Robinson+Cole

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October 31, 2016

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-059T-160901 – Cellco Partnership d/b/a Verizon Wireless**
68 Groton Long Point Road, Groton, Connecticut

Dear Ms. Bachman:

On September 26, 2016, the Siting Council acknowledged receipt of Cellco's notice of intent to modify its existing telecommunications facility at 68 Groton Long Point Road in Groton, Connecticut. The modifications involved the replacement of antennas and the installation of remote radio heads at the above-referenced facility.

As a condition of the acknowledgement, Cellco was required to provide the Council with a copy of the Structural Analysis Report referencing the Rev. G of the Structural Standards. The updated Structural Analysis Report referencing Rev. G is attached.

If you have any questions please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Tim Parks

15529478-v1

PJF PAUL J. FORD & COMPANY

Report Date: October 25, 2016

Client: On Air Engineering, LLC
88 Foundry Pond Road
Cold Spring, NY 10516
Attn: David Weinpahl, P.E.
Phone: 201.456.4624

Structure: Existing 140-ft Self Support Tower
Site Name: Groton CT
Site Address: 68 Groton Long Point Road
City, County, State: Groton, New London County, CT
Latitude, Longitude: 41° 20' 36.80" N, 72° 00' 34.80" W

PJF Project: 42916-0002.002.8700

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

Analysis Criteria:

Reference Standard:	2016 Connecticut State Building Code with the Section 1609.3 and Appendix N as required for use in the 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.
Ultimate Wind Speed:	135 mph 3-second gust wind speed without ice
Nominal Wind Speed:	105 mph 3-second gust wind speed without ice
Ice Wind Speed:	50 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 I, 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 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 On Air Engineering, LLC. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Rebekah M. Dorris, EI
Structural Designer
RDorris@pjfweb.com

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER

OCT 26 2016

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 140-ft Self Support tower designed by Rohn. PJF was not provided the original manufacturer drawings. The geometry was obtained from the previous structural analysis.

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 104.6 mph with no ice, 50 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
142.0	142.0	9	andrew	SBNHH-1D65B w/ Mount Pipe	1	Hybrid	-
		3	alcatel lucent	RRH2X60-700			
		3	alcatel lucent	RRH4x45-AWS			
		3	alcatel lucent	RRH2X60-PCS			
		1	raycap	DB-T1-6Z-8AB-0Z			

Table 2 - Existing 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
142.0	142.0	3	amphenol	BXA-171063-8BF-EDIN-X w/ Mount Pipe	-	-	2
		3	amphenol	BXA-185090-8CF-EDIN-2 w/ Mount Pipe			
		3	alcatel lucent	RRH2X40-AWS			
		3	andrew	LNX-6512DS-T4M w/ Mount Pipe			
		3	amphenol	BXA-80080-4CF-EDIN-0 w/ Mount Pipe	12 1	1-5/8 Hybrid	1
		6	rfs	RFS FD9R6004/1C-3L			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		1	tower mounts	Platform Mount			
129.0	129.0	6	kmw communications	AM-X-CD-14-65-00T-RET w/ Mount Pipe	12 1 2	1-1/4 5/8 3/4	1
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	miscl	TMA			
		6	ericsson	RRU			
		1	raycap	DC6-48-60-18-8F			
		3	tower mounts	Sector Mount			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
121.0	121.0	1	decibel	DB212-2-A	1	7/8	1
119.0	119.0	1	decibel	DB212-2-A	-	-	1
104.0	104.0	1	decibel	DB212-2-A	1	7/8	1
101.0	112.0	1	decibel	DB540K-E	3 1	1-1/4 1-5/8	1
	111.0	1	celwave	PD220			
	108.0	1	decibel	DB810T3E-XT			
	101.0	1	celwave	PD1121			
		3	tower mounts	Generic 3.5' x 6' sidearm			
97.0	97.0	1	celwave	PD1121	-	-	1
		1	tower mounts	10' x 2" Sch 40 Pipe Mount			
96.0	96.0	1	decibel	DB212-2-A	-	-	1
90.0	90.0	1	decibel	DB212-2-A	1	7/8	1
68.0	68.0	1	decibel	DB212-2-A	-	-	1
67.0	94.0	1	decibel	DB810T3E-XT	1 1	1-5/8 1-1/4	1
	90.0	1	celwave	PD340-140			
	67.0	2	tower mounts	Generic 3.5' x 6' sidearm			
67.0	67.0	2	misc	obstruction lights	1	1/2	1
66.0	66.0	1	miscl	Camera - 12" T x 8" W x 8" L	2	3/4	1
58.0	58.0	1	microwave dishes	3' std w/ HP	1	1/2	1
54.0	65.0	3	celwave	PD220	3	7/8	1
	54.0	3	tower mounts	Generic 3.5' x 6' sidearm			
43.0	43.0	1	microwave dishes	2 ft standard	4	1/4	1
		1	miscl	TMA			
		1	miscl	panel			
		1	tower mounts	Generic 3' x 4' sidearm			
35.0	35.0	1	microwave dishes	2 ft standard	-	-	1
		1	miscl	TMA			
		1	tower mounts	Generic 3' x 4' sidearm			
33.0	43.0	1	generic	20 ft x 2" omni whip	1	7/8	1
	33.0	1	tower mounts	Generic 3.5' x 6' sidearm			

Notes:
1) Existing Equipment
2) Equipment to be removed; not considered

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference
Previous Tower Analysis	URS, 12/6/2012	36917393
Foundation Drawings	PJF, 6/2/1998	35131AE
Geotechnical Report	Deisser, 5/30/1998	L-155

3.1) Analysis Method

tnxTower (version 7.0.5.1), 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	140 - 120	Leg	Pipe 2.875" x 0.276" (2.5 EH)	1	-58.23	83.33	69.9	Pass
T2	120 - 100	Leg	Pipe 3.5" x 0.300" (3 EH)	37	-103.87	119.32	87.0	Pass
T3	100 - 80	Leg	Pipe 4.5" x 0.337" (4 EH)	70	-144.57	176.06	82.1	Pass
T4	80 - 60	Leg	Pipe 5.5" x 0.375" (5 EH)	97	-182.69	236.23	77.3	Pass
T5	60 - 40	Leg	Pipe 6.625" x 0.340" (6 EHS)	118	-222.98	275.20	81.0	Pass
T6	40 - 20	Leg	Pipe 6.625" x 0.432" (6 EH)	139	-263.18	343.65	76.6	Pass
T7	20 - 0	Leg	Pipe 8.625" x 0.375" (8 EHS)	160	-297.90	386.79	77.0	Pass
T1	140 - 120	Diagonal	L 2 x 2 x 1/4	14	-6.82	19.43	35.1	Pass
T2	120 - 100	Diagonal	L 2 x 2 x 1/4	44	-5.52	15.43	35.7	Pass
T3	100 - 80	Diagonal	L 2 x 2 x 1/4	77	-6.29	10.13	62.1	Pass
T4	80 - 60	Diagonal	L 2.5 x 2.5 x 1/4	104	-7.42	12.62	58.8	Pass
T5	60 - 40	Diagonal	L 2.5 x 2.5 x 1/4	122	-8.08	9.72	83.2	Pass
T6	40 - 20	Diagonal	L 3 x 3 x 1/4	143	-8.84	13.29	66.5	Pass
T7	20 - 0	Diagonal	L 3.5 x 3.5 x 1/4	164	-10.39	14.73	70.5	Pass
T1	140 - 120	Top Girt	L 2 x 2 x 1/4	4	-1.24	19.27	6.4	Pass
							Summary	
						Leg (T2)	87.0	Pass
						Diagonal (T5)	83.2	Pass
						Top Girt (T1)	6.4	Pass
						Bolt Checks	75.4	Pass
						Rating =	87.0	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	-	67.8	Pass
1	Base Foundation Structural	-	35.4	Pass
1	Base Foundation Soil Interaction	-	75.2	Pass

Structure Rating (max from all components) =	87.0%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

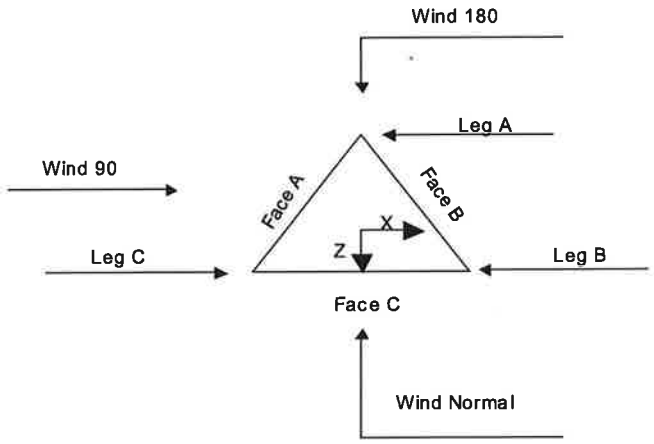
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 140.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 2.63 ft at the top and 16.85 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1) Tower is located in New London County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 105.00 mph.
4) Structure Class II.
5) Exposure Category C.
6) Topographic Category 1.
7) Crest Height 0.00 ft.
8) Nominal ice thickness of 0.75 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56 pcf.
11) A wind speed of 50.00 mph is used in combination with ice.
12) Deflections calculated using a wind speed of 60.00 mph.
13) A non-linear (P-delta) analysis was used.
14) Pressures are calculated at each section.
15) Stress ratio used in tower member design is 1.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	√ Calculate Redundant Bracing Forces
Consider Moments - Diagonals	Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Include Angle Block Shear Check
Use Special Wind Profile	Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	140.00-120.00			2.63	1	20.00
T2	120.00-100.00			4.66	1	20.00
T3	100.00-80.00			6.69	1	20.00
T4	80.00-60.00			8.72	1	20.00
T5	60.00-40.00			10.75	1	20.00
T6	40.00-20.00			12.79	1	20.00
T7	20.00-0.00			14.82	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	140.00-120.00	3.98	X Brace	No	No	0.00	1.00
T2	120.00-100.00	3.97	X Brace	No	No	1.00	1.00
T3	100.00-80.00	4.96	X Brace	No	No	1.00	1.00
T4	80.00-60.00	6.61	X Brace	No	No	1.00	1.00
T5	60.00-40.00	6.61	X Brace	No	No	1.00	1.00
T6	40.00-20.00	6.61	X Brace	No	No	1.00	1.00
T7	20.00-0.00	9.96	X Brace	No	No	1.00	0.00

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 140.00-120.00	Pipe	Pipe 2.875" x 0.276" (2.5 EH)	A618-50 (50 ksi)	Equal Angle	L 2 x 2 x 1/4	A36 (36 ksi)
T2 120.00-100.00	Pipe	Pipe 3.5" x 0.300" (3 EH)	A618-50 (50 ksi)	Equal Angle	L 2 x 2 x 1/4	A36 (36 ksi)
T3 100.00-80.00	Pipe	Pipe 4.5" x 0.337" (4 EH)	A618-50 (50 ksi)	Equal Angle	L 2 x 2 x 1/4	A36 (36 ksi)
T4 80.00-60.00	Pipe	Pipe 5.5" x 0.375" (5 EH)	A618-50 (50 ksi)	Equal Angle	L 2.5 x 2.5 x 1/4	A36 (36 ksi)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T5 60.00-40.00	Pipe	Pipe 6.625" x 0.340" (6 EHS)	A618-50 (50 ksi)	Equal Angle	L 2.5 x 2.5 x 1/4	A36 (36 ksi)
T6 40.00-20.00	Pipe	Pipe 6.625" x 0.432" (6 EH)	A618-50 (50 ksi)	Equal Angle	L 3 x 3 x 1/4	A572-50 (50 ksi)
T7 20.00-0.00	Pipe	Pipe 8.625" x 0.375" (8 EHS)	A618-50 (50 ksi)	Equal Angle	L 3.5 x 3.5 x 1/4	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 140.00-120.00	Equal Angle	L 2 x 2 x 1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 140.00-120.00	0.00	0.25	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T2 120.00-100.00	0.00	0.25	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T3 100.00-80.00	0.00	0.25	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T4 80.00-60.00	0.00	0.25	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T5 60.00-40.00	0.00	0.25	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T6 40.00-20.00	0.00	0.25	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt
T7 20.00-0.00	0.00	0.38	A36 (36 ksi)	1	1	1.1	Mid-Pt	Mid-Pt	Mid-Pt

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 140.00-120.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T2 120.00-100.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T3 100.00-80.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T4 80.00-60.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T5 60.00-40.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T6 40.00-20.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T7 20.00-0.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 140.00-120.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T2 120.00-100.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T3 100.00-80.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T4 80.00-60.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T5 60.00-40.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T6 40.00-20.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75
T7 20.00-0.00	0.00	1	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75	0.00	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 140.00-120.00	Flange	0.88 A325N	4	0.63 A325N	1	0.63 A325N	1	0.50 A325N	0	0.50 A325N	0	0.50 A325N	0	0.50 A325N	0
T2 120.00-100.00	Flange	1.00 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0
T3 100.00-80.00	Flange	1.00 A325N	4	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0
T4 80.00-60.00	Flange	1.00 A325N	6	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0
T5 60.00-40.00	Flange	1.00 A325N	6	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0
T6 40.00-20.00	Flange	1.00 A325N	8	0.63 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0
T7 20.00-0.00	Flange	1.00 A354-BC	8	0.75 A325N	1	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0	0.00 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF6-50 (1 1/4" foam) ****	B	No	Ar (CaAa)	129.00 - 6.00	3.00	-0.3	12	12	1.45 0.50	1.55		0.66
LDF7-50A (1 5/8" foam) ****	A	No	Ar (CaAa)	140.00 - 6.00	3.00	-0.3	14	7	1.00 0.50	1.98		0.92
LDF5-50A (7/8" foam)	C	No	Ar (CaAa)	121.00 - 6.00	3.00	-0.34	1	1	1.09 0.50	1.09		0.33
LDF5-50A (7/8" foam)	C	No	Ar (CaAa)	104.00 - 6.00	3.00	-0.355	1	1	1.09 0.50	1.09		0.33
LDF6-50 (1 1/4" foam)	C	No	Ar (CaAa)	101.00 - 6.00	3.00	-0.28	3	3	1.45 0.50	1.55		0.66
LDF7-50A (1 5/8" foam)	C	No	Ar (CaAa)	101.00 - 6.00	3.00	-0.38	2	2	1.00 0.50	1.98		0.92
LDF5-50A (7/8" foam)	C	No	Ar (CaAa)	90.00 - 6.00	3.00	-0.325	1	1	1.09 0.50	1.09		0.33
LDF7-50A (1	C	No	Ar (CaAa)	94.00 - 6.00	3.00	-0.38	1	1	1.00	1.98		0.92

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
5/8" foam)									0.50			
LDF6-50 (1 1/4" foam)	C	No	Ar (CaAa)	90.00 - 6.00	3.00	-0.28	1	1	1.55 0.50	1.55		0.66
LDF4-50A (1/2" foam)	C	No	Ar (CaAa)	67.00 - 6.00	3.00	-0.24	1	1	0.63 0.50	0.63		0.15
1 1/4" Rigid Conduit (1" EMT)	C	No	Ar (CaAa)	66.00 - 6.00	-3.00	-0.3	2	2	1.16 0.50	1.16		0.67
LDF4-50A (1/2" foam)	C	No	Ar (CaAa)	58.00 - 6.00	3.00	-0.23	1	1	0.63 0.50	0.63		0.15
LDF5-50A (7/8" foam)	C	No	Ar (CaAa)	54.00 - 6.00	3.00	-0.415	3	3	1.09 0.50	1.09		0.33
LDF1-50A(1/4")	C	No	Ar (CaAa)	43.00 - 6.00	-3.00	-0.305	4	4	0.34 0.50	0.34		0.06
LDF5-50A (7/8" foam) ****	C	No	Ar (CaAa)	33.00 - 6.00	3.00	-0.44	1	1	1.09 0.50	1.09		0.33
LDF4-50A (1/2" foam) ****	C	No	Ar (CaAa)	140.00 - 6.00	3.00	-0.23	1	1	0.63 0.50	0.63		0.15
LDF4.5-50 (5/8" foam)	B	No	Ar (CaAa)	129.00 - 6.00	3.00	-0.4	1	1	0.86 0.50	0.86		0.15
RLSS 8AWG DC(3/4")	B	No	Ar (CaAa)	129.00 - 6.00	3.00	-0.42	2	2	0.73 0.50	0.73		0.49
HB158-1-08U8-S8F18(1 5/8") ****	A	No	Ar (CaAa)	60.00 - 6.00	3.00	-0.375	1	1	1.00 0.50	1.98		1.70
1.5" flat Cable Ladder Rail	A	No	Af (CaAa)	140.00 - 6.00	0.00	-0.35	2	2	36.00 1.50	1.50		1.80
1.5" flat Cable Ladder Rail	B	No	Af (CaAa)	129.00 - 6.00	0.00	-0.35	2	2	36.00 1.50	1.50		1.80
1.5" flat Cable Ladder Rail ****	C	No	Af (CaAa)	140.00 - 6.00	0.00	-0.35	2	2	36.00 1.50	1.50		1.80

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
5/8" X 6' Lightning Rod	C	From Leg	0.00 0.00 3.00	0.000	145.00	No Ice 1/2" Ice 1" Ice	0.38 0.99 1.62	0.38 0.99 1.62	0.01 0.01 0.02
Flash Beacon Lighting	C	None		0.000	145.00	No Ice 1/2" Ice 1" Ice	2.70 3.10 3.50	2.70 3.10 3.50	0.05 0.07 0.09
****									
Platform Mount [LP 602-1]	C	None		0.000	142.00	No Ice 1/2" Ice 1" Ice	32.03 38.71 45.39	32.03 38.71 45.39	1.34 1.80 2.26
BXA-80080-4CF-EDIN-4 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	3.81 4.17 4.54	3.97 4.58 5.19	0.03 0.07 0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-80080-4CF-EDIN-4 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	3.81 4.17 4.54	3.97 4.58 5.19	0.03 0.07 0.11
BXA-80080-4CF-EDIN-4 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	3.81 4.17 4.54	3.97 4.58 5.19	0.03 0.07 0.11
(2) RFS FD9R6004/1C-3L	A	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
(2) RFS FD9R6004/1C-3L	B	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
(2) RFS FD9R6004/1C-3L	C	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
DB-T1-6Z-8AB-0Z	C	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	2.00 2.19 2.39	0.04 0.08 0.12
(3) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	8.42 8.96 9.48	7.42 8.45 9.35	0.08 0.15 0.23
(3) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	8.42 8.96 9.48	7.42 8.45 9.35	0.08 0.15 0.23
(3) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	8.42 8.96 9.48	7.42 8.45 9.35	0.08 0.15 0.23
(3) RRH2X60-PCS	A	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	2.20 2.39 2.59	1.72 1.90 2.09	0.06 0.08 0.10
(3) RRH2x60-700	B	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
(3) RRH4x45-AWS	C	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01	1.63 1.81 2.00	0.07 0.09 0.11
DB-T1-6Z-8AB-0Z	C	From Leg	4.00 0.00 0.00	0.000	142.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	2.00 2.19 2.39	0.04 0.08 0.12
****									
(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	5.23 5.62 6.01	4.02 4.63 5.26	0.05 0.10 0.15
(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	5.23 5.62 6.01	4.02 4.63 5.26	0.05 0.10 0.15
(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	5.23 5.62 6.01	4.02 4.63 5.26	0.05 0.10 0.15

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	5.79 6.27 6.70	4.51 5.51 6.21	0.09 0.14 0.21
7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	5.79 6.27 6.70	4.51 5.51 6.21	0.09 0.14 0.21
7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	5.79 6.27 6.70	4.51 5.51 6.21	0.09 0.14 0.21
(2) RRU-11	A	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.26 1.41 1.57	0.04 0.06 0.08
(2) RRU-11	B	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.26 1.41 1.57	0.04 0.06 0.08
(2) RRU-11	C	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.26 1.41 1.57	0.04 0.06 0.08
(2) TMA (10" x 10" x 3.5")	A	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	0.83 0.95 1.07	0.30 0.37 0.46	0.02 0.02 0.03
(2) TMA (10" x 10" x 3.5")	B	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	0.83 0.95 1.07	0.30 0.37 0.46	0.02 0.02 0.03
(2) TMA (10" x 10" x 3.5")	C	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	0.83 0.95 1.07	0.30 0.37 0.46	0.02 0.02 0.03
DC6-48-60-18-8F	C	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	0.92 1.46 1.64	0.92 1.46 1.64	0.02 0.04 0.06
Sector Mount [SM 502-3]	C	From Leg	4.00 0.00 0.00	0.000	129.00	No Ice 1/2" Ice 1" Ice	33.02 47.36 61.70	33.02 47.36 61.70	1.67 2.22 2.77
****									
DB212-2-A	A	From Leg	2.00 0.00 0.00	0.000	121.00	No Ice 1/2" Ice 1" Ice	4.00 8.02 12.05	4.00 8.02 12.05	0.03 0.07 0.13
DB212-2-A	C	From Leg	2.00 0.00 0.00	0.000	119.00	No Ice 1/2" Ice 1" Ice	4.00 8.02 12.05	4.00 8.02 12.05	0.03 0.07 0.13
DB540K-E	C	From Leg	6.00 0.00 0.00	0.000	112.00	No Ice 1/2" Ice 1" Ice	4.50 6.33 8.18	4.50 6.33 8.18	0.07 0.10 0.14
PD220	A	From Leg	6.00 0.00 0.00	0.000	111.00	No Ice 1/2" Ice 1" Ice	3.56 7.13 10.70	3.56 7.13 10.70	0.02 0.05 0.07
DB810T3E-XT	B	From Leg	6.00 0.00 0.00	0.000	108.00	No Ice 1/2" Ice 1" Ice	4.53 6.07 7.63	4.53 6.07 7.63	0.05 0.08 0.12

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
DB212-2-A	C	From Leg	6.00 0.00 0.00	0.000	104.00	No Ice 1/2" Ice 1" Ice	4.00 8.02 12.05	4.00 8.02 12.05	0.03 0.07 0.13
PD1121	C	From Leg	6.00 0.00 0.00	0.000	101.00	No Ice 1/2" Ice 1" Ice	0.41 1.52 2.63	0.41 1.52 2.63	0.00 0.01 0.02
Generic 3.5' x 6' sidearm	A	From Leg	3.00 0.00 0.00	0.000	101.00	No Ice 1/2" Ice 1" Ice	3.00 4.00 5.00	6.00 7.50 9.00	0.40 0.45 0.50
Generic 3.5' x 6' sidearm	B	From Leg	3.00 0.00 0.00	0.000	101.00	No Ice 1/2" Ice 1" Ice	3.00 4.00 5.00	6.00 7.50 9.00	0.40 0.45 0.50
Generic 3.5' x 6' sidearm	C	From Leg	3.00 0.00 0.00	0.000	101.00	No Ice 1/2" Ice 1" Ice	3.00 4.00 5.00	6.00 7.50 9.00	0.40 0.45 0.50
****									
10' x 2" Sch 40 Pipe Mount	C	From Leg	6.00 0.00 0.00	0.000	97.00	No Ice 1/2" Ice 1" Ice	2.38 3.40 4.45	2.38 3.40 4.45	0.04 0.05 0.08
PD1121	C	From Leg	6.00 0.00 0.00	0.000	97.00	No Ice 1/2" Ice 1" Ice	0.41 1.52 2.63	0.41 1.52 2.63	0.00 0.01 0.02
**									
DB212-2-A	A	From Leg	1.00 0.00 0.00	0.000	96.00	No Ice 1/2" Ice 1" Ice	4.00 8.02 12.05	4.00 8.02 12.05	0.03 0.07 0.13
DB810T3E-XT	B	From Leg	1.00 0.00 0.00	0.000	94.00	No Ice 1/2" Ice 1" Ice	4.53 6.07 7.63	4.53 6.07 7.63	0.05 0.08 0.12
PD340-140	A	From Leg	6.00 0.00 0.00	0.000	90.00	No Ice 1/2" Ice 1" Ice	5.36 8.72 12.08	5.36 8.72 12.08	0.04 0.07 0.09
DB212-2-A	C	From Leg	1.00 0.00 0.00	0.000	90.00	No Ice 1/2" Ice 1" Ice	4.00 8.02 12.05	4.00 8.02 12.05	0.03 0.07 0.13
DB212-2-A	C	From Leg	1.00 0.00 0.00	0.000	68.00	No Ice 1/2" Ice 1" Ice	4.00 8.02 12.05	4.00 8.02 12.05	0.03 0.07 0.13
Obstruction light	B	From Leg	0.50 0.00 0.00	0.000	67.00	No Ice 1/2" Ice 1" Ice	0.50 0.83 0.96	0.50 0.83 0.96	0.01 0.02 0.03
Obstruction light	C	From Leg	0.50 0.00 0.00	0.000	67.00	No Ice 1/2" Ice 1" Ice	0.50 0.83 0.96	0.50 0.83 0.96	0.01 0.02 0.03
Generic 3.5' x 6' sidearm	B	From Leg	1.00 0.00 0.00	0.000	67.00	No Ice 1/2" Ice 1" Ice	3.00 4.00 5.00	6.00 7.50 9.00	0.40 0.45 0.50
Generic 3.5' x 6' sidearm	C	From Leg	1.00 0.00 0.00	0.000	67.00	No Ice 1/2" Ice	3.00 4.00 5.00	6.00 7.50 9.00	0.40 0.45 0.50

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice			
****									
Camera - 12" T x 8" W x 8" L	B	From Leg	1.00 0.00 0.00	0.000	66.00	No Ice 1/2" Ice 1" Ice	0.80 0.91 1.04	0.80 0.91 1.04	0.01 0.02 0.03
**									
PD220	A	From Leg	6.00 0.00 0.00	0.000	65.00	No Ice 1/2" Ice 1" Ice	3.56 7.13 10.70	3.56 7.13 10.70	0.02 0.05 0.07
PD220	B	From Leg	6.00 0.00 0.00	0.000	65.00	No Ice 1/2" Ice 1" Ice	3.56 7.13 10.70	3.56 7.13 10.70	0.02 0.05 0.07
PD220	C	From Leg	6.00 0.00 0.00	0.000	65.00	No Ice 1/2" Ice 1" Ice	3.56 7.13 10.70	3.56 7.13 10.70	0.02 0.05 0.07
Generic 3.5' x 6' sidearm	A	From Leg	3.00 0.00 0.00	0.000	54.00	No Ice 1/2" Ice 1" Ice	3.00 4.00 5.00	6.00 7.50 9.00	0.40 0.45 0.50
Generic 3.5' x 6' sidearm	B	From Leg	3.00 0.00 0.00	0.000	54.00	No Ice 1/2" Ice 1" Ice	3.00 4.00 5.00	6.00 7.50 9.00	0.40 0.45 0.50
Generic 3.5' x 6' sidearm	C	From Leg	3.00 0.00 0.00	0.000	54.00	No Ice 1/2" Ice 1" Ice	3.00 4.00 5.00	6.00 7.50 9.00	0.40 0.45 0.50
****									
20 ft x 2" omni whip	A	From Leg	6.00 0.00 0.00	0.000	43.00	No Ice 1/2" Ice 1" Ice	4.07 6.13 8.20	4.07 6.13 8.20	0.04 0.07 0.12
Generic 3' x 4' sidearm	B	From Leg	3.00 0.00 0.00	0.000	43.00	No Ice 1/2" Ice 1" Ice	1.50 3.00 4.50	3.00 4.00 5.00	0.19 0.28 0.36
TMA (10" x 10" x 3.5")	B	From Leg	2.00 0.00 0.00	0.000	43.00	No Ice 1/2" Ice 1" Ice	0.83 0.95 1.07	0.30 0.37 0.46	0.02 0.02 0.03
TMA (10" x 10" x 3.5")	B	From Leg	2.00 0.00 0.00	0.000	41.50	No Ice 1/2" Ice 1" Ice	0.83 0.95 1.07	0.30 0.37 0.46	0.02 0.02 0.03
TMA (10" x 10" x 3.5")	B	From Leg	2.00 0.00 0.00	0.000	47.00	No Ice 1/2" Ice 1" Ice	0.83 0.95 1.07	0.30 0.37 0.46	0.02 0.02 0.03
Generic 3' x 4' sidearm	B	From Leg	3.00 0.00 0.00	0.000	37.00	No Ice 1/2" Ice 1" Ice	1.50 3.00 4.50	3.00 4.00 5.00	0.19 0.28 0.36
Generic 3.5' x 6' sidearm	B	From Leg	3.00 0.00 0.00	0.000	33.00	No Ice 1/2" Ice 1" Ice	3.00 4.00 5.00	6.00 7.50 9.00	0.40 0.45 0.50
****									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter		Aperture Area	Weight
				ft	°	°	ft	ft		ft^2	K
3' std w/ HP	B	Paraboloid w/Shroud (HP)	From Leg	2.00	0.000		58.00	3.00	No Ice	7.07	0.10
				0.00					1/2" Ice	7.47	0.14
				0.00					1" Ice	7.86	0.18
2 ft standard	B	Paraboloid w/o Radome	From Leg	2.00	0.000		43.00	2.00	No Ice	3.14	0.01
				0.00					1/2" Ice	3.41	0.06
				0.00					1" Ice	3.68	0.10
2 ft standard	B	Paraboloid w/o Radome	From Leg	2.00	0.000		35.00	2.00	No Ice	3.14	0.01
				0.00					1/2" Ice	3.41	0.06
				0.00					1" Ice	3.68	0.10
*****											

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service

Comb. No.	Description
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	307.72	27.73	-15.86
	Max. H_x	18	307.72	27.73	-15.86
	Max. H_z	7	-274.34	-25.31	14.48
	Min. Vert	7	-274.34	-25.31	14.48
	Min. H_x	7	-274.34	-25.31	14.48
	Min. H_z	18	307.72	27.73	-15.86
Leg B	Max. Vert	10	307.18	-27.91	-15.59
	Max. H_x	23	-276.01	25.64	14.31
	Max. H_z	23	-276.01	25.64	14.31
	Min. Vert	23	-276.01	25.64	14.31
	Min. H_x	10	307.18	-27.91	-15.59
	Min. H_z	10	307.18	-27.91	-15.59
Leg A	Max. Vert	2	305.73	-0.31	31.91
	Max. H_x	19	-137.05	2.70	-14.70
	Max. H_z	2	305.73	-0.31	31.91
	Min. Vert	15	-275.84	0.31	-29.19
	Min. H_x	9	8.29	-2.61	0.58
	Min. H_z	15	-275.84	0.31	-29.19

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	140 - 120	3.89	47	0.316	0.065
T2	120 - 100	2.66	47	0.255	0.044
T3	100 - 80	1.73	47	0.181	0.025
T4	80 - 60	1.06	47	0.128	0.014
T5	60 - 40	0.58	47	0.089	0.008
T6	40 - 20	0.26	47	0.053	0.004
T7	20 - 0	0.07	47	0.025	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.00	5/8" X 6' Lightning Rod	47	3.89	0.316	0.065	48140
142.00	Platform Mount [LP 602-1]	47	3.89	0.316	0.065	48140
129.00	(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	47	3.19	0.284	0.053	21882
121.00	DB212-2-A	47	2.71	0.258	0.045	13075
119.00	DB212-2-A	47	2.60	0.251	0.042	12653
112.00	DB540K-E	47	2.24	0.225	0.035	14235
111.00	PD220	47	2.20	0.221	0.034	14567
108.00	DB810T3E-XT	47	2.06	0.210	0.032	15666
104.00	DB212-2-A	47	1.89	0.195	0.028	17416
101.00	PD1121	47	1.76	0.185	0.026	18849
97.00	10' x 2" Sch 40 Pipe Mount	47	1.61	0.172	0.023	20218
96.00	DB212-2-A	47	1.57	0.169	0.022	20457
94.00	DB810T3E-XT	47	1.50	0.163	0.021	20913
90.00	PD340-140	47	1.36	0.152	0.018	21880
68.00	DB212-2-A	47	0.75	0.104	0.010	28788
67.00	Obstruction light	47	0.73	0.102	0.010	29186

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
66.00	Camera - 12" T x 8" W x 8" L	47	0.71	0.100	0.009	29595
65.00	PD220	47	0.68	0.098	0.009	30015
58.00	3' std w/ HP	47	0.54	0.085	0.007	32753
54.00	Generic 3.5' x 6' sidearm	47	0.47	0.078	0.006	33826
47.00	TMA (10" x 10" x 3.5")	47	0.36	0.065	0.005	35784
43.00	2 ft standard	47	0.30	0.058	0.004	36978
41.50	TMA (10" x 10" x 3.5")	47	0.28	0.056	0.004	37324
37.00	Generic 3' x 4' sidearm	47	0.22	0.049	0.003	37185
35.00	2 ft standard	47	0.20	0.045	0.003	36721
33.00	Generic 3.5' x 6' sidearm	47	0.18	0.043	0.003	36240

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	140 - 120	18.33	18	1.436	0.322
T2	120 - 100	12.67	18	1.182	0.214
T3	100 - 80	8.29	18	0.858	0.123
T4	80 - 60	5.10	18	0.614	0.067
T5	60 - 40	2.82	18	0.428	0.039
T6	40 - 20	1.27	18	0.258	0.018
T7	20 - 0	0.35	18	0.120	0.007

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.00	5/8" X 6' Lightning Rod	18	18.33	1.436	0.322	11658
142.00	Platform Mount [LP 602-1]	18	18.33	1.436	0.322	11658
129.00	(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	18	15.11	1.305	0.262	5299
121.00	DB212-2-A	18	12.92	1.197	0.219	3160
119.00	DB212-2-A	18	12.41	1.167	0.209	3047
112.00	DB540K-E	18	10.75	1.054	0.174	3330
111.00	PD220	18	10.52	1.037	0.170	3390
108.00	DB810T3E-XT	18	9.88	0.987	0.156	3586
104.00	DB212-2-A	18	9.06	0.921	0.138	3884
101.00	PD1121	18	8.48	0.874	0.126	4121
97.00	10' x 2" Sch 40 Pipe Mount	18	7.75	0.815	0.112	4363
96.00	DB212-2-A	18	7.57	0.801	0.108	4410
94.00	DB810T3E-XT	18	7.23	0.774	0.102	4503
90.00	PD340-140	18	6.57	0.724	0.090	4699
68.00	DB212-2-A	18	3.64	0.499	0.048	6101
67.00	Obstruction light	18	3.53	0.490	0.047	6182
66.00	Camera - 12" T x 8" W x 8" L	18	3.42	0.481	0.046	6265
65.00	PD220	18	3.32	0.472	0.045	6351
58.00	3' std w/ HP	18	2.64	0.410	0.036	6900
54.00	Generic 3.5' x 6' sidearm	18	2.29	0.375	0.032	7106
47.00	TMA (10" x 10" x 3.5")	18	1.74	0.314	0.024	7480
43.00	2 ft standard	18	1.46	0.281	0.021	7705
41.50	TMA (10" x 10" x 3.5")	18	1.36	0.269	0.019	7768
37.00	Generic 3' x 4' sidearm	18	1.09	0.235	0.016	7718
35.00	2 ft standard	18	0.98	0.220	0.014	7614
33.00	Generic 3.5' x 6' sidearm	18	0.87	0.206	0.013	7507

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	140	Leg	A325N	0.88	4	14.04	40.59	0.346 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	6.39	10.44	0.612 ✔	1	Member Bearing
		Top Girt	A325N	0.63	1	1.16	10.44	0.111 ✔	1	Member Bearing
T2	120	Leg	A325N	1.00	4	24.50	53.01	0.462 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	5.54	10.44	0.530 ✔	1	Member Bearing
T3	100	Leg	A325N	1.00	4	34.18	53.01	0.645 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	6.15	10.44	0.590 ✔	1	Member Bearing
T4	80	Leg	A325N	1.00	6	28.75	53.01	0.542 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	7.21	10.44	0.690 ✔	1	Member Bearing
T5	60	Leg	A325N	1.00	6	34.69	53.01	0.654 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	7.87	10.44	0.754 ✔	1	Member Bearing
T6	40	Leg	A325N	1.00	8	30.45	53.01	0.574 ✔	1	Bolt Tension
		Diagonal	A325N	0.63	1	8.64	11.70	0.738 ✔	1	Member Bearing
T7	20	Leg	A354-BC	1.00	8	33.45	55.22	0.606 ✔	1	Bolt Tension
		Diagonal	A325N	0.75	1	9.74	14.14	0.689 ✔	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	Pipe 2.875" x 0.276" (2.5 EH)	20.03	3.99	51.8 K=1.00	2.25	-58.23	83.33	0.699 [1] ✔
T2	120 - 100	Pipe 3.5" x 0.300" (3 EH)	20.03	3.97	42.0 K=1.00	3.02	-103.87	119.32	0.870 [1] ✔
T3	100 - 80	Pipe 4.5" x 0.337" (4 EH)	20.03	4.97	40.4 K=1.00	4.41	-144.57	176.06	0.821 [1] ✔
T4	80 - 60	Pipe 5.5" x 0.375" (5 EH)	20.03	6.62	43.7 K=1.00	6.04	-182.69	236.23	0.773 [1] ✔
T5	60 - 40	Pipe 6.625" x 0.340" (6 EHS)	20.03	6.62	35.7 K=1.00	6.71	-222.98	275.20	0.810 [1] ✔
T6	40 - 20	Pipe 6.625" x 0.432" (6 EH)	20.03	6.62	36.2 K=1.00	8.40	-263.18	343.65	0.766 [1] ✔
T7	20 - 0	Pipe 8.625" x 0.375" (8 EHS)	20.03	9.98	41.0 K=1.00	9.72	-297.90	386.79	0.770 [1] ✔

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L 2 x 2 x 1/4	5.68	2.70	92.2 K=1.11	0.94	-6.82	19.43	0.351 [1] ✔
T2	120 - 100	L 2 x 2 x 1/4	7.60	3.63	113.5 K=1.02	0.94	-5.52	15.43	0.357 [1] ✔
T3	100 - 80	L 2 x 2 x 1/4	9.81	4.71	144.6 K=1.00	0.94	-6.29	10.13	0.621 [1] ✔
T4	80 - 60	L 2.5 x 2.5 x 1/4	12.33	5.97	146.0 K=1.00	1.19	-7.42	12.62	0.588 [1] ✔
T5	60 - 40	L 2.5 x 2.5 x 1/4	14.09	6.80	166.3 K=1.00	1.19	-8.08	9.72	0.832 [1] ✔
T6	40 - 20	L 3 x 3 x 1/4	15.92	7.72	156.5 K=1.00	1.44	-8.84	13.29	0.665 [1] ✔
T7	20 - 0	L 3.5 x 3.5 x 1/4	19.14	9.31	161.0 K=1.00	1.69	-10.39	14.73	0.705 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L 2 x 2 x 1/4	2.63	2.15	93.0 K=1.41	0.94	-1.24	19.27	0.064 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	Pipe 2.875" x 0.276" (2.5 EH)	20.03	0.08	1.1	2.25	56.15	101.41	0.554 [1] ✔
T2	120 - 100	Pipe 3.5" x 0.300" (3 EH)	20.03	0.08	0.9	3.02	98.01	135.72	0.722 [1] ✔
T3	100 - 80	Pipe 4.5" x 0.337" (4 EH)	20.03	0.08	0.7	4.41	136.71	198.34	0.689 [1] ✔
T4	80 - 60	Pipe 5.5" x 0.375" (5 EH)	20.03	0.08	0.6	6.04	172.50	271.70	0.635 [1] ✔
T5	60 - 40	Pipe 6.625" x 0.340" (6 EHS)	20.03	0.08	0.5	6.71	208.14	302.10	0.689 [1] ✔
T6	40 - 20	Pipe 6.625" x 0.432" (6 EH)	20.03	0.08	0.5	8.40	243.58	378.22	0.644 [1] ✔
T7	20 - 0	Pipe 8.625" x 0.375" (8 EHS)	20.03	9.98	41.0	9.72	267.63	437.37	0.612 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L 2 x 2 x 1/4	5.68	2.70	55.6	0.56	6.39	24.49	0.261 [1] ✔
T2	120 - 100	L 2 x 2 x 1/4	6.28	2.98	61.1	0.56	5.54	24.49	0.226 [1] ✔
T3	100 - 80	L 2 x 2 x 1/4	9.81	4.71	95.2	0.56	6.15	24.49	0.251 [1] ✔
T4	80 - 60	L 2.5 x 2.5 x 1/4	12.33	5.97	95.1	0.75	7.21	32.71	0.220 [1] ✔
T5	60 - 40	L 2.5 x 2.5 x 1/4	14.09	6.80	108.1	0.75	7.87	32.71	0.241 [1] ✔
T6	40 - 20	L 3 x 3 x 1/4	15.92	7.72	101.1	0.94	8.64	45.79	0.189 [1] ✔
T7	20 - 0	L 3.5 x 3.5 x 1/4	19.14	9.31	104.0	1.10	9.74	53.79	0.181 [1] ✔

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	140 - 120	L 2 x 2 x 1/4	2.63	2.15	47.1	0.56	1.16	24.49	0.047 [1] ✔

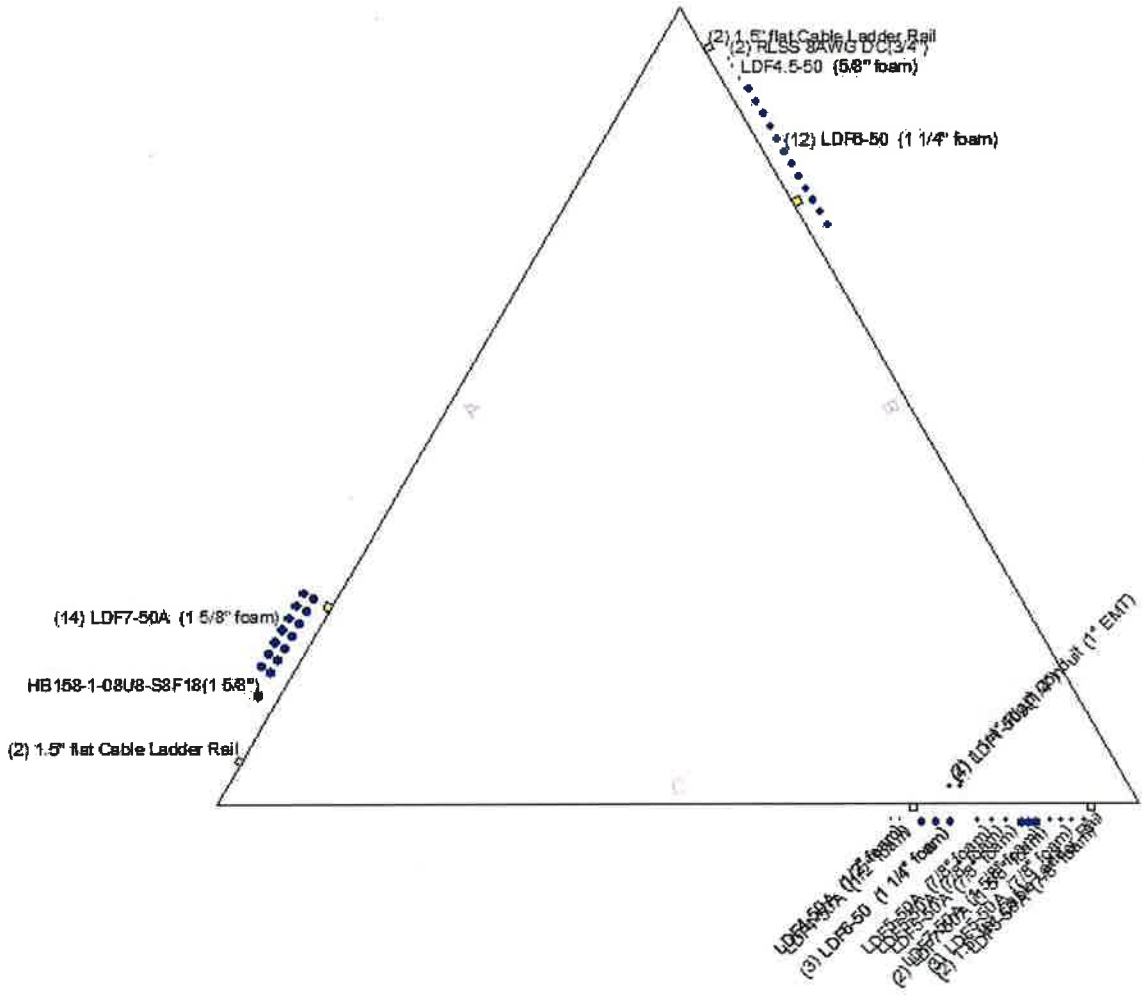
[1] $P_u / \phi P_n$ controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	140 - 120	Leg	Pipe 2.875" x 0.276" (2.5 EH)	1	-58.23	83.33	69.9	Pass
T2	120 - 100	Leg	Pipe 3.5" x 0.300" (3 EH)	37	-103.87	119.32	87.0	Pass
T3	100 - 80	Leg	Pipe 4.5" x 0.337" (4 EH)	70	-144.57	176.06	82.1	Pass
T4	80 - 60	Leg	Pipe 5.5" x 0.375" (5 EH)	97	-182.69	236.23	77.3	Pass
T5	60 - 40	Leg	Pipe 6.625" x 0.340" (6 EHS)	118	-222.98	275.20	81.0	Pass
T6	40 - 20	Leg	Pipe 6.625" x 0.432" (6 EH)	139	-263.18	343.65	76.6	Pass
T7	20 - 0	Leg	Pipe 8.625" x 0.375" (8 EHS)	160	-297.90	386.79	77.0	Pass
T1	140 - 120	Diagonal	L 2 x 2 x 1/4	14	-6.82	19.43	35.1	Pass
T2	120 - 100	Diagonal	L 2 x 2 x 1/4	44	-5.52	15.43	35.7	Pass
T3	100 - 80	Diagonal	L 2 x 2 x 1/4	77	-6.29	10.13	62.1	Pass
T4	80 - 60	Diagonal	L 2.5 x 2.5 x 1/4	104	-7.42	12.62	58.8	Pass
T5	60 - 40	Diagonal	L 2.5 x 2.5 x 1/4	122	-8.08	9.72	83.2	Pass
T6	40 - 20	Diagonal	L 3 x 3 x 1/4	143	-8.84	13.29	66.5	Pass
T7	20 - 0	Diagonal	L 3.5 x 3.5 x 1/4	164	-10.39	14.73	70.5	Pass
T1	140 - 120	Top Girt	L 2 x 2 x 1/4	4	-1.24	19.27	6.4	Pass
							Summary	
						Leg (T2)	87.0	Pass
						Diagonal (T5)	83.2	Pass
						Top Girt (T1)	6.4	Pass
						Bolt Checks	75.4	Pass
						RATING =	**87.0**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Section	T1	T2	T3	T4	T5	T6	T7
Legs	Pipe 2.875" x 0.276" (2.5 EH)	Pipe 3.5" x 0.300" (3 EH)	Pipe 4.5" x 0.337" (4 EH)	Pipe 5.5" x 0.375" (5 EH)	Pipe 6.625" x 0.340" (6 EHS)	Pipe 6.625" x 0.432" (6 EH)	Pipe 8.625" x 0.375" (8 EHS)
Leg Grade	A618-50						
Diagonals	L 2 x 2 x 1/4			L 2.5 x 2.5 x 1/4		L 3 x 3 x 1/4	L 3.5 x 3.5 x 1/4
Diagonal Grade	A36						A572-50
Top Girts	L 2 x 2 x 1/4			N.A.			
Face Width (ft)	2.63	4.66	6.69	8.72	10.75	12.79	14.82
# Panels @ (ft)	5 @ 3.98333	5 @ 3.96667	4 @ 4.95833		9 @ 6.61111		2 @ 9.95833
Weight (K)	1.1	1.4	1.8	2.3	2.8	3.4	3.6
							16.2

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A618-50	50 ksi	70 ksi	A572-50	50 ksi	65 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 105.00 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.00 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.00 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 87%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 308 K
SHEAR: 32 K

UPLIFT: -276 K
SHEAR: 29 K

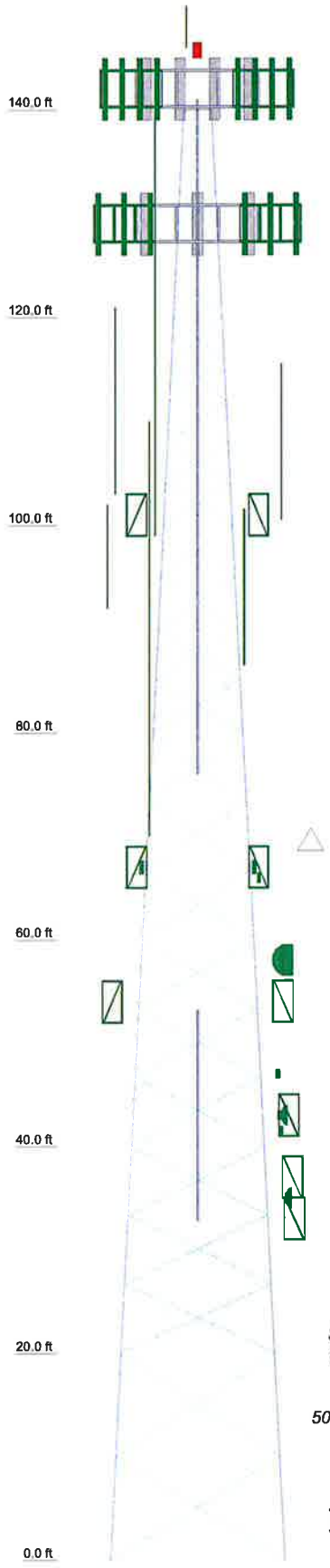
AXIAL 103 K
SHEAR 13 K *MOMENT 1115 kip-ft*
TORQUE 4 kip-ft
50.00 mph WIND - 0.75 in ICE

AXIAL 38 K
SHEAR 51 K *MOMENT 4306 kip-ft*
TORQUE 14 kip-ft
REACTIONS - 105.00 mph WIND

Paul J. Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: 140-ft SST / Groton, CT			
Project: Groton CT / PJF 42916-0002			
Client: On Air Engineering	Drawn by: Rebekah Dorris	App'd:	
Code: TIA-222-G	Date: 10/25/16	Scale: N	
Path:		Dwg No.	

Section	T1	T2	T3	T4	T5	T6	T7
Legs	Pipe 2.875" x 0.276" (2.5 EH)	Pipe 3.5" x 0.300" (3 EH)	Pipe 4.5" x 0.337" (4 EH)	Pipe 5.5" x 0.375" (5 EH)	Pipe 6.625" x 0.340" (6 EHS)	Pipe 6.625" x 0.432" (6 EH)	Pipe 8.625" x 0.375" (8 EHS)
Leg Grade	A618-50						
Diagonals	L 2 x 2 x 1/4			L 2.5 x 2.5 x 1/4		L 3 x 3 x 1/4	L 3.5 x 3.5 x 1/4
Diagonal Grade	A36					A572-50	
Top Girts	L 2 x 2 x 1/4			N.A.			
Face Width (ft)	2.63	4.66	6.69	8.72	10.75	12.79	14.82
# Panels @ (ft)	5 @ 3.98333	5 @ 3.96667	4 @ 4.95833		9 @ 6.61111		2 @ 9.95833
Weight (K)	1.1	1.4	1.8	2.3	2.8	3.4	3.6



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
5/8" X 6' Lightning Rod	145	DB212-2-A	119
Flash Beacon Lighting	145	DB540K-E	112
Platform Mount [LP 602-1]	142	PD220	111
BXA-80080-4CF-EDIN-4 w/ Mount Pipe	142	DB810T3E-XT	108
		DB212-2-A	104
BXA-80080-4CF-EDIN-4 w/ Mount Pipe	142	PD1121	101
		Generic 3.5' x 6' sidearm	101
BXA-80080-4CF-EDIN-4 w/ Mount Pipe	142	Generic 3.5' x 6' sidearm	101
		Generic 3.5' x 6' sidearm	101
(2) RFS FD9R6004/1C-3L	142	10' x 2" Sch 40 Pipe Mount	97
(2) RFS FD9R6004/1C-3L	142	PD1121	97
(2) RFS FD9R6004/1C-3L	142	DB212-2-A	96
DB-T1-6Z-8AB-0Z	142	DB810T3E-XT	94
(3) SBNHH-1D65B w/ Mount Pipe	142	PD340-140	90
(3) SBNHH-1D65B w/ Mount Pipe	142	DB212-2-A	90
(3) SBNHH-1D65B w/ Mount Pipe	142	DB212-2-A	68
(3) RRH2X60-PCS	142	Obstruction light	67
(3) RRH2x60-700	142	Obstruction light	67
(3) RRH4x45-AWS	142	Generic 3.5' x 6' sidearm	67
DB-T1-6Z-8AB-0Z	142	Generic 3.5' x 6' sidearm	67
(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	129	Camera - 12" T x 8" W x 8" L	66
		PD220	65
(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	129	PD220	65
		PD220	65
(2) AM-X-CD-14-65-00T-RET w/ Mount Pipe	129	3' std w/ HP	58
		Generic 3.5' x 6' sidearm	54
7770.00 w/ Mount Pipe	129	Generic 3.5' x 6' sidearm	54
7770.00 w/ Mount Pipe	129	Generic 3.5' x 6' sidearm	54
7770.00 w/ Mount Pipe	129	TMA (10" x 10" x 3.5")	47
(2) RRU-11	129	TMA (10" x 10" x 3.5")	43
(2) RRU-11	129	Generic 3' x 4' sidearm	43
(2) RRU-11	129	20 ft x 2" omni whip	43
(2) TMA (10" x 10" x 3.5")	129	2 ft standard	43
(2) TMA (10" x 10" x 3.5")	129	TMA (10" x 10" x 3.5")	41.5
(2) TMA (10" x 10" x 3.5")	129	Generic 3' x 4' sidearm	37
DC6-48-60-18-8F	129	2 ft standard	35
Sector Mount [SM 502-3]	129	Generic 3.5' x 6' sidearm	33
DB212-2-A	121		

MATERIAL STRENGTH

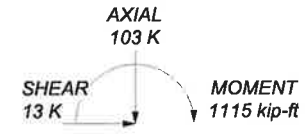
GRADE	Fy	Fu	GRADE	Fy	Fu
A618-50	50 ksi	70 ksi	A572-50	50 ksi	65 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

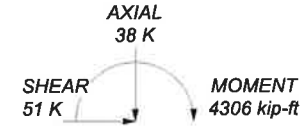
1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 105.00 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.00 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.00 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 87%

UPLIFT: -276 K
SHEAR: 29 K

ALL REACTIONS ARE FACTORED
MAX. TOWER REACTIONS AT BASE:
DOWN: 308 K
SHEAR: 32 K



TORQUE 4 kip-ft
50.00 mph WIND - 0.75 in ICE



TORQUE 14 kip-ft
REACTIONS - 105.00 mph WIND

Paul J. Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

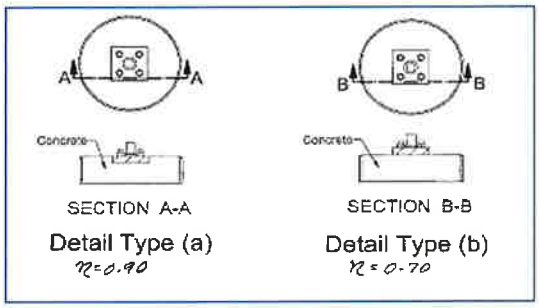
Job:	140-ft SST / Groton, CT		
Project:	Groton CT / PJF 42916-0002		
Client:	On Air Engineering	Drawn by: Rebekah Dorris	App'd:
Code:	TIA-222-G	Date: 10/25/16	Scale: N
Path:			Dwg No.

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

Self-Support Tower Anchor Rod Capacity - TIA-G

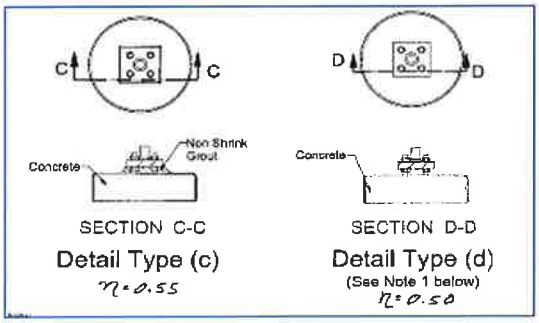
Loads				
Uplift :	276	kips	1.00	Maximum Ratio
Shear :	29	kips		

Existing Anchor Rods		
Anchor Rod Condition (n) :	0.55	
Anchor Rod ø :	1	in
Anchor Rod Quantity :	8	
Anchor Rod Grade :	A354 Gr. BC (1/4 to 2-1/2 incl.)	
F_y :	109	ksi
F_u :	125	ksi
Threads per Inch	8	
Total Net Tensile Area	4.85	in^2
ϕ :	0.8	
Total Anchor Rod Capacity ϕR_{nt} :	484.60	kip
Anchor Rod Ratio :	0.678	



SECTION A-A
Detail Type (a)
$\eta = 0.90$

SECTION B-B
Detail Type (b)
$\eta = 0.70$



SECTION C-C
Detail Type (c)
$\eta = 0.55$

SECTION D-D
Detail Type (d)
(See Note 1 below)
$\eta = 0.50$

foundation loads

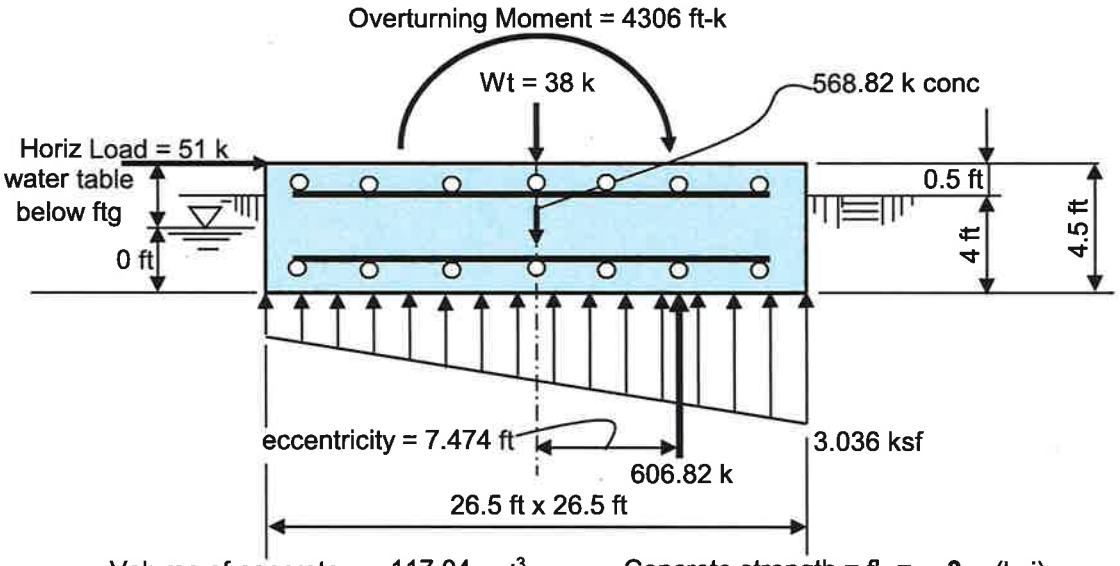
Limit states Tower or Pole Weight =	**38**	kips
limit states total horizontal force =	**51**	kips
limit states overturning moment =	**4306**	ft-kips

soil properties

Safety factor against overturning =	**1**	
Soil Density =	**125**	pcf
Ultimate soil bearing =	**10**	ksf
Depth to water table =	**99**	ft

mat dimensions

depth to bottom of footing =	**4**	ft
Footing thickness =	**4.5**	ft
Footing Width =	**26.5**	ft
Footing Length =	**26.5**	ft
Tower/Pole Center Offset =	**0**	ft



Volume of concrete = 117.04 yd^3 Concrete strength = f'_c = **3** (ksi)

Rebar = (140) #8 bars by 26 ft long

reinforcing steel = **(35) #8 @ 9.18 in o.c. ea way top and bottom**

Summary of analysis results

Overturning Moment: (Stress Ratio = 0.752) **< CONTROLLING CRITERIA**

Calculated Ultimate Overturning Moment = 4535.5 ft-kips

Resisting Moment = 6030.3 ft-kips

Factor of Safety against overturning = 1.330 **> 1 okay**

Soil Bearing (Stress Ratio = 0.405)

Limit States Maximum Net Soil Bearing = 7.5 ksf

Calculated limit states Soil Bearing Pressure = 3.036 **ksf < 7.5 ksf okay**

Bending Moment (Stress Ratio = 0.354)

Ultimate Bending Moment Resistance = 6032 ft-kips

Calculated Ultimate Bending Moment = 2137 **ft-kips < 6032 ft-kips okay**

Bending Shear (Stress Ratio = 0.206)

Ultimate Bending Shear Resistance = 1466 kips

Calculated Ultimate Bending Shear = 302 **kips < 1466 kips okay**

Rebar strength = F_y = **60** (ksi)

minimum cover over rebar = **3** inches

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES BY PAUL J. FORD AND COMPANY

1) Paul J. Ford and Company has not performed a site visit to verify the tower member sizes or the antenna/coax loading. If the existing conditions are not as represented on these drawings, we should be contacted immediately to evaluate the significance of the deviation.

2) No allowance was made for any damaged, missing, or rusted members. The analysis of this tower assumes that no physical deterioration has occurred in any of the structural components of the tower and that all the tower members have the same load carrying capacity as the day the tower was erected.

3) It is not possible to have all the very detailed information to perform a very thorough analysis of every structural sub-component of an existing tower. The structural analysis by Paul J. Ford and Company verifies the adequacy of the main structural members of the tower. Paul J. Ford and Company provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc.

4) This tower has been analyzed according to the minimum design wind loads recommended by the Telecommunications Industry Association Standard ANSI/TIA-222-G. If the owner or local or state agencies require a higher design wind load, Paul J. Ford and Company should be made aware of this requirement.

5) The attached sketches are a schematic representation of the tower that we have analyzed. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions and for the proper fit and clearance in the field.

6) Miscellaneous items such as antenna mounts etc. have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.