Sabre Industries™
Towers and Poles

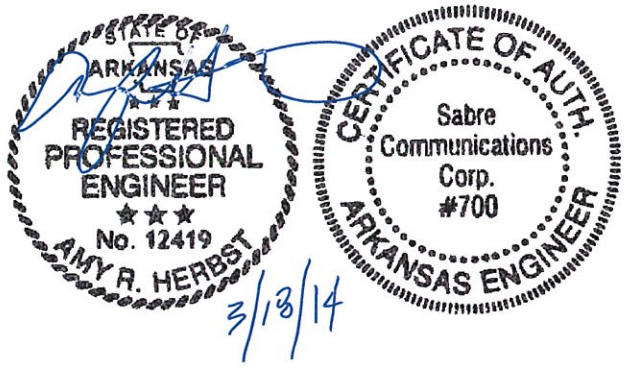
Structural Design Report

100' Extendible to 120' Monopole
Site: Methodist Hospital, AR
Site Number: AR1516

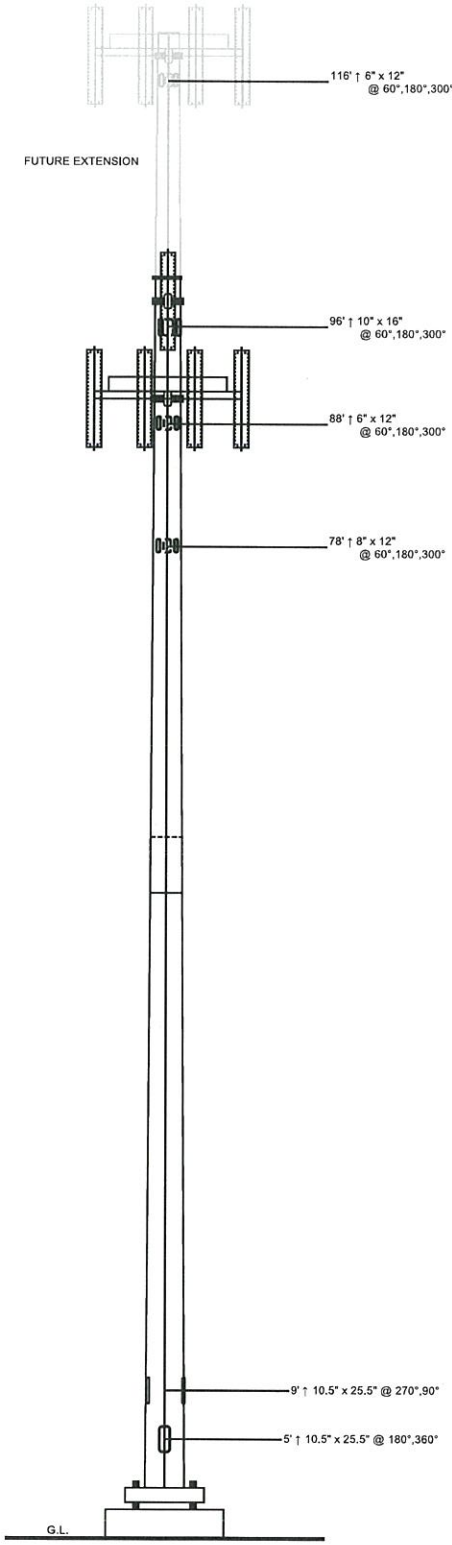
Prepared for: DIAMOND COMMUNICATIONS LLC
by: Sabre Towers & Poles ™

Job Number: 99595

March 18, 2014



Section	1	2	3
Length (ft)	20' - 0"	50' - 3"	53' - 3"
Number Of Sides	18		
Thickness (in)	1/4"		5/16"
Lap Splice (ft)		4' - 6"	
Top Diameter (in)	20.5"	23.7"	30.52"
Bottom Diameter (in)	23.7"	31.74"	39.04"
Taper (in/ft)	0.16		
Grade	A572-65		
Weight (lbs)	1438	4354	7679



Designed Appurtenance Loading

Elev	Description	Tx-Line
120***	L.P. Platform (Monopole Only) - 12' w/ Handrail	
120***	(12) RRHs	
120***	(12) 8' X 1' X 6INs	(12) 1 5/8"
100	Commscope Tri-Sector Platform Mount - MTC3607	
100	(3) RRUS AWS A2s	
100	(3) DC6-48-60-18-8Fs	
100	(3) RRUS-32B30s	
100	(6) SBNHH-1D65Cs	(18) 3/4"
100	(6) SBNH-1D6565Cs	(6) 1 5/8"
100	(3) RRUS 12s	
100	(12) RRUS 11s	(6) 1/2"
90	L.P. Platform (Monopole Only) - 12' w/ Handrail	
90	(12) RRHs	
90	(12) 8' X 1' X 6INs	(12) 1 5/8"

Load Case Reactions

Description	Axial (kips)	Shear (kips)	Moment (ft-k)	Deflection (ft)	Sway (deg)
3s Gusted Wind	31	22.8	2108	9.6	7.54
3s Gusted Wind 0.9 Dead	23.4	22.8	2066	9.3	7.33
3s Gusted Wind&Ice	40.9	2.3	199	0.9	0.69
Service Loads	25.4	5.7	520	2.4	1.85

Base Plate Dimensions

Shape	Width	Thickness	Bolt Circle	Bolt Qty	Bolt Diameter
Square	45.25"	2.25"	45"	12	2.25"

Anchor Bolt Dimensions

Length	Diameter	Hole Diameter	Weight	Type	Finish
84"	2.25"	2.625"	1707	A615-75	Galv-18"

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 90 mph with 0" of radial ice, and 30 mph with 1" of radial ice, in accordance with ANSI/TIA-222-G-2 (2009), Structure Class II, Exposure Category C, Topographic Category 1.
5) Full Height Step Bolts

*** These Appurtenances cannot be installed until the Monopole has been extended.

Sabre Industries™ Towers and Poles

Sabre Communications Corporation
2101 Murray Street
P.O. Box 658
Sioux City, IA 51102-0658
Phone: (712) 258-6690
Fax: (712) 258-8250

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Job:	99595
Customer:	DIAMOND COMMUNICATIONS LLC
Site Name:	Methodist Hospital, AR AR1516
Description:	100' ext. 120' Monopole
Date:	3/18/2014 By: TTW

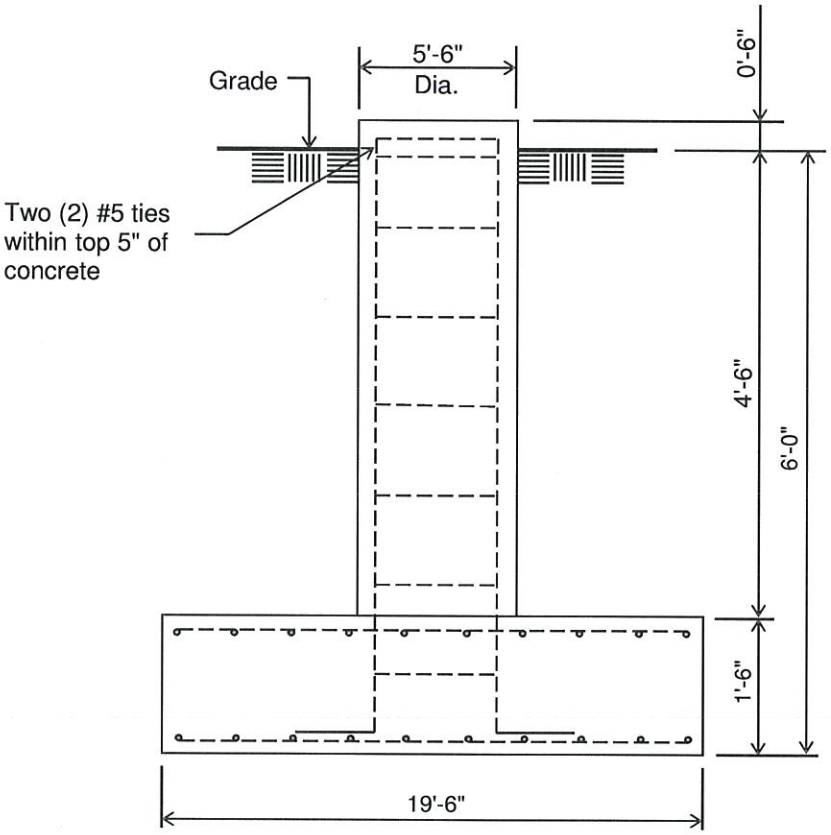
Sabre Industries™
Towers and Poles

No.: 99595

Date: 3/18/14
By: TTW

Customer: DIAMOND COMMUNICATIONS LLC
Site: Methodist Hospital, AR AR1516

100' Extendible to 120' Monopole at
90 mph Wind with no ice and 30 mph Wind with 1 in. Ice per ANSI/TIA-222-G.
Antenna Loading per Page 1



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

Notes:

1). Concrete shall have a minimum 28-day compressive strength of 4000 PSI, in accordance with ACI 318-05

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 Geotechnical Testing & Services, Project No. 13-15200, dated December 24, 2013.

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

7). The foundation is based on the following factored loads:
Moment (kip-ft) = 2107.5
Axial (kips) = 31.01
Shear (kips) = 22.81

Rebar Schedule per Pad and Pier	
Pier	(30) #7 vertical rebar w/hooks at bottom w/#5 ties, two within top 5" of top of pier then 12" C/C
Pad	(28) #8 horizontal rebar evenly spaced each way top and bottom (112 Total)

8). This is a design drawing only. Please see final construction drawings for all installation details.

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2101 Murray St - P.O. Box 658 - Sioux City, IA 51102-0658 - Phone 712.258.6690 - Fax 712.258.8250

TOP	DIAMETER	20.50 in.	[20.82 in. Point-Point]
BOTTOM	DIAMETER	39.04 in.	[39.64 in. Point-Point]
POLE	HEIGHT	119.00 ft.	18 SIDED FLAT ORIENTATION
BASE	HEIGHT	1.00 ft.	ABOVE GROUND
E-MODULUS		29000 ksi	[12000 ksi SHEAR MODULUS]

APPURTENANCES

ATTACH POINTS:

NO.	X,ft	Qty	Description	Status
1	117.00	1	User Defined Loading	Future Appurt
2	97.00	1	User Defined Loading	Future Appurt
3	89.00	1	User Defined Loading	Future Appurt

Some wind forces may have been derived from full-scale wind tunnel tests.

Pole Section	Bottom X,ft.	Thick in.	Connect Type	LAP in.	Taper in/ft	Length ft.	Weight lbs	Steel Spec	Pole Finish
1	20.00	.25000	FLANGE-X		.1600	20.00	1179	A572-65	Special
2	70.25	.25000	SLIP-JNT	54.	.1600	50.25	3726	A572-65	GALVANIZE
3	119.00	.31250	C-WELD		.1600	53.25	6194	A572-65	GALVANIZE

SECTION PROPERTIES

X,ft	UP,ft	D,in	T,in	Area in^2	Iz in^4	IxIy in^4	SxSy in^3	w/t	d/t	F_y(ksi)	
119.00	.00	20.50	.2500	16.07	1666	833	80.0	12.70	82.0	65.00	TOP
117.00	2.00	20.82	.2500	16.32	1744	872	82.5	12.92	83.3	65.00	P01
112.00	7.00	21.62	.2500	16.96	1956	978	89.1	13.49	86.5	65.00	
107.00	12.00	22.42	.2500	17.59	2184	1092	95.9	14.05	89.7	65.00	
102.00	17.00	23.22	.2500	18.23	2428	1214	103.0	14.61	92.9	65.00	
99.00	20.00	23.70	.2500	18.61	2586	1293	107.5	14.95	94.8	65.00	Flng-T02
97.00	22.00	24.02	.2500	18.86	2692	1346	110.4	15.18	96.1	65.00	P02
92.00	27.00	24.82	.2500	19.50	2972	1486	117.9	15.74	99.3	65.00	
89.00	30.00	25.30	.2500	19.88	3152	1576	122.7	16.08	101.2	65.00	P03
84.00	35.00	26.10	.2500	20.51	3462	1731	130.6	16.65	104.4	65.00	
79.00	40.00	26.90	.2500	21.15	3792	1896	138.8	17.21	107.6	65.00	
74.00	45.00	27.70	.2500	21.78	4146	2073	147.4	17.77	110.8	65.00	
69.00	50.00	28.50	.2500	22.42	4520	2260	156.2	18.34	114.0	65.00	
64.00	55.00	29.30	.2500	23.05	4914	2457	165.2	18.90	117.2	65.00	
59.00	60.00	30.10	.2500	23.69	5330	2665	174.4	19.47	120.4	65.00	
54.00	65.00	30.90	.2500	24.32	5772	2886	184.0	20.03	123.6	65.00	
53.25	65.75	31.02	.2500	24.42	5840	2920	185.4	20.12	124.1	65.00	Slip-B02
48.75	70.25	31.24	.3125	30.68	7412	3706	233.7	15.86	100.0	65.00	Slip-T03
43.75	75.25	32.04	.3125	31.47	8002	4001	246.0	16.32	102.5	65.00	
38.75	80.25	32.84	.3125	32.26	8622	4311	258.6	16.77	105.1	65.00	
33.75	85.25	33.64	.3125	33.06	9276	4638	271.6	17.22	107.6	65.00	
28.75	90.25	34.44	.3125	33.85	9960	4980	284.8	17.67	110.2	65.00	
23.75	95.25	35.24	.3125	34.64	10676	5338	298.3	18.12	112.8	65.00	
18.75	100.25	36.04	.3125	35.44	11426	5713	312.2	18.57	115.3	65.00	
13.75	105.25	36.84	.3125	36.23	12210	6105	326.4	19.02	117.9	65.00	
8.75	110.25	37.64	.3125	37.02	13032	6516	341.0	19.47	120.4	65.00	
3.75	115.25	38.44	.3125	37.82	13888	6944	355.8	19.93	123.0	65.00	
.00	119.00	39.04	.3125	38.41	14554	7277	367.1	20.26	124.9	65.00	BASE

CASE - 1: 3s Gusted Wind — ANSI-TIA-222-G

WIND OLF	1.60	GUSTED WIND (3sec)	90.0 mph	144.8 kph	
VERTICAL OLF	1.20	EXP-CAT/STRUC_CLASS	C-II		
DESIGN ICE	.00 in	EXP-POWER COEFF.	.2105		
GUST FACTOR (Gh)	1.10	REFERENCE HEIGHT	900.0 ft		
FORCE COEFF (Cf)	.65	PRESSURE @ 32.7 ft	34.7 psf	1659.0 Pa	
IMPORTANCE FAC (I)	1.00	BASE ABOVE Grd	1.0		
DIRECTION FAC (Kd)	.95	CREST HEIGHT	.0 ft		
TOPOGRAPHIC CAT	1				

APPURTENANCES — Sabre Areas

#	Qty	Description	Center Line Elev-Ft	WEIGHT each Lbs	AREA each Ft^2	Tx-CABLE Type	Qty	#/Ft	WIND Psf	FORCES Tra-Y Kips	Ax-Z Kips	MOM. Lg-X Ft-K
1	1	User Defined Loading	117.0	1491	91.6				45.4	4.16	-1.8	-.2
	12	8' X 1' X 6IN	119.0	42	.0	1 5/8"	12	1.04	45.6	.00	-2.4	
	12	RRH	119.0	44	.0	None	1	.00	45.6	.00	-.6	
2	1	User Defined Loading	97.0	4690	164.6				43.7	7.19	-5.6	-.4
	6		99.0	0	.0	1 5/8"	6	1.04	43.9	.00	-.7	
	12		97.0	0	.0	1/2"	6	.40	43.7	.00	-.3	
	6		97.0	0	.0	3/4"	18	.50	43.7	.00	-1.0	
3	1	User Defined Loading	89.0	1491	91.6				42.9	3.93	-1.8	-.2
	12	8' X 1' X 6IN	89.0	42	.0	1 5/8"	12	1.04	42.9	.00	-1.9	
	12	RRH	89.0	44	.0	None	1	.00	42.9	.00	-.6	

RESULTS

X, ft	Kzt	WIND psf	ICE in	FORCES,kips ShearX	ShearY	AxiaZ	MOMENTS,ft-kips BendX	BendY	TorqZ	F'y ksi	Inter 4.8.2
119.00	1.00	29.64	.00	.0	.01	-.1	.0	.0	.0	82.55	.000
117.00	1.00	29.53	.00	.0	4.97	-4.5	-.3	.0	.0	82.55	.004
112.00	1.00	29.27	.00	.0	5.33	-4.8	-25.4	.0	.0	82.55	.050
107.00	1.00	28.99	.00	.0	5.64	-5.2	-52.1	.0	.0	82.55	.092
102.00	1.00	28.70	.00	.0	5.89	-5.5	-80.3	.0	.0	82.55	.130
99.00	1.00	28.52	.00	.0	6.05	-5.7	-98.0	.0	.0	82.55	.152
97.00	1.00	28.40	.00	.0	14.37	-12.7	-110.4	.0	.0	82.55	.171
92.00	1.00	28.09	.00	.0	14.62	-13.0	-182.3	.0	.0	82.55	.259
89.00	1.00	27.90	.00	.0	19.28	-17.3	-226.3	.0	.0	82.47	.311
84.00	1.00	27.56	.00	.0	19.55	-17.8	-322.8	.0	.0	81.80	.415
79.00	1.00	27.21	.00	.0	19.80	-18.3	-420.5	.0	.0	81.14	.510
74.00	1.00	26.85	.00	.0	20.05	-18.9	-519.5	.0	.0	80.48	.597
69.00	1.00	26.46	.00	.0	20.28	-19.5	-619.8	.0	.0	79.81	.676
64.00	1.00	26.05	.00	.0	20.50	-20.1	-721.2	.0	.0	79.15	.748
59.00	1.00	25.61	.00	.0	20.71	-20.7	-823.6	.0	.0	78.48	.815
54.00	1.00	25.15	.00	.0	20.82	-21.1	-927.5	.0	.0	77.82	.877
53.25	1.00	25.08	.00	.0	20.95	-21.8	-942.5	.0	.0	77.72	.885
48.75	1.00	24.62	.00	.0	21.18	-22.9	-1036.7	.0	.0	82.55	.727
43.75	1.00	24.08	.00	.0	21.39	-23.8	-1143.3	.0	.0	82.19	.765
38.75	1.00	23.49	.00	.0	21.58	-24.6	-1250.0	.0	.0	81.66	.800
33.75	1.00	22.83	.00	.0	21.75	-25.5	-1357.5	.0	.0	81.13	.832
28.75	1.00	22.10	.00	.0	21.92	-26.3	-1466.7	.0	.0	80.60	.863
23.75	1.00	21.26	.00	.0	22.08	-27.2	-1575.8	.0	.0	80.07	.891
18.75	1.00	20.27	.00	.0	22.24	-28.1	-1686.7	.0	.0	79.54	.917
13.75	1.00	19.16	.00	.0	22.40	-29.0	-1797.5	.0	.0	79.01	.941
8.75	1.00	19.16	.00	.0	22.56	-29.9	-1910.0	.0	.0	78.47	.964
3.75	1.00	19.16	.00	.0	22.69	-30.7	-2022.5	.0	.0	77.94	.984
.00	1.00	19.16	.00	.0	22.81	-31.0	2107.5	.0	.0	77.54	.999

DISPLACEMENTS

ELEV X, ft	DEFLECTION feet X	Y	Z	XY-Result	ROTATION, degrees X	Y	Z	XY-Result
119.00	.00	9.58	-.50	9.58< 8.05%>	-7.54	.00	.00	7.54

CASE - 2: 3s Gusted Wind 0.9 Dead — ANSI-TIA-222-G

WIND OLF	1.60	GUSTED WIND (3sec)	90.0 mph	144.8 kph	
VERTICAL OLF	.90	EXP-CAT/STRUC_CLASS	C-II		
DESIGN ICE	.00 in	EXP-POWER COEFF.	.2105		
GUST FACTOR (Gh)	1.10	REFERENCE HEIGHT	900.0 ft		
FORCE COEFF (Cf)	.65	PRESSURE @ 32.7 ft	34.7 psf	1659.0 Pa	
IMPORTANCE FAC (I)	1.00	BASE ABOVE Grd	1.0		
DIRECTION FAC (Kd)	.95	CREST HEIGHT	.0 ft		
TOPOGRAPHIC CAT	1				

APPURTENANCES — Sabre Areas

#	Qty	Description	Center Line Elev-Ft	WEIGHT each Lbs	AREA each Ft^2	Tx-CABLE Type	Qty	#/Ft	WIND Psf	FORCES Tra-Y Kips	Ax-Z Kips	MOM. Lg-X Ft-K
1	1	User Defined Loading	117.0	1491	91.6				45.4	4.16	-1.3	-.2
	12	8' X 1' X 6IN	119.0	42	.0	1 5/8"	12	1.04	45.6	.00	-1.8	
	12	RRH	119.0	44	.0	None	1	.00	45.6	.00	-.5	
2	1	User Defined Loading	97.0	4690	164.6				43.7	7.19	-4.2	-.4
	6		99.0	0	.0	1 5/8"	6	1.04	43.9	.00	-.5	
	12		97.0	0	.0	1/2"	6	.40	43.7	.00	-.2	
	6		97.0	0	.0	3/4"	18	.50	43.7	.00	-.8	
3	1	User Defined Loading	89.0	1491	91.6				42.9	3.93	-1.3	-.2
	12	8' X 1' X 6IN	89.0	42	.0	1 5/8"	12	1.04	42.9	.00	-1.5	
	12	RRH	89.0	44	.0	None	1	.00	42.9	.00	-.5	

RESULTS

X, ft	Kzt	WIND psf	ICE in	FORCES,kips ShearX	ShearY	AxiaZ	MOMENTS,ft-kips BendX	BendY	TorqZ	F'y ksi	Inter 4.8.2
119.00	1.00	29.64	.00	.0	.01	.0	.0	.0	.0	82.55	.000
117.00	1.00	29.53	.00	.0	4.79	-3.3	-.3	.0	.0	82.55	.003
112.00	1.00	29.27	.00	.0	5.14	-3.5	-24.5	.0	.0	82.55	.047
107.00	1.00	28.99	.00	.0	5.44	-3.8	-50.3	.0	.0	82.55	.088
102.00	1.00	28.70	.00	.0	5.68	-4.0	-77.4	.0	.0	82.55	.125
99.00	1.00	28.52	.00	.0	5.84	-4.2	-94.5	.0	.0	82.55	.145
97.00	1.00	28.40	.00	.0	13.90	-9.2	-106.5	.0	.0	82.55	.163
92.00	1.00	28.09	.00	.0	14.14	-9.5	-176.0	.0	.0	82.55	.248
89.00	1.00	27.90	.00	.0	18.66	-12.6	-218.7	.0	.0	82.47	.297
84.00	1.00	27.56	.00	.0	18.94	-12.9	-311.9	.0	.0	81.80	.398
79.00	1.00	27.21	.00	.0	19.21	-13.4	-406.7	.0	.0	81.14	.491
74.00	1.00	26.85	.00	.0	19.48	-13.8	-502.7	.0	.0	80.48	.574
69.00	1.00	26.46	.00	.0	19.73	-14.3	-600.1	.0	.0	79.81	.651
64.00	1.00	26.05	.00	.0	19.98	-14.8	-698.8	.0	.0	79.15	.722
59.00	1.00	25.61	.00	.0	20.23	-15.3	-798.7	.0	.0	78.48	.788
54.00	1.00	25.15	.00	.0	20.36	-15.6	-900.0	.0	.0	77.82	.848
53.25	1.00	25.08	.00	.0	20.51	-16.1	-915.0	.0	.0	77.72	.857
48.75	1.00	24.62	.00	.0	20.75	-17.0	-1007.5	.0	.0	82.55	.704
43.75	1.00	24.08	.00	.0	21.00	-17.7	-1110.8	.0	.0	82.19	.741
38.75	1.00	23.49	.00	.0	21.22	-18.4	-1215.8	.0	.0	81.66	.776
33.75	1.00	22.83	.00	.0	21.44	-19.0	-1322.5	.0	.0	81.13	.809
28.75	1.00	22.10	.00	.0	21.65	-19.7	-1429.2	.0	.0	80.60	.838
23.75	1.00	21.26	.00	.0	21.86	-20.4	-1537.5	.0	.0	80.07	.867
18.75	1.00	20.27	.00	.0	22.07	-21.1	-1646.7	.0	.0	79.54	.893
13.75	1.00	19.16	.00	.0	22.28	-21.8	-1757.5	.0	.0	79.01	.917
8.75	1.00	19.16	.00	.0	22.49	-22.5	-1868.3	.0	.0	78.47	.940
3.75	1.00	19.16	.00	.0	22.67	-23.2	-1980.8	.0	.0	77.94	.961
.00	1.00	19.16	.00	.0	22.79	-23.4	2065.8	.0	.0	77.54	.977

DISPLACEMENTS

ELEV X, ft	DEFLECTION feet X	Y	Z	XY-Result	ROTATION, degrees X	Y	Z	XY-Result
119.00	.00	9.33	-.47	9.33< 7.84%>	-7.33	.00	.00	7.33

CASE - 3: 3s Gusted Wind&Ice — ANSI-TIA-222-G

WIND OLF		1.00	GUSTED WIND (3sec)	30.0 mph	48.3 kph
VERTICAL OLF		1.20	EXP-CAT/STRUC_CLASS	C-II	
DESIGN ICE		1.00 in	EXP-POWER COEFF.	.2105	
GUST FACTOR	(Gh)	1.10	REFERENCE HEIGHT	900.0 ft	
FORCE COEFF	(Cf)	1.20	PRESSURE @ 32.7 ft	2.4 psf	115.2 Pa
IMPORTANCE FAC	(I)	1.00	BASE ABOVE Grd	1.0	
DIRECTION FAC	(Kd)	.95	CREST HEIGHT	.0 ft	
TOPOGRAPHIC CAT		1			

APPURTENANCES — Sabre Areas

#	Qty	Description	Center Line Elev-Ft	WEIGHT each Lbs	AREA each Ft^2	Tx-CABLE Type	Tx-CABLE Qty	Tx-CABLE #/Ft	WIND Psf	FORCES Tra-Y Kips	FORCES Ax-Z Kips	MOM. Lg-X Ft-K
1	1	User Defined Loading	117.0	1640	100.8				3.2	.32	-2.0	.0
	12	8' X 1' X 6IN	119.0	103	.0	1 5/8"	12	1.04	3.2	.00	-2.4	
	12	RRH	119.0	62	.0	None	1	.00	3.2	.00	-.6	
2	1	User Defined Loading	97.0	5159	181.0				3.0	.55	-6.2	.0
	6		99.0	0	.0	1 5/8"	6	1.04	3.0	.00	-.7	
	12		97.0	0	.0	1/2"	6	.40	3.0	.00	-.3	
	6		97.0	0	.0	3/4"	18	.50	3.0	.00	-1.0	
3	1	User Defined Loading	89.0	1640	100.8				3.0	.30	-2.0	.0
	12	8' X 1' X 6IN	89.0	103	.0	1 5/8"	12	1.04	3.0	.00	-1.9	
	12	RRH	89.0	62	.0	None	1	.00	3.0	.00	-.6	

RESULTS

X, ft	Kzt	WIND psf	ICE in	FORCES,kips ShearX	ShearY	AxiaZ	MOMENTS,ft-kips BendX	BendY	TorqZ	F'y ksi	Inter 4.8.2
119.00	1.00	3.80	2.28	.0	.00	-.1	.0	.0	.0	82.55	.000
117.00	1.00	3.79	2.27	.0	.41	-5.5	.0	.0	.0	82.55	.005
112.00	1.00	3.75	2.26	.0	.47	-6.2	-2.1	.0	.0	82.55	.009
107.00	1.00	3.72	2.25	.0	.52	-6.9	-4.5	.0	.0	82.55	.013
102.00	1.00	3.68	2.24	.0	.56	-7.5	-7.1	.0	.0	82.55	.017
99.00	1.00	3.66	2.23	.0	.59	-7.9	-8.8	.0	.0	82.55	.019
97.00	1.00	3.64	2.23	.0	1.27	-16.6	-10.0	.0	.0	82.55	.026
92.00	1.00	3.60	2.22	.0	1.30	-17.2	-16.3	.0	.0	82.55	.034
89.00	1.00	3.58	2.21	.0	1.69	-22.4	-20.2	.0	.0	82.47	.042
84.00	1.00	3.53	2.20	.0	1.74	-23.2	-28.7	.0	.0	81.80	.051
79.00	1.00	3.49	2.19	.0	1.78	-24.0	-37.4	.0	.0	81.14	.060
74.00	1.00	3.44	2.17	.0	1.82	-24.9	-46.3	.0	.0	80.48	.068
69.00	1.00	3.39	2.16	.0	1.86	-25.7	-55.4	.0	.0	79.81	.075
64.00	1.00	3.34	2.14	.0	1.90	-26.6	-64.7	.0	.0	79.15	.082
59.00	1.00	3.28	2.12	.0	1.94	-27.5	-74.2	.0	.0	78.48	.089
54.00	1.00	3.22	2.10	.0	1.96	-28.1	-83.8	.0	.0	77.82	.095
53.25	1.00	3.21	2.10	.0	1.98	-28.9	-85.3	.0	.0	77.72	.096
48.75	1.00	3.16	2.08	.0	2.01	-30.3	-94.3	.0	.0	82.55	.078
43.75	1.00	3.09	2.06	.0	2.05	-31.5	-104.3	.0	.0	82.19	.082
38.75	1.00	3.01	2.04	.0	2.08	-32.6	-114.5	.0	.0	81.66	.086
33.75	1.00	2.93	2.01	.0	2.11	-33.7	-124.9	.0	.0	81.13	.090
28.75	1.00	2.83	1.98	.0	2.14	-34.9	-135.4	.0	.0	80.60	.093
23.75	1.00	2.73	1.94	.0	2.16	-36.0	-146.2	.0	.0	80.07	.096
18.75	1.00	2.60	1.90	.0	2.19	-37.2	-156.9	.0	.0	79.54	.099
13.75	1.00	2.46	1.85	.0	2.22	-38.4	-167.9	.0	.0	79.01	.102
8.75	1.00	2.46	1.77	.0	2.24	-39.6	-179.0	.0	.0	78.47	.104
3.75	1.00	2.46	1.65	.0	2.26	-40.6	-190.2	.0	.0	77.94	.107
.00	1.00	2.46	1.41	.0	2.28	-40.9	198.7	.0	.0	77.54	.108

DISPLACEMENTS

ELEV X, ft	DEFLECTION feet X	Y	Z	XY-Result		ROTATION, degrees X	Y	Z	XY-Result
119.00	.00	.88	-.01	.88<	.74%>	-.69	.00	.00	.69

CASE - 4: Service Loads — ANSI-TIA-222-G

WIND OLF	1.00	GUSTED WIND (3sec)	60.0 mph	96.6 kph	
VERTICAL OLF	1.00	EXP-CAT/STRUC_CLASS	C-II		
DESIGN ICE	.00 in	EXP-POWER COEFF.	.2105		
GUST FACTOR (Gh)	1.10	REFERENCE HEIGHT	900.0 ft		
FORCE COEFF (Cf)	.65	PRESSURE @ 32.7 ft	8.6 psf	412.3 Pa	
IMPORTANCE FAC (I)	1.00	BASE ABOVE Grd	1.0		
DIRECTION FAC (Kd)	.85	CREST HEIGHT	.0 ft		
TOPOGRAPHIC CAT	1				

APPURTENANCES — Sabre Areas

#	Qty	Description	Center Line Elev-Ft	WEIGHT each Lbs	AREA each Ft^2	Tx-CABLE Type	Tx-CABLE Qty	Tx-CABLE #/Ft	WIND Psf	FORCES Tra-Y Kips	FORCES Ax-Z Kips	MOM. Lg-X Ft-K
1	1	User Defined Loading	117.0	1491	91.6				11.3	1.03	-1.5	-.1
	12	8' X 1' X 6IN	119.0	42	.0	1 5/8"	12	1.04	11.3	.00	-2.0	
	12	RRH	119.0	44	.0	None	1	.00	11.3	.00	-.5	
2	1	User Defined Loading	97.0	4690	164.6				10.9	1.79	-4.7	-.1
	6		99.0	0	.0	1 5/8"	6	1.04	10.9	.00	-.6	
	12		97.0	0	.0	1/2"	6	.40	10.9	.00	-.2	
	6		97.0	0	.0	3/4"	18	.50	10.9	.00	-.9	
3	1	User Defined Loading	89.0	1491	91.6				10.7	.98	-1.5	.0
	12	8' X 1' X 6IN	89.0	42	.0	1 5/8"	12	1.04	10.7	.00	-1.6	
	12	RRH	89.0	44	.0	None	1	.00	10.7	.00	-.5	

RESULTS

X, ft	Kzt	WIND psf	ICE in	FORCES,kips ShearX	ShearY	AxiaZ	MOMENTS,ft-kips BendX	BendY	TorqZ	F'y ksi	Inter 4.8.2
119.00	1.00	7.37	.00	.0	.00	-.1	.0	.0	.0	82.55	.000
117.00	1.00	7.34	.00	.0	1.22	-4.2	-.1	.0	.0	82.55	.004
112.00	1.00	7.27	.00	.0	1.30	-4.5	-6.2	.0	.0	82.55	.015
107.00	1.00	7.20	.00	.0	1.38	-4.8	-12.7	.0	.0	82.55	.025
102.00	1.00	7.13	.00	.0	1.44	-5.0	-19.6	.0	.0	82.55	.035
99.00	1.00	7.09	.00	.0	1.48	-5.2	-24.0	.0	.0	82.55	.040
97.00	1.00	7.06	.00	.0	3.52	-11.8	-27.0	.0	.0	82.55	.048
92.00	1.00	6.98	.00	.0	3.58	-12.0	-44.6	.0	.0	82.55	.069
89.00	1.00	6.93	.00	.0	4.72	-15.9	-55.4	.0	.0	82.47	.084
84.00	1.00	6.85	.00	.0	4.79	-16.3	-79.0	.0	.0	81.80	.109
79.00	1.00	6.76	.00	.0	4.86	-16.6	-103.0	.0	.0	81.14	.133
74.00	1.00	6.67	.00	.0	4.92	-17.0	-127.3	.0	.0	80.48	.154
69.00	1.00	6.58	.00	.0	4.98	-17.4	-151.8	.0	.0	79.81	.173
64.00	1.00	6.47	.00	.0	5.04	-17.8	-176.8	.0	.0	79.15	.191
59.00	1.00	6.37	.00	.0	5.09	-18.2	-201.9	.0	.0	78.48	.208
54.00	1.00	6.25	.00	.0	5.12	-18.5	-227.4	.0	.0	77.82	.223
53.25	1.00	6.23	.00	.0	5.16	-18.9	-231.3	.0	.0	77.72	.225
48.75	1.00	6.12	.00	.0	5.22	-19.8	-254.4	.0	.0	82.55	.185
43.75	1.00	5.98	.00	.0	5.27	-20.4	-280.5	.0	.0	82.19	.194
38.75	1.00	5.84	.00	.0	5.32	-21.0	-306.8	.0	.0	81.66	.203
33.75	1.00	5.67	.00	.0	5.37	-21.6	-333.5	.0	.0	81.13	.211
28.75	1.00	5.49	.00	.0	5.42	-22.2	-360.3	.0	.0	80.60	.218
23.75	1.00	5.28	.00	.0	5.47	-22.8	-387.4	.0	.0	80.07	.225
18.75	1.00	5.04	.00	.0	5.52	-23.4	-414.8	.0	.0	79.54	.232
13.75	1.00	4.76	.00	.0	5.57	-24.0	-442.4	.0	.0	79.01	.238
8.75	1.00	4.76	.00	.0	5.61	-24.6	-470.3	.0	.0	78.47	.244
3.75	1.00	4.76	.00	.0	5.66	-25.2	-498.3	.0	.0	77.94	.249
.00	1.00	4.76	.00	.0	5.68	-25.4	519.5	.0	.0	77.54	.253

DISPLACEMENTS

ELEV X, ft	DEFLECTION feet X	Y	Z	XY-Result	ROTATION, degrees X	Y	Z	XY-Result	MicroW AlloW
119.00	.00	2.36	-.03	2.36< 1.98%>	-1.85	.00	.00	1.85	

FLANGE DESIGN at: 99.0 ft from BASE of POLE [20.0 ft from TOP]
SHAPE: 18 SIDED POLYGON
POLE ORIENTATION: FLAT-FLAT
LOAD ORIENTATION: ANY LOAD DIRECTION

DESIGN CASE = 1 3s Gusted Wind

DIAMETER #1=	23.70 in.	AXIAL FORCE=	-5.7 kips
PLATE #1=	.2500 in.	SHEAR X =	.0 kips
DIAMETER #2=	23.70 in.	SHEAR Y =	6.1 kips
PLATE #2=	.2500 in.	X-AXIS MOM =	-98.0 ft-kips
		Y-AXIS MOM =	.0 ft-kips
		Z-AXIS MOM =	.0 ft-kips

FLANGE BOLTS: EXTERNAL BC MODEL

AXIAL	Stress	=	35.10 ksi
SHEAR	Stress	=	.96 ksi
BOLT	AREA (Tension)	=	.61 in^2
MOMENT	of INERTIA	=	433 in^4
	CSR	=	.529
ALLOW	TENSION Stress	=	69.00 ksi [.75 x Fy]
	SHEAR Stress	=	48.30 ksi [.75 x Fy x 0.70]

A-325 ::: BOLT DESIGN USED

8 Bolts	1.00	in.	BOLT DIAMETER	
	92.00	ksi	Fy YIELD STRENGTH	
	120.00	ksi	Fu ULTIMATE STRENGTH	
	26.750	in.	BOLT CIRCLE	SHIP
	10.24	in.	CHORD LENGTH	WEIGHT
	45.00°		ARC ANGLE	8 lbs

PLATE DESIGN

			Upper-PL	Lower-PL	
THICKNESS	Reqd	=	.60	.60	in.
BENDING	Stress	=	33.78	33.78	ksi
TENSION	Stress	=	.52	.52	ksi
COMBINED	Ratio	=	.64	.64	
ALLOWABLE	Stress (Fa)	=	54.00	54.00	ksi [Fy x .90]

:: FLANGE PLATE DESIGN USED

.750	in.	THICK
31.000	in.	OUTSIDE ROUND
60.00	ksi	YIELD STRENGTH
18.000	in.	CENTER HOLE
208	lbs.	SHIP WEIGHT (both)

LOAD CASE SUMMARY

	RESULTANTS				BOLT STRESS		Flange-UP Stress		Flange-DW Stress	
	Axial	Shear	Moment	Torq-Z	Actual	Allow	Actual	Allow	Actual	Allow
Case	kips	kips	ft-kips	ft-kips	CSR	ksi	ksi	ksi	ksi	ksi
1	-5.70	6.05	98.0	.0	.529	69.00	34.30	54.00	34.30	54.00
2	-4.16	5.84	94.5	.0	.514	69.00	33.09	54.00	33.09	54.00
3	-7.87	.59	8.8	.0	.025	69.00	3.55	54.00	3.55	54.00
4	-5.19	1.48	24.0	.0	.118	69.00	8.79	54.00	8.79	54.00

SHAPE: 18 SIDED POLYGON with FLAT-FLAT ORIENTATION
BOLTS: QUADRANT SPACED BOLTS 6.00 in. ON CENTER
LOCATE:

POLE DATA

DIAMETER	= 39.04 in.	BASE	AXIAL FORCE=	-31.0 kips	Vert
PLATE	= .3125 in.	ACTIONS	SHEAR X =	16.1 kips	Long
TAPER	= .1600 in/ft		SHEAR Y =	16.1 kips	Tran
POLE Fy	= 65.00 ksi		X-AXIS MOM =	1490.0 ft-kips	Tran
			Y-Axis MOM =	1490.0 ft-kips	Long
			Z-Axis MOM =	.0 ft-kips	Vert

DESIGN CASE = 1 3s Gusted Wind

Design: ANY Orientation Reactions at 45.00 deg to X-AXIS

BOLT LOADS

	AXIAL - COMPRESSION	= 189.92 kips		
	AXIAL - TENSION	= 184.75 kips		
	SHEAR	= 2.69 kips		
AXIAL	STRESS	= 58.44 ksi		
SHEAR	STRESS	= .88 ksi		
YIELD	STRENGTH Fy	= 75.00 ksi		
ULT.	STRENGTH Fu	= 100.00 ksi		Interaction
ALLOW	STRESS Fa [.80 x 1.00]	= 80.00 ksi	.752	TIA-G
	SHEAR Fv [.80 x .40]	= 32.00 ksi		
	TENSION AREA REQUIRED	= 2.37 in^2		
	TENSION AREA FURNISHED	= 3.25 in^2		
	ROOT AREA FURNISHED	= 3.07 in^2		

A615 ::: ANCHOR BOLT DESIGN USED

12	Bolts on a	45.000 in.	Bolt Circle	SHIP
2.250 in.	Diameter	67.13 in.	Embedded	(lbs)
12.00 in.	Exposed	84.00 in.	Total Length	1632

CONCRETE - Fc= 4000 psi

ANCHOR BOLTS are STRAIGHT w\ UPLIFT NUT

BASE PLATE

[Bend Model: Flat- 17]

YIELD STRENGTH	= 50.0 ksi
BEND LINE WIDTH	= 25.1 in.
PLATE MOMENT	= 1318.4 in-k
THICKNESS REQD	= 2.161 in.
BENDING STRESS	= 41.5 ksi
ALLOWABLE STRESS	= 45.0 ksi
[Fy x .90 x 1.00]	

BASE PLATE USED

2.25	in.	THICK	SHIP
45.25	in.	SQUARE	(lbs)
27.00	in.	CENTER HOLE	811
8.00	in.	CORNER CLIP	

LOAD CASE SUMMARY

	FORCES-(kips)			MOMENTS-(ft-k)			ABolt-Str	Plate-Str		
							Allow	Actual	Allow	Design
LC	Axial	ShearX	ShearY	X-axis	Y-axis	TorQ	CSR	ksi	ksi	ksi	Code
1	31.0	16.1	16.1	1490	1490	0	.752	75.00	41.52	45.00	TIA-G
2	23.4	16.1	16.1	1460	1460	0	.736	75.00	40.57	45.00	TIA-G
3	40.9	1.6	1.6	140	140	0	.083	75.00	4.62	45.00	TIA-G
4	25.4	4.0	4.0	367	367	0	.191	75.00	10.57	45.00	TIA-G

MAT FOUNDATION DESIGN BY SABRE TOWERS & POLES

120' Monopole DIAMOND COMMUNICATIONS LLC Methodist Hospital, AR (99595) 3-18-14 TTW

Overall Loads:			
Factored Moment (ft-kips)	2107.5		
Factored Axial (kips)	31.01		
Factored Shear (kips)	22.81		
Bearing Design Strength (ksf)	10.275	Max. Net Bearing Press. (ksf)	10.17
Water Table Below Grade (ft)	**18**		
Width of Mat (ft)	19.5	Allowable Bearing Pressure (ksf)	**6.85**
Thickness of Mat (ft)	1.5	Safety Factor	**2.00**
Depth to Bottom of Slab (ft)	6	Ultimate Bearing Pressure (ksf)	13.70
Quantity of Bolts in Bolt Circle	12	Bearing Φs	0.75
Bolt Circle Diameter (in)	45		
Top of Concrete to Top of Bottom Threads (in)	60		
Diameter of Pier (ft)	5.5	Minimum Pier Diameter (ft)	5.25
Ht. of Pier Above Ground (ft)	0.5	Equivalent Square b (ft)	4.87
Ht. of Pier Below Ground (ft)	4.5		
Quantity of Bars in Mat	28		
Bar Diameter in Mat (in)	1		
Area of Bars in Mat (in^2)	21.99		
Spacing of Bars in Mat (in)	8.41	Recommended Spacing (in)	6 to 12
Quantity of Bars Pier	30		
Bar Diameter in Pier (in)	0.875		
Tie Bar Diameter in Pier (in)	0.625		
Spacing of Ties (in)	12		
Area of Bars in Pier (in^2)	18.04	Minimum Pier A_s (in^2)	17.11
Spacing of Bars in Pier (in)	6.06	Recommended Spacing (in)	6 to 12
f'c (ksi)	4		
fy (ksi)	60		
Unit Wt. of Soil (kcf)	**0.094**		
Unit Wt. of Concrete (kcf)	0.15		
Volume of Concrete (yd^3)	25.52		
Two-Way Shear Action:			
Average d (in)	14		
ϕV_c (kips)	756.6	V_u (kips)	67.5
$\phi V_c = \phi(2 + 4/\beta_c)f'_c{}^{1/2}b_o d$	1134.9		
$\phi V_c = \phi(\alpha_s d/b_o + 2)f'_c{}^{1/2}b_o d$	799.8		
$\phi V_c = \phi 4 f'_c{}^{1/2}b_o d$	756.6		
Shear perimeter, b_o (in)	251.33		
β_c	1		
One-Way Shear:			
ϕV_c (kips)	352.2	V_u (kips)	204.3
Stability:			
Overturning Design Strength (ft-k)	2457.1	Total Applied M (ft-k)	2255.8

Pier Design:

ϕV_n (kips)	376.4	V_u (kips)	22.8
$\phi V_c=\phi 2(1+N_u/(2000A_g))f'_c{}^{1/2}b_wd$	376.4		
V_s (kips)	0.0	*** V_s max = 4 $f'_c{}^{1/2}b_wd$ (kips)	881.6
Maximum Spacing (in)	11.16	(Only if Shear Ties are Required)	
Actual Hook Development (in)	13.00	Req'd Hook Development l_{dh} (in)	11.62
		*** Ref. To Spacing Requirements ACI 11.5.4.3	

Flexure in Slab:

ϕM_n (ft-kips)	1303.4	M_u (ft-kips)	1286.0
a (in)	1.66		
Steel Ratio	0.00671		
β_1	0.85		
Maximum Steel Ratio (ρ_t)	0.0181		
Minimum Steel Ratio	0.0018		
Rebar Development in Pad (in)	84.75	Required Development in Pad (in)	28.02

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