

Date: **October 4, 2016**

Sean Dempsey
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277



Crown Castle
2000 Corporate Dr.
Canonsburg PA 15317
(724) 416-2000

Subject: Structural Analysis Report

Carrier Designation: Metro PCS Co-Locate
Carrier Site Number: CTHA509A
Carrier Site Name: AT&T Burlington Monopole

Crown Castle Designation: Crown Castle BU Number: 845993
Crown Castle Site Name: BURLINGTON-NEPAUG ROAD
Crown Castle JDE Job Number: 392501
Crown Castle Work Order Number: 1306193
Crown Castle Application Number: 358447 Rev. 0

Engineering Firm Designation: Crown Castle Project Number: 1306193

Site Data: 12 NEPAUG ROAD, BURLINGTON, Hartford County, CT
Latitude 41° 46' 56.86", Longitude -72° 59' 22.68"
120 Foot - Monopole Tower

Dear Sean Dempsey,

Crown Castle 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 1306193, in accordance with application 358447, revision 0.

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:

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing 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 TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category II were used in this analysis.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at Crown Castle 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.

Structural analysis prepared by: Alexander Greguric, E.I.T. / BNM

Respectfully submitted by:

Terry P. Styran, P.E.
Senior Project Engineer
trnTower Report - version 7.0.5.1



TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Antenna and Cable Information

Table 2 - Existing Antenna and Cable Information

Table 3 - Design Antenna and Cable Information

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Table 6 – 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 120ft Monopole tower designed by ENGINEERED ENDEAVORS, INC and mapped by FDH in February of 2016. The original design standard and wind speed are unknown.

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 97 mph with no ice, 50 mph with 1 inch ice thickness and 60 mph under service loads, exposure category B.

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
88.0	90.0	3	commscope	LNx-6515DS-A1M w/ Mount Pipe	-	-	1

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
119.0	119.0	3	ericsson	RRUS-11	12 2 2	1-5/8 7/8 1/2	1
		1	gps	GPS_A			
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP13519			
		6	powerwave technologies	LGP21401			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 1201-1]			
109.0	109.0	6	andrew	950F85T2E-M w/ Mount Pipe	6	1-1/4	1
		1	tower mounts	Platform Mount [LP 1201-1]			
99.0	99.0	3	antel	BXA-171085-8BF-EDIN-2 w/ Mount Pipe	12	1-5/8	1
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe			
		6	antel	LPA-80080/4CF w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 1201-1]			
88.0	90.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	7	1-5/8	1
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
	88.0	1	tower mounts	T-Arm Mount [TA 602-3]			

Notes:

- Existing Equipment

Table 3 - Design 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)
Unknown						

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Jaworski Geotech, Inc.	4551029	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	URS	5072131	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	FDH Velocitel (Foundation Mapping)	6171674	CCISITES
4-TOWER MANUFACTURER DRAWINGS	FDH Velocitel (Tower Mapping)	6172249	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.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	120 - 97	Pole	TP28.93x22.69x0.1875	1	-7.67	1079.70	17.2	Pass
L2	97 - 48	Pole	TP39.7x27.5729x0.25	2	-19.54	1957.24	50.0	Pass
L3	48 - 0	Pole	TP51.04x38.0569x0.3125	3	-31.73	3154.51	52.2	Pass
							Summary	
						Pole (L3)	52.2	Pass
						Rating =	52.2	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	45.5	Pass
1	Base Plate	0	59.5	Pass
1	Base Foundation	0	45.9	Pass
1	Base Foundation Soil Interaction	0	39.7	Pass

Structure Rating (max from all components) =	59.5%
---	--------------

Notes:

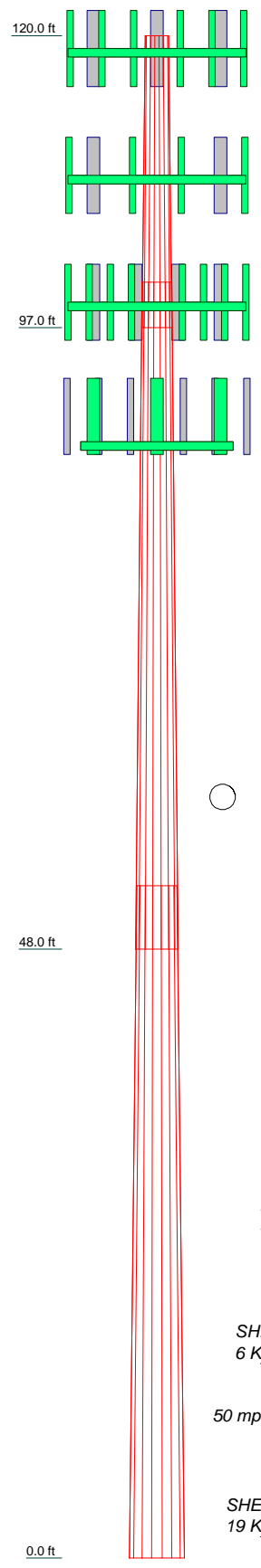
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

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

APPENDIX A
TNXTOWER OUTPUT

Section	1	2	3
Length (ft)	23.00	52.62	52.96
Number of Sides	18	18	18
Thickness (in)	0.1875	0.2500	0.3125
Socket Length (ft)	3.62	4.96	38.0569
Top Dia (in)	22.6900	27.5729	51.0400
Bot Dia (in)	28.9300	39.7000	
Grade		A572-65	
Weight (K)	1.2	4.7	7.9



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
AM-X-CD-16-65-00T-RET w/ Mount Pipe	119	Platform Mount [LP 1201-1]	109
AM-X-CD-16-65-00T-RET w/ Mount Pipe	119	(2) LPA-80080/4CF w/ Mount Pipe	99
AM-X-CD-16-65-00T-RET w/ Mount Pipe	119	(2) LPA-80080/4CF w/ Mount Pipe	99
AM-X-CD-16-65-00T-RET w/ Mount Pipe	119	(2) LPA-80080/4CF w/ Mount Pipe	99
(2) 7770.00 w/ Mount Pipe	119	BXA-171085-8BF-EDIN-2 w/ Mount Pipe	99
(2) 7770.00 w/ Mount Pipe	119	BXA-171085-8BF-EDIN-2 w/ Mount Pipe	99
(2) 7770.00 w/ Mount Pipe	119	BXA-171085-8BF-EDIN-2 w/ Mount Pipe	99
GPS_A	119	BXA-171085-8BF-EDIN-2 w/ Mount Pipe	99
(2) LGP21401	119	BXA-70063-6CF-2 w/ Mount Pipe	99
(2) LGP21401	119	BXA-70063-6CF-2 w/ Mount Pipe	99
(2) LGP21401	119	BXA-70063-6CF-2 w/ Mount Pipe	99
DC6-48-60-18-8F	119	(2) FD9R6004/2C-3L	99
(2) LGP13519	119	(2) FD9R6004/2C-3L	99
(2) LGP13519	119	(2) FD9R6004/2C-3L	99
(2) LGP13519	119	Platform Mount [LP 1201-1]	99
RRUS-11	119	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
RRUS-11	119	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
RRUS-11	119	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
6' x 2" Mount Pipe	119	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
6' x 2" Mount Pipe	119	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
6' x 2" Mount Pipe	119	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
6' x 2" Mount Pipe	119	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
6' x 2" Mount Pipe	119	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
6' x 2" Mount Pipe	119	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
Platform Mount [LP 1201-1]	119	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
(2) 950F85T2E-M w/ Mount Pipe	109	LNx-6515DS-A1M w/ Mount Pipe	88
(2) 950F85T2E-M w/ Mount Pipe	109	LNx-6515DS-A1M w/ Mount Pipe	88
(2) 950F85T2E-M w/ Mount Pipe	109	LNx-6515DS-A1M w/ Mount Pipe	88
(2) 6' x 2" Mount Pipe	109	LNx-6515DS-A1M w/ Mount Pipe	88
(2) 6' x 2" Mount Pipe	109	T-Arm Mount [TA 602-3]	88
(2) 6' x 2" Mount Pipe	109		

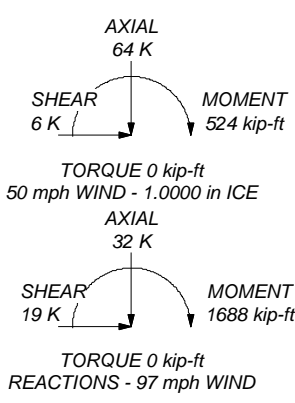
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B 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 1.00 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: 52.2%

ALL REACTIONS ARE FACTORED



Crown Castle
 2000 Corporate Dr.
 Canonsburg PA 15317
 Phone: (724) 416-2000
 FAX: (724) 416-4623

Job: **BU# 845993**
 Project:
 Client: Crown Castle Drawn by: Alexander Greguric App'd:
 Code: TIA-222-G Date: 10/04/16 Scale: NTS
 Path: X:\ENG Work Area\AGreguric\WIP\845993 WD 1306193\Runin with 125mph\845993.dwg Dwg No. E-1

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 Hartford County, Connecticut.
- 2) Basic wind speed of 97 mph.
- 3) Structure Class II.
- 4) Exposure Category B.
- 5) Topographic Category 1.
- 6) Crest Height 0.00 ft.
- 7) Nominal ice thickness of 1.0000 in.
- 8) Ice thickness is considered to increase with height.
- 9) Ice density of 56 pcf.
- 10) A wind speed of 50 mph is used in combination with ice.
- 11) Temperature drop of 50 °F.
- 12) Deflections calculated using a wind speed of 60 mph.
- 13) A non-linear (P-delta) analysis was used.
- 14) Pressures are calculated at each section.
- 15) Stress ratio used in pole design is 1.
- 16) 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 <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
--	--	---

Tapered Pole Section Geometry

Section	Elevation <small>ft</small>	Section Length <small>ft</small>	Splice Length <small>ft</small>	Number of Sides	Top Diameter <small>in</small>	Bottom Diameter <small>in</small>	Wall Thickness <small>in</small>	Bend Radius <small>in</small>	Pole Grade
L1	120.00-97.00	23.00	3.62	18	22.6900	28.9300	0.1875	0.7500	A572-65 (65 ksi)
L2	97.00-48.00	52.62	4.96	18	27.5729	39.7000	0.2500	1.0000	A572-65 (65 ksi)
L3	48.00-0.00	52.96		18	38.0569	51.0400	0.3125	1.2500	A572-65 (65 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	It/Q in ²	w in	w/t
L1	23.0400	13.3918	856.7181	7.9884	11.5265	74.3258	1714.5635	6.6972	3.6634	19.538
	29.3763	17.1054	1785.3331	10.2036	14.6964	121.4807	3573.0155	8.5543	4.7617	25.396
L2	28.8454	21.6807	2044.8606	9.6996	14.0070	145.9882	4092.4119	10.8424	4.4128	17.651
	40.3124	31.3036	6154.9624	14.0048	20.1676	305.1906	12318.023	15.6548	6.5472	26.189
L3	39.8787	37.4377	6738.3194	13.3993	19.3329	348.5416	13485.505	18.7224	6.1480	19.674
	51.8274	50.3153	16357.795	18.0083	25.9283	630.8853	32737.114	25.1625	8.4330	26.986

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Spacing Diagonals	Double Angle Stitch Spacing Horizontals	Double Angle Stitch Spacing Redundants
ft	ft ²	in					in	in	in
L1 120.00-97.00				1	1	1			
L2 97.00-48.00				1	1	1			
L3 48.00-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	Number Per Row	Clear Spacing	Width or Diameter	Perimeter	Weight
				ft			in	r in	r in	plf

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")	A	No	Inside Pole	119.00 - 8.00	2	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00
LDF5-50A(7/8")	A	No	Inside Pole	119.00 - 8.00	2	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00
LDF7-50A(1-5/8")	A	No	Inside Pole	119.00 - 8.00	12	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00

LDF6-50A(1-1/4")	C	No	Inside Pole	109.00 - 8.00	6	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00

LDF7-50A(1-5/8")	C	No	Inside Pole	99.00 - 8.00	12	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00

LDF7-50A(1-5/8")	B	No	Inside Pole	88.00 - 8.00	6	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00
MLE Hybrid 9Power/18Fiber RL 2(1-5/8")	B	No	Inside Pole	88.00 - 8.00	1	No Ice	0.00
						1/2" Ice	0.00
						1" Ice	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation	Face	A _R	A _F	C _A A _A In Face	C _A A _A Out Face	Weight
n	ft		ft ²	ft ²	ft ²	ft ²	K
L1	120.00-97.00	A	0.000	0.000	0.000	0.000	0.24
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.07
L2	97.00-48.00	A	0.000	0.000	0.000	0.000	0.53
		B	0.000	0.000	0.000	0.000	0.24
		C	0.000	0.000	0.000	0.000	0.68
L3	48.00-0.00	A	0.000	0.000	0.000	0.000	0.43
		B	0.000	0.000	0.000	0.000	0.24
		C	0.000	0.000	0.000	0.000	0.55

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation	Face or Leg	Ice Thickness	A _R	A _F	C _A A _A In Face	C _A A _A Out Face	Weight
n	ft		in	ft ²	ft ²	ft ²	ft ²	K
L1	120.00-97.00	A	2.252	0.000	0.000	0.000	0.000	0.24
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.07
L2	97.00-48.00	A	2.162	0.000	0.000	0.000	0.000	0.53
		B		0.000	0.000	0.000	0.000	0.24
		C		0.000	0.000	0.000	0.000	0.68
L3	48.00-0.00	A	1.931	0.000	0.000	0.000	0.000	0.43
		B		0.000	0.000	0.000	0.000	0.24
		C		0.000	0.000	0.000	0.000	0.55

Feed Line Center of Pressure

Section	Elevation	CP _X	CP _Z	CP _X Ice	CP _Z Ice
	ft	in	in	in	in
L1	120.00-97.00	0.0000	0.0000	0.0000	0.0000
L2	97.00-48.00	0.0000	0.0000	0.0000	0.0000
L3	48.00-0.00	0.0000	0.0000	0.0000	0.0000

Shielding Factor Ka

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

Discrete Tower Loads

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

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
			ft	ft	°	ft	ft ²	ft ²	K

AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	0.0000	119.00	No Ice	8.26	6.30	0.07
			0.00			1/2"	8.82	7.48	0.14
			0.00			Ice	9.35	8.37	0.21
						1" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.0000	119.00	No Ice	8.26	6.30	0.07
			0.00			1/2"	8.82	7.48	0.14
			0.00			Ice	9.35	8.37	0.21
						1" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.0000	119.00	No Ice	8.26	6.30	0.07
			0.00			1/2"	8.82	7.48	0.14
			0.00			Ice	9.35	8.37	0.21
						1" Ice			
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0.0000	119.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
						1" Ice			
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	119.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
						1" Ice			
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0.0000	119.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
						1" Ice			
GPS_A	A	From Leg	4.00	0.0000	119.00	No Ice	0.26	0.26	0.00
			0.00			1/2"	0.32	0.32	0.00
			0.00			Ice	0.39	0.39	0.01
						1" Ice			
(2) LGP21401	C	From Leg	4.00	0.0000	119.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
						1" Ice			
(2) LGP21401	A	From Leg	4.00	0.0000	119.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
						1" Ice			
(2) LGP21401	B	From Leg	4.00	0.0000	119.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
						1" Ice			
DC6-48-60-18-8F	A	From Leg	4.00	0.0000	119.00	No Ice	0.79	0.79	0.02
			0.00			1/2"	1.27	1.27	0.04
			0.00			Ice	1.45	1.45	0.05
						1" Ice			
(2) LGP13519	C	From Leg	4.00	0.0000	119.00	No Ice	0.29	0.18	0.01
			0.00			1/2"	0.36	0.24	0.01
			0.00			Ice	0.44	0.31	0.01
						1" Ice			
(2) LGP13519	A	From Leg	4.00	0.0000	119.00	No Ice	0.29	0.18	0.01
			0.00			1/2"	0.36	0.24	0.01
			0.00			Ice	0.44	0.31	0.01
						1" Ice			
(2) LGP13519	B	From Leg	4.00	0.0000	119.00	No Ice	0.29	0.18	0.01
			0.00			1/2"	0.36	0.24	0.01
			0.00			Ice	0.44	0.31	0.01
						1" Ice			
RRUS-11	C	From Leg	4.00	0.0000	119.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			0.00			Ice	3.21	1.49	0.09
						1" Ice			
RRUS-11	A	From Leg	4.00	0.0000	119.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			0.00			Ice	3.21	1.49	0.09
						1" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} _{Front}	C _{AA} _{Side}	Weight	
			Horz	Lateral						Vert
			ft	ft	°	ft	ft ²	ft ²	K	
RRUS-11	B	From Leg	4.00		0.0000	119.00	No Ice	2.78	1.19	0.05
			0.00				1/2"	2.99	1.33	0.07
			0.00				Ice	3.21	1.49	0.09
6' x 2" Mount Pipe	C	From Leg	4.00		0.0000	119.00	1" Ice			
			0.00				No Ice	1.43	1.43	0.02
			0.00				1/2"	1.92	1.92	0.03
6' x 2" Mount Pipe	A	From Leg	4.00		0.0000	119.00	Ice	2.29	2.29	0.05
			0.00				1" Ice			
			0.00				No Ice	1.43	1.43	0.02
6' x 2" Mount Pipe	B	From Leg	4.00		0.0000	119.00	1/2"	1.92	1.92	0.03
			0.00				Ice	2.29	2.29	0.05
			0.00				1" Ice			
6' x 2" Mount Pipe	C	From Leg	2.00		0.0000	119.00	No Ice	1.43	1.43	0.02
			0.00				1/2"	1.92	1.92	0.03
			0.00				Ice	2.29	2.29	0.05
6' x 2" Mount Pipe	A	From Leg	2.00		0.0000	119.00	1" Ice			
			0.00				No Ice	1.43	1.43	0.02
			0.00				1/2"	1.92	1.92	0.03
6' x 2" Mount Pipe	B	From Leg	2.00		0.0000	119.00	Ice	2.29	2.29	0.05
			0.00				1" Ice			
			0.00				No Ice	1.43	1.43	0.02
Platform Mount [LP 1201-1]	B	None			0.0000	119.00	1/2"	1.92	1.92	0.03
							Ice	2.29	2.29	0.05
							1" Ice			
*** (2) 950F85T2E-M w/ Mount Pipe	C	From Leg	4.00		0.0000	109.00	No Ice	3.02	5.66	0.03
			0.00				1/2"	3.47	6.55	0.07
			0.00				Ice	3.90	7.31	0.12
(2) 950F85T2E-M w/ Mount Pipe	A	From Leg	4.00		0.0000	109.00	1" Ice			
			0.00				No Ice	3.02	5.66	0.03
			0.00				1/2"	3.47	6.55	0.07
(2) 950F85T2E-M w/ Mount Pipe	B	From Leg	4.00		0.0000	109.00	Ice	3.90	7.31	0.12
			0.00				1" Ice			
			0.00				No Ice	3.02	5.66	0.03
(2) 6' x 2" Mount Pipe	C	From Leg	4.00		0.0000	109.00	1/2"	1.92	1.92	0.03
			0.00				Ice	2.29	2.29	0.05
			0.00				1" Ice			
(2) 6' x 2" Mount Pipe	A	From Leg	4.00		0.0000	109.00	No Ice	1.43	1.43	0.02
			0.00				1/2"	1.92	1.92	0.03
			0.00				Ice	2.29	2.29	0.05
(2) 6' x 2" Mount Pipe	B	From Leg	4.00		0.0000	109.00	1" Ice			
			0.00				No Ice	1.43	1.43	0.02
			0.00				1/2"	1.92	1.92	0.03
Platform Mount [LP 1201-1]	B	None			0.0000	109.00	Ice	2.29	2.29	0.05
							1" Ice			
							No Ice	23.10	23.10	2.10
*** (2) LPA-80080/4CF w/ Mount Pipe	C	From Leg	4.00		0.0000	99.00	1/2"	26.80	26.80	2.50
			0.00				Ice	30.50	30.50	2.90
			0.00				1" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} _{Front}	C _{AA} _{Side}	Weight	
			Horz	Lateral						Vert
			ft	ft	°	ft	ft ²	ft ²	K	
(2) LPA-80080/4CF w/ Mount Pipe	A	From Leg	4.00		0.0000	99.00	1" Ice			
			0.00				No Ice	2.86	6.57	0.03
			0.00				1/2" Ice	3.22	7.19	0.08
(2) LPA-80080/4CF w/ Mount Pipe	B	From Leg	4.00		0.0000	99.00	1" Ice			
			0.00				No Ice	2.86	6.57	0.03
			0.00				1/2" Ice	3.22	7.19	0.08
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	C	From Leg	4.00		0.0000	99.00	1" Ice			
			0.00				No Ice	3.18	3.35	0.03
			0.00				1/2" Ice	3.56	3.97	0.06
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	A	From Leg	4.00		0.0000	99.00	1" Ice			
			0.00				No Ice	3.18	3.35	0.03
			0.00				1/2" Ice	3.56	3.97	0.06
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	B	From Leg	4.00		0.0000	99.00	1" Ice			
			0.00				No Ice	3.18	3.35	0.03
			0.00				1/2" Ice	3.56	3.97	0.06
BXA-70063-6CF-2 w/ Mount Pipe	C	From Leg	4.00		0.0000	99.00	1" Ice			
			0.00				No Ice	7.81	5.80	0.04
			0.00				1/2" Ice	8.36	6.95	0.10
BXA-70063-6CF-2 w/ Mount Pipe	A	From Leg	4.00		0.0000	99.00	1" Ice			
			0.00				No Ice	7.81	5.80	0.04
			0.00				1/2" Ice	8.36	6.95	0.10
BXA-70063-6CF-2 w/ Mount Pipe	B	From Leg	4.00		0.0000	99.00	1" Ice			
			0.00				No Ice	7.81	5.80	0.04
			0.00				1/2" Ice	8.36	6.95	0.10
(2) FD9R6004/2C-3L	C	From Leg	4.00		0.0000	99.00	1" Ice			
			0.00				No Ice	0.31	0.08	0.00
			0.00				1/2" Ice	0.39	0.12	0.01
(2) FD9R6004/2C-3L	A	From Leg	4.00		0.0000	99.00	1" Ice			
			0.00				No Ice	0.31	0.08	0.00
			0.00				1/2" Ice	0.39	0.12	0.01
(2) FD9R6004/2C-3L	B	From Leg	4.00		0.0000	99.00	1" Ice			
			0.00				No Ice	0.31	0.08	0.00
			0.00				1/2" Ice	0.39	0.12	0.01
Platform Mount [LP 1201-1]	B	None			0.0000	99.00	1" Ice			
							No Ice	23.10	23.10	2.10
							1/2" Ice	26.80	26.80	2.50
***						Ice	30.50	30.50	2.90	
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	4.00		0.0000	88.00	1" Ice			
			0.00				No Ice	6.33	5.64	0.11
			2.00				1/2" Ice	6.78	6.43	0.17
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	4.00		0.0000	88.00	1" Ice			
			0.00				No Ice	6.33	5.64	0.11
			2.00				1/2" Ice	6.78	6.43	0.17
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	4.00		0.0000	88.00	1" Ice			
			0.00				No Ice	6.33	5.64	0.11
			2.00				1/2" Ice	6.78	6.43	0.17
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Face	4.00		0.0000	88.00	1" Ice			
			0.00				No Ice	6.33	5.64	0.11
			2.00				1/2" Ice	6.78	6.43	0.17
						Ice	7.21	7.13	0.23	

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Horz	Lateral	Vert					
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Face	4.00	0.0000	88.00	1" Ice	6.33	5.64	0.11	
			0.00			No Ice	6.33	5.64	0.11	
			2.00			1/2" Ice	6.78	6.43	0.17	
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Face	4.00	0.0000	88.00	1" Ice	7.21	7.13	0.23	
			0.00			No Ice	6.33	5.64	0.11	
			2.00			1/2" Ice	6.78	6.43	0.17	
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	4.00	0.0000	88.00	1" Ice	11.68	9.84	0.08	
			0.00			No Ice	11.68	9.84	0.08	
			2.00			1/2" Ice	12.40	11.37	0.17	
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	4.00	0.0000	88.00	1" Ice	13.14	12.91	0.27	
			0.00			No Ice	11.68	9.84	0.08	
			2.00			1/2" Ice	12.40	11.37	0.17	
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	4.00	0.0000	88.00	1" Ice	13.14	12.91	0.27	
			0.00			No Ice	11.68	9.84	0.08	
			2.00			1/2" Ice	12.40	11.37	0.17	
T-Arm Mount [TA 602-3]	B	None		0.0000	88.00	1" Ice	11.59	11.59	0.77	
						No Ice	11.59	11.59	0.77	
						1/2" Ice	15.44	15.44	0.99	
						Ice	19.29	19.29	1.21	

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+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

Comb. No.	Description
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	120 - 97	Pole	Max Tension	14	0.00	0.00	0.00
			Max. Compression	26	-19.54	0.00	0.74
			Max. Mx	8	-7.67	-101.21	0.12
			Max. My	2	-7.67	0.00	101.34
			Max. Vy	8	7.28	-101.21	0.12
			Max. Vx	2	-7.28	0.00	101.34
			Max. Torque	8			0.20
L2	97 - 48	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-45.86	0.00	0.74
			Max. Mx	8	-19.54	-755.21	0.13
			Max. My	2	-19.54	0.00	755.34
			Max. Vy	8	15.97	-755.21	0.13
			Max. Vx	2	-15.97	0.00	755.34
			Max. Torque	8			0.20
L3	48 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-64.04	0.00	0.74
			Max. Mx	8	-31.73	-1687.50	0.13
			Max. My	2	-31.73	0.00	1687.63
			Max. Vy	8	19.23	-1687.50	0.13
			Max. Vx	2	-19.23	0.00	1687.63
			Max. Torque	8			0.20

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	64.04	0.00	5.84
	Max. H _x	20	31.74	19.21	0.00
	Max. H _z	2	31.74	0.00	19.21
	Max. M _x	2	1687.63	0.00	19.21
	Max. M _z	8	1687.50	-19.21	0.00
	Max. Torsion	8	0.20	-19.21	0.00
	Min. Vert	13	23.81	-9.61	-16.64
	Min. H _x	8	31.74	-19.21	0.00

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. H _z	14	31.74	0.00	-19.21
	Min. M _x	14	-1687.37	0.00	-19.21
	Min. M _z	20	-1687.50	19.21	0.00
	Min. Torsion	20	-0.20	19.21	0.00

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturing Moment, M _x kip-ft	Overturing Moment, M _z kip-ft	Torque kip-ft
Dead Only	26.45	0.00	0.00	-0.10	0.00	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	31.74	0.00	-19.21	-1687.63	0.00	0.00
0.9 Dead+1.6 Wind 0 deg - No Ice	23.81	0.00	-19.21	-1673.68	0.00	0.00
1.2 Dead+1.6 Wind 30 deg - No Ice	31.74	9.61	-16.64	-1461.55	-843.75	-0.10
0.9 Dead+1.6 Wind 30 deg - No Ice	23.81	9.61	-16.64	-1449.46	-836.79	-0.10
1.2 Dead+1.6 Wind 60 deg - No Ice	31.74	16.64	-9.61	-843.88	-1461.42	-0.17
0.9 Dead+1.6 Wind 60 deg - No Ice	23.81	16.64	-9.61	-836.89	-1449.36	-0.17
1.2 Dead+1.6 Wind 90 deg - No Ice	31.74	19.21	-0.00	-0.13	-1687.50	-0.20
0.9 Dead+1.6 Wind 90 deg - No Ice	23.81	19.21	0.00	-0.10	-1673.58	-0.20
1.2 Dead+1.6 Wind 120 deg - No Ice	31.74	16.64	9.61	843.62	-1461.42	-0.17
0.9 Dead+1.6 Wind 120 deg - No Ice	23.81	16.64	9.61	836.69	-1449.36	-0.17
1.2 Dead+1.6 Wind 150 deg - No Ice	31.74	9.61	16.64	1461.29	-843.75	-0.10
0.9 Dead+1.6 Wind 150 deg - No Ice	23.81	9.61	16.64	1449.27	-836.79	-0.10
1.2 Dead+1.6 Wind 180 deg - No Ice	31.74	0.00	19.21	1687.37	0.00	0.00
0.9 Dead+1.6 Wind 180 deg - No Ice	23.81	0.00	19.21	1673.48	0.00	0.00
1.2 Dead+1.6 Wind 210 deg - No Ice	31.74	-9.61	16.64	1461.29	843.75	0.10
0.9 Dead+1.6 Wind 210 deg - No Ice	23.81	-9.61	16.64	1449.27	836.79	0.10
1.2 Dead+1.6 Wind 240 deg - No Ice	31.74	-16.64	9.61	843.62	1461.42	0.17
0.9 Dead+1.6 Wind 240 deg - No Ice	23.81	-16.64	9.61	836.69	1449.36	0.17
1.2 Dead+1.6 Wind 270 deg - No Ice	31.74	-19.21	-0.00	-0.13	1687.50	0.20
0.9 Dead+1.6 Wind 270 deg - No Ice	23.81	-19.21	0.00	-0.10	1673.58	0.20
1.2 Dead+1.6 Wind 300 deg - No Ice	31.74	-16.64	-9.61	-843.88	1461.42	0.17
0.9 Dead+1.6 Wind 300 deg - No Ice	23.81	-16.64	-9.61	-836.89	1449.36	0.17
1.2 Dead+1.6 Wind 330 deg - No Ice	31.74	-9.61	-16.64	-1461.55	843.75	0.10
0.9 Dead+1.6 Wind 330 deg - No Ice	23.81	-9.61	-16.64	-1449.46	836.79	0.10
1.2 Dead+1.0 Ice+1.0 Temp	64.04	0.00	0.00	-0.74	0.00	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	64.04	0.00	-5.84	-524.34	0.00	0.00
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	64.04	2.92	-5.06	-454.21	-261.74	-0.05
1.2 Dead+1.0 Wind 60	64.04	5.06	-2.92	-262.60	-453.35	-0.08

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 90	64.04	5.84	-0.00	-0.86	-523.48	-0.09
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 120	64.04	5.06	2.92	260.88	-453.35	-0.08
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 150	64.04	2.92	5.06	452.49	-261.74	-0.05
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 180	64.04	0.00	5.84	522.63	0.00	0.00
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 210	64.04	-2.92	5.06	452.49	261.74	0.05
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 240	64.04	-5.06	2.92	260.88	453.35	0.08
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 270	64.04	-5.84	-0.00	-0.86	523.48	0.09
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 300	64.04	-5.06	-2.92	-262.60	453.35	0.08
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	64.04	-2.92	-5.06	-454.21	261.74	0.05
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	26.45	0.00	-4.11	-359.34	0.00	0.00
Dead+Wind 30 deg - Service	26.45	2.06	-3.56	-311.21	-179.62	-0.02
Dead+Wind 60 deg - Service	26.45	3.56	-2.06	-179.73	-311.10	-0.04
Dead+Wind 90 deg - Service	26.45	4.11	0.00	-0.11	-359.23	-0.04
Dead+Wind 120 deg - Service	26.45	3.56	2.06	179.51	-311.10	-0.04
Dead+Wind 150 deg - Service	26.45	2.06	3.56	311.00	-179.62	-0.02
Dead+Wind 180 deg - Service	26.45	0.00	4.11	359.12	0.00	0.00
Dead+Wind 210 deg - Service	26.45	-2.06	3.56	311.00	179.62	0.02
Dead+Wind 240 deg - Service	26.45	-3.56	2.06	179.51	311.10	0.04
Dead+Wind 270 deg - Service	26.45	-4.11	0.00	-0.11	359.23	0.04
Dead+Wind 300 deg - Service	26.45	-3.56	-2.06	-179.73	311.10	0.04
Dead+Wind 330 deg - Service	26.45	-2.06	-3.56	-311.21	179.62	0.02

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	-26.45	0.00	0.00	26.45	0.00	0.000%
2	0.00	-31.74	-19.21	0.00	31.74	19.21	0.000%
3	0.00	-23.81	-19.21	0.00	23.81	19.21	0.000%
4	9.61	-31.74	-16.64	-9.61	31.74	16.64	0.000%
5	9.61	-23.81	-16.64	-9.61	23.81	16.64	0.000%
6	16.64	-31.74	-9.61	-16.64	31.74	9.61	0.000%
7	16.64	-23.81	-9.61	-16.64	23.81	9.61	0.000%
8	19.21	-31.74	0.00	-19.21	31.74	0.00	0.000%
9	19.21	-23.81	0.00	-19.21	23.81	0.00	0.000%
10	16.64	-31.74	9.61	-16.64	31.74	-9.61	0.000%
11	16.64	-23.81	9.61	-16.64	23.81	-9.61	0.000%
12	9.61	-31.74	16.64	-9.61	31.74	-16.64	0.000%
13	9.61	-23.81	16.64	-9.61	23.81	-16.64	0.000%
14	0.00	-31.74	19.21	0.00	31.74	-19.21	0.000%
15	0.00	-23.81	19.21	0.00	23.81	-19.21	0.000%
16	-9.61	-31.74	16.64	9.61	31.74	-16.64	0.000%
17	-9.61	-23.81	16.64	9.61	23.81	-16.64	0.000%
18	-16.64	-31.74	9.61	16.64	31.74	-9.61	0.000%
19	-16.64	-23.81	9.61	16.64	23.81	-9.61	0.000%
20	-19.21	-31.74	0.00	-19.21	31.74	0.00	0.000%
21	-19.21	-23.81	0.00	19.21	23.81	0.00	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
22	-16.64	-31.74	-9.61	16.64	31.74	9.61	0.000%
23	-16.64	-23.81	-9.61	16.64	23.81	9.61	0.000%
24	-9.61	-31.74	-16.64	9.61	31.74	16.64	0.000%
25	-9.61	-23.81	-16.64	9.61	23.81	16.64	0.000%
26	0.00	-64.04	0.00	0.00	64.04	0.00	0.000%
27	0.00	-64.04	-5.84	0.00	64.04	5.84	0.000%
28	2.92	-64.04	-5.06	-2.92	64.04	5.06	0.000%
29	5.06	-64.04	-2.92	-5.06	64.04	2.92	0.000%
30	5.84	-64.04	0.00	-5.84	64.04	0.00	0.000%
31	5.06	-64.04	2.92	-5.06	64.04	-2.92	0.000%
32	2.92	-64.04	5.06	-2.92	64.04	-5.06	0.000%
33	0.00	-64.04	5.84	0.00	64.04	-5.84	0.000%
34	-2.92	-64.04	5.06	2.92	64.04	-5.06	0.000%
35	-5.06	-64.04	2.92	5.06	64.04	-2.92	0.000%
36	-5.84	-64.04	0.00	5.84	64.04	0.00	0.000%
37	-5.06	-64.04	-2.92	5.06	64.04	2.92	0.000%
38	-2.92	-64.04	-5.06	2.92	64.04	5.06	0.000%
39	0.00	-26.45	-4.11	0.00	26.45	4.11	0.000%
40	2.06	-26.45	-3.56	-2.06	26.45	3.56	0.000%
41	3.56	-26.45	-2.06	-3.56	26.45	2.06	0.000%
42	4.11	-26.45	0.00	-4.11	26.45	0.00	0.000%
43	3.56	-26.45	2.06	-3.56	26.45	-2.06	0.000%
44	2.06	-26.45	3.56	-2.06	26.45	-3.56	0.000%
45	0.00	-26.45	4.11	0.00	26.45	-4.11	0.000%
46	-2.06	-26.45	3.56	2.06	26.45	-3.56	0.000%
47	-3.56	-26.45	2.06	3.56	26.45	-2.06	0.000%
48	-4.11	-26.45	0.00	4.11	26.45	0.00	0.000%
49	-3.56	-26.45	-2.06	3.56	26.45	2.06	0.000%
50	-2.06	-26.45	-3.56	2.06	26.45	3.56	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00010123
3	Yes	4	0.00000001	0.00004477
4	Yes	5	0.00000001	0.00035241
5	Yes	5	0.00000001	0.00016684
6	Yes	5	0.00000001	0.00035897
7	Yes	5	0.00000001	0.00017011
8	Yes	4	0.00000001	0.00024725
9	Yes	4	0.00000001	0.00015519
10	Yes	5	0.00000001	0.00035036
11	Yes	5	0.00000001	0.00016587
12	Yes	5	0.00000001	0.00035681
13	Yes	5	0.00000001	0.00016909
14	Yes	4	0.00000001	0.00010118
15	Yes	4	0.00000001	0.00004476
16	Yes	5	0.00000001	0.00035681
17	Yes	5	0.00000001	0.00016909
18	Yes	5	0.00000001	0.00035036
19	Yes	5	0.00000001	0.00016587
20	Yes	4	0.00000001	0.00024725
21	Yes	4	0.00000001	0.00015519
22	Yes	5	0.00000001	0.00035897
23	Yes	5	0.00000001	0.00017011
24	Yes	5	0.00000001	0.00035241
25	Yes	5	0.00000001	0.00016684
26	Yes	4	0.00000001	0.00000001
27	Yes	5	0.00000001	0.00025907
28	Yes	5	0.00000001	0.00033129
29	Yes	5	0.00000001	0.00033313
30	Yes	5	0.00000001	0.00025835
31	Yes	5	0.00000001	0.00032792

32	Yes	5	0.00000001	0.00032961
33	Yes	5	0.00000001	0.00025719
34	Yes	5	0.00000001	0.00032961
35	Yes	5	0.00000001	0.00032792
36	Yes	5	0.00000001	0.00025835
37	Yes	5	0.00000001	0.00033313
38	Yes	5	0.00000001	0.00033129
39	Yes	4	0.00000001	0.00001697
40	Yes	4	0.00000001	0.00010095
41	Yes	4	0.00000001	0.00010742
42	Yes	4	0.00000001	0.00002012
43	Yes	4	0.00000001	0.00009911
44	Yes	4	0.00000001	0.00010514
45	Yes	4	0.00000001	0.0001695
46	Yes	4	0.00000001	0.00010514
47	Yes	4	0.00000001	0.00009911
48	Yes	4	0.00000001	0.00002012
49	Yes	4	0.00000001	0.00010742
50	Yes	4	0.00000001	0.00010095

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 97	9.620	39	0.6665	0.0005
L2	100.62 - 48	6.963	39	0.6297	0.0003
L3	52.96 - 0	1.913	39	0.3361	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	39	9.480	0.6653	0.0005	65333
109.00	(2) 950F85T2E-M w/ Mount Pipe	39	8.095	0.6506	0.0004	29697
99.00	(2) LPA-80080/4CF w/ Mount Pipe	39	6.750	0.6242	0.0003	16004
88.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	39	5.357	0.5743	0.0002	11650

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 97	45.226	2	3.1340	0.0025
L2	100.62 - 48	32.738	2	2.9620	0.0013
L3	52.96 - 0	8.992	2	1.5805	0.0004

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
-----------------	--------------	-----------------	------------------	-----------	------------	---------------------------

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	2	44.570	3.1282	0.0024	13991
109.00	(2) 950F85T2E-M w/ Mount Pipe	2	38.057	3.0598	0.0018	6359
99.00	(2) LPA-80080/4CF w/ Mount Pipe	2	31.733	2.9362	0.0013	3425
88.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	2	25.184	2.7015	0.0009	2488

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	KI/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	120 - 97 (1)	TP28.93x22.69x0.1875	23.00	0.00	0.0	16.520 9	-7.67	1079.70	0.007
L2	97 - 48 (2)	TP39.7x27.5729x0.25	52.62	0.00	0.0	30.396 5	-19.54	1957.24	0.010
L3	48 - 0 (3)	TP51.04x38.0569x0.3125	52.96	0.00	0.0	50.315 3	-31.73	3154.51	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	120 - 97 (1)	TP28.93x22.69x0.1875	101.34	617.02	0.164	0.00	617.02	0.000
L2	97 - 48 (2)	TP39.7x27.5729x0.25	755.34	1543.79	0.489	0.00	1543.79	0.000
L3	48 - 0 (3)	TP51.04x38.0569x0.3125	1687.63	3296.10	0.512	0.00	3296.10	0.000

Pole Shear Design Data

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 $\frac{T_u}{\phi T_n}$
L1	120 - 97 (1)	TP28.93x22.69x0.1875	7.28	539.85	0.013	0.00	1235.55	0.000
L2	97 - 48 (2)	TP39.7x27.5729x0.25	15.97	978.62	0.016	0.00	3091.35	0.000
L3	48 - 0 (3)	TP51.04x38.0569x0.3125	19.23	1577.25	0.012	0.00	6600.26	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	120 - 97 (1)	0.007	0.164	0.000	0.013	0.000	0.172	1.000	4.8.2 ✓
L2	97 - 48 (2)	0.010	0.489	0.000	0.016	0.000	0.500	1.000	4.8.2 ✓

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
L3	48 - 0 (3)	0.010	0.512	0.000	0.012	0.000	0.522	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	120 - 97	Pole	TP28.93x22.69x0.1875	1	-7.67	1079.70	17.2	Pass
L2	97 - 48	Pole	TP39.7x27.5729x0.25	2	-19.54	1957.24	50.0	Pass
L3	48 - 0	Pole	TP51.04x38.0569x0.3125	3	-31.73	3154.51	52.2	Pass
Summary								
Pole (L3)							52.2	Pass
RATING =							52.2	Pass

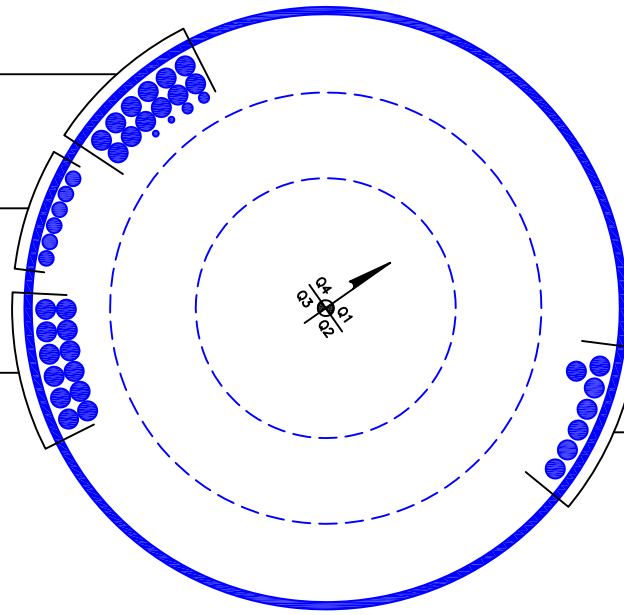
APPENDIX B
BASE LEVEL DRAWING



(INSTALLED)
(2) 1/2" TO 119 FT LEVEL
(2) 7/8" TO 119 FT LEVEL
(12) 1-5/8" TO 119 FT LEVEL

(INSTALLED)
(6) 1-1/4" TO 109 FT LEVEL

(INSTALLED)
(12) 1-5/8" TO 99 FT LEVEL



(INSTALLED)
(7) 1-5/8" TO 88 FT LEVEL

APPENDIX C
ADDITIONAL CALCULATIONS

Stiffened or Unstiffened, UngROUTED, Circular Base Plate - Any Rod Material

TIA Rev G Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: 845993

Site Name: BURLINGTON-NEPAUG ROAD

App #: 358447 Rev. 0

Pole Manufacturer: *Other*

Anchor Rod Data

Qty: 12
 Diam: 2.25 in
 Rod Material: A615-J
 Strength (Fu): 100 ksi
 Yield (Fy): 75 ksi
 Bolt Circle: 60 in

Plate Data

Diam: 74 in
 Thick: 2.25 in
 Grade: 36 ksi
 Single-Rod B-eff: 13.50 in

Stiffener Data (Welding at both sides)

Config: 0 *
 Weld Type:
 Groove Depth: <-- Disregard
 Groove Angle: <-- Disregard
 Fillet H. Weld: in
 Fillet V. Weld: in
 Width: in
 Height: in
 Thick: in
 Notch: in
 Grade: ksi
 Weld str.: ksi

Pole Data

Diam: 51.04 in
 Thick: 0.3125 in
 Grade: 65 ksi
 # of Sides: 18 "0" IF Round
 Fu: 80 ksi
 Reinf. Fillet Weld: 0 "0" if None

Reactions

Mu:	1688	ft-kips
Axial, Pu:	32	kips
Shear, Vu:	19	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

If No stiffeners, Criteria: AISC LRFD <-Only Applicable to Unstiffened Cases

Anchor Rod Results

Max Rod (Cu+ Vu/η): 118.4 Kips
 Allowable Axial, Φ*Fu*Anet: 260.0 Kips
 Anchor Rod Stress Ratio: 45.5% **Pass**

Non-Rigid
AISC LRFD
φ*Tn

Base Plate Results

Base Plate Stress: 19.3 ksi
 Allowable Plate Stress: 32.4 ksi
 Base Plate Stress Ratio: 59.5% **Pass**

Flexural Check

Non-Rigid
AISC LRFD
φ*Fy
Y.L. Length: 31.54

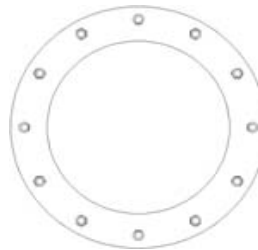
n/a

Stiffener Results

Horizontal Weld : n/a
 Vertical Weld: n/a
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: n/a
 Plate Tension+Shear, ft/Ft+(fv/Fv)^2: n/a
 Plate Comp. (AISC Bracket): n/a

Pole Results

Pole Punching Shear Check: n/a



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

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

Monopole Pier and Pad Foundation

BU # : 845993

Site Name: BURLINGTON-NEPAUG RO.

App. Number: 358447 Rev. 0

TIA-222 Revision: **G**



Design Reactions		
Shear, S:	19	kips
Moment, M:	1688	ft-kips
Tower Height, H:	120	ft
Tower Weight, Wt:	32	kips
Base Diameter, BD:	4.25	ft

Foundation Dimensions		
Depth, D:	5	ft
Pad Width, W:	23.8	ft
Neglected Depth, N:	3.50	ft
Thickness, T:	3.00	ft
Pier Diameter, Pd:	7.00	ft
Ext. Above Grade, E:	0.90	ft
BP Dist. Above Pier:	3	in.
Clear Cover, Cc:	3.0	in

Soil Properties		
Soil Unit Weight, γ :	0.120	kcf
Ult. Bearing Capacity, Bc:	12.0	ksf
Angle of Friction, Φ :	30	deg
Cohesion, Co:	0.000	ksf
Passive Pressure, Pp:	0.000	ksf
Base Friction, μ :	0.45	

Material Properties		
Rebar Yield Strength, Fy:	60000	psi
Concrete Strength, F'c:	3000	psi
Concrete Unit Weight, δ_c :	0.150	kcf
Seismic Zone, z:	1	

Rebar Properties		
Pier Rebar Size, Sp:	8	
Pier Rebar Quantity, mp:	29	36
Pad Rebar Size, Spad:	8	
Pad Rebar Quantity, mpad:	29	12
Pier Tie Size, St:	3	3
Tie Quantity, mt:	5	5

Design Checks			
	Capacity/Availability	Demand/Limits	Check
<i>Req'd Pier Diam.(ft)</i>	7	5.75	OK
<i>Overturning (ft-kips)</i>	4249.00	1688.00	39.7%
<i>Shear Capacity (kips)</i>	149.84	19.00	12.7%
<i>Bearing (ksf)</i>	9.00	1.43	15.9%
<i>Pad Shear - 1-way (kips)</i>	762.59	188.76	24.8%
<i>Pad Shear - 2-way (kips)</i>	1954.52	66.06	3.4%
<i>Pad Moment Capacity (k-ft)</i>	3253.29	561.96	17.3%
<i>Pier Moment Capacity (k-ft)</i>	3801.53	1743.10	45.9%

CCISeismic - Design Category

Per 2012/2015 IBC

Site BU: 845993
 Work Order: 1306193
 Application: 358447 Rev. 0



	Degrees	Minutes	Seconds	
Site Latitude =	41	46	56.86	41.7825 degrees
Site Longitude =	-72	59	22.68	-72.9896 degrees
Ground Supported Structure =	Yes			
Structure Class =	II			(Table 2-1)
Site Class =	D - Stiff Soil			(Table 2-11)
Spectral response acceleration short periods, S_S =	0.182			USGS Seismic Tool
Spectral response acceleration 1 s period, S_1 =	0.064			
Importance Factor, I =	1.0			(Table 2-3)
Acceleration-based site coefficient, F_a =	1.6			(Table 2-12)
Velocity-based site coefficient, F_v =	2.4			(Table 2-13)
Design spectral response acceleration short period, S_{DS} =	0.194			(2.7.6)
Design spectral response acceleration 1 s period, S_{D1} =	0.102			(2.7.6)
Seismic Design Category - Short Period Response =	B			ASCE 7-05 Table 11.6-1
Seismic Design Category - 1s Period Response =	B			ASCE 7-05 Table 11.6-2
Worst Case Seismic Design Category =	B			ASCE 7-05 Tables 11.6-1 and 6-2

USGS Design Maps Summary Report

User-Specified Input

Report Title 845993
Thu September 29, 2016 16:00:30 UTC

Building Code Reference Document 2012/2015 International Building Code
(which utilizes USGS hazard data available in 2008)

Site Coordinates 41.7825°N, 72.9896°W

Site Soil Classification Site Class D – “Stiff Soil”

Risk Category I/II/III



USGS-Provided Output

$S_s = 0.182 \text{ g}$	$S_{MS} = 0.291 \text{ g}$	$S_{DS} = 0.194 \text{ g}$
$S_1 = 0.064 \text{ g}$	$S_{M1} = 0.155 \text{ g}$	$S_{D1} = 0.103 \text{ g}$

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the “2009 NEHRP” building code reference document.

