0.02 C
	35.73 I	11.87 F	0.00 F	-392.32 D	-0.14 C	-0.04 C

146.2						
	35.73 I	11.91 K	-0.03 L	-392.32 F	-0.15 C	-0.04 C
	37.04 I	12.00 K	-0.03 L	-452.82 D	-0.21 C	-0.04 C
141.7						
	37.06 I	12.03 E	-0.04 L	-452.85 D	-0.23 C	-0.04 C
	39.59 I	12.33 E	-0.04 L	-646.91 E	0.61 L	-0.05 C
127.5						
	39.59 I	12.33 E	-0.06 L	-646.90 E	0.61 L	-0.06 C
	42.41 I	12.66 E	-0.06 L	-844.21 E	1.45 L	-0.08 L
113.2						
	42.41 K	12.66 E	-0.06 L	-844.20 E	1.45 L	-0.08 L
	45.53 K	13.02 E	-0.06 L	-1044.66 E	2.26 L	-0.11 L
99.0						
	45.53 K	13.02 E	-0.07 L	-1044.63 E	2.22 L	-0.11 L
	48.42 K	13.18 E	-0.07 L	-1133.68 E	2.63 L	-0.12 L
92.7						
	48.42 I	13.17 F	0.05 I	-1133.62 E	2.62 L	-0.12 L
	51.62 I	13.52 F	0.05 I	-1323.06 E	3.19 L	-0.14 L
79.6						
	51.62 K	13.53 F	-0.04 L	-1323.06 E	3.18 L	-0.14 L
	55.07 K	13.90 F	-0.04 L	-1515.27 E	3.74 L	-0.15 L
66.4						
	55.07 K	13.89 F	0.04 I	-1515.26 E	3.74 L	-0.15 L
	58.76 K	14.26 F	0.04 I	-1710.33 F	4.27 L	-0.16 L
53.2						
	58.76 K	14.27 F	-0.05 L	-1710.34 F	4.29 L	-0.16 L
	63.59 K	14.49 F	-0.05 L	-1826.75 F	4.65 L	-0.16 L
45.5						
	63.59 K	14.50 F	-0.05 L	-1826.77 F	4.64 L	-0.16 L
	67.48 K	14.82 F	-0.05 L	-1999.66 F	5.22 L	-0.17 L
34.1						
	67.48 K	14.81 F	-0.05 L	-1999.66 F	5.21 L	-0.17 L
	71.66 K	15.12 F	-0.05 L	-2174.45 F	5.72 L	-0.17 L
22.7						
	71.66 K	15.12 F	-0.04 L	-2174.45 F	5.72 L	-0.17 L
	75.97 K	15.43 F	-0.04 L	-2351.00 F	6.22 L	-0.17 L
11.4						
	75.97 K	15.43 F	-0.04 L	-2351.00 F	6.22 L	-0.17 L
	80.42 K	15.73 F	-0.04 L	-2529.19 F	6.72 L	-0.17 L
base reaction	80.42 K	-15.73 F	0.04 L	2529.19 F	-6.72 L	0.17 L

COMPLIANCE WITH 4.8.2 & 4.5.4

ELEV ft	AXIAL	BENDING	SHEAR + TORSIONAL	TOTAL	SATISFIED	D/t(w/t)	MAX ALLOWED
194.00							
	0.00C	0.00K	0.00L	0.00K	YES	6.82A	45.2
	0.01D	0.07D	0.01L	0.08D	YES	8.83A	45.2
178.08							
	0.01I	0.07D	0.01L	0.08D	YES	8.83A	45.2
	0.01I	0.16D	0.01L	0.17D	YES	10.84A	45.2
162.17							
	0.01I	0.16D	0.01F	0.17D	YES	10.84A	45.2
	0.01I	0.23D	0.01F	0.24D	YES	12.84A	45.2
146.25							
	0.01I	0.17F	0.01K	0.18F	YES	9.19A	45.2

	0.01I	0.19D	0.01K	0.20D	YES	9.62A	45.2
141.75							
	0.01I	0.20D	0.01E	0.21D	YES	9.35A	45.2
	0.01I	0.22E	0.01E	0.23E	YES	10.70A	45.2
127.50							
	0.01I	0.22E	0.01E	0.23E	YES	10.70A	45.2
	0.01I	0.23E	0.01E	0.24E	YES	12.05A	45.2
113.25							
	0.01K	0.23E	0.01E	0.24E	YES	12.05A	45.2
	0.01K	0.24E	0.01E	0.25E	YES	13.40A	45.2
99.00							
	0.01K	0.24E	0.01E	0.25E	YES	13.40A	45.2
	0.01K	0.24E	0.01E	0.25E	YES	13.99A	45.2
92.75							
	0.01I	0.25E	0.01F	0.26E	YES	13.64A	45.2
	0.01I	0.25E	0.00F	0.26E	YES	14.89A	45.2
79.58							
	0.01K	0.25E	0.00F	0.26E	YES	14.89A	45.2
	0.01K	0.25E	0.00F	0.26E	YES	16.13A	45.2
66.42							
	0.01K	0.25E	0.00F	0.26E	YES	16.13A	45.2
	0.01K	0.25F	0.00F	0.26F	YES	17.38A	45.2
53.25							
	0.01K	0.22F	0.00F	0.23F	YES	15.25A	45.2
	0.01K	0.22F	0.00F	0.22F	YES	15.90A	45.2
45.50							
	0.01K	0.22F	0.00F	0.23F	YES	15.59A	45.2
	0.01K	0.22F	0.00F	0.23F	YES	16.55A	45.2
34.12							
	0.01K	0.22F	0.00F	0.23F	YES	16.55A	45.2
	0.01K	0.22F	0.00F	0.23F	YES	17.50A	45.2
22.75							
	0.01K	0.22F	0.00F	0.23F	YES	17.50A	45.2
	0.01K	0.22F	0.00F	0.23F	YES	18.46A	45.2
11.37							
	0.01K	0.22F	0.00F	0.23F	YES	18.46A	45.2
	0.01K	0.22F	0.00F	0.23F	YES	19.42A	45.2
0.00							

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)
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DOWN	SHEAR.w.r.t.WIND.DIR ALONG	ACROSS	MOMENT.w.r.t.WIND.DIR ALONG	ACROSS	TORSION
kip	kip	kip	ft-kip	ft-kip	ft-kip
80.42	15.73	-0.04	-2529.19	6.72	-0.17
K	F	L	F	L	L

==========

Sabre Industries™
Towers and Poles

SO#: 175104
Site Name: Cane Ridge, KY
Date: 11/29/2017

Round Base Plate and Anchor Rods, per ANSI/TIA 222-G

Pole Data

Diameter:	67.570	in (flat to flat)
Thickness:	0.5625	in
Yield (Fy):	65	ksi
# of Sides:	18	"0" IF Round
Strength (Fu):	80	ksi

Reactions

Moment, Mu:	9952.91	ft-kips
Axial, Pu:	96.39	kips
Shear, Vu:	61.72	kips

Anchor Rod Data

Quantity:	26		
Diameter:	2.25	in	
Rod Material:	A615		
Strength (Fu):	100	ksi	
Yield (Fy):	75	ksi	
BC Diam. (in):	75	BC Override:	

Anchor Rod Results

Maximum Rod (Pu+ Vu/η):	253.4 Kips	
Allowable Φ*Rnt:	260.0 Kips	(per 4.9.9)
Anchor Rod Interaction Ratio:	**97.5%** **Pass**	

Plate Data

Diameter (in):	80.75	Dia. Override:	
Thickness:	2.75	in	
Yield (Fy):	50	ksi	
Eff Width/Rod:	8.25	in	
Drain Hole:	2.625	in. diameter	
Drain Location:	31.5	in. center of pole to center of drain hole	
Center Hole:	55	in. diameter	

Base Plate Results

Base Plate (Mu/Z):	37.3 ksi	
Allowable Φ*Fy:	45.0 ksi	(per AISC)
Base Plate Interaction Ratio:	**82.9%** **Pass**	

MAT FOUNDATION DESIGN BY SABRE TOWERS & POLES

195' Monopole AT&T Cane Ridge, KY (175104) 11-29-17 NM

Overall Loads:			
Factored Moment (ft-kips)	9952.91		
Factored Axial (kips)	96.39		
Factored Shear (kips)	61.72		
Bearing Design Strength (ksf)	7.5	Max. Net Bearing Press. (ksf)	7.04
Water Table Below Grade (ft)	**999**		
Width of Mat (ft)	31	Allowable Bearing Pressure (ksf)	**5.00**
Thickness of Mat (ft)	2	Safety Factor	**2.00**
Depth to Bottom of Slab (ft)	6	Ultimate Bearing Pressure (ksf)	10.00
Quantity of Bolts in Bolt Circle	26	Bearing Φs	0.75
Bolt Circle Diameter (in)	75		
Top of Concrete to Top of Bottom Threads (in)	60		
Diameter of Pier (ft)	9	Minimum Pier Diameter (ft)	7.58
Ht. of Pier Above Ground (ft)	0.5	Equivalent Square b (ft)	7.98
Ht. of Pier Below Ground (ft)	4	Square Pier? (Y/N)	**N**
Quantity of Bars in Mat	69		
Bar Diameter in Mat (in)	1.128		
Area of Bars in Mat (in^2)	68.95		
Spacing of Bars in Mat (in)	5.37	Recommended Spacing (in)	5 to 12
Quantity of Bars Pier	62		
Bar Diameter in Pier (in)	1		
Tie Bar Diameter in Pier (in)	0.625		
Spacing of Ties (in)	12		
Area of Bars in Pier (in^2)	48.69	Minimum Pier A_s (in^2)	45.80
Spacing of Bars in Pier (in)	5.05	Recommended Spacing (in)	5 to 12
f'c (ksi)	4.5		
fy (ksi)	60		
Unit Wt. of Soil (kcf)	**0.12**		
Unit Wt. of Concrete (kcf)	0.15		
Volume of Concrete (yd^3)	81.79		
Two-Way Shear Action:			
Average d (in)	19.872		
ϕv_c (ksi)	0.227	v_u (ksi)	0.203
$\phi v_c = \phi(2 + 4/\beta_c)f'_c{}^{1/2}$	0.342		
$\phi v_c = \phi(\alpha_s d/b_o+2)f'_c{}^{1/2}$	0.227		
$\phi v_c = \phi 4f'_c{}^{1/2}$	0.228		
Shear perimeter, b_o (in)	401.72		
β_c	1		
One-Way Shear:			
ϕV_c (kips)	843.0	V_u (kips)	577.9
Stability:			
Overturning Design Strength (ft-k)	11750.2	Total Applied M (ft-k)	10354.1

Pier Design:

ϕV_n (kips)	1069.7	V_u (kips)	61.7
$\phi V_c=\phi 2(1+N_u/(2000A_g))f'_c{}^{1/2}b_w d$	1069.7		
V_s (kips)	0.0	*** V_s max = 4 $f'_c{}^{1/2}b_w d$ (kips)	2503.8
Maximum Spacing (in)	6.78	(Only if Shear Ties are Required)	
Actual Hook Development (in)	18.74	Req'd Hook Development l_{dh} (in)	11.82
		*** Ref. To Spacing Requirements ACI 11.5.4.3	

Flexure in Slab:

ϕM_n (ft-kips)	5715.0	M_u (ft-kips)	5653.6
a (in)	2.91		
Steel Ratio	0.00933		
β_1	0.825		
Maximum Steel Ratio (ρ_t)	0.0197		
Minimum Steel Ratio	0.0018		
Rebar Development in Pad (in)	135.14	Required Development in Pad (in)	31.40

Condition	1 is OK, 0 Fails
Maximum Soil Bearing Pressure	1
Pier Area of Steel	1
Pier Shear	1
Interaction Diagram Visual Check	1
Two-Way Shear Action	1
One-Way Shear Action	1
Overturning	1
Flexure	1
Steel Ratio	1
Length of Development in Pad	1
Hook Development	1