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Also admitted in Massachusetts

January 27, 2017

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

Re: **EM-VER-084-16082^q – Cellco Partnership d/b/a Verizon Wireless
111 Schoolhouse Road, Milford, Connecticut**

Dear Ms. Bachman:

On September 19, 2016, the Siting Council acknowledged receipt of the Cellco Partnership d/b/a Verizon Wireless (“Cellco”) notice of intent to modify its existing telecommunications facility at 111 Schoolhouse Road in Milford, Connecticut. The modifications involved the replacement of certain antennas and the installation of new remote radio heads.

As a condition of the acknowledgement, Cellco was required to provide the Council with an updated Structural Analysis Report referencing Rev. G of the structural standards. The updated Structural Analysis Report is attached for your records.

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

Sincerely,



Kenneth C. Baldwin

Attachment
Copy to:
Tim Parks

16081436-v1

Date: January 23, 2017

Timothy Howell
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277
980.209.8242

Paul J. Ford and Company
250 E Broad St, Suite 600
Columbus, OH 43215
(614) 221-6679
mherbert@pjfweb.com

Subject: Structural Analysis Report

Carrier Designation:	Verizon Wireless Co-Locate	
	Carrier Site Number:	117577
	Carrier Site Name:	Milford 2 CT
Crown Castle Designation:	Crown Castle BU Number:	876342
	Crown Castle Site Name:	BIC DRIVE (SSUSA)
	Crown Castle JDE Job Number:	348546
	Crown Castle Work Order Number:	1351376
	Crown Castle Application Number:	312913 Rev. 1

Engineering Firm Designation: Paul J. Ford and Company Project Number: 37517-0320.001.7805

Site Data: 111 School House Road, a/k/a Bic Drive, MILFORD, New Haven County, CT
Latitude 41° 12' 46.06", Longitude -73° 5' 7.1"
140 Foot - Monopole Tower

Dear Timothy Howell,

Paul J. Ford and Company is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 991888, in accordance with application 312913, revision 1.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

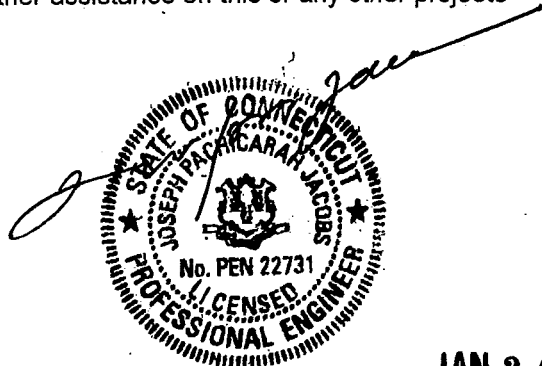
LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per 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. Risk Category II, Exposure Category C and Topographic Category 1 were used in this analysis.

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

Respectfully submitted by:

Michelle Herbert
Structural Designer JWM



Date: **January 23, 2017**

Timothy Howell
Crown Castle
3530 Toringdon Way Suite 300
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980.209.8242

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Subject: Structural Analysis Report

Carrier Designation: Verizon Wireless Co-Locate
Carrier Site Number: 117577
Carrier Site Name: Milford 2 CT

Crown Castle Designation: Crown Castle BU Number: 876342
Crown Castle Site Name: BIC DRIVE (SSUSA)
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Respectfully submitted by:

Michelle Herbert
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Antenna and Cable Information

Table 2 - Existing and Reserved Antenna and Cable Information

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Table 5 - Tower Components vs. Capacity

4.1) Recommendations

5) APPENDIX A

tnxTower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 140 ft Monopole tower designed by SUMMIT in October of 1999. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per 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. Risk Category II, Exposure Category C and Topographic Category 1 were used in this analysis

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
104.0	104.0	3	alcatel lucent	RRH2X60-PCS	1 2	1/2 1-5/8	--
		3	alcatel lucent	RRH2x60-700			
		3	alcatel lucent	RRH4X45-AWS4 B66			
		9	commscope	SBNHH-1D65B			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

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
140.0	140.0	3	alcatel lucent	TD-RRH8x20-25	1 3 1	1/2 1-1/4 1-5/8	1
		9	rfs celwave	ACU-A20-N			
		3	rfs celwave	APXVSP18-C-A20			
		3	rfs celwave	APXVTM14-C-120			
		1	tower mounts	Platform Mount [LP 1201-1]			
137.0	137.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	--	--	1
		3	alcatel lucent	TME-1900MHz RRH (65 MHz)			
		3	alcatel lucent	TME-800MHZ RRH			
		1	tower mounts	Side Arm Mount [SO 103-3]			
123.0	123.0	1	tower mounts	Side Arm Mount [SO 104-3]	--	--	1

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	123.0	3	cci antennas	HPA-65R-BUU-H6	--	--	2
		3	ericsson	RRUS 11			
		3	ericsson	RRUS12/RRUS A2			
		3	powerwave	1001940	1 2 12	3/8 7/16 1-5/8	1
		6	powerwave	7770.00			
		6	powerwave	LGP21401			
	6	powerwave	LGP21901				
1	raycap	DC6-48-60-18-8F					
121.0	1	tower mounts	Platform Mount [LP 1201-1]				
115.0	116.0	6	ems wireless	RR90-17-02DP	11 6	1-1/4 1-5/8	1
		3	rfs celwave	APX16DWV-16DWV-S-E-A20			
		3	andrew	ETW200VS12UB			
	6	remec	S20070A1				
115.0	1	tower mounts	Platform Mount [LP 1201-1]				
104.0	107.0	1	trimble	ACUTIME 2000	--	--	1
	104.0	3	rymsa wireless	MG D3-800Tx	7	1-5/8	3
		3	alcatel lucent	RRH2X40-AWS			
		3	antel	BXA-171063-8BF-EDIN-0			
		2	antel	BXA-70063/6CF	6	1-5/8	1
		1	powerwave	P65.16.XL.2			
		1	rfs celwave	DB-T1-6Z-8AB-OZ			
		3	andrew	LNx-6514DS-VTM			
6	rfs celwave	FD9R6004/2C-3L					
1	tower mounts	Platform Mount [LP 1201-1]					
95.0	95.0	3	rfs celwave	APXV18-206517S-C	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
80.0	82.0	1	kathrein	OG-860/1920/GPS-A	1	1/2	1
	80.0	1	tower mounts	Side Arm Mount [SO 901-1]			

- Notes:
 1) Existing Equipment
 2) Reserved Equipment
 3) Equipment To Be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 08-12040E G1, 12/05/2008	1531894	CCISITES
4-POST-MODIFICATION INSPECTION	PJF, 41709-0132, 12/04/2009	2547672	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 25566, 04/21/2016	6234048	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PJF, 29299-549, 09/29/1999	1631615	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PJF, 29299-549, 10/29/1999	1630877	CCISITES

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.
- 4) For existing modifications: monopole was modified in conformance with the referenced modification 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	
L1	140 - 104	Pole	TP23.3105x16x0.25	1	-12.94	1342.99	65.4	Pass	
L2	104 - 98.5	Pole	TP24.4273x23.3105x0.4484	2	-17.66	1494.32	76.4	Pass	
L3	98.5 - 97	Pole	TP24.7319x24.4273x0.7154	3	-18.07	2383.90	51.7	Pass	
L4	97 - 88.5	Pole	TP26.458x24.7319x0.4933	4	-19.57	2017.41	71.1	Pass	
L5	88.5 - 88	Pole	TP26.0593x24.8114x0.5565	5	-20.99	2295.71	71.0	Pass	
L6	88 - 68.08	Pole	TP30.1033x26.0593x0.6607	6	-27.15	3159.33	76.7	Pass	
L7	68.08 - 47.25	Pole	TP34.332x30.1033x0.7176	7	-33.17	3884.33	77.7	Pass	
L8	47.25 - 37.75	Pole	TP35.6358x32.0339x0.7546	8	-38.69	4224.28	81.8	Pass	
L9	37.75 - 32.5	Pole	TP36.7017x35.6358x0.8008	9	-42.33	4704.88	79.0	Pass	
L10	32.5 - 23.5	Pole	TP38.5289x36.7017x0.8175	10	-46.58	5196.44	76.9	Pass	
L11	23.5 - 20.75	Pole	TP39.0872x38.5289x0.9506	11	-48.08	5578.27	73.7	Pass	
L12	20.75 - 3	Pole	TP42.6909x39.0872x0.8077	12	-57.05	5709.31	80.4	Pass	
L13	3 - 0	Pole	TP43.3x42.6909x0.8586	13	-58.71	6140.68	76.3	Pass	
							Summary		
							Pole (L8)	81.8	Pass
							RATING =	81.8	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	76.0	Pass
1	Base Plate	0	66.7	Pass
1	Base Foundation Structural Steel	0	48.2	Pass
1	Base Foundation Soil Interaction	0	15.3	Pass

Structure Rating (max from all components) =	81.8%
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Notes:

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

4.1) Recommendations

The monopole 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

There is a pole section.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

- 1) Tower is located in New Haven County, Connecticut.
- 2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
- 3) Basic wind speed of 97 mph.
- 4) Structure Class II.
- 5) Exposure Category C.
- 6) Topographic Category 1.
- 7) Crest Height 0.00 ft.
- 8) Nominal ice thickness of 0.7500 in.
- 9) Ice thickness is considered to increase with height.
- 10) Ice density of 56 pcf.
- 11) A wind speed of 50 mph is used in combination with ice.
- 12) Temperature drop of 50 °F.
- 13) Deflections calculated using a wind speed of 60 mph.
- 14) A non-linear (P-delta) analysis was used.
- 15) Pressures are calculated at each section.
- 16) Stress ratio used in pole design is 1.
- 17) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	140.00-104.00	36.00	0.00	12	16.0000	23.3104	0.2500	1.0000	A572-65 (65 ksi)
L2	104.00-98.50	5.50	0.00	12	23.3104	24.4273	0.4484	1.7936	Reinf 38.06 ksi (38 ksi)
L3	98.50-97.00	1.50	0.00	12	24.4273	24.7319	0.7154	2.8614	Reinf 38.00 ksi (38 ksi)
L4	97.00-88.50	8.50	3.25	12	24.7319	26.4580	0.4933	1.9732	Reinf 44.26 ksi (44 ksi)
L5	88.50-88.00	3.75	0.00	12	24.8114	26.0593	0.5565	2.2260	Reinf 44.30 ksi

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L6	88.00-68.08	19.92	0.00	12	26.0593	30.1033	0.6607	2.6427	(44 ksi) Reinf 44.48 ksi (44 ksi)
L7	68.08-47.25	20.83	4.25	12	30.1033	34.3320	0.7176	2.8705	Reinf 45.26 ksi (45 ksi)
L8	47.25-37.75	13.75	0.00	12	32.0339	35.6358	0.7546	3.0186	Reinf 45.02 ksi (45 ksi)
L9	37.75-32.50	5.25	0.00	12	35.6358	36.7017	0.8008	3.2030	Reinf 44.82 ksi (45 ksi)
L10	32.50-23.50	9.00	0.00	12	36.7017	38.5289	0.8175	3.2701	Reinf 46.16 ksi (46 ksi)
L11	23.50-20.75	2.75	0.00	12	38.5289	39.0872	0.9506	3.8024	Reinf 42.14 ksi (42 ksi)
L12	20.75-3.00	17.75	0.00	12	39.0872	42.6909	0.8077	3.2308	Reinf 46.22 ksi (46 ksi)
L13	3.00-0.00	3.00		12	42.6909	43.3000	0.8586	3.4344	Reinf 46.15 ksi (46 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	16.5644	12.6788	401.4426	5.6385	8.2880	48.4366	813.4316	6.2401	3.6180	14.472
	24.1328	18.5637	1260.0424	8.2556	12.0748	104.3530	2553.1875	9.1365	5.5772	22.309
L2	24.1328	33.0100	2202.2268	8.1846	12.0748	182.3819	4462.3086	16.2465	5.0455	11.252
	25.2890	34.6227	2541.0044	8.5844	12.6534	200.8167	5148.7639	17.0402	5.3448	11.919
L3	25.2890	54.6195	3919.8445	8.4889	12.6534	309.7870	7942.6676	26.8821	4.6294	6.471
	25.6044	55.3212	4072.8543	8.5979	12.8111	317.9152	8252.7071	27.2274	4.7110	6.585
L4	25.6044	38.5013	2887.1983	8.6774	12.8111	225.3663	5850.2464	18.9491	5.3061	10.756
	27.3913	41.2430	3548.9744	9.2954	13.7052	258.9501	7191.1843	20.2986	5.7687	11.694
L5	26.8063	43.4624	3263.6208	8.6833	12.8523	253.9324	6612.9806	21.3909	5.1581	9.269
	26.9786	45.6984	3793.6982	9.1300	13.4987	281.0415	7687.0611	22.4914	5.4925	9.87
L6	26.9786	54.0319	4448.9423	9.0927	13.4987	329.5827	9014.7632	26.5929	5.2133	7.891
	31.1652	62.6350	6930.3525	10.5405	15.5935	444.4386	14042.773	30.8270	6.2971	9.531
L7	31.1652	67.9034	7484.2505	10.5201	15.5935	479.9597	15165.120	33.4200	6.1444	8.562
	35.5431	77.6750	11202.561	12.0339	17.7840	629.9245	22699.426	38.2293	7.2777	10.141
L8	34.3166	76.0069	9491.8932	11.1980	16.5936	572.0219	19233.149	37.4083	6.5627	8.696
	36.8929	84.7592	13162.985	12.4875	18.4593	713.0798	26671.777	41.7159	7.5280	9.976
L9	36.8929	89.8203	13912.114	12.4709	18.4593	753.6624	28189.715	44.2068	7.4044	9.247
	37.9964	92.5686	15228.633	12.8525	19.0115	801.0234	30857.339	45.5595	7.6900	9.603
L10	37.9964	94.4620	15525.606	12.8465	19.0115	816.6442	31459.087	46.4913	7.6451	9.352
	39.8881	99.2720	18020.126	13.5007	19.9580	902.9035	36513.661	48.8587	8.1348	9.951
L11	39.8881	115.0235	20732.283	13.4530	19.9580	1038.7969	42009.227	56.6111	7.7782	8.182
	40.4661	116.7324	21670.171	13.6529	20.2472	1070.2807	43909.642	57.4522	7.9278	8.34
L12	40.4661	99.5560	18620.299	13.7041	20.2472	919.6488	37729.774	48.9984	8.3108	10.29
	44.1969	108.9283	24389.732	14.9942	22.1139	1102.9143	49420.209	53.6112	9.2766	11.485
L13	44.1969	115.6522	25832.343	14.9760	22.1139	1168.1498	52343.332	56.9205	9.1401	10.646
	44.8275	117.3361	26977.211	15.1940	22.4294	1202.7612	54663.144	57.7492	9.3034	10.836

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_r	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
L1 140.00-104.00				1	1	1			
L2 104.00-98.50				1	1	1			
L3 98.50-97.00				1	1	1			
L4 97.00-88.50				1	1	1			
L5 88.50-88.00				1	1	1			
L6 88.00-68.08				1	1	1			
L7 68.08-47.25				1	1	1			
L8 47.25-37.75				1	1	1			
L9 37.75-32.50				1	1	1			
L10 32.50-23.50				1	1	1			
L11 23.50-20.75				1	1	1			
L12 20.75-3.00				1	1	1			
L13 3.00-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number		$C_A A_A$	Weight
				ft			ft ² /ft	plf

LDF4-50A(1/2)	C	No	Inside Pole	140.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.15 0.15 0.15
HB114-1-0813U4-M5J(1-1/4)	C	No	Inside Pole	140.00 - 0.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.20 1.20 1.20
LDF7-50A(1-5/8)	C	No	Inside Pole	140.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.82 0.82 0.82

FB-L98B-002-75000(3/8)	C	No	Inside Pole	121.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.06 0.06 0.06
WR-VG122ST-BRDA(7/16)	C	No	Inside Pole	121.00 - 0.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.14 0.14 0.14
LDF7-50A(1-5/8)	C	No	Inside Pole	121.00 - 0.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.82 0.82 0.82

LDF6-50A(1-1/4)	C	No	Inside Pole	115.00 - 0.00	11	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.60 0.60 0.60
HJ7-50A(1-5/8)	C	No	CaAa (Out Of Face)	115.00 - 0.00	5	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.04 2.55 4.68
HJ7-50A(1-5/8)	C	No	CaAa (Out Of Face)	115.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.20 0.30 0.40	1.04 2.55 4.68

LDF7-50A(1-5/8)	C	No	Inside Pole	104.00 - 0.00	6	No Ice	0.00	0.82

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A		Weight	
						ft ² /ft	plf		
LDF4-50A(1/2)	C	No	Inside Pole	104.00 - 0.00	1	1/2" Ice	0.00	0.82	
						1" Ice	0.00	0.82	
						No Ice	0.00	0.15	
						1/2" Ice	0.00	0.15	
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	104.00 - 0.00	2	1" Ice	0.00	0.15	
						No Ice	0.00	1.30	
						1/2" Ice	0.00	1.30	
						1" Ice	0.00	1.30	
***	CR 50 1873(1-5/8)	C	No	CaAa (Out Of Face)	95.00 - 0.00	6	No Ice	0.00	0.83
1/2" Ice							0.00	2.34	
1" Ice							0.00	4.47	
***	LDF4-50A(1/2)	C	No	Inside Pole	80.00 - 0.00	1	No Ice	0.00	0.15
1/2" Ice							0.00	0.15	
1" Ice							0.00	0.15	
***	Aero MP3-08	C	No	CaAa (Out Of Face)	41.75 - 0.00	1	No Ice	0.47	0.00
1/2" Ice							0.58	0.00	
1" Ice							0.69	0.00	
Aero MP3-06	C	No	CaAa (Out Of Face)	71.75 - 41.75	1	No Ice	0.43	0.00	
						1/2" Ice	0.55	0.00	
						1" Ice	0.66	0.00	
Aero MP3-05	C	No	CaAa (Out Of Face)	100.75 - 71.75	1	No Ice	0.35	0.00	
						1/2" Ice	0.40	0.00	
						1" Ice	0.66	0.00	
***	1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	35.50 - 0.00	1	No Ice	0.21	0.00
1/2" Ice							0.32	0.00	
1" Ice							0.43	0.00	
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	90.67 - 35.50	1	No Ice	0.17	0.00	
						1/2" Ice	0.28	0.00	
						1" Ice	0.39	0.00	
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	105.50 - 95.50	1	No Ice	0.17	0.00	
						1/2" Ice	0.28	0.00	
						1" Ice	0.39	0.00	

Feed Line/Linear Appurtenances Section Areas

Tower Section n	Tower Elevation ft	Face	A _R	A _F	C _A A _A In Face	C _A A _A Out Face	Weight
			ft ²	ft ²	ft ²	ft ²	K
L1	140.00-104.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.428	0.48
L2	104.00-98.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.788	0.19
L3	98.50-97.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.069	0.05
L4	97.00-88.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.251	0.33
L5	88.50-88.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.356	0.02
L6	88.00-68.08	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	14.510	0.80
L7	68.08-47.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	16.643	0.84
L8	47.25-37.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	7.720	0.38

Tower Section n	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L9	37.75-32.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.490	0.21
L10	32.50-23.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	7.857	0.36
L11	23.50-20.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.401	0.11
L12	20.75-3.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	15.496	0.72
L13	3.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.619	0.12

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	140.00-104.00	A	1.708	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	6.755	1.00
L2	104.00-98.50	A	1.678	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	7.718	0.45
L3	98.50-97.00	A	1.672	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.815	0.12
L4	97.00-88.50	A	1.663	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	13.312	1.02
L5	88.50-88.00	A	1.655	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.935	0.07
L6	88.00-68.08	A	1.634	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	36.896	2.60
L7	68.08-47.25	A	1.585	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	37.926	2.64
L8	47.25-37.75	A	1.538	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	17.426	1.20
L9	37.75-32.50	A	1.509	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	9.596	0.64
L10	32.50-23.50	A	1.475	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	16.414	1.07
L11	23.50-20.75	A	1.441	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	4.955	0.32
L12	20.75-3.00	A	1.353	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	30.970	1.95
L13	3.00-0.00	A	1.101	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	4.747	0.27

Feed Line Center of Pressure

Section	Elevation ft	CP _x	CP _z	CP _x	CP _z
		in	in	Ice in	Ice in
L1	140.00-104.00	-0.0923	0.0533	-0.2090	0.1207
L2	104.00-98.50	-0.5124	0.2958	-0.9721	0.5612
L3	98.50-97.00	-0.6692	0.3863	-1.1678	0.6742
L4	97.00-88.50	-0.6059	0.3498	-1.0716	0.6187
L5	88.50-88.00	-0.6783	0.3916	-1.1986	0.6920
L6	88.00-68.08	-0.7036	0.4062	-1.2382	0.7149
L7	68.08-47.25	-0.7787	0.4496	-1.3054	0.7537
L8	47.25-37.75	-0.8007	0.4623	-1.3484	0.7785
L9	37.75-32.50	-0.8424	0.4863	-1.3764	0.7947
L10	32.50-23.50	-0.8632	0.4984	-1.3973	0.8067
L11	23.50-20.75	-0.8689	0.5016	-1.4043	0.8108
L12	20.75-3.00	-0.8781	0.5070	-1.4047	0.8110
L13	3.00-0.00	-0.8867	0.5120	-1.3452	0.7767

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
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Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustmen t	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
			Horz Lateral ft	Vert ft					

APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00	0.0000	140.00	No Ice	8.26	6.95	0.08
			0.00			1/2" Ice	8.82	8.13	0.15
			0.00			1" Ice	9.35	9.02	0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00	0.0000	140.00	No Ice	8.26	6.95	0.08
			0.00			1/2" Ice	8.82	8.13	0.15
			0.00			1" Ice	9.35	9.02	0.23
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00	0.0000	140.00	No Ice	8.26	6.95	0.08
			0.00			1/2" Ice	8.82	8.13	0.15
			0.00			1" Ice	9.35	9.02	0.23
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00	0.0000	140.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			0.00			1" Ice	7.47	6.47	0.19
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00	0.0000	140.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			0.00			1" Ice	7.47	6.47	0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00	0.0000	140.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			0.00			1" Ice	7.47	6.47	0.19
(3) ACU-A20-N	A	From Leg	4.00	0.0000	140.00	No Ice	0.07	0.12	0.00
			0.00			1/2" Ice	0.10	0.16	0.00
			0.00			1" Ice	0.15	0.21	0.00
(3) ACU-A20-N	B	From Leg	4.00	0.0000	140.00	No Ice	0.07	0.12	0.00
			0.00			1/2" Ice	0.10	0.16	0.00
			0.00			1" Ice	0.15	0.21	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
(3) ACU-A20-N	C	From Leg	4.00 0.00 0.00	0.0000	140.00	1" Ice	0.07	0.12	0.00
						No Ice	0.10	0.16	0.00
						1/2" Ice	0.15	0.21	0.00
TD-RRH8x20-25	A	From Leg	4.00 0.00 0.00	0.0000	140.00	1" Ice	4.05	1.53	0.07
						No Ice	4.30	1.71	0.10
						1/2" Ice	4.56	1.90	0.13
TD-RRH8x20-25	B	From Leg	4.00 0.00 0.00	0.0000	140.00	1" Ice	4.05	1.53	0.07
						No Ice	4.30	1.71	0.10
						1/2" Ice	4.56	1.90	0.13
TD-RRH8x20-25	C	From Leg	4.00 0.00 0.00	0.0000	140.00	1" Ice	4.05	1.53	0.07
						No Ice	4.30	1.71	0.10
						1/2" Ice	4.56	1.90	0.13
Platform Mount [LP 1201-1]	C	None		0.0000	140.00	1" Ice	23.10	23.10	2.10
						No Ice	26.80	26.80	2.50
						1/2" Ice	30.50	30.50	2.90
(2) 2 3/8" OD x 6 ft mount pipe	A	None		0.0000	140.00	1" Ice	1.43	1.43	0.00
						No Ice	1.92	1.92	0.01
						1/2" Ice	2.29	2.29	0.03
(2) 2 3/8" OD x 6 ft mount pipe	B	None		0.0000	140.00	1" Ice	1.43	1.43	0.00
						No Ice	1.92	1.92	0.01
						1/2" Ice	2.29	2.29	0.03
(2) 2 3/8" OD x 6 ft mount pipe	C	None		0.0000	140.00	1" Ice	1.43	1.43	0.00
						No Ice	1.92	1.92	0.01
						1/2" Ice	2.29	2.29	0.03
*** 800MHz 2X50W RRH W/FILTER	A	From Leg	2.00 0.00 0.00	0.0000	137.00	1" Ice	2.06	1.93	0.06
						No Ice	2.24	2.11	0.09
						1/2" Ice	2.43	2.29	0.11
800MHz 2X50W RRH W/FILTER	B	From Leg	2.00 0.00 0.00	0.0000	137.00	1" Ice	2.06	1.93	0.06
						No Ice	2.24	2.11	0.09
						1/2" Ice	2.43	2.29	0.11
800MHz 2X50W RRH W/FILTER	C	From Leg	2.00 0.00 0.00	0.0000	137.00	1" Ice	2.06	1.93	0.06
						No Ice	2.24	2.11	0.09
						1/2" Ice	2.43	2.29	0.11
TME-800MHZ RRH	A	From Leg	2.00 0.00 0.00	0.0000	137.00	1" Ice	2.13	1.77	0.05
						No Ice	2.32	1.95	0.07
						1/2" Ice	2.51	2.13	0.10
TME-800MHZ RRH	B	From Leg	2.00 0.00 0.00	0.0000	137.00	1" Ice	2.13	1.77	0.05
						No Ice	2.32	1.95	0.07
						1/2" Ice	2.51	2.13	0.10
TME-800MHZ RRH	C	From Leg	2.00 0.00 0.00	0.0000	137.00	1" Ice	2.13	1.77	0.05
						No Ice	2.32	1.95	0.07
						1/2" Ice	2.51	2.13	0.10
TME-1900MHz RRH (65 MHz)	A	From Leg	2.00 0.00 0.00	0.0000	137.00	1" Ice	2.31	2.38	0.06
						No Ice	2.52	2.58	0.08
						1/2" Ice	2.73	2.79	0.11
TME-1900MHz RRH (65 MHz)	B	From Leg	2.00 0.00 0.00	0.0000	137.00	1" Ice	2.31	2.38	0.06
						No Ice	2.52	2.58	0.08
						1/2" Ice	2.73	2.79	0.11

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight	
			Horz	Lateral						ft
							ft ²	ft ²	K	
TME-1900MHz RRH (65 MHz)	C	From Leg	2.00	0.00	0.0000	137.00	1" Ice			
							No Ice	2.31	2.38	0.06
							1/2" Ice	2.52	2.58	0.08
							1" Ice	2.73	2.79	0.11
							No Ice	9.50	9.50	0.22
							1/2" Ice	11.80	11.80	0.32
Side Arm Mount [SO 103-3]	C	None			0.0000	137.00	1" Ice	14.10	14.10	0.41
							No Ice	3.30	3.30	0.29
							1/2" Ice	4.13	4.13	0.32
*** Side Arm Mount [SO 104-3]	C	None			0.0000	123.00	1" Ice	4.96	4.96	0.35
							No Ice	5.81	4.62	0.09
							1/2" Ice	6.27	5.51	0.14
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	121.00	1" Ice	6.70	6.21	0.21
							No Ice	5.81	4.62	0.09
							1/2" Ice	6.27	5.51	0.14
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	121.00	1" Ice	6.70	6.21	0.21
							No Ice	5.81	4.62	0.09
							1/2" Ice	6.27	5.51	0.14
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	121.00	1" Ice	6.70	6.21	0.21
							No Ice	5.81	4.62	0.09
							1/2" Ice	6.27	5.51	0.14
(2) LGP21401	A	From Leg	4.00	0.00	0.0000	121.00	1" Ice	1.38	0.54	0.03
							No Ice	1.10	0.35	0.01
							1/2" Ice	1.24	0.44	0.02
(2) LGP21401	B	From Leg	4.00	0.00	0.0000	121.00	1" Ice	1.38	0.54	0.03
							No Ice	1.10	0.35	0.01
							1/2" Ice	1.24	0.44	0.02
(2) LGP21401	C	From Leg	4.00	0.00	0.0000	121.00	1" Ice	1.38	0.54	0.03
							No Ice	1.10	0.35	0.01
							1/2" Ice	1.24	0.44	0.02
(2) LGP21901	A	From Leg	4.00	0.00	0.0000	121.00	1" Ice	0.36	0.28	0.01
							No Ice	0.23	0.16	0.01
							1/2" Ice	0.29	0.21	0.01
(2) LGP21901	B	From Leg	4.00	0.00	0.0000	121.00	1" Ice	0.36	0.28	0.01
							No Ice	0.23	0.16	0.01
							1/2" Ice	0.29	0.21	0.01
(2) LGP21901	C	From Leg	4.00	0.00	0.0000	121.00	1" Ice	0.36	0.28	0.01
							No Ice	0.23	0.16	0.01
							1/2" Ice	0.29	0.21	0.01
DC6-48-60-18-8F	B	From Leg	4.00	0.00	0.0000	121.00	1" Ice	1.64	1.64	0.06
							No Ice	0.92	0.92	0.02
							1/2" Ice	1.46	1.46	0.04
HPA-65R-BUU-H6 w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	121.00	1" Ice	11.01	10.21	0.25
							No Ice	9.90	8.11	0.08
							1/2" Ice	10.47	9.30	0.16
HPA-65R-BUU-H6 w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	121.00	1" Ice	11.01	10.21	0.25
							No Ice	9.90	8.11	0.08
							1/2" Ice	10.47	9.30	0.16
HPA-65R-BUU-H6 w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	121.00	1" Ice	11.01	10.21	0.25
							No Ice	9.90	8.11	0.08
							1/2" Ice	10.47	9.30	0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft	Azimuth Adjustment t °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
			2.00			Ice	11.01	10.21	0.25
1001940	A	From Leg	4.00 0.00 2.00	0.0000	121.00	1" Ice No Ice	0.18 0.23	0.08 0.13	0.00 0.00
						1/2" Ice	0.23 0.30	0.13 0.18	0.00 0.01
1001940	B	From Leg	4.00 0.00 2.00	0.0000	121.00	1" Ice No Ice	0.18 0.23	0.08 0.13	0.00 0.00
						1/2" Ice	0.23 0.30	0.13 0.18	0.00 0.01
1001940	C	From Leg	4.00 0.00 2.00	0.0000	121.00	1" Ice No Ice	0.18 0.23	0.08 0.13	0.00 0.00
						1/2" Ice	0.23 0.30	0.13 0.18	0.00 0.01
RRUS12/RRUS A2	A	From Leg	4.00 0.00 2.00	0.0000	121.00	1" Ice No Ice	3.14 3.36	1.84 2.01	0.07 0.10
						1/2" Ice	3.36 3.59	2.01 2.20	0.10 0.13
RRUS12/RRUS A2	B	From Leg	4.00 0.00 2.00	0.0000	121.00	1" Ice No Ice	3.14 3.36	1.84 2.01	0.07 0.10
						1/2" Ice	3.36 3.59	2.01 2.20	0.10 0.13
RRUS12/RRUS A2	C	From Leg	4.00 0.00 2.00	0.0000	121.00	1" Ice No Ice	3.14 3.36	1.84 2.01	0.07 0.10
						1/2" Ice	3.36 3.59	2.01 2.20	0.10 0.13
RRUS 11	A	From Leg	4.00 0.00 2.00	0.0000	121.00	1" Ice No Ice	2.79 3.00	1.19 1.34	0.05 0.07
						1/2" Ice	3.00 3.21	1.34 1.50	0.07 0.10
RRUS 11	B	From Leg	4.00 0.00 2.00	0.0000	121.00	1" Ice No Ice	2.79 3.00	1.19 1.34	0.05 0.07
						1/2" Ice	3.00 3.21	1.34 1.50	0.07 0.10
RRUS 11	C	From Leg	4.00 0.00 2.00	0.0000	121.00	1" Ice No Ice	2.79 3.00	1.19 1.34	0.05 0.07
						1/2" Ice	3.00 3.21	1.34 1.50	0.07 0.10
Platform Mount [LP 1201-1]	C	None		0.0000	121.00	1" Ice No Ice	23.10 26.80	23.10 26.80	2.10 2.50
						1/2" Ice	26.80 30.50	26.80 30.50	2.50 2.90
***						1" Ice			
(2) RR90-17-02DP w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	115.00	No Ice 1/2" Ice	4.59 5.02 5.44	3.32 4.09 4.78	0.03 0.07 0.12
						1" Ice			
(2) RR90-17-02DP w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	115.00	No Ice 1/2" Ice	4.59 5.02 5.44	3.32 4.09 4.78	0.03 0.07 0.12
						1" Ice			
(2) RR90-17-02DP w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	115.00	No Ice 1/2" Ice	4.59 5.02 5.44	3.32 4.09 4.78	0.03 0.07 0.12
						1" Ice			
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	115.00	No Ice 1/2" Ice	6.82 7.28 7.72	3.49 4.26 4.96	0.06 0.11 0.16
						1" Ice			
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	115.00	No Ice 1/2" Ice	6.82 7.28 7.72	3.49 4.26 4.96	0.06 0.11 0.16
						1" Ice			
APX16DWV-16DWV-S-E-A20 w/ Mount Pipe	C	From Leg	4.00 0.00	0.0000	115.00	No Ice 1/2"	6.82 7.28	3.49 4.26	0.06 0.11

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Horz	Lateral	Vert					
					1.00					
(2) S20070A1	A	From Leg	4.00	0.0000	115.00	Ice	7.72	4.96	0.16	
			0.00			1" Ice				
			1.00			No Ice	0.66	0.33	0.01	
						1/2"	0.76	0.41	0.01	
						Ice	0.88	0.50	0.02	
(2) S20070A1	B	From Leg	4.00	0.0000	115.00	1" Ice				
			0.00			No Ice	0.66	0.33	0.01	
			1.00			1/2"	0.76	0.41	0.01	
						Ice	0.88	0.50	0.02	
(2) S20070A1	C	From Leg	4.00	0.0000	115.00	1" Ice				
			0.00			No Ice	0.66	0.33	0.01	
			1.00			1/2"	0.76	0.41	0.01	
						Ice	0.88	0.50	0.02	
ETW200VS12UB	A	From Leg	4.00	0.0000	115.00	1" Ice				
			0.00			No Ice	0.40	0.16	0.01	
			1.00			1/2"	0.49	0.22	0.01	
						Ice	0.57	0.28	0.02	
ETW200VS12UB	B	From Leg	4.00	0.0000	115.00	1" Ice				
			0.00			No Ice	0.40	0.16	0.01	
			1.00			1/2"	0.49	0.22	0.01	
						Ice	0.57	0.28	0.02	
ETW200VS12UB	C	From Leg	4.00	0.0000	115.00	1" Ice				
			0.00			No Ice	0.40	0.16	0.01	
			1.00			1/2"	0.49	0.22	0.01	
						Ice	0.57	0.28	0.02	
Platform Mount [LP 1201-1]	C	None		0.0000	115.00	1" Ice				
						No Ice	23.10	23.10	2.10	
						1/2"	26.80	26.80	2.50	
						Ice	30.50	30.50	2.90	
						1" Ice				

LNx-6514DS-VTM w/ Mount Pipe	A	From Leg	4.00	0.0000	104.00	No Ice	8.40	7.07	0.06	
			0.00			1/2"	8.95	8.25	0.13	
			0.00			Ice	9.48	9.15	0.21	
						1" Ice				
LNx-6514DS-VTM w/ Mount Pipe	B	From Leg	4.00	0.0000	104.00	No Ice	8.40	7.07	0.06	
			0.00			1/2"	8.95	8.25	0.13	
			0.00			Ice	9.48	9.15	0.21	
						1" Ice				
LNx-6514DS-VTM w/ Mount Pipe	C	From Leg	4.00	0.0000	104.00	No Ice	8.40	7.07	0.06	
			0.00			1/2"	8.95	8.25	0.13	
			0.00			Ice	9.48	9.15	0.21	
						1" Ice				
ACUTIME 2000	A	From Leg	4.00	0.0000	104.00	No Ice	0.26	0.26	0.00	
			0.00			1/2"	0.32	0.32	0.00	
			3.00			Ice	0.39	0.39	0.01	
						1" Ice				
(2) FD9R6004/2C-3L	A	From Leg	4.00	0.0000	104.00	No Ice	0.31	0.08	0.00	
			0.00			1/2"	0.39	0.12	0.01	
			0.00			Ice	0.47	0.17	0.01	
						1" Ice				
(2) FD9R6004/2C-3L	B	From Leg	4.00	0.0000	104.00	No Ice	0.31	0.08	0.00	
			0.00			1/2"	0.39	0.12	0.01	
			0.00			Ice	0.47	0.17	0.01	
						1" Ice				
(2) FD9R6004/2C-3L	C	From Leg	4.00	0.0000	104.00	No Ice	0.31	0.08	0.00	
			0.00			1/2"	0.39	0.12	0.01	
			0.00			Ice	0.47	0.17	0.01	
						1" Ice				
(3) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00	0.0000	104.00	No Ice	8.40	7.07	0.07	
			0.00			1/2"	8.96	8.26	0.14	
			0.00			Ice	9.49	9.18	0.21	
						1" Ice				
(3) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00	0.0000	104.00	No Ice	8.40	7.07	0.07	
			0.00			1/2"	8.96	8.26	0.14	

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	Ice	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
			0.00			Ice	9.49	9.18	0.21
(3) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	8.40 8.96	7.07 8.26	0.07 0.14
						1/2" Ice	9.49	9.18	0.21
RRH2X60-PCS	A	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	2.20 2.39	1.72 1.90	0.06 0.08
						1/2" Ice	2.59	2.09	0.10
RRH2X60-PCS	B	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	2.20 2.39	1.72 1.90	0.06 0.08
						1/2" Ice	2.59	2.09	0.10
RRH2X60-PCS	C	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	2.20 2.39	1.72 1.90	0.06 0.08
						1/2" Ice	2.59	2.09	0.10
RRH2x60-700	A	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	3.50 3.76	1.82 2.05	0.06 0.08
						1/2" Ice	4.03	2.29	0.11
RRH2x60-700	B	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	3.50 3.76	1.82 2.05	0.06 0.08
						1/2" Ice	4.03	2.29	0.11
RRH2x60-700	C	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	3.50 3.76	1.82 2.05	0.06 0.08
						1/2" Ice	4.03	2.29	0.11
RRH4X45-AWS4 B66	A	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	2.66 2.88	1.59 1.77	0.06 0.08
						1/2" Ice	3.10	1.96	0.11
RRH4X45-AWS4 B66	B	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	2.66 2.88	1.59 1.77	0.06 0.08
						1/2" Ice	3.10	1.96	0.11
RRH4X45-AWS4 B66	C	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	2.66 2.88	1.59 1.77	0.06 0.08
						1/2" Ice	3.10	1.96	0.11
DB-T1-6Z-8AB-0Z	C	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	4.80 5.07	2.00 2.19	0.04 0.08
						1/2" Ice	5.35	2.39	0.12
DB-T1-6Z-8AB-0Z	C	From Leg	4.00 0.00 0.00	0.0000	104.00	1" Ice No Ice	4.80 5.07	2.00 2.19	0.04 0.08
						1/2" Ice	5.35	2.39	0.12
Platform Mount [LP 1201-1]	C	None		0.0000	104.00	1" Ice No Ice	23.10 26.80	23.10 26.80	2.10 2.50
						1/2" Ice	30.50	30.50	2.90
***						1" Ice			
APXV18-206517S-C w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	0.05 0.10
						Ice	6.48	6.73	0.15
APXV18-206517S-C w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	95.00	1" Ice No Ice	5.40 5.96	4.70 5.86	0.05 0.10
						1/2" Ice	6.48	6.73	0.15
APXV18-206517S-C w/ Mount Pipe	C	From Leg	4.00 0.00	0.0000	95.00	1" Ice No Ice	5.40 5.96	4.70 5.86	0.05 0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
			0.00			Ice 1" Ice No Ice 1/2" Ice 1" Ice	6.48 6.73	0.15
Pipe Mount [PM 601-3]	C	None		0.0000	95.00	4.39 5.48 6.57	4.39 5.48 6.57	0.20 0.24 0.28

OG-860/1920/GPS-A	A	From Leg	3.00 0.00 2.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice	0.31 0.40 0.49	0.37 0.46 0.55
Side Arm Mount [SO 901-1]	C	None		0.0000	80.00	No Ice 1/2" Ice 1" Ice	0.50 0.68 0.86	0.88 1.13 1.38

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K _Z	q _Z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 140.00-104.00	121.02	1.317	30.13	61.046	A	0.000	61.046	61.046	100.00	0.000	0.000
					B	0.000	61.046		100.00	0.000	0.000
					C	0.000	61.046		100.00	0.000	2.428
L2 104.00-98.50	101.23	1.269	29.04	11.326	A	0.000	11.326	11.326	100.00	0.000	0.000
					B	0.000	11.326		100.00	0.000	0.000
					C	0.000	11.326		100.00	0.000	2.788
L3 98.50-97.00	97.75	1.26	28.82	3.181	A	0.000	3.181	3.181	100.00	0.000	0.000
					B	0.000	3.181		100.00	0.000	0.000
					C	0.000	3.181		100.00	0.000	1.069
L4 97.00-88.50	92.70	1.246	28.50	18.769	A	0.000	18.769	18.769	100.00	0.000	0.000
					B	0.000	18.769		100.00	0.000	0.000
					C	0.000	18.769		100.00	0.000	5.251
L5 88.50-88.00	88.25	1.233	28.21	1.121	A	0.000	1.121	1.121	100.00	0.000	0.000
					B	0.000	1.121		100.00	0.000	0.000
					C	0.000	1.121		100.00	0.000	0.356
L6 88.00-68.08	77.80	1.2	27.47	48.259	A	0.000	48.259	48.259	100.00	0.000	0.000
					B	0.000	48.259		100.00	0.000	0.000
					C	0.000	48.259		100.00	0.000	14.510
L7 68.08-47.25	57.44	1.126	25.77	57.897	A	0.000	57.897	57.897	100.00	0.000	0.000
					B	0.000	57.897		100.00	0.000	0.000
					C	0.000	57.897		100.00	0.000	16.643
L8 47.25-37.75	42.44	1.057	24.18	28.187	A	0.000	28.187	28.187	100.00	0.000	0.000
					B	0.000	28.187		100.00	0.000	0.000
					C	0.000	28.187		100.00	0.000	7.720
L9 37.75-32.50	35.11	1.015	23.23	16.382	A	0.000	16.382	16.382	100.00	0.000	0.000
					B	0.000	16.382		100.00	0.000	0.000
					C	0.000	16.382		100.00	0.000	4.490
L10 32.50-23.50	27.96	0.968	22.15	29.207	A	0.000	29.207	29.207	100.00	0.000	0.000
					B	0.000	29.207		100.00	0.000	0.000
					C	0.000	29.207		100.00	0.000	7.857
L11 23.50-20.75	22.12	0.921	21.08	9.207	A	0.000	9.207	9.207	100.00	0.000	0.000
					B	0.000	9.207		100.00	0.000	0.000
					C	0.000	9.207		100.00	0.000	2.401
L12 20.75-3.00	11.74	0.85	19.45	62.615	A	0.000	62.615	62.615	100.00	0.000	0.000
					B	0.000	62.615		100.00	0.000	0.000

Section Elevation ft	z ft	K _z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L13 3.00-0.00	1.50	0.85	19.45	11.128	C	0.000	62.615		100.00	0.000	15.496
					A	0.000	11.128	11.128	100.00	0.000	0.000
					B	0.000	11.128		100.00	0.000	0.000
					C	0.000	11.128		100.00	0.000	2.619

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K _z	q _z psf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 140.00-104.00	121.02	1.317	8.00	1.7082	71.295	A	0.000	71.295	71.295	100.00	0.000	0.000
						B	0.000	71.295		100.00	0.000	0.000
						C	0.000	71.295		100.00	0.000	6.755
L2 104.00-98.50	101.23	1.269	7.71	1.6779	12.864	A	0.000	12.864	12.864	100.00	0.000	0.000
						B	0.000	12.864		100.00	0.000	0.000
						C	0.000	12.864		100.00	0.000	7.718
L3 98.50-97.00	97.75	1.26	7.66	1.6721	3.599	A	0.000	3.599	3.599	100.00	0.000	0.000
						B	0.000	3.599		100.00	0.000	0.000
						C	0.000	3.599		100.00	0.000	2.815
L4 97.00-88.50	92.70	1.246	7.57	1.6632	21.126	A	0.000	21.126	21.126	100.00	0.000	0.000
						B	0.000	21.126		100.00	0.000	0.000
						C	0.000	21.126		100.00	0.000	13.312
L5 88.50-88.00	88.25	1.233	7.50	1.6551	1.259	A	0.000	1.259	1.259	100.00	0.000	0.000
						B	0.000	1.259		100.00	0.000	0.000
						C	0.000	1.259		100.00	0.000	0.935
L6 88.00-68.08	77.80	1.2	7.30	1.6343	53.685	A	0.000	53.685	53.685	100.00	0.000	0.000
						B	0.000	53.685		100.00	0.000	0.000
						C	0.000	53.685		100.00	0.000	36.896
L7 68.08-47.25	57.44	1.126	6.85	1.5855	63.401	A	0.000	63.401	63.401	100.00	0.000	0.000
						B	0.000	63.401		100.00	0.000	0.000
						C	0.000	63.401		100.00	0.000	37.926
L8 47.25-37.75	42.44	1.057	6.42	1.5382	30.697	A	0.000	30.697	30.697	100.00	0.000	0.000
						B	0.000	30.697		100.00	0.000	0.000
						C	0.000	30.697		100.00	0.000	17.426
L9 37.75-32.50	35.11	1.015	6.17	1.5093	17.703	A	0.000	17.703	17.703	100.00	0.000	0.000
						B	0.000	17.703		100.00	0.000	0.000
						C	0.000	17.703		100.00	0.000	9.596
L10 32.50-23.50	27.96	0.968	5.88	1.4754	31.420	A	0.000	31.420	31.420	100.00	0.000	0.000
						B	0.000	31.420		100.00	0.000	0.000
						C	0.000	31.420		100.00	0.000	16.414
L11 23.50-20.75	22.12	0.921	5.60	1.4412	9.868	A	0.000	9.868	9.868	100.00	0.000	0.000
						B	0.000	9.868		100.00	0.000	0.000
						C	0.000	9.868		100.00	0.000	4.955
L12 20.75-3.00	11.74	0.85	5.17	1.3528	66.617	A	0.000	66.617	66.617	100.00	0.000	0.000
						B	0.000	66.617		100.00	0.000	0.000
						C	0.000	66.617		100.00	0.000	30.970
L13 3.00-0.00	1.50	0.85	5.17	1.1009	11.678	A	0.000	11.678	11.678	100.00	0.000	0.000
						B	0.000	11.678		100.00	0.000	0.000
						C	0.000	11.678		100.00	0.000	4.747

Tower Pressure - Service

G_H = 1.100

Section Elevation	z	K _z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
L1 140.00- 104.00	121.02	1.317	10.31	61.046	A	0.000	61.046	61.046	100.00	0.000	0.000
					B	0.000	61.046		100.00	0.000	0.000
					C	0.000	61.046		100.00	0.000	2.428
L2 104.00- 98.50	101.23	1.269	9.94	11.326	A	0.000	11.326	11.326	100.00	0.000	0.000
					B	0.000	11.326		100.00	0.000	0.000
					C	0.000	11.326		100.00	0.000	2.788
L3 98.50- 97.00	97.75	1.26	9.87	3.181	A	0.000	3.181	3.181	100.00	0.000	0.000
					B	0.000	3.181		100.00	0.000	0.000
					C	0.000	3.181		100.00	0.000	1.069
L4 97.00- 88.50	92.70	1.246	9.76	18.769	A	0.000	18.769	18.769	100.00	0.000	0.000
					B	0.000	18.769		100.00	0.000	0.000
					C	0.000	18.769		100.00	0.000	5.251
L5 88.50- 88.00	88.25	1.233	9.66	1.121	A	0.000	1.121	1.121	100.00	0.000	0.000
					B	0.000	1.121		100.00	0.000	0.000
					C	0.000	1.121		100.00	0.000	0.356
L6 88.00- 68.08	77.80	1.2	9.40	48.259	A	0.000	48.259	48.259	100.00	0.000	0.000
					B	0.000	48.259		100.00	0.000	0.000
					C	0.000	48.259		100.00	0.000	14.510
L7 68.08- 47.25	57.44	1.126	8.82	57.897	A	0.000	57.897	57.897	100.00	0.000	0.000
					B	0.000	57.897		100.00	0.000	0.000
					C	0.000	57.897		100.00	0.000	16.643
L8 47.25- 37.75	42.44	1.057	8.28	28.187	A	0.000	28.187	28.187	100.00	0.000	0.000
					B	0.000	28.187		100.00	0.000	0.000
					C	0.000	28.187		100.00	0.000	7.720
L9 37.75- 32.50	35.11	1.015	7.95	16.382	A	0.000	16.382	16.382	100.00	0.000	0.000
					B	0.000	16.382		100.00	0.000	0.000
					C	0.000	16.382		100.00	0.000	4.490
L10 32.50- 23.50	27.96	0.968	7.58	29.207	A	0.000	29.207	29.207	100.00	0.000	0.000
					B	0.000	29.207		100.00	0.000	0.000
					C	0.000	29.207		100.00	0.000	7.857
L11 23.50- 20.75	22.12	0.921	7.22	9.207	A	0.000	9.207	9.207	100.00	0.000	0.000
					B	0.000	9.207		100.00	0.000	0.000
					C	0.000	9.207		100.00	0.000	2.401
L12 20.75- 3.00	11.74	0.85	6.66	62.615	A	0.000	62.615	62.615	100.00	0.000	0.000
					B	0.000	62.615		100.00	0.000	0.000
					C	0.000	62.615		100.00	0.000	15.496
L13 3.00-0.00	1.50	0.85	6.66	11.128	A	0.000	11.128	11.128	100.00	0.000	0.000
					B	0.000	11.128		100.00	0.000	0.000
					C	0.000	11.128		100.00	0.000	2.619

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

Comb. No.	Description
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+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
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
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	140 - 104	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-29.40	0.31	-0.67
			Max. Mx	8	-12.94	-404.66	-0.06
			Max. My	14	-12.94	0.11	-404.69
			Max. Vy	20	-17.90	404.64	-0.20
			Max. Vx	14	17.90	0.11	-404.69
			Max. Torque	7			-0.16
L2	104 - 98.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-40.92	2.30	-1.72
			Max. Mx	20	-17.67	542.04	-1.00
			Max. My	14	-17.69	1.08	-541.25
			Max. Vy	20	-25.32	542.04	-1.00
			Max. Vx	14	25.20	1.08	-541.25
			Max. Torque	12			-0.99
L3	98.5 - 97	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-41.48	2.39	-1.77
			Max. Mx	20	-18.08	580.21	-1.16
			Max. My	14	-18.09	1.24	-579.23
			Max. Vy	20	-25.58	580.21	-1.16
			Max. Vx	14	25.46	1.24	-579.23
			Max. Torque	12			-1.05
L4	97 - 88.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-44.41	2.91	-2.08
			Max. Mx	20	-19.58	719.51	-1.75
			Max. My	14	-19.60	1.86	-717.88
			Max. Vy	20	-27.28	719.51	-1.75
			Max. Vx	14	27.16	1.86	-717.88
			Max. Torque	12			-1.22
L5	88.5 - 88	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-46.52	3.29	-2.30
			Max. Mx	20	-21.00	823.11	-2.17
			Max. My	14	-21.02	2.30	-821.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L6	88 - 68.08	Pole	Max. Vy	20	-27.96	823.11	-2.17
			Max. Vx	14	27.84	2.30	-821.01
			Max. Torque	24			1.34
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-55.39	5.63	-3.58
			Max. Mx	20	-27.16	1414.54	-4.41
			Max. My	14	-27.17	4.67	-1409.88
			Max. Vy	20	-31.44	1414.54	-4.41
			Max. Vx	14	31.32	4.67	-1409.88
			Max. Torque	12			-2.13
L7	68.08 - 47.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-63.60	7.73	-4.80
			Max. Mx	20	-33.17	1959.44	-6.29
			Max. My	14	-33.18	6.66	-1952.65
			Max. Vy	20	-34.32	1959.44	-6.29
			Max. Vx	14	34.19	6.66	-1952.65
			Max. Torque	12			-2.92
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-72.54	9.52	-5.84
			Max. Mx	20	-39.98	2448.83	-7.85
L8	47.25 - 37.75	Pole	Max. My	14	-39.99	8.32	-2440.26
			Max. Vy	20	-36.75	2448.83	-7.85
			Max. Vx	14	36.63	8.32	-2440.26
			Max. Torque	12			-3.60
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-75.54	10.21	-6.23
			Max. Mx	20	-42.33	2644.01	-8.45
			Max. My	14	-42.34	8.95	-2634.77
			Max. Vy	20	-37.61	2644.01	-8.45
			Max. Vx	14	37.49	8.95	-2634.77
L9	37.75 - 32.5	Pole	Max. Torque	12			-3.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-80.89	11.34	-6.89
			Max. Mx	20	-46.58	2988.90	-9.46
			Max. My	14	-46.58	10.04	-2978.51
			Max. Vy	20	-39.04	2988.90	-9.46
			Max. Vx	14	38.92	10.04	-2978.51
			Max. Torque	12			-4.36
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-82.74	11.68	-7.09
L10	32.5 - 23.5	Pole	Max. Mx	20	-48.08	3096.85	-9.77
			Max. My	14	-48.08	10.37	-3086.10
			Max. Vy	20	-39.47	3096.85	-9.77
			Max. Vx	14	39.35	10.37	-3086.10
			Max. Torque	12			-4.50
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-93.66	13.84	-8.33
			Max. Mx	20	-57.05	3818.91	-11.77
			Max. My	14	-57.05	12.51	-3805.89
			Max. Vy	20	-41.91	3818.91	-11.77
L11	23.5 - 20.75	Pole	Max. Vx	14	41.79	12.51	-3805.89
			Max. Torque	12			-5.40
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-95.56	14.14	-8.50
			Max. Mx	20	-58.71	3945.25	-12.10
			Max. My	14	-58.71	12.86	-3931.85
			Max. Vy	20	-42.33	3945.25	-12.10
			Max. Vx	14	42.21	12.86	-3931.85
			Max. Torque	12			-5.56
			Max Tension	1	0.00	0.00	0.00
L12	20.75 - 3	Pole	Max. Vy	20	-31.44	1414.54	-4.41
			Max. Vx	14	31.32	4.67	-1409.88
			Max. Torque	12			-2.13
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-63.60	7.73	-4.80
			Max. Mx	20	-33.17	1959.44	-6.29
			Max. My	14	-33.18	6.66	-1952.65
			Max. Vy	20	-34.32	1959.44	-6.29
			Max. Vx	14	34.19	6.66	-1952.65
			Max. Torque	12			-2.92
L13	3 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-72.54	9.52	-5.84
			Max. Mx	20	-39.98	2448.83	-7.85
			Max. My	14	-39.99	8.32	-2440.26
			Max. Vy	20	-36.75	2448.83	-7.85
			Max. Vx	14	36.63	8.32	-2440.26
			Max. Torque	12			-3.60
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-75.54	10.21	-6.23
			Max. Mx	20	-42.33	2644.01	-8.45

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	95.56	-0.00	0.00
	Max. H _x	20	58.73	42.30	-0.10
	Max. H _z	2	58.73	-0.10	42.19
	Max. M _x	2	3929.22	-0.10	42.19
	Max. M _z	8	3940.92	-42.30	0.10
	Max. Torsion	24	5.56	21.07	36.49
	Min. Vert	21	44.05	42.30	-0.10
	Min. H _x	9	44.05	-42.30	0.10
	Min. H _z	15	44.05	0.10	-42.19
	Min. M _x	14	-3931.85	0.10	-42.19
	Min. M _z	20	-3945.25	42.30	-0.10
	Min. Torsion	12	-5.56	-21.07	-36.49

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	48.94	-0.00	0.00	1.05	1.67	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	58.73	0.10	-42.19	-3929.22	-8.72	-4.79
0.9 Dead+1.6 Wind 0 deg - No Ice	44.05	0.10	-42.19	-3886.50	-9.14	-4.78
1.2 Dead+1.6 Wind 30 deg - No Ice	58.73	21.24	-36.58	-3408.06	-1978.89	-2.74
0.9 Dead+1.6 Wind 30 deg - No Ice	44.05	21.24	-36.58	-3371.10	-1957.76	-2.73
1.2 Dead+1.6 Wind 60 deg - No Ice	58.73	36.69	-21.18	-1973.31	-3418.24	0.05
0.9 Dead+1.6 Wind 60 deg - No Ice	44.05	36.69	-21.18	-1952.05	-3381.36	0.05
1.2 Dead+1.6 Wind 90 deg - No Ice	58.73	42.30	-0.10	-9.48	-3940.92	2.82
0.9 Dead+1.6 Wind 90 deg - No Ice	44.05	42.30	-0.10	-9.71	-3898.41	2.82
1.2 Dead+1.6 Wind 120 deg - No Ice	58.73	36.59	21.01	1957.26	-3407.50	4.84
0.9 Dead+1.6 Wind 120 deg - No Ice	44.05	36.59	21.01	1935.52	-3370.74	4.83
1.2 Dead+1.6 Wind 150 deg - No Ice	58.73	21.07	36.49	3399.94	-1960.23	5.56
0.9 Dead+1.6 Wind 150 deg - No Ice	44.05	21.07	36.49	3362.41	-1939.29	5.55
1.2 Dead+1.6 Wind 180 deg - No Ice	58.73	-0.10	42.19	3931.85	12.86	4.79
0.9 Dead+1.6 Wind 180 deg - No Ice	44.05	-0.10	42.19	3888.54	12.22	4.78
1.2 Dead+1.6 Wind 210 deg - No Ice	58.73	-21.24	36.58	3410.70	1983.05	2.74
0.9 Dead+1.6 Wind 210 deg - No Ice	44.05	-21.24	36.58	3373.06	1960.84	2.73
1.2 Dead+1.6 Wind 240 deg - No Ice	58.73	-36.69	21.18	1975.94	3422.41	-0.05
0.9 Dead+1.6 Wind 240 deg - No Ice	44.05	-36.69	21.18	1954.00	3384.46	-0.05
1.2 Dead+1.6 Wind 270 deg - No Ice	58.73	-42.30	0.10	12.10	3945.25	-2.82
0.9 Dead+1.6 Wind 270 deg - No Ice	44.05	-42.30	0.10	11.65	3901.51	-2.82
1.2 Dead+1.6 Wind 300 deg - No Ice	58.73	-36.59	-21.01	-1954.66	3411.66	-4.84
0.9 Dead+1.6 Wind 300 deg - No Ice	44.05	-36.59	-21.01	-1933.59	3373.82	-4.83
1.2 Dead+1.6 Wind 330 deg - No Ice	58.73	-21.07	-36.49	-3397.33	1964.37	-5.56

Load Combination	Vertical	Shear _x	Shear _y	Overturning Moment, M _x	Overturning Moment, M _y	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
0.9 Dead+1.6 Wind 330 deg - No Ice	44.05	-21.07	-36.49	-3360.48	1942.37	-5.55
1.2 Dead+1.0 Ice+1.0 Temp	95.56	0.00	-0.00	8.50	14.14	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	95.56	0.02	-10.49	-1062.00	11.77	-1.77
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	95.56	5.28	-9.10	-919.84	-524.70	-1.01
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	95.56	9.12	-5.27	-528.90	-916.74	0.02
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	95.56	10.52	-0.02	6.06	-1059.30	1.05
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	95.56	9.10	5.23	541.71	-914.18	1.79
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	95.56	5.24	9.08	934.52	-520.27	2.06
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	95.56	-0.02	10.49	1079.24	16.88	1.77
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	95.56	-5.28	9.10	937.09	553.35	1.01
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	95.56	-9.12	5.27	546.15	945.39	-0.02
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	95.56	-10.52	0.02	11.17	1087.95	-1.05
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	95.56	-9.10	-5.23	-524.48	942.83	-1.79
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	95.56	-5.24	-9.08	-917.29	548.92	-2.06
Dead+Wind 0 deg - Service	48.94	0.02	-9.03	-834.91	-0.56	-0.12
Dead+Wind 30 deg - Service	48.94	4.54	-7.83	-724.05	-419.60	-0.07
Dead+Wind 60 deg - Service	48.94	7.85	-4.53	-418.89	-725.74	0.01
Dead+Wind 90 deg - Service	48.94	9.05	-0.02	-1.20	-836.96	0.08
Dead+Wind 120 deg - Service	48.94	7.83	4.49	417.11	-723.45	0.13
Dead+Wind 150 deg - Service	48.94	4.51	7.81	723.94	-415.62	0.15
Dead+Wind 180 deg - Service	48.94	-0.02	9.03	837.09	4.03	0.12
Dead+Wind 210 deg - Service	48.94	-4.54	7.83	726.24	423.07	0.07
Dead+Wind 240 deg - Service	48.94	-7.85	4.53	421.08	729.21	-0.01
Dead+Wind 270 deg - Service	48.94	-9.05	0.02	3.39	840.43	-0.08
Dead+Wind 300 deg - Service	48.94	-7.83	-4.49	-414.92	726.92	-0.13
Dead+Wind 330 deg - Service	48.94	-4.51	-7.81	-721.76	419.09	-0.15

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-48.94	0.00	0.00	48.94	-0.00	0.000%
2	0.10	-58.73	-42.19	-0.10	58.73	42.19	0.001%
3	0.10	-44.05	-42.19	-0.10	44.05	42.19	0.002%
4	21.24	-58.73	-36.58	-21.24	58.73	36.58	0.000%
5	21.24	-44.05	-36.58	-21.24	44.05	36.58	0.000%
6	36.69	-58.73	-21.18	-36.69	58.73	21.18	0.000%
7	36.69	-44.05	-21.18	-36.69	44.05	21.18	0.000%
8	42.30	-58.73	-0.10	-42.30	58.73	0.10	0.003%
9	42.30	-44.05	-0.10	-42.30	44.05	0.10	0.002%
10	36.59	-58.73	21.01	-36.59	58.73	-21.01	0.000%
11	36.59	-44.05	21.01	-36.59	44.05	-21.01	0.000%
12	21.07	-58.73	36.49	-21.07	58.73	-36.49	0.000%
13	21.07	-44.05	36.49	-21.07	44.05	-36.49	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
14	-0.10	-58.73	42.19	0.10	58.73	-42.19	0.001%
15	-0.10	-44.05	42.19	0.10	44.05	-42.19	0.001%
16	-21.24	-58.73	36.58	21.24	58.73	-36.58	0.000%
17	-21.24	-44.05	36.58	21.24	44.05	-36.58	0.000%
18	-36.69	-58.73	21.18	36.69	58.73	-21.18	0.000%
19	-36.69	-44.05	21.18	36.69	44.05	-21.18	0.000%
20	-42.30	-58.73	0.10	42.30	58.73	-0.10	0.001%
21	-42.30	-44.05	0.10	42.30	44.05	-0.10	0.002%
22	-36.59	-58.73	-21.01	36.59	58.73	21.01	0.000%
23	-36.59	-44.05	-21.01	36.59	44.05	21.01	0.000%
24	-21.07	-58.73	-36.49	21.07	58.73	36.49	0.000%
25	-21.07	-44.05	-36.49	21.07	44.05	36.49	0.000%
26	0.00	-95.56	0.00	-0.00	95.56	0.00	0.001%
27	0.02	-95.56	-10.49	-0.02	95.56	10.49	0.000%
28	5.28	-95.56	-9.10	-5.28	95.56	9.10	0.000%
29	9.12	-95.56	-5.27	-9.12	95.56	5.27	0.000%
30	10.52	-95.56	-0.02	-10.52	95.56	0.02	0.000%
31	9.10	-95.56	5.23	-9.10	95.56	-5.23	0.000%
32	5.24	-95.56	9.08	-5.24	95.56	-9.08	0.000%
33	-0.02	-95.56	10.49	0.02	95.56	-10.49	0.000%
34	-5.28	-95.56	9.10	5.28	95.56	-9.10	0.000%
35	-9.12	-95.56	5.27	9.12	95.56	-5.27	0.000%
36	-10.52	-95.56	0.02	10.52	95.56	-0.02	0.000%
37	-9.10	-95.56	-5.23	9.10	95.56	5.23	0.000%
38	-5.24	-95.56	-9.08	5.24	95.56	9.08	0.000%
39	0.02	-48.94	-9.03	-0.02	48.94	9.03	0.002%
40	4.54	-48.94	-7.83	-4.54	48.94	7.83	0.002%
41	7.85	-48.94	-4.53	-7.85	48.94	4.53	0.002%
42	9.05	-48.94	-0.02	-9.05	48.94	0.02	0.002%
43	7.83	-48.94	4.49	-7.83	48.94	-4.49	0.002%
44	4.51	-48.94	7.81	-4.51	48.94	-7.81	0.002%
45	-0.02	-48.94	9.03	0.02	48.94	-9.03	0.002%
46	-4.54	-48.94	7.83	4.54	48.94	-7.83	0.002%
47	-7.85	-48.94	4.53	7.85	48.94	-4.53	0.002%
48	-9.05	-48.94	0.02	9.05	48.94	-0.02	0.002%
49	-7.83	-48.94	-4.49	7.83	48.94	4.49	0.002%
50	-4.51	-48.94	-7.81	4.51	48.94	7.81	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00000001	0.00007706
3	Yes	14	0.00002464	0.00014832
4	Yes	18	0.00000001	0.00007746
5	Yes	17	0.00000001	0.00014762
6	Yes	18	0.00000001	0.00007871
7	Yes	18	0.00000001	0.00005368
8	Yes	14	0.00003811	0.00010933
9	Yes	14	0.00002463	0.00008671
10	Yes	18	0.00000001	0.00008031
11	Yes	18	0.00000001	0.00005486
12	Yes	18	0.00000001	0.00007523
13	Yes	17	0.00000001	0.00014334
14	Yes	15	0.00000001	0.00009555
15	Yes	15	0.00000001	0.00007251
16	Yes	18	0.00000001	0.00008036
17	Yes	18	0.00000001	0.00005480
18	Yes	18	0.00000001	0.00007912
19	Yes	18	0.00000001	0.00005391
20	Yes	15	0.00000001	0.00006239
21	Yes	14	0.00002463	0.00011996
22	Yes	18	0.00000001	0.00007561
23	Yes	17	0.00000001	0.00014401

24	Yes	18	0.00000001	0.00008067
25	Yes	18	0.00000001	0.00005512
26	Yes	10	0.00000001	0.00007485
27	Yes	16	0.00000001	0.00008692
28	Yes	16	0.00000001	0.00011024
29	Yes	16	0.00000001	0.00011094
30	Yes	16	0.00000001	0.00008637
31	Yes	16	0.00000001	0.00011401
32	Yes	16	0.00000001	0.00011104
33	Yes	16	0.00000001	0.00008848
34	Yes	16	0.00000001	0.00011722
35	Yes	16	0.00000001	0.00011645
36	Yes	16	0.00000001	0.00008871
37	Yes	16	0.00000001	0.00011238
38	Yes	16	0.00000001	0.00011541
39	Yes	13	0.00000001	0.00002868
40	Yes	13	0.00000001	0.00009735
41	Yes	13	0.00000001	0.00009889
42	Yes	13	0.00000001	0.00002836
43	Yes	13	0.00000001	0.00010214
44	Yes	13	0.00000001	0.00009416
45	Yes	13	0.00000001	0.00002908
46	Yes	13	0.00000001	0.00010251
47	Yes	13	0.00000001	0.00010123
48	Yes	13	0.00000001	0.00002871
49	Yes	13	0.00000001	0.00009492
50	Yes	13	0.00000001	0.00010266

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 104	21.852	47	1.4767	0.0007
L2	104 - 98.5	11.661	47	1.1110	0.0007
L3	98.5 - 97	10.419	47	1.0446	0.0006
L4	97 - 88.5	10.093	47	1.0321	0.0006
L5	91.75 - 88	8.994	47	0.9652	0.0005
L6	88 - 68.08	8.246	47	0.9368	0.0005
L7	68.08 - 47.25	4.826	47	0.6990	0.0003
L8	51.5 - 37.75	2.730	47	0.5084	0.0002
L9	37.75 - 32.5	1.439	47	0.3721	0.0001
L10	32.5 - 23.5	1.060	47	0.3165	0.0001
L11	23.5 - 20.75	0.551	47	0.2247	0.0001
L12	20.75 - 3	0.428	47	0.2008	0.0001
L13	3 - 0	0.008	47	0.0268	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.00	APXVSP18-C-A20 w/ Mount Pipe	47	21.852	1.4767	0.0007	21502
137.00	800MHz 2X50W RRH W/FILTER	47	20.931	1.4512	0.0007	21502
123.00	Side Arm Mount [SO 104-3]	47	16.721	1.3259	0.0009	6324
121.00	(2) 7770.00 w/ Mount Pipe	47	16.143	1.3064	0.0009	5658
115.00	(2) RR90-17-02DP w/ Mount Pipe	47	14.463	1.2442	0.0009	4300
104.00	LNx-6514DS-VTM w/ Mount Pipe	47	11.661	1.1110	0.0007	3351
95.00	APXV18-206517S-C w/ Mount Pipe	47	9.667	1.0081	0.0006	5183
80.00	OG-860/1920/GPS-A	47	6.756	0.8583	0.0004	4973

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 104	102.496	18	6.9456	0.0105
L2	104 - 98.5	54.737	18	5.2224	0.0102
L3	98.5 - 97	48.910	18	4.9101	0.0094
L4	97 - 88.5	47.380	18	4.8513	0.0093
L5	91.75 - 88	42.226	18	4.5368	0.0086
L6	88 - 68.08	38.716	18	4.4035	0.0083
L7	68.08 - 47.25	22.662	18	3.2849	0.0061
L8	51.5 - 37.75	12.819	18	2.3885	0.0044
L9	37.75 - 32.5	6.756	18	1.7479	0.0032
L10	32.5 - 23.5	4.978	18	1.4863	0.0027
L11	23.5 - 20.75	2.585	18	1.0551	0.0019
L12	20.75 - 3	2.010	18	0.9426	0.0017
L13	3 - 0	0.039	18	0.1257	0.0002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.00	APXVSP18-C-A20 w/ Mount Pipe	18	102.496	6.9456	0.0105	4682
137.00	800MHz 2X50W RRH W/FILTER	18	98.181	6.8250	0.0107	4682
123.00	Side Arm Mount [SO 104-3]	18	78.455	6.2337	0.0113	1374
121.00	(2) 7770.00 w/ Mount Pipe	18	75.746	6.1418	0.0113	1229
115.00	(2) RR90-17-02DP w/ Mount Pipe	18	67.872	5.8487	0.0112	932
104.00	LNx-6514DS-VTM w/ Mount Pipe	18	54.737	5.2224	0.0102	724
95.00	APXV18-206517S-C w/ Mount Pipe	18	45.381	4.7385	0.0091	1118
80.00	OG-860/1920/GPS-A	18	31.723	4.0341	0.0076	1069

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	K/lr	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
L1	140 - 104 (1)	TP23.3105x16x0.25	36.00	0.00	0.0	18.563 7	-12.94	1342.99	0.010
L2	104 - 98.5 (2)	TP24.4273x23.3105x0.44 84	5.50	0.00	0.0	34.622 7	-17.66	1494.32	0.012
L3	98.5 - 97 (3)	TP24.7319x24.4273x0.71 54	1.50	0.00	0.0	55.321 2	-18.07	2383.90	0.008
L4	97 - 88.5 (4)	TP26.458x24.7319x0.493 3	8.50	0.00	0.0	40.194 7	-19.57	2017.41	0.010
L5	88.5 - 88 (5)	TP26.0593x24.8114x0.55 65	3.75	0.00	0.0	45.698 4	-20.99	2295.71	0.009
L6	88 - 68.08 (6)	TP30.1033x26.0593x0.66 07	19.92	0.00	0.0	62.635 0	-27.15	3159.33	0.009

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
L7	68.08 - 47.25 (7)	TP34.332x30.1033x0.717 6	20.83	0.00	0.0	75.681 3	-33.17	3884.33	0.009
L8	47.25 - 37.75 (8)	TP35.6358x32.0339x0.75 46	13.75	0.00	0.0	82.743 5	-38.69	4224.28	0.009
L9	37.75 - 32.5 (9)	TP36.7017x35.6358x0.80 08	5.25	0.00	0.0	92.568 6	-42.33	4704.88	0.009
L10	32.5 - 23.5 (10)	TP38.5289x36.7017x0.81 75	9.00	0.00	0.0	99.272 0	-46.58	5196.44	0.009
L11	23.5 - 20.75 (11)	TP39.0872x38.5289x0.95 06	2.75	0.00	0.0	116.73 20	-48.08	5578.27	0.009
L12	20.75 - 3 (12)	TP42.6909x39.0872x0.80 77	17.75	0.00	0.0	108.92 80	-57.05	5709.31	0.010
L13	3 - 0 (13)	TP43.3x42.6909x0.8586 60	3.00	0.00	0.0	117.33 60	-58.71	6140.68	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{ux} kip-ft	Ratio M _{ux} / φM _{ux}	M _{uy} kip-ft	φM _{uy} kip-ft	Ratio M _{uy} / φM _{uy}
L1	140 - 104 (1)	TP23.3105x16x0.25	404.75	629.12	0.643	0.00	629.12	0.000
L2	104 - 98.5 (2)	TP24.4273x23.3105x0.44 84	542.54	722.27	0.751	0.00	722.27	0.000
L3	98.5 - 97 (3)	TP24.7319x24.4273x0.71 54	580.80	1141.63	0.509	0.00	1141.63	0.000
L4	97 - 88.5 (4)	TP26.458x24.7319x0.493 3	720.43	1028.22	0.701	0.00	1028.22	0.000
L5	88.5 - 88 (5)	TP26.0593x24.8114x0.55 65	824.26	1176.54	0.701	0.00	1176.54	0.000
L6	88 - 68.08 (6)	TP30.1033x26.0593x0.66 07	1416.93	1868.13	0.758	0.00	1868.13	0.000
L7	68.08 - 47.25 (7)	TP34.332x30.1033x0.717 6	1962.87	2556.29	0.768	0.00	2556.29	0.000
L8	47.25 - 37.75 (8)	TP35.6358x32.0339x0.75 46	2337.39	2889.65	0.809	0.00	2889.65	0.000
L9	37.75 - 32.5 (9)	TP36.7017x35.6358x0.80 08	2648.63	3392.72	0.781	0.00	3392.72	0.000
L10	32.5 - 23.5 (10)	TP38.5289x36.7017x0.81 75	2994.08	3938.57	0.760	0.00	3938.57	0.000
L11	23.5 - 20.75 (11)	TP39.0872x38.5289x0.95 06	3102.19	4262.10	0.728	0.00	4262.10	0.000
L12	20.75 - 3 (12)	TP42.6909x39.0872x0.80 77	3825.34	4817.30	0.794	0.00	4817.30	0.000
L13	3 - 0 (13)	TP43.3x42.6909x0.8586 60	3951.87	5245.45	0.753	0.00	5245.45	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V _u K	φV _n K	Ratio V _u / φV _n	Actual T _u kip-ft	φT _n kip-ft	Ratio T _u / φT _n
L1	140 - 104 (1)	TP23.3105x16x0.25	17.91	671.50	0.027	0.13	1275.66	0.000
L2	104 - 98.5 (2)	TP24.4273x23.3105x0.44 84	25.38	747.16	0.034	0.10	1464.54	0.000
L3	98.5 - 97 (3)	TP24.7319x24.4273x0.71 54	25.64	1191.95	0.022	0.10	2314.88	0.000
L4	97 - 88.5 (4)	TP26.458x24.7319x0.493 3	27.34	1008.70	0.027	0.10	2084.90	0.000
L5	88.5 - 88 (5)	TP26.0593x24.8114x0.55 65	28.03	1147.86	0.024	0.10	2385.65	0.000
L6	88 - 68.08 (6)	TP30.1033x26.0593x0.66 07	31.50	1579.66	0.020	0.05	3787.99	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L7	68.08 - 47.25 (7)	TP34.332x30.1033x0.717 6	34.38	1942.17	0.018	0.05	5183.36	0.000
L8	47.25 - 37.75 (8)	TP35.6358x32.0339x0.75 46	36.46	2129.29	0.017	0.05	5859.32	0.000
L9	37.75 - 32.5 (9)	TP36.7017x35.6358x0.80 08	37.67	2352.44	0.016	0.05	6879.39	0.000
L10	32.5 - 23.5 (10)	TP38.5289x36.7017x0.81 75	39.10	2598.22	0.015	0.05	7986.20	0.000
L11	23.5 - 20.75 (11)	TP39.0872x38.5289x0.95 06	39.53	2789.13	0.014	0.05	8642.25	0.000
L12	20.75 - 3 (12)	TP42.6909x39.0872x0.80 77	41.96	2854.66	0.015	0.05	9768.00	0.000
L13	3 - 0 (13)	TP43.3x42.6909x0.8586	42.38	3070.34	0.014	0.05	10636.17	0.000

Pole Interaction Design Data

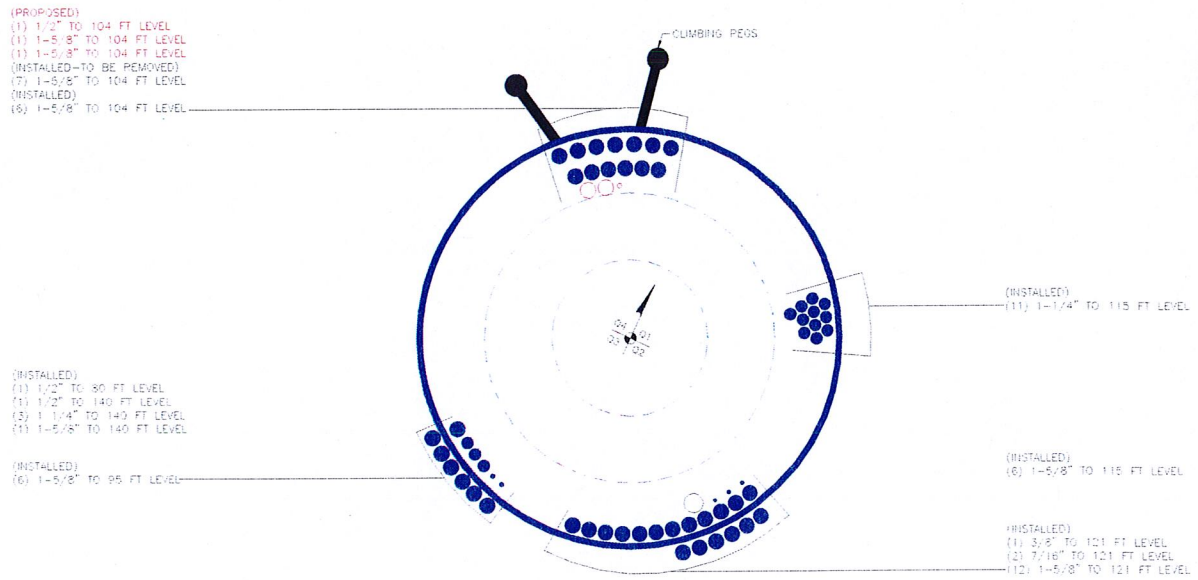
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	140 - 104 (1)	0.010	0.643	0.000	0.027	0.000	0.654	1.000	4.8.2 ✓
L2	104 - 98.5 (2)	0.012	0.751	0.000	0.034	0.000	0.764	1.000	4.8.2 ✓
L3	98.5 - 97 (3)	0.008	0.509	0.000	0.022	0.000	0.517	1.000	4.8.2 ✓
L4	97 - 88.5 (4)	0.010	0.701	0.000	0.027	0.000	0.711	1.000	4.8.2 ✓
L5	88.5 - 88 (5)	0.009	0.701	0.000	0.024	0.000	0.710	1.000	4.8.2 ✓
L6	88 - 68.08 (6)	0.009	0.758	0.000	0.020	0.000	0.767	1.000	4.8.2 ✓
L7	68.08 - 47.25 (7)	0.009	0.768	0.000	0.018	0.000	0.777	1.000	4.8.2 ✓
L8	47.25 - 37.75 (8)	0.009	0.809	0.000	0.017	0.000	0.818	1.000	4.8.2 ✓
L9	37.75 - 32.5 (9)	0.009	0.781	0.000	0.016	0.000	0.790	1.000	4.8.2 ✓
L10	32.5 - 23.5 (10)	0.009	0.760	0.000	0.015	0.000	0.769	1.000	4.8.2 ✓
L11	23.5 - 20.75 (11)	0.009	0.728	0.000	0.014	0.000	0.737	1.000	4.8.2 ✓
L12	20.75 - 3 (12)	0.010	0.794	0.000	0.015	0.000	0.804	1.000	4.8.2 ✓
L13	3 - 0 (13)	0.010	0.753	0.000	0.014	0.000	0.763	1.000	4.8.2 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	140 - 104	Pole	TP23.3105x16x0.25	1	-12.94	1342.99	65.4	Pass
L2	104 - 98.5	Pole	TP24.4273x23.3105x0.4484	2	-17.66	1494.32	76.4	Pass

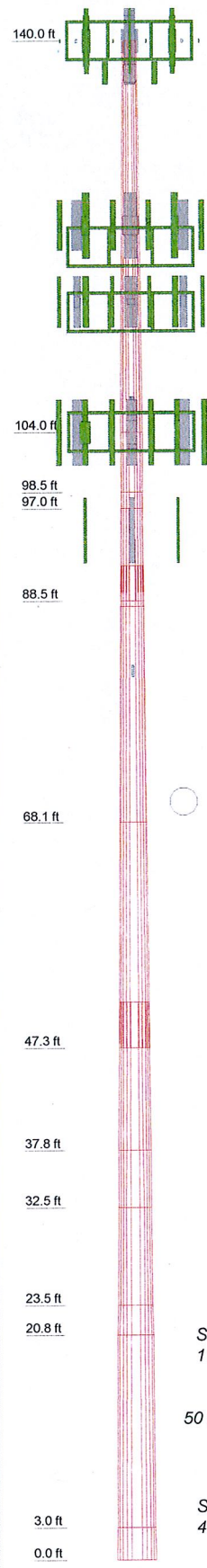
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
L3	98.5 - 97	Pole	TP24.7319x24.4273x0.7154	3	-18.07	2383.90	51.7	Pass	
L4	97 - 88.5	Pole	TP26.458x24.7319x0.4933	4	-19.57	2017.41	71.1	Pass	
L5	88.5 - 88	Pole	TP26.0593x24.8114x0.5565	5	-20.99	2295.71	71.0	Pass	
L6	88 - 68.08	Pole	TP30.1033x26.0593x0.6607	6	-27.15	3159.33	76.7	Pass	
L7	68.08 - 47.25	Pole	TP34.332x30.1033x0.7176	7	-33.17	3884.33	77.7	Pass	
L8	47.25 - 37.75	Pole	TP35.6358x32.0339x0.7546	8	-38.69	4224.28	81.8	Pass	
L9	37.75 - 32.5	Pole	TP36.7017x35.6358x0.8008	9	-42.33	4704.88	79.0	Pass	
L10	32.5 - 23.5	Pole	TP38.5289x36.7017x0.8175	10	-46.58	5196.44	76.9	Pass	
L11	23.5 - 20.75	Pole	TP39.0872x38.5289x0.9506	11	-48.08	5578.27	73.7	Pass	
L12	20.75 - 3	Pole	TP42.6909x39.0872x0.8077	12	-57.05	5709.31	80.4	Pass	
L13	3 - 0	Pole	TP43.3x42.6909x0.8586	13	-58.71	6140.68	76.3	Pass	
							Summary		
							Pole (L8)	81.8	Pass
							RATING =	81.8	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

Length (ft)	36.00	19.92	20.83	13.75	9.00	2.75	17.75	3.00
Number of Sides	12	12	12	12	12	12	12	12
Thickness (in)	0.2500	0.6607	0.7176	0.7546	0.8175	0.9506	0.8077	0.8586
Socket Length (ft)		3.25	4.25					
Top Dia (in)	16.0000	26.0593	30.1033	32.0339	36.7017	38.5289	39.0872	42.6909
Bot Dia (in)	23.3104	30.1033	34.3320	35.6358	36.7017	38.5289	39.0872	42.6909
Grade		Reinf 44.30 ksi	Reinf 44.48 ksi	Reinf 45.26 ksi	Reinf 44.82 ksi	Reinf 46.16 ksi	Reinf 42.14 ksi	Reinf 46.22 ksi
Weight (K)	1.9	4.0	5.2	3.8	3.0	1.1	6.3	30.6



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXVSP18-C-A20 w/ Mount Pipe	140	RRUS 11	121
APXVSP18-C-A20 w/ Mount Pipe	140	RRUS 11	121
APXVSP18-C-A20 w/ Mount Pipe	140	Platform Mount [LP 1201-1]	121
APXVTM14-C-120 w/ Mount Pipe	140	(2) RR90-17-02DP w/ Mount Pipe	115
APXVTM14-C-120 w/ Mount Pipe	140	(2) RR90-17-02DP w/ Mount Pipe	115
APXVTM14-C-120 w/ Mount Pipe	140	(2) RR90-17-02DP w/ Mount Pipe	115
(3) ACU-A20-N	140	APX16DWW-16DWW-S-E-A20 w/ Mount Pipe	115
(3) ACU-A20-N	140	APX16DWW-16DWW-S-E-A20 w/ Mount Pipe	115
(3) ACU-A20-N	140	APX16DWW-16DWW-S-E-A20 w/ Mount Pipe	115
TD-RRH8x20-25	140	APX16DWW-16DWW-S-E-A20 w/ Mount Pipe	115
TD-RRH8x20-25	140	(2) S20070A1	115
TD-RRH8x20-25	140	(2) S20070A1	115
Platform Mount [LP 1201-1]	140	(2) S20070A1	115
(2) 2 3/8" OD x 6 ft mount pipe	140	ETW200VS12UB	115
(2) 2 3/8" OD x 6 ft mount pipe	140	ETW200VS12UB	115
(2) 2 3/8" OD x 6 ft mount pipe	140	ETW200VS12UB	115
800MHz 2X50W RRH W/FILTER	137	Platform Mount [LP 1201-1]	115
800MHz 2X50W RRH W/FILTER	137	LNX-6514DS-VTM w/ Mount Pipe	104
800MHz 2X50W RRH W/FILTER	137	LNX-6514DS-VTM w/ Mount Pipe	104
TME-800MHZ RRH	137	LNX-6514DS-VTM w/ Mount Pipe	104
TME-800MHZ RRH	137	ACUTIME 2000	104
TME-800MHZ RRH	137	(2) FD9R6004/2C-3L	104
TME-1900MHz RRH (65 MHz)	137	(2) FD9R6004/2C-3L	104
TME-1900MHz RRH (65 MHz)	137	(2) FD9R6004/2C-3L	104
TME-1900MHz RRH (65 MHz)	137	(2) FD9R6004/2C-3L	104
Side Arm Mount [SO 103-3]	137	(3) SBNHH-1D65B w/ Mount Pipe	104
Side Arm Mount [SO 104-3]	123	(3) SBNHH-1D65B w/ Mount Pipe	104
(2) 7770.00 w/ Mount Pipe	121	(3) SBNHH-1D65B w/ Mount Pipe	104
(2) 7770.00 w/ Mount Pipe	121	RRH2X60-PCS	104
(2) 7770.00 w/ Mount Pipe	121	RRH2X60-PCS	104
(2) LGP21401	121	RRH2x60-700	104
(2) LGP21401	121	RRH2x60-700	104
(2) LGP21401	121	RRH2x60-700	104
(2) LGP21901	121	RRH2x60-700	104
(2) LGP21901	121	RRH4X45-AWS4 B66	104
(2) LGP21901	121	RRH4X45-AWS4 B66	104
DC6-48-60-18-8F	121	RRH4X45-AWS4 B66	104
HPA-65R-BUU-H6 w/ Mount Pipe	121	DB-T1-6Z-8AB-0Z	104
HPA-65R-BUU-H6 w/ Mount Pipe	121	DB-T1-6Z-8AB-0Z	104
HPA-65R-BUU-H6 w/ Mount Pipe	121	Platform Mount [LP 1201-1]	104
1001940	121	APXV18-206517S-C w/ Mount Pipe	95
1001940	121	APXV18-206517S-C w/ Mount Pipe	95
1001940	121	APXV18-206517S-C w/ Mount Pipe	95
RRUS12/RRUS A2	121	Pipe Mount [PM 601-3]	95
RRUS12/RRUS A2	121	OG-860/1920/GPS-A	80
RRUS12/RRUS A2	121	Side Arm Mount [SO 901-1]	80
RRUS 11	121		

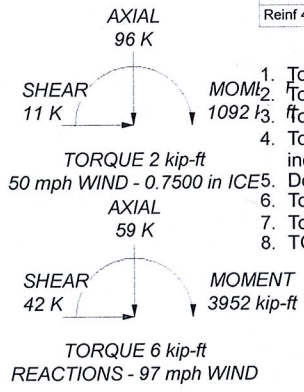
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	Reinf 45.02 ksi	45 ksi	57 ksi
Reinf 38.06 ksi	38 ksi	48 ksi	Reinf 44.82 ksi	45 ksi	57 ksi
Reinf 38.00 ksi	38 ksi	48 ksi	Reinf 46.16 ksi	46 ksi	58 ksi
Reinf 44.26 ksi	44 ksi	56 ksi	Reinf 42.14 ksi	42 ksi	53 ksi
Reinf 44.30 ksi	44 ksi	56 ksi	Reinf 46.22 ksi	46 ksi	58 ksi
Reinf 44.48 ksi	44 ksi	56 ksi	Reinf 46.15 ksi	46 ksi	58 ksi
Reinf 45.26 ksi	45 ksi	57 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 81.8%

ALL REACTIONS ARE FACTORED



Paul J. Ford and Company
 250 E Broad St, Suite 600
 Columbus, OH 43215
 Phone: (614) 221-6679
 FAX: (555) 555-1235

Job: **140-Ft. Monopole / BIC DRIVE (SSU)**
 Project: **37517-0320.001.7805 / BU 876342**
 Client: Crown Castle Drawn by: mherbert App'd:
 Code: TIA-222-G Date: 01/23/17 Scale: NT:
 Path: Dwg No. E-

v4.4 - Effective 7-12-13

Asymmetric Anchor Rod Analysis

Moment =	3952	k-ft	TIA Ref.	G	Location =	Base Plate
Axial =	59.0	kips	ASIF =	1.0000	η =	0.50 for BP, Rev. G Sect. 4.9.9
Shear =	42.0	kips	Max Ratio =	105.0%	Threads =	N/A for FP, Rev. G
Anchor Qty =	19					

**** For Post Installed Anchors: Check anchors for embedment, epoxy/grout bond, and capacity based on proof load. ****

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in ²	Area, in ²	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	2.250	#18J A615 Gr 75	75	100	26.0	54.00	0.00	3.98	191.84	185.67	196.23	0.00	260.00	75.5%
2	2.250	#18J A615 Gr 75	75	100	39.0	54.00	0.00	3.98	193.10	186.93	197.50	0.00	260.00	76.0%
3	2.250	#18J A615 Gr 75	75	100	51.0	54.00	0.00	3.98	191.90	185.73	196.29	0.00	260.00	75.5%
4	2.250	#18J A615 Gr 75	75	100	64.0	54.00	0.00	3.98	188.27	182.10	192.67	0.00	260.00	74.1%
5	2.250	#18J A615 Gr 75	75	100	116.0	54.00	0.00	3.98	166.25	160.08	170.65	0.00	260.00	65.6%
6	2.250	#18J A615 Gr 75	75	100	129.0	54.00	0.00	3.98	164.11	157.94	168.51	0.00	260.00	64.8%
7	2.250	#18J A615 Gr 75	75	100	141.0	54.00	0.00	3.98	164.47	158.30	168.86	0.00	260.00	64.9%
8	2.250	#18J A615 Gr 75	75	100	154.0	54.00	0.00	3.98	167.05	160.88	171.45	0.00	260.00	65.9%
9	2.250	#18J A615 Gr 75	75	100	206.0	54.00	0.00	3.98	180.97	174.80	185.36	0.00	260.00	71.3%
10	2.250	#18J A615 Gr 75	75	100	219.0	54.00	0.00	3.98	180.80	174.63	185.19	0.00	260.00	71.2%
11	2.250	#18J A615 Gr 75	75	100	231.0	54.00	0.00	3.98	178.67	172.50	183.06	0.00	260.00	70.4%
12	2.250	#18J A615 Gr 75	75	100	244.0	54.00	0.00	3.98	174.54	168.37	178.93	0.00	260.00	68.8%
13	2.250	#18J A615 Gr 75	75	100	296.0	54.00	0.00	3.98	157.25	151.08	161.64	0.00	260.00	62.2%
14	2.250	#18J A615 Gr 75	75	100	309.0	54.00	0.00	3.98	158.14	151.97	162.53	0.00	260.00	62.5%
15	2.250	#18J A615 Gr 75	75	100	321.0	54.00	0.00	3.98	161.63	155.46	166.02	0.00	260.00	63.9%
16	2.250	#18J A615 Gr 75	75	100	334.0	54.00	0.00	3.98	167.66	161.49	172.05	0.00	260.00	66.2%
17	2.250	Williams R71	127.7	150	125.0	66.30	0.00	4.14	208.68	202.26	213.25	0.00	489.60	43.6%
18	2.250	Williams R71	127.7	150	240.0	66.30	0.00	4.14	225.85	219.42	230.42	0.00	489.60	47.1%
19	2.250	Williams R71	127.7	150	330.0	66.30	0.00	4.14	210.98	204.55	215.55	0.00	489.60	44.0%

76.11

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F / G

- Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
 2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
 3) Clear space between bottom of leveling nut and top of concrete not exceeding (1)*(Rod Diameter)

Site Data	
BU#:	846342
Site Name:	BIC DRIVE (SSUSA)
App #:	

Anchor Rod Data		
Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	54	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	56	in
Thick:	3	in
Grade:	50	ksi
Clip Distance:	6	in

Stiffener Data (Welding at both sides)		
Configuration:	Stiffened	
Weld Type:	Both	**
Groove Depth:	0.5	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.3125	in
Width:	7.75	in
Height:	18	in
Thick:	1.25	in
Notch:	0.75	in
Grade:	65	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	43.3	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round

Base Reactions		
TIA Revision:	G	
Factored Moment, Mu:	3952	ft-kips
Factored Axial, Pu:	59	kips
Factored Shear, Vu:	42	kips

Reactions adjusted to account for additional anchor rods.

Anchor Rod Results

TIA G --> Max Rod (Cu+ Vu/ η): 228.5 Kips
 Axial Design Strength, Φ^*Fu^*Anet : 260.0 Kips
 Anchor Rod Stress Ratio: 87.9% **Pass**

Base Plate Results

Base Plate Stress: 4.8 ksi
 PL Design Bending Strength, Φ^*Fy : 27.0 ksi
 Base Plate Stress Ratio: 17.8% **Pass**

Shear Check Only

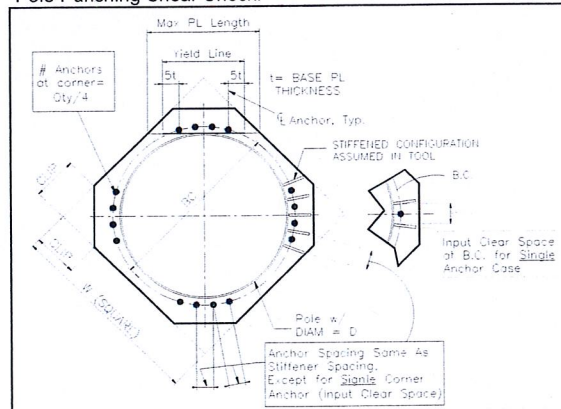
PL Ref. Data	
Yield Line (in):	N/A, Roark
Max PL Length:	35.90

Stiffener Results

Horizontal Weld : 69.4% **Pass**
 Vertical Weld: 77.1% **Pass**
 Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$: 12.3% **Pass**
 Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$: 33.0% **Pass**
 Plate Comp. (AISC Bracket): 41.0% **Pass**

Pole Results

Pole Punching Shear Check: 22.9% **Pass**



** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Factored Foundation Loads:

Factored Axial Load (+Comp, -Ten) =	59	44.25	kips
Factored Horiz. Load at Top of Pier =	42	42	kips
Factored OTM at Top of Pier =	3952	3952	kips

LRFD Resistance and Load Factors:

Soil Bearing =	0.75	
Soil Weight =	0.75	
Concrete Weight =	0.75	

Soil Properties:

Depth to Water Table =	99	ft
Uplift Cone from	Top	of footing

Dead Load Factors

	1.2	0.9
	1.2	0.9

Layer	Thk	Soil	Cohesion	Friction	Ult	Depth
ft	pcf	ksf	degrees	Bearing	ksf	ft
4	115	0	32			4.00
4	135	0	32			8.00
4	130	0	32	20		12.00

Dimensions:

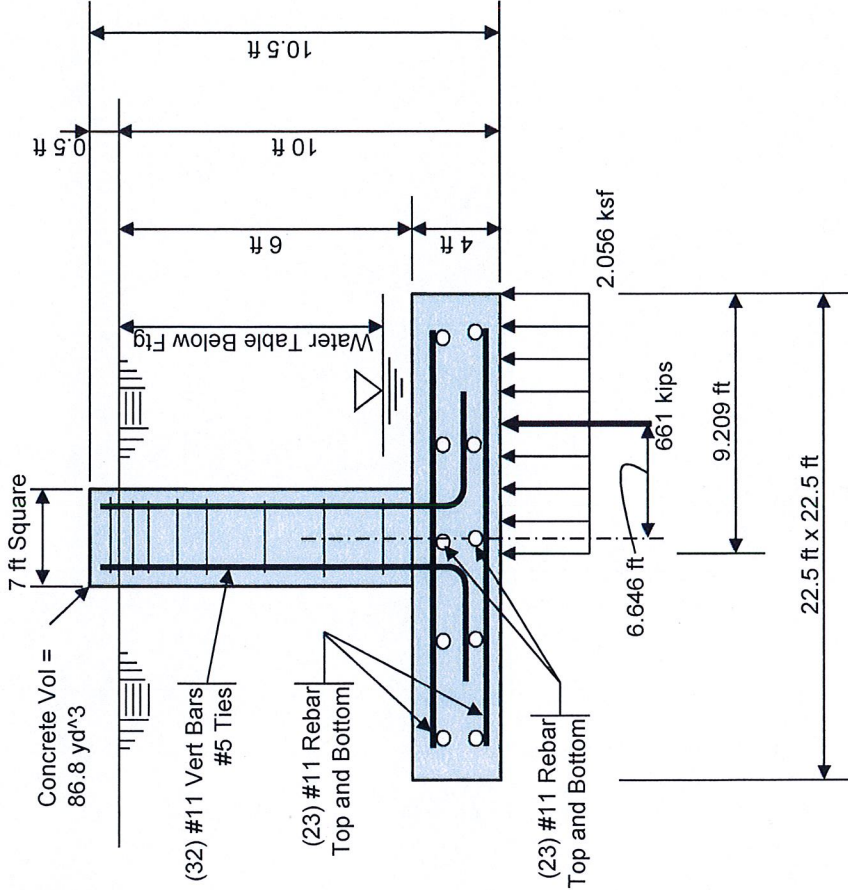
Pier Shape =	Square
Pier Width =	7
Pier Height above Grade =	0.5
Depth to Bottom of Footing =	10
Footing Thickness =	4
Footing Width, B =	22.5
Footing Length, L =	22.5

Concrete:

Concrete Strength =	3	ksi
Rebar Strength =	60	ksi

Summary Results:

Maximum Net Soil Bearing =	2.289	ksf	Available	15.000	ksf
Uplift =	0.0	kips	612.7	kips	
Punching Shear Stress =	0.026	ksi	0.164	ksi	
Bending Shear Stress =	226.8	kips	951.3	kips	
Bending Moment =	1528	k-ft	6671.8	k-ft	
Conc Pier Reinforcing Steel =	4225.0	k-ft	8775.2	k-ft	



Total Pad Reinf Stl = 71.76 in² >= 23.33 in² = Min Stl, OK
 Total Pier Reinf Stl = 49.92 in² >= 35.28 in² = Min Stl, OK
 Footing Thickness = 4.00 ft >= 2.05 ft = Min Ftg Thk, OK

Stress Ratio = 15.3% in Soil Bearing
 Stress Ratio = 0.0% in Uplift
 Stress Ratio = 15.7% in Punching Shear
 Stress Ratio = 23.8% in Bending Shear
 Stress Ratio = 22.9% in Bending Moment
 Stress Ratio = 48.2% in Pier Rebar