PAUL J. FORD & COMPANY

Report Date: January 21, 2015

Client: AW Solutions Incorporated
300 Crown Oak Centre Deive
Longwood, FL 32750
Attn: Suzie Varma
Phone: 407.260.0231

Structure: Existing 420-ft Self Support Tower
Site Address: 2815 Bernice Road
City, County, State: Lansing, Cook County, IL
Latitude, Longitude: 41° 34' 44.0", -87° 32' 47.0"

PJF Project: A00016-T042.001.8700

Paul J. Ford and Company is pleased to submit this "**Structural Analysis Report**" to determine the structural integrity of the above mentioned self-support tower. The purpose of this analysis is to determine the acceptability of the self-support tower stress level.

Analysis Criteria:

Reference Standard:	ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1.
Basic Wind Speed:	90 mph 3-second gust wind speed without ice
Wind Speed With Ice:	40 mph 3-second gust wind speed with 0.75" ice
Service Wind Speed:	60.0 mph (Serviceability) without ice
TIA-222 Criteria:	Structure Class II; Topographic Category 1; Exposure Category C

Proposed Appurtenance Loads:
The structure was analyzed with the addition of the proposed appurtenance loads shown in Table 1 combined with the existing and reserved loads shown in Table 2 of this report.

Summary of Analysis Results:

Existing Structure:	Pass
Existing Foundation:	Pass

We at Paul J. Ford and Company appreciate the opportunity of providing our continuing professional services to you and AW Solutions Incorporated. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Sara Mansoori
Structural Designer
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1) INTRODUCTION

This tower is a 420 ft Self Support tower designed by PiRod in January of 1986.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 90 mph with no ice, 40 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category C with topographic category 1 and crest height of 0 feet.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
200.0	200.0	2	commscope	UHX6-107/K	4	1/2	-
		2	miscl	12" x 12" x 4" TMA			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
412.0	412.0	1	eri_lp-lpx	ERI LP-2E	1	1 5/8	1
385.0	385.0	1	shively labs	Shively 6810-1 Bay No Rad.	1	1 5/8	1
300.0	300.0	3	microwave dishes	4 ft standard	3	EW90	1
290.0	290.0	1	generic	10 ft x 2.5" omni whip	1	1/2	1
		1	tower mounts	Generic 1' x 2' sidearm			
275.0	275.0	1	andrew	UHX4-107	2	1/2	1
		1	andrew	UHX6-59W			
		2	tower mounts	Pipe Mount [PM 601-1]			
160.0	160.0	1	microwave dishes	2 ft standard	1	7/8	1
		1	microwave dishes	4 ft Grid			
85.0	85.0	2	radiowaves	SP1-4.7	2	7/8	2
		1	-	Stand-Off Bracket			

Notes:
1) Existing Equipment
2) Reserved Equipment

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference
TOWER MANUFACTUER DRAWINGS	PiRod, 1/9/1986	#108238-B
GEOTECHNICAL REPORT	Johnson Publishing 11/14/1985	1185-1745

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	420 - 400	Leg	1 3/4" solid	3	5.98	60.15	9.9	Pass
T2	400 - 380	Leg	1 3/4" solid	97	21.26	24.38	87.2	Pass
T3	380 - 360	Leg	2" solid	191	21.24	87.47	24.3	Pass
T4	360 - 340	Leg	2" solid	285	28.26	76.17	37.1	Pass
T5	340 - 320	Leg	2 1/4" solid	379	43.89	106.69	41.1	Pass
T6	320 - 310	Leg	2 1/4" solid	445	53.61	81.78	65.5	Pass
T7	310 - 300	Leg	Pirod 105216 (12x1.25)	481	-61.06	142.49	42.8	Pass
T8	300 - 280	Leg	Pirod 105217 (12x1.5)	490	-77.23	214.86	35.9	Pass
T9	280 - 260	Leg	Pirod 105217 (12x1.5)	505	-95.86	214.86	44.6	Pass
T10	260 - 240	Leg	Pirod 105217 (12x1.5)	520	-115.65	214.86	53.8	Pass
T11	240 - 220	Leg	Pirod 105218 (12x1.75)	535	-136.09	300.68	45.3	Pass
T12	220 - 200	Leg	Pirod 105218 (12x1.75)	550	-157.46	300.68	52.4	Pass
T13	200 - 180	Leg	Pirod 105218 (12x1.75)	565	-181.51	300.68	60.4	Pass
T14	180 - 160	Leg	Pirod 105219 (12x2)	580	-207.64	399.87	51.9	Pass
T15	160 - 140	Leg	Pirod 105219 (12x2)	595	-235.23	399.87	58.8	Pass
T16	140 - 120	Leg	Pirod 105219 (12x2)	610	-264.33	399.87	66.1	Pass
T17	120 - 100	Leg	Pirod 105220 (12x2.25)	626	-285.74	451.15	63.3	Pass
T18	100 - 80	Leg	Pirod 105716 (18x2.25)	635	-317.81	496.60	64.0	Pass
T19	80 - 60	Leg	Pirod 105656 (18x2.5)	644	-348.99	613.14	56.9	Pass
T20	60 - 40	Leg	Pirod 105656 (18x2.5)	653	-381.04	613.14	62.1	Pass
T21	40 - 20	Leg	Pirod 105656 (18x2.5)	662	-414.14	613.14	67.5	Pass
T22	20 - 0	Leg	Pirod 105700 (18x2.75)	671	-444.20	741.99	59.9	Pass
T1	420 - 400	Diagonal	1/2" solid	13	-0.52	3.64	14.4	Pass
T2	400 - 380	Diagonal	1/2" solid	108	-0.92	3.64	25.4	Pass
T3	380 - 360	Diagonal	7/8" solid	205	-0.40	6.17	6.5	Pass
T4	360 - 340	Diagonal	7/8" solid	296	-2.02	5.25	38.5	Pass
T5	340 - 320	Diagonal	1" solid	390	-2.55	7.37	34.6	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T6	320 - 310	Diagonal	1" solid	475	-3.10	7.51	41.3	Pass
T7	310 - 300	Diagonal	L 3 x 3 x 3/16	488	-3.25	17.43	18.7	Pass
T8	300 - 280	Diagonal	L 3 x 3 x 3/16	497	-3.07	14.96	20.5	Pass
T9	280 - 260	Diagonal	L 3 x 3 x 3/16	509	-4.35	12.12	35.9	Pass
T10	260 - 240	Diagonal	L 3 x 3 x 5/16	524	-4.74	15.59	30.4	Pass
T11	240 - 220	Diagonal	L 4 x 4 x 1/4	539	-5.27	25.17	20.9	Pass
T12	220 - 200	Diagonal	L 4 x 4 x 1/4	554	-6.08	20.95	29.0	Pass
T13	200 - 180	Diagonal	L 4 x 4 x 1/4	568	-7.20	17.55	41.0	Pass
T14	180 - 160	Diagonal	L 4 x 4 x 3/8	583	-7.94	21.54	36.9	Pass
T15	160 - 140	Diagonal	L 5 x 5 x 3/8	598	-9.07	36.75	24.7	Pass
T16	140 - 120	Diagonal	L 5 x 5 x 3/8	613	-9.94	31.76	31.3	Pass
T17	120 - 100	Diagonal	L 5 x 5 x 3/8	629	-13.22	25.05	52.8	Pass
T18	100 - 80	Diagonal	L 5 x 5 x 3/8	637	-13.63	23.79	57.3	Pass
T19	80 - 60	Diagonal	L 5 x 5 x 3/8	646	-14.53	21.92	66.3	Pass
T20	60 - 40	Diagonal	L 5 x 5 x 3/8	655	-15.56	20.23	76.9	Pass
T21	40 - 20	Diagonal	L 5 x 5 x 3/8	664	-15.71	18.71	83.9	Pass
T22	20 - 0	Diagonal	L 5 x 5 x 3/8	674	-17.66	17.85	98.9	Pass
T1	420 - 400	Horizontal	5/8" solid	26	-0.06	6.68	0.9	Pass
T2	400 - 380	Horizontal	5/8" solid	113	-0.30	6.68	4.5	Pass
T3	380 - 360	Horizontal	7/8" solid	276	-0.53	16.05	3.3	Pass
T4	360 - 340	Horizontal	7/8" solid	370	-0.17	2.65	6.3	Pass
T5	340 - 320	Horizontal	7/8" solid	436	-0.45	2.25	19.9	Pass
T6	320 - 310	Horizontal	7/8" solid	474	-0.57	1.99	28.9	Pass
T1	420 - 400	Top Girt	3/4" solid	6	-0.02	12.00	0.1	Pass
T2	400 - 380	Top Girt	3/4" solid	99	-0.14	12.00	1.2	Pass
T3	380 - 360	Top Girt	1 1/4" solid	194	-0.26	45.86	0.6	Pass
T4	360 - 340	Top Girt	1 1/4" solid	287	-0.26	11.20	2.3	Pass
T5	340 - 320	Top Girt	1 1/4" solid	381	-0.84	9.56	8.7	Pass
T6	320 - 310	Top Girt	1 1/4" solid	447	-1.12	8.27	13.6	Pass
T1	420 - 400	Bottom Girt	3/4" solid	7	-0.21	12.00	1.8	Pass
T2	400 - 380	Bottom Girt	3/4" solid	103	-0.15	12.00	1.2	Pass
T3	380 - 360	Bottom Girt	1 1/4" solid	196	-0.73	11.47	6.3	Pass
T4	360 - 340	Bottom Girt	1 1/4" solid	291	-0.96	9.58	10.1	Pass
T5	340 - 320	Bottom Girt	1 1/4" solid	384	-1.54	8.28	18.6	Pass
T6	320 - 310	Bottom Girt	1 1/4" solid	449	-0.94	8.27	11.4	Pass
T1	420 - 400	Mid Girt	3/4" solid	10	0.04	19.88	0.2	Pass
T2	400 - 380	Mid Girt	3/4" solid	104	-0.20	12.00	1.7	Pass
T3	380 - 360	Mid Girt	1 1/4" solid	198	-0.20	25.45	0.8	Pass
T4	360 - 340	Mid Girt	1 1/4" solid	292	-0.10	10.35	1.0	Pass
T5	340 - 320	Mid Girt	1 1/4" solid	386	-0.28	8.89	3.2	Pass
T6	320 - 310	Mid Girt	1 1/4" solid	452	-0.18	8.27	2.2	Pass
							Summary	
						Leg (T2)	87.2	Pass
						Diagonal (T22)	98.9	Pass
						Horizontal (T6)	28.9	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
						Top Girt (T6)	13.6	Pass
						Bottom Girt (T5)	18.6	Pass
						Mid Girt (T5)	3.2	Pass
						Bolt Checks	46.9	Pass
						Rating =	98.9	Pass

Table 5 - Tower Component Stresses vs. Capacity

Component	Elevation (ft)	% Capacity	Pass / Fail
Anchor Rods	-	28.0	Pass
Base Foundation Structural	-	14.3	Pass
Base Foundation Soil Interaction	-	88.9	Pass

Structure Rating (max from all components) =	98.9%