



**PAUL J. FORD AND COMPANY**  
**STRUCTURAL ENGINEERS**  
 250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **May 04, 2015**

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

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

**Subject: Structural Analysis Report**

**Carrier Designation:** *AT&T Mobility Co-Locate*  
**Carrier Site Number:** CTL05276  
**Carrier Site Name:** AWE-EAST HARTFORD SOUTH

**Crown Castle Designation:** *Crown Castle BU Number:* 806376  
*Crown Castle Site Name:* HRT 100 943239  
*Crown Castle JDE Job Number:* 330758  
*Crown Castle Work Order Number:* 1054097  
*Crown Castle Application Number:* 280746 Rev. 0

**Engineering Firm Designation:** *Paul J. Ford and Company Project Number:* 37515-1502.003.7805

**Site Data:** *1455 FORBES STREET, EAST HARTFORD, Hartford County, CT*  
*Latitude 41° 43' 53.3", Longitude -72° 36' 28"*  
*131 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 782997, in accordance with application 280746, 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**

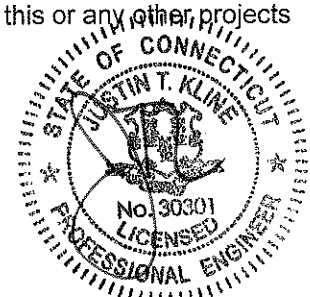
Note: See Table I and Table II for the proposed and existing loading, respectively.

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1.25 inch ice thickness and 50 mph under service loads.

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:

Christopher Poelking, E.I.  
 Structural Designer



5-415



PAUL J. FORD AND COMPANY  
STRUCTURAL ENGINEERS  
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **May 04, 2015**

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

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

**Subject: Structural Analysis Report**

**Carrier Designation:**

**AT&T Mobility Co-Locate**

**Carrier Site Number:**

CTL05276

**Carrier Site Name:**

AWE-EAST HARTFORD SOUTH

**Crown Castle Designation:**

**Crown Castle BU Number:**

806376

**Crown Castle Site Name:**

HRT 100 943239

**Crown Castle JDE Job Number:**

330758

**Crown Castle Work Order Number:**

1054097

**Crown Castle Application Number:**

280746 Rev. 0

**Engineering Firm Designation:**

**Paul J. Ford and Company Project Number:** 37515-1502.003.7805

**Site Data:**

**1455 FORBES STREET, EAST HARTFORD, Hartford County, CT**

**Latitude 41° 43' 53.3", Longitude -72° 36' 28"**

**131 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 782997, in accordance with application 280746, 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.

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1.25 inch ice thickness and 50 mph under service loads.

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:

Christopher Poelking, E.I.  
Structural Designer

## 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

### 5) APPENDIX A

tnxTower Output

### 6) APPENDIX B

Base Level Drawing

### 7) APPENDIX C

Additional Calculations

## 1) INTRODUCTION

This tower is a 131 ft Monopole tower designed by VALMONT in January of 1999. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

## 2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1.25 inch ice thickness and 50 mph under service loads.

**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
121.0	121.0	3	ericsson	RRUS 11 B2	-	-	-

**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
128.0	128.0	3	rfs	APX18-206517S-C w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
121.0	121.0	3	ericsson	RRUS-11	1* 2* 6	3/8 3/4 1-1/4	1
		3	kathrein	800 10121 w/ Mount Pipe			
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	T-Arm Mount [TA 601-3]			
		107.0	111.0	2			
6	alcatel lucent			RRH2X40-AWS			
3	antel			BXA-171085-8CF-EDIN-2			
1	antel			BXA-185060/8CFx2			
2	antel			BXA-185090/8CF			
3	antel			BXA-70063/6CFx4			
3	antel			BXA-80063/4CF			
1	rfs celwave			DB-T1-6Z-8AB-0Z			
6	rfs celwave			FD9R6004/2C-3L			
107.0	1		tower mounts	Platform Mount (LP 101-1)			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
99.0	100.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	-	-	1
	99.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Side Arm Mount [SO 101-3]			
	98.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
97.0	101.0	2	andrew	VHLP2.5-11	1 3 2* 3*	1/2 1-1/4 1/2 5-16	1
		2	dragonwave	HORIZON COMPACT			
	97.0	3	kathrein	840 10054			
		1	motorola	TIMING 2000			
		3	rfs celwave	APXVSP18-C-A20			
		3	rfs celwave	IBC1900BB-1			
		3	rfs celwave	IBC1900HG-2A			
		3	samsung telecommunications	WIMAX DAP HEAD			
1	tower mounts	Platform Mount (LP 101-1)					
87.0	87.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	12 1	1-1/4 1-5/8	1
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		1	tower mounts	T-Arm Mount [TA 702-3]			

Notes:  
 1) 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)
-	-	-	-	-	-	-

### 3) ANALYSIS PROCEDURE

**Table 4 - Documents Provided**

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Welti, 11/11/91	262381	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Valmont, 10613-91 & 10614-91, 11/30/91	262389	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont, 1/22/91	262386	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 127151, 2/26/2013	3675451	CCISITES
4-POST-MODIFICATION INSPECTION	TEP, 25676, 6/4/2014	5099148	CCISITES

#### 3.1) Analysis Method

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

#### 3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) Monopole was reinforced 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 5 - Section Capacity (Summary)**

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	131 - 110	Pole	TP15.525x10.525x0.1875	1	-1.88	481.40	40.3	Pass
L2	110 - 84.5833	Pole	TP21.883x15.525x0.25	2	-8.82	905.33	98.5	Pass
L3	84.5833 - 70	Pole	TP25.531x21.883x0.3779	3	-10.41	1470.87	81.8	Pass
L4	70 - 67.0833	Pole	TP25.7604x23.7745x0.4353	4	-11.95	1778.28	79.4	Pass
L5	67.0833 - 44.5833	Pole	TP31.388x25.7604x0.4104	5	-16.13	2063.06	92.0	Pass
L6	44.5833 - 34.08	Pole	TP34.015x31.388x0.4057	6	-17.26	2133.13	94.0	Pass
L7	34.08 - 18.75	Pole	TP37.217x31.973x0.4269	7	-19.87	2354.01	94.2	Pass
L8	18.75 - 17.0833	Pole	TP37.6333x37.217x0.4968	8	-22.43	2967.56	81.2	Pass
L9	17.0833 - 0	Pole	TP41.9x37.6333x0.4074	9	-22.86	2470.26	98.2	Pass
							Summary	
						Pole (L2)	98.5	Pass
						Rating =	98.5	Pass

**Table 6 - Tower Component Stresses vs. Capacity – LC5**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	91.2	Pass
1	Base Plate	0	65.4	Pass
1	Base Foundation	0	55.0	Pass
1	Base Foundation Soil Interaction	0	63.0	Pass
1	Flange Connection	110	22.9	Pass

<b>Structure Rating (max from all components) =</b>	<b>98.5%</b>
---	--------------

Notes:

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

**APPENDIX A**  
**TNXTOWER OUTPUT**



## Tower Input Data

There is a pole section.  
 This tower is designed using the TIA/EIA-222-F standard.  
 The following design criteria apply:

- 1) Tower is located in Hartford County, Connecticut.
- 2) Basic wind speed of 80 mph.
- 3) Nominal ice thickness of 1.2500 in.
- 4) Ice thickness is considered to increase with height.
- 5) Ice density of 56.00 pcf.
- 6) A wind speed of 38 mph is used in combination with ice.
- 7) Temperature drop of 50 °F.
- 8) Deflections calculated using a wind speed of 50 mph.
- 9) A non-linear (P-delta) analysis was used.
- 10) Pressures are calculated at each section.
- 11) Stress ratio used in pole design is 1.333.
- 12) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

- |  |  |  |
|--|--|--|
| Consider Moments - Legs<br>Consider Moments - Horizontals<br>Consider Moments - Diagonals<br>Use Moment Magnification<br>✓ Use Code Stress Ratios<br>✓ Use Code Safety Factors - Guys<br>✓ Escalate Ice<br>Always Use Max Kz<br>Use Special Wind Profile<br>Include Bolts In Member Capacity<br>Leg Bolts Are At Top Of Section<br>Secondary Horizontal Braces Leg<br>Use Diamond Inner Bracing (4 Sided)<br>Add IBC .6D+W Combination | Distribute Leg Loads As Uniform<br>Assume Legs Pinned<br>✓ Assume Rigid Index Plate<br>✓ Use Clear Spans For Wind Area<br>Use Clear Spans For KL/r<br>Retension Guys To Initial Tension<br>✓ Bypass Mast Stability Checks<br>✓ Use Azimuth Dish Coefficients<br>✓ Project Wind Area of Appurt.<br>✓ Autocalc Torque Arm Areas<br>SR Members Have Cut Ends<br>Sort Capacity Reports By Component<br>Triangulate Diamond Inner Bracing<br>Use TIA-222-G Tension Splice<br>Capacity Exemption | Treat Feedline Bundles As Cylinder<br>Use ASCE 10 X-Brace Ly Rules<br>Calculate Redundant Bracing Forces<br>Ignore Redundant Members in FEA<br>SR Leg Bolts Resist Compression<br>All Leg Panels Have Same Allowable<br>Offset Girt At Foundation<br>✓ Consider Feedline Torque<br>Include Angle Block Shear Check<br><div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction<br>Always Use Sub-Critical Flow<br>Use Top Mounted Sockets |
|--|--|--|

## Tapered Pole Section Geometry

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
L1	131.0000- 110.0000	21.0000	0.00	12	10.5250	15.5250	0.1875	0.7500	A572-65 (65 ksi)
L2	110.0000- 84.5833	25.4167	0.00	12	15.5250	21.8830	0.2500	1.0000	A572-65 (65 ksi)
L3	84.5833- 70.0000	14.5833	4.00	12	21.8830	25.5310	0.3779	1.5117	Reinf 62.57 ksi (63 ksi)
L4	70.0000- 67.0833	6.9167	0.00	12	23.7745	25.7604	0.4353	1.7411	Reinf 62.64 ksi (63 ksi)
L5	67.0833- 44.5833	22.5000	0.00	12	25.7604	31.3880	0.4104	1.6416	Reinf 63.01 ksi (63 ksi)
L6	44.5833- 34.0800	10.5033	4.92	12	31.3880	34.0150	0.4057	1.6229	Reinf 63.05 ksi (63 ksi)
L7	34.0800- 18.7500	20.2500	0.00	12	31.9730	37.2170	0.4269	1.7076	Reinf 63.20 ksi (63 ksi)
L8	18.7500- 17.0833	1.6667	0.00	12	37.2170	37.6333	0.4968	1.9874	Reinf 63.16 ksi (63 ksi)
L9	17.0833- 0.0000	17.0833		12	37.6333	41.9000	0.4074	1.6295	Reinf 63.25 ksi (63 ksi)

## Tapered Pole Properties

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	It/Q in <sup>2</sup>	w in	w/t
L1	10.8963	6.2413	85.1314	3.7008	5.4520	15.6148	172.4993	3.0718	2.3182	12.364
	16.0727	9.2600	278.0397	5.4908	8.0419	34.5737	563.3838	4.5575	3.6582	19.51
L2	16.0727	12.2964	366.2060	5.4684	8.0419	45.5370	742.0327	6.0519	3.4907	13.963
	22.6549	17.4146	1040.2350	7.7446	11.3354	91.7688	2107.7982	8.5709	5.1946	20.779
L3	22.6549	26.1703	1544.8103	7.6988	11.3354	136.2821	3130.2045	12.8802	4.8518	12.838
	26.4316	30.6096	2471.8732	9.0048	13.2251	186.9083	5008.6852	15.0651	5.8295	15.425
L4	25.8022	32.7116	2274.3768	8.3555	12.3152	184.6803	4608.5040	16.0997	5.2051	11.958
	26.6691	35.4949	2905.7220	9.0664	13.3439	217.7570	5887.7806	17.4695	5.7373	13.181
L5	26.6691	33.5005	2747.8409	9.0753	13.3439	205.9253	5567.8707	16.4879	5.8039	14.142
	32.4952	40.9375	5014.1920	11.0900	16.2590	308.3956	10160.112	20.1482	7.3121	17.817
L6	32.4952	40.4768	4959.2610	11.0916	16.2590	305.0170	10048.807	19.9214	7.3246	18.053
	35.2149	43.9089	6330.7648	12.0321	17.6198	359.2989	12827.845	21.6106	8.0287	19.788
L7	34.4199	43.3638	5508.1252	11.2935	16.5620	332.5761	11160.955	21.3423	7.4247	17.392
	38.5299	50.5724	8736.9850	13.1709	19.2784	453.2003	17703.500	24.8902	8.8301	20.684
L8	38.5299	58.7459	10110.503	13.1458	19.2784	524.4468	20486.621	28.9129	8.6426	17.395
	38.9608	59.4118	10458.262	13.2948	19.4940	536.4850	21191.274	29.2407	8.7542	17.62
L9	38.9608	48.8316	8637.2899	13.3269	19.4940	443.0733	17501.491	24.0334	8.9939	22.078
	43.3781	54.4285	11960.631	14.8544	21.7042	551.0745	24235.481	26.7881	10.1374	24.884

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A <sub>r</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft <sup>2</sup>	in					in	in
L1 131.0000-110.0000				1	1	1		
L2 110.0000-84.5833				1	1	1		
L3 84.5833-70.0000				1	1	1		
L4 70.0000-67.0833				1	1	1		
L5 67.0833-44.5833				1	1	1		
L6 44.5833-34.0800				1	1	1		
L7 34.0800-18.7500				1	1	1		
L8 18.7500-17.0833				1	1	1		
L9 17.0833-0.0000				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 <sub>A</sub> A <sub>A</sub>	Weight
				ft		ft <sup>2</sup> /ft	plf

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		CA <sub>A</sub> ft <sup>2</sup> /ft	Weight plf
***								
CR 50 1873(1-5/8")	C	No	CaAa (Out Of Face)	128.0000 - 0.0000	2	No Ice	0.1980	0.83
						1/2" Ice	0.2980	2.34
						1" Ice	0.3980	4.47
						2" Ice	0.5980	10.55
						4" Ice	0.9980	30.05
CR 50 1873(1-5/8")	C	No	CaAa (Out Of Face)	128.0000 - 0.0000	4	No Ice	0.0000	0.83
						1/2" Ice	0.0000	2.34
						1" Ice	0.0000	4.47
						2" Ice	0.0000	10.55
						4" Ice	0.0000	30.05
***								
LDF6-50A(1-1/4")	C	No	CaAa (Out Of Face)	121.0000 - 0.0000	6	No Ice	0.0000	0.66
						1/2" Ice	0.0000	1.91
						1" Ice	0.0000	3.78
						2" Ice	0.0000	9.33
						4" Ice	0.0000	27.78
FB-L98B-002-75000(3/8")	C	No	CaAa (Out Of Face)	121.0000 - 0.0000	1	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.60
						1" Ice	0.0000	1.76
						2" Ice	0.0000	5.91
						4" Ice	0.0000	21.53
WR-VG86ST-BRD(3/4)	C	No	CaAa (Out Of Face)	121.0000 - 0.0000	2	No Ice	0.0000	0.59
						1/2" Ice	0.0000	1.37
						1" Ice	0.0000	2.76
						2" Ice	0.0000	7.37
						4" Ice	0.0000	23.92
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	121.0000 - 0.0000	1	No Ice	0.2375	0.72
						1/2" Ice	0.3375	2.48
						1" Ice	0.4375	4.84
						2" Ice	0.6375	11.41
						4" Ice	1.0375	31.87
***								
HJ7-50A(1-5/8")	C	No	Inside Pole	107.0000 - 0.0000	12	No Ice	0.0000	1.04
						1/2" Ice	0.0000	1.04
						1" Ice	0.0000	1.04
						2" Ice	0.0000	1.04
						4" Ice	0.0000	1.04
LDF4-50A(1/2")	C	No	Inside Pole	107.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.15
						1" Ice	0.0000	0.15
						2" Ice	0.0000	0.15
						4" Ice	0.0000	0.15
HB114-1-0813U4-M5F(1 1/4")	C	No	Inside Pole	107.0000 - 0.0000	1	No Ice	0.0000	1.20
						1/2" Ice	0.0000	1.20
						1" Ice	0.0000	1.20
						2" Ice	0.0000	1.20
						4" Ice	0.0000	1.20
***								
ATCB-B01-005( 5/16)	C	No	CaAa (Out Of Face)	97.0000 - 0.0000	3	No Ice	0.0000	0.07
						1/2" Ice	0.0000	0.57
						1" Ice	0.0000	1.68
						2" Ice	0.0000	5.73
						4" Ice	0.0000	21.16
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	97.0000 - 0.0000	2	No Ice	0.0000	0.14
						1/2" Ice	0.0000	0.76
						1" Ice	0.0000	2.00
						2" Ice	0.0000	6.30
						4" Ice	0.0000	22.23
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	97.0000 - 0.0000	1	No Ice	0.0000	0.14
						1/2" Ice	0.0000	0.76
						1" Ice	0.0000	2.00
						2" Ice	0.0000	6.30
						4" Ice	0.0000	22.23
HB114-1-08U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	97.0000 - 0.0000	3	No Ice	0.0000	1.08
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.18
						2" Ice	0.0000	9.73
						4" Ice	0.0000	28.15

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C <sub>AA</sub>		Weight
						ft <sup>2</sup> /ft	plf	
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	97.0000 - 0.0000	2	No Ice	0.0000	0.72
						1/2" Ice	0.0000	2.48
						1" Ice	0.0000	4.84
						2" Ice	0.0000	11.41
						4" Ice	0.0000	31.87
***								
LCF114-50J(1-1/4")	C	No	CaAa (Out Of Face)	87.0000 - 0.0000	12	No Ice	0.0000	0.70
						1/2" Ice	0.0000	1.97
						1" Ice	0.0000	3.85
						2" Ice	0.0000	9.45
						4" Ice	0.0000	27.97
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	C	No	CaAa (Out Of Face)	87.0000 - 0.0000	1	No Ice	0.0000	1.07
						1/2" Ice	0.0000	2.37
						1" Ice	0.0000	4.28
						2" Ice	0.0000	9.93
						4" Ice	0.0000	28.56
****								
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	20.5000 - 0.0000	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00
						2" Ice	0.6111	0.00
						4" Ice	1.0556	0.00
3/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	45.8333 - 15.8333	1	No Ice	0.1250	0.00
						1/2" Ice	0.2361	0.00
						1" Ice	0.3472	0.00
						2" Ice	0.5694	0.00
						4" Ice	1.0139	0.00
3/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	68.3333 - 43.3333	1	No Ice	0.1250	0.00
						1/2" Ice	0.2361	0.00
						1" Ice	0.3472	0.00
						2" Ice	0.5694	0.00
						4" Ice	1.0139	0.00
3/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	85.8333 - 65.8333	1	No Ice	0.1250	0.00
						1/2" Ice	0.2361	0.00
						1" Ice	0.3472	0.00
						2" Ice	0.5694	0.00
						4" Ice	1.0139	0.00
****								

**Feed Line/Linear Appurtenances Section Areas**

Tower Sectio n	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
L1	131.0000- 110.0000	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	9.741	0.15
L2	110.0000- 84.5833	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	16.258	0.68
L3	84.5833-70.0000	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	11.062	0.58
L4	70.0000-67.0833	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	2.369	0.12
L5	67.0833-44.5833	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	17.379	0.89
L6	44.5833-34.0800	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	8.123	0.42
L7	34.0800-18.7500	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	11.920	0.61
L8	18.7500-17.0833	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation	Face	A <sub>R</sub>	A <sub>F</sub>	C <sub>A</sub> A <sub>A</sub> In Face	C <sub>A</sub> A <sub>A</sub> Out Face	Weight
n	ft		ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>	K
L9	17.0833-0.0000	C	0.000	0.000	0.000	1.542	0.07
		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	13.826	0.68

### Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation	Face or Leg	Ice Thickness	A <sub>R</sub>	A <sub>F</sub>	C <sub>A</sub> A <sub>A</sub> In Face	C <sub>A</sub> A <sub>A</sub> Out Face	Weight
n	ft		in	ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>	ft <sup>2</sup>	K
L1	131.0000-110.0000	A	1.459	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	23.457	1.44
L2	110.0000-84.5833	A	1.422	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	38.337	3.74
L3	84.5833-70.0000	A	1.384	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	27.657	3.54
L4	70.0000-67.0833	A	1.365	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	6.072	0.71
L5	67.0833-44.5833	A	1.330	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	42.730	5.20
L6	44.5833-34.0800	A	1.276	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	19.500	2.30
L7	34.0800-18.7500	A	1.250	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	28.504	3.36
L8	18.7500-17.0833	A	1.250	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	3.718	0.36
L9	17.0833-0.0000	A	1.250	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	31.731	3.65

### Feed Line Center of Pressure

Section	Elevation	CP <sub>X</sub>	CP <sub>Z</sub>	CP <sub>X</sub> Ice	CP <sub>Z</sub> Ice
	ft	in	in	in	in
L1	131.0000-110.0000	-0.4410	0.2546	-0.6719	0.3879
L2	110.0000-84.5833	-0.5901	0.3407	-0.9265	0.5349
L3	84.5833-70.0000	-0.7120	0.4111	-1.1863	0.6849
L4	70.0000-67.0833	-0.7624	0.4402	-1.2919	0.7459
L5	67.0833-44.5833	-0.7576	0.4374	-1.3048	0.7533
L6	44.5833-34.0800	-0.7820	0.4515	-1.3696	0.7907
L7	34.0800-18.7500	-0.7995	0.4616	-1.4180	0.8187
L8	18.7500-17.0833	-0.9269	0.5351	-1.6261	0.9388
L9	17.0833-0.0000	-0.8445	0.4876	-1.4852	0.8575

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral	Azimuth Adjustmen t	Placement	C <sub>A</sub> A <sub>A</sub> Front	C <sub>A</sub> A <sub>A</sub> Side	Weight	
			ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
APX18-206517S-C w/	A	From Face	1.0000	0.00	128.0000	No Ice	5.1667	3.1653	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
Mount Pipe			0.00 0.00			1/2" Ice 6.0772 1" Ice 7.0173 2" Ice 9.1225 4" Ice	3.6631 4.1794 5.2676 7.6662	0.06 0.09 0.18 0.46
APX18-206517S-C w/ Mount Pipe	B	From Face	1.0000 0.00 0.00	0.00	128.0000	No Ice 1/2" 5.6182 Ice 6.0772 1" Ice 7.0173 2" Ice 9.1225 4" Ice	3.1653 3.6631 4.1794 5.2676 7.6662	0.03 0.06 0.09 0.18 0.46
APX18-206517S-C w/ Mount Pipe	C	From Face	1.0000 0.00 0.00	0.00	128.0000	No Ice 1/2" 5.6182 Ice 6.0772 1" Ice 7.0173 2" Ice 9.1225 4" Ice	3.1653 3.6631 4.1794 5.2676 7.6662	0.03 0.06 0.09 0.18 0.46
Pipe Mount [PM 601-3]	C	None		0.00	128.0000	No Ice 1/2" 5.4800 Ice 6.5700 1" Ice 8.7500 2" Ice 13.1100 4" Ice	4.3900 5.4800 6.5700 8.7500 13.1100	0.20 0.24 0.28 0.36 0.53
***								
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" 9.1490 Ice 9.7672 1" Ice 11.0311 2" Ice 13.6786 4" Ice	6.3042 7.4790 8.3676 10.1785 14.0237	0.07 0.14 0.21 0.38 0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" 9.1490 Ice 9.7672 1" Ice 11.0311 2" Ice 13.6786 4" Ice	6.3042 7.4790 8.3676 10.1785 14.0237	0.07 0.14 0.21 0.38 0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" 9.1490 Ice 9.7672 1" Ice 11.0311 2" Ice 13.6786 4" Ice	6.3042 7.4790 8.3676 10.1785 14.0237	0.07 0.14 0.21 0.38 0.87
800 10121 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" 6.7136 Ice 7.2991 1" Ice 8.4999 2" Ice 11.0444 4" Ice	4.9479 6.0222 6.8104 8.4586 12.1015	0.07 0.12 0.18 0.32 0.73
800 10121 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" 6.7136 Ice 7.2991 1" Ice 8.4999 2" Ice 11.0444 4" Ice	4.9479 6.0222 6.8104 8.4586 12.1015	0.07 0.12 0.18 0.32 0.73
800 10121 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" 6.7136 Ice 7.2991 1" Ice 8.4999 2" Ice 11.0444 4" Ice	4.9479 6.0222 6.8104 8.4586 12.1015	0.07 0.12 0.18 0.32 0.73
RRUS-11	A	From Leg	4.0000 0.00 0.00	0.00	121.0000	No Ice 1/2" 3.4905 Ice 3.7411 1" Ice 4.2682 2" Ice 5.4260	1.3726 1.5510 1.7380 2.1381 3.0418	0.05 0.07 0.09 0.15 0.31

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Lateral						Vert
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
RRUS-11	B	From Leg	4.0000	0.00	0.00	121.0000	4" Ice			
							No Ice	3.2486	1.3726	0.05
							1/2" Ice	3.4905	1.5510	0.07
							1" Ice	3.7411	1.7380	0.09
							2" Ice	4.2682	2.1381	0.15
RRUS-11	C	From Leg	4.0000	0.00	0.00	121.0000	4" Ice			
							No Ice	3.2486	1.3726	0.05
							1/2" Ice	3.4905	1.5510	0.07
							1" Ice	3.7411	1.7380	0.09
							2" Ice	4.2682	2.1381	0.15
(2) LGP21401	A	From Leg	4.0000	0.00	0.00	121.0000	4" Ice			
							No Ice	1.2880	0.3640	0.01
							1/2" Ice	1.4453	0.4785	0.02
							1" Ice	1.6112	0.6017	0.03
							2" Ice	1.9690	0.8739	0.05
(2) LGP21401	B	From Leg	4.0000	0.00	0.00	121.0000	4" Ice			
							No Ice	1.2880	0.3640	0.01
							1/2" Ice	1.4453	0.4785	0.02
							1" Ice	1.6112	0.6017	0.03
							2" Ice	1.9690	0.8739	0.05
(2) LGP21401	C	From Leg	4.0000	0.00	0.00	121.0000	4" Ice			
							No Ice	1.2880	0.3640	0.01
							1/2" Ice	1.4453	0.4785	0.02
							1" Ice	1.6112	0.6017	0.03
							2" Ice	1.9690	0.8739	0.05
DC6-48-60-18-8F	A	From Leg	4.0000	0.00	0.00	121.0000	4" Ice			
							No Ice	1.4667	1.4667	0.02
							1/2" Ice	1.6667	1.6667	0.04
							1" Ice	1.8778	1.8778	0.06
							2" Ice	2.3333	2.3333	0.11
RRUS 11 B2	A	From Leg	4.0000	0.00	0.00	121.0000	4" Ice			
							No Ice	3.3056	1.3611	0.05
							1/2" Ice	3.5497	1.5404	0.07
							1" Ice	3.8025	1.7284	0.10
							2" Ice	4.3340	2.1302	0.15
RRUS 11 B2	B	From Leg	4.0000	0.00	0.00	121.0000	4" Ice			
							No Ice	3.3056	1.3611	0.05
							1/2" Ice	3.5497	1.5404	0.07
							1" Ice	3.8025	1.7284	0.10
							2" Ice	4.3340	2.1302	0.15
RRUS 11 B2	C	From Leg	4.0000	0.00	0.00	121.0000	4" Ice			
							No Ice	3.3056	1.3611	0.05
							1/2" Ice	3.5497	1.5404	0.07
							1" Ice	3.8025	1.7284	0.10
							2" Ice	4.3340	2.1302	0.15
T-Arm Mount [TA 601-3]	C	None			0.00	121.0000	4" Ice			
							No Ice	10.9000	10.9000	0.73
							1/2" Ice	14.6500	14.6500	0.93
							1" Ice	18.4000	18.4000	1.13
							2" Ice	25.9000	25.9000	1.52
*** BXA-70063/6CFx4	A	From Face	4.0000	0.00	0.00	107.0000	4" Ice			
							No Ice	7.7311	3.7554	0.02
							1/2" Ice	8.2682	4.1889	0.06
							1" Ice	8.8140	4.6297	0.10

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
			Horz ft	Lateral ft						Vert ft
BXA-70063/6CFx4	B	From Face	4.0000	0.00	0.00	107.0000	1" Ice	9.9314	5.5335	0.22
							2" Ice	12.2699	7.4301	0.52
							4" Ice			
							No Ice	7.7311	3.7554	0.02
							1/2" Ice	8.2682	4.1889	0.06
							Ice	8.8140	4.6297	0.10
BXA-70063/6CFx4	C	From Face	4.0000	0.00	0.00	107.0000	1" Ice	9.9314	5.5335	0.22
							2" Ice	12.2699	7.4301	0.52
							4" Ice			
							No Ice	7.7311	3.7554	0.02
							1/2" Ice	8.2682	4.1889	0.06
							Ice	8.8140	4.6297	0.10
BXA-185090/8CF	A	From Face	4.0000	0.00	0.00	107.0000	1" Ice	9.9314	5.5335	0.22
							2" Ice	12.2699	7.4301	0.52
							4" Ice			
							No Ice	2.9199	2.1389	0.01
							1/2" Ice	3.2318	2.4399	0.03
							Ice	3.5797	2.7484	0.05
BXA-185090/8CF	B	From Face	4.0000	0.00	0.00	107.0000	1" Ice	4.3354	3.3876	0.11
							2" Ice	5.9506	4.9097	0.28
							4" Ice			
							No Ice	2.9199	2.1389	0.01
							1/2" Ice	3.2318	2.4399	0.03
							Ice	3.5797	2.7484	0.05
BXA-185060/8CFx2	C	From Face	4.0000	0.00	0.00	107.0000	1" Ice	4.3354	3.3876	0.11
							2" Ice	5.9506	4.9097	0.28
							4" Ice			
							No Ice	3.0567	1.8703	0.01
							1/2" Ice	3.3805	2.1784	0.03
							Ice	3.7128	2.4938	0.05
(2) FD9R6004/2C-3L	A	From Face	4.0000	0.00	0.00	107.0000	1" Ice	4.4955	3.1469	0.11
							2" Ice	6.1646	4.5901	0.28
							4" Ice			
							No Ice	0.3665	0.0846	0.00
							1/2" Ice	0.4506	0.1362	0.01
							Ice	0.5433	0.1965	0.01
(2) FD9R6004/2C-3L	B	From Face	4.0000	0.00	0.00	107.0000	1" Ice	0.7546	0.3430	0.02
							2" Ice	1.2808	0.7396	0.06
							4" Ice			
							No Ice	0.3665	0.0846	0.00
							1/2" Ice	0.4506	0.1362	0.01
							Ice	0.5433	0.1965	0.01
(2) FD9R6004/2C-3L	C	From Face	4.0000	0.00	0.00	107.0000	1" Ice	0.7546	0.3430	0.02
							2" Ice	1.2808	0.7396	0.06
							4" Ice			
							No Ice	0.3665	0.0846	0.00
							1/2" Ice	0.4506	0.1362	0.01
							Ice	0.5433	0.1965	0.01
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	A	From Face	4.0000	0.00	0.00	107.0000	1" Ice	2.2767	1.3964	0.09
							2" Ice	3.1426	2.1224	0.19
							4" Ice			
							No Ice	1.5490	0.8088	0.03
							1/2" Ice	1.7180	0.9427	0.04
							Ice	1.8956	1.0853	0.05
BXA-80063/4CF	A	From Face	4.0000	0.00	0.00	107.0000	1" Ice	6.7497	3.4884	0.15
							2" Ice	8.4764	5.0414	0.36
							4" Ice			
							No Ice	5.1613	2.2482	0.01
							1/2" Ice	5.5455	2.5469	0.04
							Ice	5.9382	2.8529	0.07
BXA-80063/4CF	B	From Face	4.0000	0.00	0.00	107.0000	1" Ice	6.7497	3.4884	0.15
							2" Ice	8.4764	5.0414	0.36
							4" Ice			
BXA-80063/4CF	B	From Face	4.0000	0.00	0.00	107.0000	No Ice	5.1613	2.2482	0.01
							1/2" Ice	5.5455	2.5469	0.04



Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CA <sub>AA</sub> Front ft <sup>2</sup>	CA <sub>AA</sub> Side ft <sup>2</sup>	Weight K
			4.00			Ice 5.9382	2.8529	0.07
						1" Ice 6.7497	3.4884	0.15
						2" Ice 8.4764	5.0414	0.36
						4" Ice		
BXA-80063/4CF	C	From Face	4.0000	0.00	107.0000	No Ice 5.1613	2.2482	0.01
			0.00			1/2" 5.5455	2.5469	0.04
			4.00			Ice 5.9382	2.8529	0.07
						1" Ice 6.7497	3.4884	0.15
						2" Ice 8.4764	5.0414	0.36
						4" Ice		
BXA-171085-8CF-EDIN-2	A	From Face	4.0000	0.00	107.0000	No Ice 2.9414	2.1556	0.01
			0.00			1/2" 3.2550	2.4583	0.03
			4.00			Ice 3.6014	2.7685	0.05
						1" Ice 4.3610	3.4111	0.11
						2" Ice 5.9840	4.9372	0.28
						4" Ice		
BXA-171085-8CF-EDIN-2	B	From Face	4.0000	0.00	107.0000	No Ice 2.9414	2.1556	0.01
			0.00			1/2" 3.2550	2.4583	0.03
			4.00			Ice 3.6014	2.7685	0.05
						1" Ice 4.3610	3.4111	0.11
						2" Ice 5.9840	4.9372	0.28
						4" Ice		
BXA-171085-8CF-EDIN-2	C	From Face	4.0000	0.00	107.0000	No Ice 2.9414	2.1556	0.01
			0.00			1/2" 3.2550	2.4583	0.03
			4.00			Ice 3.6014	2.7685	0.05
						1" Ice 4.3610	3.4111	0.11
						2" Ice 5.9840	4.9372	0.28
						4" Ice		
(2) RRH2X40-AWS	A	From Face	4.0000	0.00	107.0000	No Ice 2.5217	1.5894	0.04
			0.00			1/2" 2.7530	1.7953	0.06
			4.00			Ice 2.9930	2.0098	0.08
						1" Ice 3.4990	2.4648	0.13
						2" Ice 4.6146	3.4785	0.28
						4" Ice		
(2) RRH2X40-AWS	B	From Face	4.0000	0.00	107.0000	No Ice 2.5217	1.5894	0.04
			0.00			1/2" 2.7530	1.7953	0.06
			4.00			Ice 2.9930	2.0098	0.08
						1" Ice 3.4990	2.4648	0.13
						2" Ice 4.6146	3.4785	0.28
						4" Ice		
(2) RRH2X40-AWS	C	From Face	4.0000	0.00	107.0000	No Ice 2.5217	1.5894	0.04
			0.00			1/2" 2.7530	1.7953	0.06
			4.00			Ice 2.9930	2.0098	0.08
						1" Ice 3.4990	2.4648	0.13
						2" Ice 4.6146	3.4785	0.28
						4" Ice		
DB-T1-6Z-8AB-0Z	C	From Face	4.0000	0.00	107.0000	No Ice 5.6000	2.3333	0.04
			0.00			1/2" 5.9154	2.5580	0.08
			4.00			Ice 6.2395	2.7914	0.12
						1" Ice 6.9136	3.2840	0.21
						2" Ice 8.3654	4.3728	0.45
						4" Ice		
Platform Mount (LP 101-1)	C	None		0.00	107.0000	No Ice 36.2100	36.2100	1.50
						1/2" 42.8200	42.8200	2.30
						Ice 49.4300	49.4300	3.10
						1" Ice 62.6500	62.6500	4.70
						2" Ice 89.0900	89.0900	7.89
						4" Ice		
***								
800MHz 2X50W RRH W/FILTER	A	From Leg	4.0000	0.00	99.0000	No Ice 2.4014	2.2536	0.06
			0.00			1/2" 2.6131	2.4602	0.09
			1.00			Ice 2.8335	2.6753	0.11
						1" Ice 3.3002	3.1316	0.17
						2" Ice 4.3372	4.1479	0.34
						4" Ice		

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C <sub>AA</sub>		Weight	
			Horz	Lateral	Vert			Front	Side		
			ft	ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
800MHz 2X50W RRH W/FILTER	B	From Leg	4.0000			0.00	99.0000	No Ice	2.4014	2.2536	0.06
			0.00					1/2"	2.6131	2.4602	0.09
			1.00					Ice	2.8335	2.6753	0.11
								1" Ice	3.3002	3.1316	0.17
								2" Ice	4.3372	4.1479	0.34
800MHz 2X50W RRH W/FILTER	C	From Leg	4.0000			0.00	99.0000	No Ice	2.4014	2.2536	0.06
			0.00					1/2"	2.6131	2.4602	0.09
			1.00					Ice	2.8335	2.6753	0.11
								1" Ice	3.3002	3.1316	0.17
								2" Ice	4.3372	4.1479	0.34
PCS 1900MHz 4x45W-65MHz	A	From Leg	4.0000			0.00	99.0000	No Ice	2.7087	2.6111	0.06
			0.00					1/2"	2.9477	2.8475	0.08
			0.00					Ice	3.1953	3.0925	0.11
								1" Ice	3.7164	3.6084	0.17
								2" Ice	4.8623	4.7439	0.35
PCS 1900MHz 4x45W-65MHz	B	From Leg	4.0000			0.00	99.0000	No Ice	2.7087	2.6111	0.06
			0.00					1/2"	2.9477	2.8475	0.08
			0.00					Ice	3.1953	3.0925	0.11
								1" Ice	3.7164	3.6084	0.17
								2" Ice	4.8623	4.7439	0.35
PCS 1900MHz 4x45W-65MHz	C	From Leg	4.0000			0.00	99.0000	No Ice	2.7087	2.6111	0.06
			0.00					1/2"	2.9477	2.8475	0.08
			0.00					Ice	3.1953	3.0925	0.11
								1" Ice	3.7164	3.6084	0.17
								2" Ice	4.8623	4.7439	0.35
PCS 1900MHz 4x45W-65MHz	A	From Leg	4.0000			0.00	99.0000	No Ice	2.7087	2.6111	0.06
			0.00					1/2"	2.9477	2.8475	0.08
			-1.00					Ice	3.1953	3.0925	0.11
								1" Ice	3.7164	3.6084	0.17
								2" Ice	4.8623	4.7439	0.35
PCS 1900MHz 4x45W-65MHz	B	From Leg	4.0000			0.00	99.0000	No Ice	2.7087	2.6111	0.06
			0.00					1/2"	2.9477	2.8475	0.08
			-1.00					Ice	3.1953	3.0925	0.11
								1" Ice	3.7164	3.6084	0.17
								2" Ice	4.8623	4.7439	0.35
PCS 1900MHz 4x45W-65MHz	C	From Leg	4.0000			0.00	99.0000	No Ice	2.7087	2.6111	0.06
			0.00					1/2"	2.9477	2.8475	0.08
			-1.00					Ice	3.1953	3.0925	0.11
								1" Ice	3.7164	3.6084	0.17
								2" Ice	4.8623	4.7439	0.35
Side Arm Mount [SO 101-3]	C	None				0.00	99.0000	No Ice	7.5000	7.5000	0.25
								1/2"	8.9000	8.9000	0.33
								Ice	10.3000	10.3000	0.41
								1" Ice	13.1000	13.1000	0.58
								2" Ice	18.7000	18.7000	0.90
**Clearwire** TIMING 2000	A	From Face	4.0000			0.00	97.0000	No Ice	0.1258	0.1258	0.00
			0.00					1/2"	0.1771	0.1771	0.00
			0.00					Ice	0.2370	0.2370	0.01
								1" Ice	0.3827	0.3827	0.01
								2" Ice	0.7778	0.7778	0.05
840 10054	A	From Face	4.0000			0.00	97.0000	No Ice	5.1858	1.3611	0.04
			0.00					1/2"	5.5447	1.6198	0.06
			0.00					Ice	5.9122	1.8858	0.09
								1" Ice	6.6731	2.4401	0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
						2" Ice	8.2987	3.7428	0.35
840 10054	B	From Face	4.0000 0.00 0.00	0.00	97.0000	4" Ice No Ice	5.1858	1.3611	0.04
						1/2" Ice	5.5447	1.6198	0.06
						1" Ice	5.9122	1.8858	0.09
						2" Ice	6.6731	2.4401	0.16
						4" Ice	8.2987	3.7428	0.35
840 10054	C	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	5.1858	1.3611	0.04
						1/2" Ice	5.5447	1.6198	0.06
						1" Ice	5.9122	1.8858	0.09
						2" Ice	6.6731	2.4401	0.16
						4" Ice	8.2987	3.7428	0.35
WIMAX DAP HEAD	A	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	1.8044	0.7778	0.03
						1/2" Ice	1.9877	0.9182	0.04
						1" Ice	2.1795	1.0673	0.06
						2" Ice	2.5891	1.3914	0.09
						4" Ice	3.5121	2.1432	0.20
WIMAX DAP HEAD	B	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	1.8044	0.7778	0.03
						1/2" Ice	1.9877	0.9182	0.04
						1" Ice	2.1795	1.0673	0.06
						2" Ice	2.5891	1.3914	0.09
						4" Ice	3.5121	2.1432	0.20
WIMAX DAP HEAD	C	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	1.8044	0.7778	0.03
						1/2" Ice	1.9877	0.9182	0.04
						1" Ice	2.1795	1.0673	0.06
						2" Ice	2.5891	1.3914	0.09
						4" Ice	3.5121	2.1432	0.20
HORIZON COMPACT	B	From Face	4.0000 0.00 4.00	0.00	97.0000	No Ice	0.8409	0.4295	0.01
						1/2" Ice	0.9658	0.5249	0.02
						1" Ice	1.0993	0.6289	0.03
						2" Ice	1.3922	0.8629	0.05
						4" Ice	2.0819	1.4345	0.12
HORIZON COMPACT	C	From Face	4.0000 0.00 4.00	0.00	97.0000	No Ice	0.8409	0.4295	0.01
						1/2" Ice	0.9658	0.5249	0.02
						1" Ice	1.0993	0.6289	0.03
						2" Ice	1.3922	0.8629	0.05
						4" Ice	2.0819	1.4345	0.12
**Sprint**									
APXVSP18-C-A20	A	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	8.2600	5.2833	0.06
						1/2" Ice	8.8075	5.7360	0.11
						1" Ice	9.3636	6.1960	0.16
						2" Ice	10.5017	7.1383	0.29
						4" Ice	12.8817	9.2728	0.63
APXVSP18-C-A20	B	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	8.2600	5.2833	0.06
						1/2" Ice	8.8075	5.7360	0.11
						1" Ice	9.3636	6.1960	0.16
						2" Ice	10.5017	7.1383	0.29
						4" Ice	12.8817	9.2728	0.63
APXVSP18-C-A20	C	From Face	4.0000 0.00 0.00	0.00	97.0000	No Ice	8.2600	5.2833	0.06
						1/2" Ice	8.8075	5.7360	0.11
						1" Ice	9.3636	6.1960	0.16
						2" Ice	10.5017	7.1383	0.29
						4" Ice	12.8817	9.2728	0.63
IBC1900HG-2A	A	From Face	4.0000 0.00	0.00	97.0000	No Ice	1.1270	0.5329	0.02
						1/2" Ice	1.2726	0.6471	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
			0.00			Ice	1.4269	0.7699	0.04
						1" Ice	1.7613	1.0415	0.06
						2" Ice	2.5339	1.6883	0.15
						4" Ice			
IBC1900HG-2A	B	From Face	4.0000	0.00	97.0000	No Ice	1.1270	0.5329	0.02
			0.00			1/2"	1.2726	0.6471	0.03
			0.00			Ice	1.4269	0.7699	0.04
						1" Ice	1.7613	1.0415	0.06
						2" Ice	2.5339	1.6883	0.15
						4" Ice			
IBC1900HG-2A	C	From Face	4.0000	0.00	97.0000	No Ice	1.1270	0.5329	0.02
			0.00			1/2"	1.2726	0.6471	0.03
			0.00			Ice	1.4269	0.7699	0.04
						1" Ice	1.7613	1.0415	0.06
						2" Ice	2.5339	1.6883	0.15
						4" Ice			
IBC1900BB-1	A	From Face	4.0000	0.00	97.0000	No Ice	1.1270	0.5329	0.02
			0.00			1/2"	1.2726	0.6471	0.03
			0.00			Ice	1.4269	0.7699	0.04
						1" Ice	1.7613	1.0415	0.06
						2" Ice	2.5339	1.6883	0.15
						4" Ice			
IBC1900BB-1	B	From Face	4.0000	0.00	97.0000	No Ice	1.1270	0.5329	0.02
			0.00			1/2"	1.2726	0.6471	0.03
			0.00			Ice	1.4269	0.7699	0.04
						1" Ice	1.7613	1.0415	0.06
						2" Ice	2.5339	1.6883	0.15
						4" Ice			
IBC1900BB-1	C	From Face	4.0000	0.00	97.0000	No Ice	1.1270	0.5329	0.02
			0.00			1/2"	1.2726	0.6471	0.03
			0.00			Ice	1.4269	0.7699	0.04
						1" Ice	1.7613	1.0415	0.06
						2" Ice	2.5339	1.6883	0.15
						4" Ice			
Platform Mount (LP 101-1)	C	None		0.00	97.0000	No Ice	36.2100	36.2100	1.50
						1/2"	42.8200	42.8200	2.30
						Ice	49.4300	49.4300	3.10
						1" Ice	62.6500	62.6500	4.70
						2" Ice	89.0900	89.0900	7.89
						4" Ice			
***									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	4.0000	0.00	87.0000	No Ice	6.8253	5.6424	0.11
			0.00			1/2"	7.3471	6.4800	0.17
			0.00			Ice	7.8631	7.2567	0.23
						1" Ice	8.9261	8.8640	0.38
						2" Ice	11.1755	12.2932	0.81
						4" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	4.0000	0.00	87.0000	No Ice	6.8253	5.6424	0.11
			0.00			1/2"	7.3471	6.4800	0.17
			0.00			Ice	7.8631	7.2567	0.23
						1" Ice	8.9261	8.8640	0.38
						2" Ice	11.1755	12.2932	0.81
						4" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	4.0000	0.00	87.0000	No Ice	6.8253	5.6424	0.11
			0.00			1/2"	7.3471	6.4800	0.17
			0.00			Ice	7.8631	7.2567	0.23
						1" Ice	8.9261	8.8640	0.38
						2" Ice	11.1755	12.2932	0.81
						4" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Face	4.0000	0.00	87.0000	No Ice	6.8155	5.6334	0.11
			0.00			1/2"	7.3373	6.4717	0.17
			0.00			Ice	7.8532	7.2478	0.23
						1" Ice	8.9160	8.8537	0.38
						2" Ice	11.1650	12.2804	0.81
						4" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.00	87.0000	No Ice	6.8155	5.6334	0.11
						1/2" Ice	7.3373	6.4717	0.17
						Ice	7.8532	7.2478	0.23
						1" Ice	8.9160	8.8537	0.38
						2" Ice	11.1650	12.2804	0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.00	87.0000	No Ice	6.8155	5.6334	0.11
						1/2" Ice	7.3373	6.4717	0.17
						Ice	7.8532	7.2478	0.23
						1" Ice	8.9160	8.8537	0.38
						2" Ice	11.1650	12.2804	0.81
KRY 112 144/1	A	From Face	4.0000 0.00 0.00	0.00	87.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						Ice	0.5941	0.3511	0.02
						1" Ice	0.8145	0.5326	0.03
						2" Ice	1.3590	0.9992	0.08
KRY 112 144/1	B	From Face	4.0000 0.00 0.00	0.00	87.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						Ice	0.5941	0.3511	0.02
						1" Ice	0.8145	0.5326	0.03
						2" Ice	1.3590	0.9992	0.08
KRY 112 144/1	C	From Face	4.0000 0.00 0.00	0.00	87.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						Ice	0.5941	0.3511	0.02
						1" Ice	0.8145	0.5326	0.03
						2" Ice	1.3590	0.9992	0.08
T-Arm Mount [TA 702-3]	C	None		0.00	87.0000	No Ice	5.6400	5.6400	0.34
						1/2" Ice	6.5500	6.5500	0.43
						Ice	7.4600	7.4600	0.52
						1" Ice	9.2800	9.2800	0.70
						2" Ice	12.9200	12.9200	1.06
						4" Ice			

\*\*\*\*

### Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft <sup>2</sup>	Weight K	
VHLP2.5-11	B	Paraboloid w/Shroud (HP)	From Leg	1.0000 0.00 4.00	0.00		97.0000	2.9167	No Ice	6.6800	0.05
									1/2" Ice	7.0700	0.08
									1" Ice	7.4600	0.12
									2" Ice	8.2300	0.19
									4" Ice	9.7800	0.34
VHLP2.5-11	C	Paraboloid w/Shroud (HP)	From Leg	1.0000 0.00 4.00	0.00		97.0000	2.9167	No Ice	6.6800	0.05
									1/2" Ice	7.0700	0.08
									1" Ice	7.4600	0.12
									2" Ice	8.2300	0.19
									4" Ice	9.7800	0.34

### Tower Pressures - No Ice

$$G_H = 1.690$$

Section Elevation ft	z ft	K <sub>z</sub>	q <sub>z</sub> psf	A <sub>G</sub> ft <sup>2</sup>	F a c e	A <sub>F</sub> ft <sup>2</sup>	A <sub>R</sub> ft <sup>2</sup>	A <sub>leg</sub> ft <sup>2</sup>	Leg %	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>
L1 131.0000-110.0000	119.8282	1.445	23.68 3	22.794	A	0.000	22.794	22.794	100.00	0.000	0.000
					B	0.000	22.794		100.00	0.000	0.000
					C	0.000	22.794		100.00	0.000	9.741
L2 110.0000-84.5833	96.5717	1.359	22.26 7	39.616	A	0.000	39.616	39.616	100.00	0.000	0.000
					B	0.000	39.616		100.00	0.000	0.000
					C	0.000	39.616		100.00	0.000	16.258
L3 84.5833-70.0000	77.1046	1.274	20.88 0	28.811	A	0.000	28.811	28.811	100.00	0.000	0.000
					B	0.000	28.811		100.00	0.000	0.000
					C	0.000	28.811		100.00	0.000	11.062
L4 70.0000-67.0833	68.5336	1.232	20.18 8	6.160	A	0.000	6.160	6.160	100.00	0.000	0.000
					B	0.000	6.160		100.00	0.000	0.000
					C	0.000	6.160		100.00	0.000	2.369
L5 67.0833-44.5833	55.4640	1.16	19.00 4	53.577	A	0.000	53.577	53.577	100.00	0.000	0.000
					B	0.000	53.577		100.00	0.000	0.000
					C	0.000	53.577		100.00	0.000	17.379
L6 44.5833-34.0800	39.2613	1.051	17.21 8	28.623	A	0.000	28.623	28.623	100.00	0.000	0.000
					B	0.000	28.623		100.00	0.000	0.000
					C	0.000	28.623		100.00	0.000	8.123
L7 34.0800-18.7500	26.2711	1	16.38 4	45.009	A	0.000	45.009	45.009	100.00	0.000	0.000
					B	0.000	45.009		100.00	0.000	0.000
					C	0.000	45.009		100.00	0.000	11.920
L8 18.7500-17.0833	17.9151	1	16.38 4	5.198	A	0.000	5.198	5.198	100.00	0.000	0.000
					B	0.000	5.198		100.00	0.000	0.000
					C	0.000	5.198		100.00	0.000	1.542
L9 17.0833-0.0000	8.3889	1	16.38 4	56.612	A	0.000	56.612	56.612	100.00	0.000	0.000
					B	0.000	56.612		100.00	0.000	0.000
					C	0.000	56.612		100.00	0.000	13.826

**Tower Pressure - With Ice**

$G_H = 1.690$

Section Elevation ft	z ft	K <sub>z</sub>	q <sub>z</sub> psf	t <sub>z</sub> in	A <sub>G</sub> ft <sup>2</sup>	F a c e	A <sub>F</sub> ft <sup>2</sup>	A <sub>R</sub> ft <sup>2</sup>	A <sub>leg</sub> ft <sup>2</sup>	Leg %	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>
L1 131.0000-110.0000	119.8282	1.445	5.232	1.4592	27.901	A	0.000	27.901	27.901	100.00	0.000	0.000
						B	0.000	27.901		100.00	0.000	0.000
						C	0.000	27.901		100.00	0.000	23.457
L2 110.0000-84.5833	96.5717	1.359	4.919	1.4219	45.640	A	0.000	45.640	45.640	100.00	0.000	0.000
						B	0.000	45.640		100.00	0.000	0.000
						C	0.000	45.640		100.00	0.000	38.337
L3 84.5833-70.0000	77.1046	1.274	4.612	1.3840	32.174	A	0.000	32.174	32.174	100.00	0.000	0.000
						B	0.000	32.174		100.00	0.000	0.000
						C	0.000	32.174		100.00	0.000	27.657
L4 70.0000-67.0833	68.5336	1.232	4.460	1.3646	6.832	A	0.000	6.832	6.832	100.00	0.000	0.000
						B	0.000	6.832		100.00	0.000	0.000
						C	0.000	6.832		100.00	0.000	6.072
L5 67.0833-44.5833	55.4640	1.16	4.198	1.3304	58.565	A	0.000	58.565	58.565	100.00	0.000	0.000
						B	0.000	58.565		100.00	0.000	0.000
						C	0.000	58.565		100.00	0.000	42.730
L6 44.5833-34.0800	39.2613	1.051	3.803	1.2763	30.857	A	0.000	30.857	30.857	100.00	0.000	0.000
						B	0.000	30.857		100.00	0.000	0.000
						C	0.000	30.857		100.00	0.000	19.500
L7 34.0800-18.7500	26.2711	1	3.619	1.2500	48.270	A	0.000	48.270	48.270	100.00	0.000	0.000
						B	0.000	48.270		100.00	0.000	0.000
						C	0.000	48.270		100.00	0.000	28.504
L8 18.7500-17.0833	17.9151	1	3.619	1.2500	5.545	A	0.000	5.545	5.545	100.00	0.000	0.000
						B	0.000	5.545		100.00	0.000	0.000
						C	0.000	5.545		100.00	0.000	3.718
L9 17.0833-0.0000	8.3889	1	3.619	1.2500	60.171	A	0.000	60.171	60.171	100.00	0.000	0.000
						B	0.000	60.171		100.00	0.000	0.000
						C	0.000	60.171		100.00	0.000	31.731

**Tower Pressure - Service**

$G_H = 1.690$

Section Elevation ft	z ft	K <sub>Z</sub>	q <sub>z</sub> psf	A <sub>G</sub> ft <sup>2</sup>	F a c e	A <sub>F</sub> ft <sup>2</sup>	A <sub>R</sub> ft <sup>2</sup>	A <sub>leg</sub> ft <sup>2</sup>	Leg %	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>
L1 131.0000-110.0000	119.8282	1.445	9.251	22.794	A	0.000	22.794	22.794	100.00	0.000	0.000
					B	0.000	22.794		100.00	0.000	0.000
					C	0.000	22.794		100.00	0.000	9.741
L2 110.0000-84.5833	96.5717	1.359	8.698	39.616	A	0.000	39.616	39.616	100.00	0.000	0.000
					B	0.000	39.616		100.00	0.000	0.000
					C	0.000	39.616		100.00	0.000	16.258
L3 84.5833-70.0000	77.1046	1.274	8.156	28.811	A	0.000	28.811	28.811	100.00	0.000	0.000
					B	0.000	28.811		100.00	0.000	0.000
					C	0.000	28.811		100.00	0.000	11.062
L4 70.0000-67.0833	68.5336	1.232	7.886	6.160	A	0.000	6.160	6.160	100.00	0.000	0.000
					B	0.000	6.160		100.00	0.000	0.000
					C	0.000	6.160		100.00	0.000	2.369
L5 67.0833-44.5833	55.4640	1.16	7.423	53.577	A	0.000	53.577	53.577	100.00	0.000	0.000
					B	0.000	53.577		100.00	0.000	0.000
					C	0.000	53.577		100.00	0.000	17.379
L6 44.5833-34.0800	39.2613	1.051	6.726	28.623	A	0.000	28.623	28.623	100.00	0.000	0.000
					B	0.000	28.623		100.00	0.000	0.000
					C	0.000	28.623		100.00	0.000	8.123
L7 34.0800-18.7500	26.2711	1	6.400	45.009	A	0.000	45.009	45.009	100.00	0.000	0.000
					B	0.000	45.009		100.00	0.000	0.000
					C	0.000	45.009		100.00	0.000	11.920
L8 18.7500-17.0833	17.9151	1	6.400	5.198	A	0.000	5.198	5.198	100.00	0.000	0.000
					B	0.000	5.198		100.00	0.000	0.000
					C	0.000	5.198		100.00	0.000	1.542
L9 17.0833-0.0000	8.3889	1	6.400	56.612	A	0.000	56.612	56.612	100.00	0.000	0.000
					B	0.000	56.612		100.00	0.000	0.000
					C	0.000	56.612		100.00	0.000	13.826

## Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service

Comb. No.	Description
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

### Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	131 - 110	Pole	Max Tension	11	0.00	-0.00	-0.00
			Max. Compression	14	-7.25	0.85	-0.13
			Max. Mx	11	-1.88	59.72	0.02
			Max. My	2	-1.88	0.09	59.69
			Max. Vy	11	-5.10	59.72	0.02
			Max. Vx	8	5.10	0.08	-59.60
			Max. Torque	5			0.25
			Max Tension	1	0.00	0.00	0.00
L2	110 - 84.5833	Pole	Max. Compression	14	-29.02	4.29	-2.62
			Max. Mx	11	-8.83	386.15	0.65
			Max. My	8	-8.83	-0.02	-386.45
			Max. Vy	11	-17.87	386.15	0.65
			Max. Vx	2	-17.86	1.13	386.41
			Max. Torque	13			0.64
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-33.05	6.68	-4.01
L3	84.5833 - 70	Pole	Max. Mx	11	-10.42	580.62	0.92
			Max. My	8	-10.42	0.02	-580.46
			Max. Vy	11	-18.87	580.62	0.92
			Max. Vx	2	-18.86	1.59	580.45
			Max. Torque	13			0.70
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-36.43	8.29	-4.94
			Max. Mx	11	-11.96	713.95	1.10
L4	70 - 67.0833	Pole	Max. My	2	-11.96	1.89	713.49
			Max. Vy	11	-19.63	713.95	1.10
			Max. Vx	2	-19.62	1.89	713.49
			Max. Torque	13			0.75
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-45.60	13.94	-8.21
			Max. Mx	11	-16.13	1179.52	1.63
			Max. My	8	-16.14	0.25	-1178.02
L5	67.0833 - 44.5833	Pole	Max. Vy	11	-21.78	1179.52	1.63
			Max. Vx	2	-21.77	2.94	1177.98
			Max. Torque	13			0.92
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-47.91	15.42	-9.06
			Max. Mx	11	-17.26	1302.62	1.74
			Max. My	8	-17.26	0.32	-1300.86
			Max. Vy	11	-22.28	1302.62	1.74
L6	44.5833 - 34.08	Pole	Max. Vx	2	-22.28	3.22	1300.78
			Max. Torque	13			0.96
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-57.73	20.96	-12.27
			Max. Mx	11	-22.40	1773.95	2.15
			Max. My	8	-22.40	0.60	-1771.22
			Max. Vy	11	-24.17	1773.95	2.15
			Max. Vx	2	-24.17	4.27	1770.97
L7	34.08 - 18.75	Pole	Max. Torque	13			1.12
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-57.73	20.96	-12.27
			Max. Mx	11	-22.40	1773.95	2.15
			Max. My	8	-22.40	0.60	-1771.22
			Max. Vy	11	-24.17	1773.95	2.15
			Max. Vx	2	-24.17	4.27	1770.97
			Max. Torque	13			1.12
L8	18.75 - 17.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-57.73	20.96	-12.27



Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L9	17.0833 - 0	Pole	Max. Compression	14	-58.53	21.43	-12.54
			Max. M <sub>x</sub>	11	-22.83	1814.41	2.18
			Max. M <sub>y</sub>	8	-22.83	0.63	-1811.59
			Max. V <sub>y</sub>	11	-24.34	1814.41	2.18
			Max. V <sub>x</sub>	2	-24.34	4.36	1811.33
			Max. Torque	13			1.14
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-66.27	26.40	-15.40
			Max. M <sub>x</sub>	11	-26.92	2244.14	2.46
			Max. M <sub>y</sub>	8	-26.92	0.94	-2240.48
			Max. V <sub>y</sub>	11	-25.95	2244.14	2.46
			Max. V <sub>x</sub>	2	-25.94	5.31	2239.97
			Max. Torque	13			1.30

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	66.27	-0.00	0.00
	Max. H <sub>x</sub>	11	26.93	25.93	0.04
	Max. H <sub>z</sub>	2	26.93	0.02	25.93
	Max. M <sub>x</sub>	2	2239.97	0.02	25.93
	Max. M <sub>z</sub>	5	2237.91	-25.93	0.00
	Max. Torsion	13	1.30	13.06	22.45
	Min. Vert	11	26.93	25.93	0.04
	Min. H <sub>x</sub>	5	26.93	-25.93	0.00
	Min. H <sub>z</sub>	8	26.93	-0.02	-25.90
	Min. M <sub>x</sub>	8	-2240.48	-0.02	-25.90
	Min. M <sub>z</sub>	11	-2244.14	25.93	0.04
	Min. Torsion	7	-1.23	-12.96	-22.43

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overtuning Moment, M <sub>x</sub> kip-ft	Overtuning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	26.93	0.00	-0.00	1.69	3.01	-0.00
Dead+Wind 0 deg - No Ice	26.93	-0.02	-25.93	-2239.97	5.31	-0.92
Dead+Wind 30 deg - No Ice	26.93	13.03	-22.43	-1936.97	-1123.64	-0.30
Dead+Wind 60 deg - No Ice	26.93	22.49	-12.92	-1113.83	-1940.26	0.18
Dead+Wind 90 deg - No Ice	26.93	25.93	-0.00	1.90	-2237.91	0.61
Dead+Wind 120 deg - No Ice	26.93	22.49	12.87	1113.09	-1941.24	0.97
Dead+Wind 150 deg - No Ice	26.93	12.96	22.43	1940.83	-1117.31	1.23
Dead+Wind 180 deg - No Ice	26.93	0.02	25.90	2240.48	0.94	0.93
Dead+Wind 210 deg - No Ice	26.93	-12.93	22.41	1938.66	1119.78	0.38
Dead+Wind 240 deg - No Ice	26.93	-22.47	12.84	1109.31	1945.31	-0.05
Dead+Wind 270 deg - No Ice	26.93	-25.93	-0.04	-2.46	2244.14	-0.61
Dead+Wind 300 deg - No Ice	26.93	-22.50	-12.95	-1117.60	1948.67	-1.11
Dead+Wind 330 deg - No Ice	26.93	-13.06	-22.45	-1939.13	1133.66	-1.30
Dead+Ice+Temp	66.27	0.00	-0.00	15.40	26.40	-0.00
Dead+Wind 0 deg+Ice+Temp	66.27	-0.00	-8.09	-744.48	27.04	-0.46
Dead+Wind 30 deg+Ice+Temp	66.27	4.06	-7.00	-641.83	-355.26	-0.21
Dead+Wind 60 deg+Ice+Temp	66.27	7.02	-4.03	-363.02	-632.39	0.03
Dead+Wind 90 deg+Ice+Temp	66.27	8.10	-0.00	15.46	-733.60	0.27
Dead+Wind 120 deg+Ice+Temp	66.27	7.02	4.02	392.68	-632.63	0.46
Dead+Wind 150 deg+Ice+Temp	66.27	4.05	7.00	672.78	-353.46	0.56
Dead+Wind 180 deg+Ice+Temp	66.27	0.00	8.08	774.51	25.87	0.46

Load Combination	Vertical	Shear <sub>x</sub>	Shear <sub>z</sub>	Overturning Moment, M <sub>x</sub>	Overturning Moment, M <sub>z</sub>	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
deg+Ice+Temp						
Dead+Wind 210	66.27	-4.04	7.00	672.19	405.36	0.23
deg+Ice+Temp						
Dead+Wind 240	66.27	-7.01	4.01	391.66	684.95	-0.00
deg+Ice+Temp						
Dead+Wind 270	66.27	-8.10	-0.01	14.29	786.49	-0.27
deg+Ice+Temp						
Dead+Wind 300	66.27	-7.02	-4.04	-364.01	685.87	-0.49
deg+Ice+Temp						
Dead+Wind 330	66.27	-4.07	-7.01	-642.40	409.17	-0.58
deg+Ice+Temp						
Dead+Wind 0 deg - Service	26.93	-0.01	-10.13	-875.50	3.99	-0.37
Dead+Wind 30 deg - Service	26.93	5.09	-8.76	-756.85	-437.76	-0.12
Dead+Wind 60 deg - Service	26.93	8.78	-5.04	-434.76	-757.29	0.07
Dead+Wind 90 deg - Service	26.93	10.13	-0.00	1.81	-873.84	0.24
Dead+Wind 120 deg - Service	26.93	8.79	5.03	436.61	-757.67	0.39
Dead+Wind 150 deg - Service	26.93	5.06	8.76	760.50	-435.28	0.49
Dead+Wind 180 deg - Service	26.93	0.01	10.12	877.84	2.28	0.37
Dead+Wind 210 deg - Service	26.93	-5.05	8.75	759.64	440.07	0.15
Dead+Wind 240 deg - Service	26.93	-8.78	5.01	435.13	763.09	-0.02
Dead+Wind 270 deg - Service	26.93	-10.13	-0.01	0.10	880.11	-0.24
Dead+Wind 300 deg - Service	26.93	-8.79	-5.06	-436.24	764.41	-0.43
Dead+Wind 330 deg - Service	26.93	-5.10	-8.77	-757.70	445.51	-0.51

## 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	-26.93	0.00	-0.00	26.93	0.00	0.003%
2	-0.02	-26.93	-25.93	0.02	26.93	25.93	0.012%
3	13.03	-26.93	-22.43	-13.03	26.93	22.43	0.000%
4	22.49	-26.93	-12.92	-22.49	26.93	12.92	0.000%
5	25.94	-26.93	-0.00	-25.93	26.93	0.00	0.012%
6	22.49	-26.93	12.87	-22.49	26.93	-12.87	0.000%
7	12.96	-26.93	22.43	-12.96	26.93	-22.43	0.000%
8	0.02	-26.93	25.90	-0.02	26.93	-25.90	0.012%
9	-12.93	-26.93	22.41	12.93	26.93	-22.41	0.000%
10	-22.47	-26.93	12.84	22.47	26.93	-12.84	0.000%
11	-25.94	-26.93	-0.04	25.93	26.93	0.04	0.012%
12	-22.50	-26.93	-12.95	22.50	26.93	12.95	0.000%
13	-13.06	-26.93	-22.45	13.06	26.93	22.45	0.000%
14	0.00	-66.27	0.00	-0.00	66.27	0.00	0.001%
15	-0.00	-66.27	-8.09	0.00	66.27	8.09	0.002%
16	4.06	-66.27	-7.00	-4.06	66.27	7.00	0.002%
17	7.02	-66.27	-4.03	-7.02	66.27	4.03	0.002%
18	8.10	-66.27	-0.00	-8.10	66.27	0.00	0.002%
19	7.02	-66.27	4.02	-7.02	66.27	-4.02	0.002%
20	4.05	-66.27	7.00	-4.05	66.27	-7.00	0.002%
21	0.00	-66.27	8.09	-0.00	66.27	-8.08	0.002%
22	-4.04	-66.27	7.00	4.04	66.27	-7.00	0.002%
23	-7.02	-66.27	4.01	7.01	66.27	-4.01	0.002%
24	-8.10	-66.27	-0.01	8.10	66.27	0.01	0.002%
25	-7.02	-66.27	-4.04	7.02	66.27	4.04	0.002%
26	-4.07	-66.27	-7.01	4.07	66.27	7.01	0.002%
27	-0.01	-26.93	-10.13	0.01	26.93	10.13	0.006%
28	5.09	-26.93	-8.76	-5.09	26.93	8.76	0.003%
29	8.78	-26.93	-5.05	-8.78	26.93	5.04	0.003%
30	10.13	-26.93	-0.00	-10.13	26.93	0.00	0.006%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
31	8.79	-26.93	5.03	-8.79	26.93	-5.03	0.003%
32	5.06	-26.93	8.76	-5.06	26.93	-8.76	0.003%
33	0.01	-26.93	10.12	-0.01	26.93	-10.12	0.006%
34	-5.05	-26.93	8.76	5.05	26.93	-8.75	0.003%
35	-8.78	-26.93	5.02	8.78	26.93	-5.01	0.003%
36	-10.13	-26.93	-0.01	10.13	26.93	0.01	0.006%
37	-8.79	-26.93	-5.06	8.79	26.93	5.06	0.003%
38	-5.10	-26.93	-8.77	5.10	26.93	8.77	0.003%

### Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000563
2	Yes	17	0.00010534	0.00013003
3	Yes	23	0.00000001	0.00008914
4	Yes	23	0.00000001	0.00008837
5	Yes	17	0.00010540	0.00011439
6	Yes	23	0.00000001	0.00008978
7	Yes	23	0.00000001	0.00008776
8	Yes	17	0.00010534	0.00012250
9	Yes	23	0.00000001	0.00008957
10	Yes	23	0.00000001	0.00008870
11	Yes	17	0.00010534	0.00011013
12	Yes	23	0.00000001	0.00008833
13	Yes	23	0.00000001	0.00009198
14	Yes	16	0.00000001	0.00002158
15	Yes	20	0.00010968	0.00008375
16	Yes	20	0.00010937	0.00012518
17	Yes	20	0.00010938	0.00012551
18	Yes	20	0.00010973	0.00008191
19	Yes	20	0.00010930	0.00013445
20	Yes	20	0.00010930	0.00013000
21	Yes	20	0.00010960	0.00008698
22	Yes	20	0.00010913	0.00014623
23	Yes	20	0.00010913	0.00014458
24	Yes	20	0.00010955	0.00008758
25	Yes	20	0.00010921	0.00013571
26	Yes	20	0.00010920	0.00014156
27	Yes	17	0.00011320	0.00006243
28	Yes	18	0.00006316	0.00013324
29	Yes	18	0.00006317	0.00013186
30	Yes	17	0.00011321	0.00006092
31	Yes	18	0.00006316	0.00013873
32	Yes	18	0.00006316	0.00012839
33	Yes	17	0.00011319	0.00006229
34	Yes	18	0.00006315	0.00013751
35	Yes	18	0.00006315	0.00013526
36	Yes	17	0.00011318	0.00006118
37	Yes	18	0.00006315	0.00013069
38	Yes	18	0.00006314	0.00014478

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	131 - 110	44.05	37	3.07	0.00
L2	110 - 84.5833	30.78	37	2.87	0.00
L3	84.5833 - 70	17.40	37	2.06	0.00
L4	74 - 67.0833	13.17	37	1.75	0.00
L5	67.0833 - 44.5833	10.71	37	1.61	0.00
L6	44.5833 - 34.08	4.61	37	0.99	0.00
L7	39 - 18.75	3.54	37	0.84	0.00
L8	18.75 - 17.0833	0.80	37	0.41	0.00

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L9	17.0833 - 0	0.66	37	0.38	0.00

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
128.0000	APX18-206517S-C w/ Mount Pipe	37	42.11	3.06	0.00	11204
121.0000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	37	37.61	3.02	0.00	5601
107.0000	BXA-70063/6CFx4	37	29.00	2.80	0.00	2422
101.0000	VHLP2.5-11	37	25.58	2.63	0.00	2043
99.0000	800MHz 2X50W RRH W/FILTER	37	24.48	2.56	0.00	1942
97.0000	TIMING 2000	37	23.41	2.50	0.00	1851
87.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	37	18.48	2.14	0.00	1510

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	131 - 110	111.96	13	7.83	0.01
L2	110 - 84.5833	78.32	13	7.31	0.01
L3	84.5833 - 70	44.32	13	5.25	0.01
L4	74 - 67.0833	33.56	13	4.47	0.00
L5	67.0833 - 44.5833	27.31	13	4.12	0.00
L6	44.5833 - 34.08	11.75	12	2.52	0.00
L7	39 - 18.75	9.02	12	2.15	0.00
L8	18.75 - 17.0833	2.05	12	1.05	0.00
L9	17.0833 - 0	1.70	12	0.97	0.00

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
128.0000	APX18-206517S-C w/ Mount Pipe	13	107.04	7.79	0.01	4562
121.0000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	13	95.63	7.69	0.01	2280
107.0000	BXA-70063/6CFx4	13	73.80	7.13	0.01	981
101.0000	VHLP2.5-11	13	65.11	6.70	0.01	824
99.0000	800MHz 2X50W RRH W/FILTER	13	62.33	6.53	0.01	782
97.0000	TIMING 2000	13	59.61	6.36	0.01	745
87.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	13	47.06	5.47	0.01	604

### Compression Checks

### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	KI/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P/P <sub>a</sub>
-------------	-----------------	------	---------	----------------------	------	-----------------------	----------------------	---------------	----------------------------	---------------------------

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P K	Allow. P <sub>a</sub> K	Ratio P P <sub>a</sub>
L1	131 - 110 (1)	TP15.525x10.525x0.1875	21.0000	0.0000	0.0	39.00	9.2600	-1.88	361.14	0.005
L2	110 - 84.5833 (2)	TP21.883x15.525x0.25	25.4167	0.0000	0.0	39.00	17.4146	-8.82	679.17	0.013
L3	84.5833 - 70 (3)	TP25.531x21.883x0.3779	14.5833	0.0000	0.0	37.54	29.3920	-10.41	1103.43	0.009
L4	70 - 67.0833 (4)	TP25.7604x23.7745x0.435 3	6.9167	0.0000	0.0	37.58	35.4949	-11.95	1334.04	0.009
L5	67.0833 - 44.5833 (5)	TP31.388x25.7604x0.4104	22.5000	0.0000	0.0	37.81	40.9375	-16.13	1547.68	0.010
L6	44.5833 - 34.08 (6)	TP34.015x31.388x0.4057	10.5033	0.0000	0.0	37.83	42.3012	-17.26	1600.25	0.011
L7	34.08 - 18.75 (7)	TP37.217x31.973x0.4269	20.2500	0.0000	0.0	37.92	46.5704	-19.87	1765.95	0.011
L8	18.75 - 17.0833 (8)	TP37.6333x37.217x0.4968	1.6667	0.0000	0.0	37.90	58.7459	-22.43	2226.23	0.010
L9	17.0833 - 0 (9)	TP41.9x37.6333x0.4074	17.0833	0.0000	0.0	37.95	48.8316	-22.86	1853.16	0.012

### Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M <sub>x</sub> kip-ft	Actual f <sub>bx</sub> ksi	Allow. F <sub>bx</sub> ksi	Ratio f <sub>bx</sub> F <sub>bx</sub>	Actual M <sub>y</sub> kip-ft	Actual f <sub>by</sub> ksi	Allow. F <sub>by</sub> ksi	Ratio f <sub>by</sub> F <sub>by</sub>
L1	131 - 110 (1)	TP15.525x10.525x0.1875	59.76	20.74	39.00	0.532	0.00	0.00	39.00	0.000
L2	110 - 84.5833 (2)	TP21.883x15.525x0.25	387.42	50.66	39.00	1.299	0.00	0.00	39.00	0.000
L3	84.5833 - 70 (3)	TP25.531x21.883x0.3779	582.07	40.56	37.54	1.080	0.00	0.00	37.54	0.000
L4	70 - 67.0833 (4)	TP25.7604x23.7745x0.43 53	715.51	39.43	37.58	1.049	0.00	0.00	37.58	0.000
L5	67.0833 - 44.5833 (5)	TP31.388x25.7604x0.410 4	1181.3 7	45.97	37.81	1.216	0.00	0.00	37.81	0.000
L6	44.5833 - 34.08 (6)	TP34.015x31.388x0.4057 1	1304.5 1	46.96	37.83	1.241	0.00	0.00	37.83	0.000
L7	34.08 - 18.75 (7)	TP37.217x31.973x0.4269 7	1509.6 7	47.19	37.92	1.244	0.00	0.00	37.92	0.000
L8	18.75 - 17.0833 (8)	TP37.6333x37.217x0.496 8	1775.9 7	40.64	37.90	1.072	0.00	0.00	37.90	0.000
L9	17.0833 - 0 (9)	TP41.9x37.6333x0.4074 5	1816.4 5	49.20	37.95	1.296	0.00	0.00	37.95	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f <sub>v</sub> ksi	Allow. F <sub>v</sub> ksi	Ratio f <sub>v</sub> F <sub>v</sub>	Actual T kip-ft	Actual f <sub>vt</sub> ksi	Allow. F <sub>vt</sub> ksi	Ratio f <sub>vt</sub> F <sub>vt</sub>
L1	131 - 110 (1)	TP15.525x10.525x0.1875	5.11	0.55	26.00	0.043	0.18	0.03	26.00	0.001
L2	110 - 84.5833 (2)	TP21.883x15.525x0.25	17.91	1.03	26.00	0.080	0.64	0.04	26.00	0.002
L3	84.5833 - 70 (3)	TP25.531x21.883x0.3779	18.91	0.64	25.03	0.052	0.70	0.02	25.03	0.001
L4	70 - 67.0833 (4)	TP25.7604x23.7745x0.43 53	19.67	0.55	25.06	0.045	0.75	0.02	25.06	0.001
L5	67.0833 - 44.5833 (5)	TP31.388x25.7604x0.410 4	21.82	0.53	25.20	0.043	0.92	0.02	25.20	0.001
L6	44.5833 - 34.08 (6)	TP34.015x31.388x0.4057 1	22.32	0.53	25.22	0.043	0.96	0.02	25.22	0.001
L7	34.08 - 18.75 (7)	TP37.217x31.973x0.4269 7	23.29	0.50	25.28	0.040	1.04	0.02	25.28	0.001
L8	18.75 - 17.0833 (8)	TP37.6333x37.217x0.496 8	24.38	0.41	25.26	0.033	1.14	0.01	25.26	0.000
L9	17.0833 - 0 (9)	TP41.9x37.6333x0.4074 5	24.47	0.50	25.30	0.040	1.15	0.01	25.30	0.001

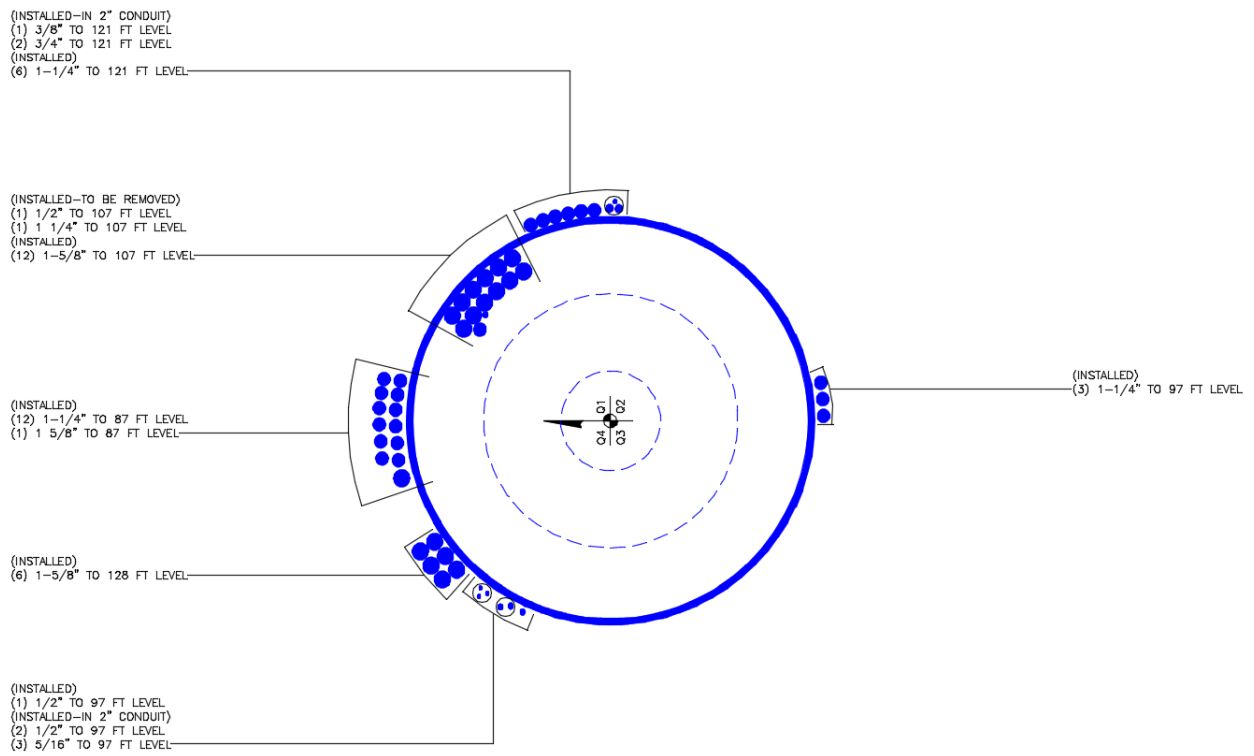
### Pole Interaction Design Data

Section No.	Elevation ft	Ratio P	Ratio $f_{bx}$	Ratio $f_{by}$	Ratio $f_v$	Ratio $f_{vt}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_a$	$F_{bx}$	$F_{by}$	$F_v$	$F_{vt}$			
L1	131 - 110 (1)	0.005	0.532	0.000	0.043	0.001	0.538 ✓	1.333	H1-3+VT ✓
L2	110 - 84.5833 (2)	0.013	1.299	0.000	0.080	0.002	1.314 ✓	1.333	H1-3+VT ✓
L3	84.5833 - 70 (3)	0.009	1.080	0.000	0.052	0.001	1.090 ✓	1.333	H1-3+VT ✓
L4	70 - 67.0833 (4)	0.009	1.049	0.000	0.045	0.001	1.059 ✓	1.333	H1-3+VT ✓
L5	67.0833 - 44.5833 (5)	0.010	1.216	0.000	0.043	0.001	1.227 ✓	1.333	H1-3+VT ✓
L6	44.5833 - 34.08 (6)	0.011	1.241	0.000	0.043	0.001	1.253 ✓	1.333	H1-3+VT ✓
L7	34.08 - 18.75 (7)	0.011	1.244	0.000	0.040	0.001	1.256 ✓	1.333	H1-3+VT ✓
L8	18.75 - 17.0833 (8)	0.010	1.072	0.000	0.033	0.000	1.083 ✓	1.333	H1-3+VT ✓
L9	17.0833 - 0 (9)	0.012	1.296	0.000	0.040	0.001	1.309 ✓	1.333	H1-3+VT ✓

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF* $P_{allow}$ K	% Capacity	Pass Fail	
L1	131 - 110	Pole	TP15.525x10.525x0.1875	1	-1.88	481.40	40.3	Pass	
L2	110 - 84.5833	Pole	TP21.883x15.525x0.25	2	-8.82	905.33	98.5	Pass	
L3	84.5833 - 70	Pole	TP25.531x21.883x0.3779	3	-10.41	1470.87	81.8	Pass	
L4	70 - 67.0833	Pole	TP25.7604x23.7745x0.4353	4	-11.95	1778.28	79.4	Pass	
L5	67.0833 - 44.5833	Pole	TP31.388x25.7604x0.4104	5	-16.13	2063.06	92.0	Pass	
L6	44.5833 - 34.08	Pole	TP34.015x31.388x0.4057	6	-17.26	2133.13	94.0	Pass	
L7	34.08 - 18.75	Pole	TP37.217x31.973x0.4269	7	-19.87	2354.01	94.2	Pass	
L8	18.75 - 17.0833	Pole	TP37.6333x37.217x0.4968	8	-22.43	2967.56	81.2	Pass	
L9	17.0833 - 0	Pole	TP41.9x37.6333x0.4074	9	-22.86	2470.26	98.2	Pass	
							Summary		
							Pole (L2)	98.5	Pass
							<b>RATING =</b>	<b>98.5</b>	<b>Pass</b>

**APPENDIX B**  
**BASE LEVEL DRAWING**





**APPENDIX C**  
**ADDITIONAL CALCULATIONS**

131.0 ft

**DESIGNED APPURTENANCE LOADING**

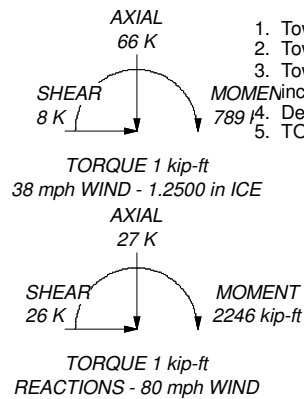
TYPE	ELEVATION	TYPE	ELEVATION
APX18-206517S-C w/ Mount Pipe	128	800MHz 2X50W RRH W/FILTER	99
APX18-206517S-C w/ Mount Pipe	128	800MHz 2X50W RRH W/FILTER	99
APX18-206517S-C w/ Mount Pipe	128	PCS 1900MHz 4x45W-65MHz	99
Pipe Mount [PM 601-3]	128	PCS 1900MHz 4x45W-65MHz	99
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	PCS 1900MHz 4x45W-65MHz	99
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	PCS 1900MHz 4x45W-65MHz	99
AM-X-CD-16-65-00T-RET w/ Mount Pipe	121	PCS 1900MHz 4x45W-65MHz	99
800 10121 w/ Mount Pipe	121	Side Arm Mount [SO 101-3]	99
800 10121 w/ Mount Pipe	121	TIMING 2000	97
800 10121 w/ Mount Pipe	121	840 10054	97
RRUS-11	121	840 10054	97
RRUS-11	121	840 10054	97
RRUS-11	121	WIMAX DAP HEAD	97
(2) LGP21401	121	WIMAX DAP HEAD	97
(2) LGP21401	121	WIMAX DAP HEAD	97
DC6-48-60-18-8F	121	HORIZON COMPACT	97
RRUS 11 B2	121	HORIZON COMPACT	97
RRUS 11 B2	121	APXVSPP18-C-A20	97
RRUS 11 B2	121	APXVSPP18-C-A20	97
T-Arm Mount [TA 601-3]	121	APXVSPP18-C-A20	97
BXA-70063/6CFx4	107	IBC1900HG-2A	97
BXA-70063/6CFx4	107	IBC1900HG-2A	97
BXA-70063/6CFx4	107	IBC1900BB-1	97
BXA-185090/8CF	107	IBC1900BB-1	97
BXA-185090/8CF	107	IBC1900BB-1	97
BXA-185060/8CFx2	107	Platform Mount (LP 101-1)	97
(2) FD9R6004/2C-3L	107	VHLP2.5-11	97
(2) FD9R6004/2C-3L	107	VHLP2.5-11	97
(2) FD9R6004/2C-3L	107	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	87
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	107	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	87
BXA-80063/4CF	107	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	87
BXA-80063/4CF	107	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	87
BXA-80063/4CF	107	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	87
BXA-171085-8CF-EDIN-2	107	KRY 112 144/1	87
BXA-171085-8CF-EDIN-2	107	KRY 112 144/1	87
BXA-171085-8CF-EDIN-2	107	KRY 112 144/1	87
(2) RRH2X40-AWS	107	T-Arm Mount [TA 702-3]	87
(2) RRH2X40-AWS	107	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	87
(2) RRH2X40-AWS	107	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	87
DB-T1-6Z-8AB-0Z	107	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	87
Platform Mount (LP 101-1)	107		
800MHz 2X50W RRH W/FILTER	99		

**MATERIAL STRENGTH**

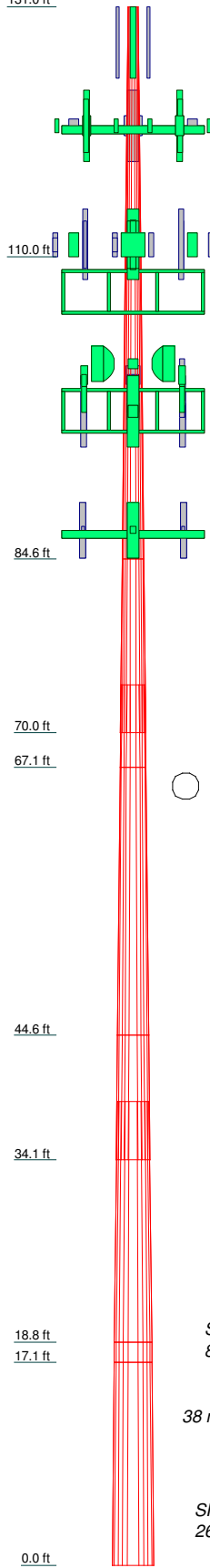
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	Reinf 63.05 ksi	63 ksi	79 ksi
Reinf 62.57 ksi	63 ksi	79 ksi	Reinf 63.20 ksi	63 ksi	79 ksi
Reinf 62.64 ksi	63 ksi	79 ksi	Reinf 63.16 ksi	63 ksi	79 ksi
Reinf 63.01 ksi	63 ksi	79 ksi	Reinf 63.25 ksi	63 ksi	80 ksi

**TOWER DESIGN NOTES**

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.25 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 98.5%



Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	21.0000	12	0.1875	10.5250	15.5250	A572-65	0.6	
2	25.4167	12	0.2500	15.5250	21.8830	A572-65	1.3	
3	14.5833	12	0.3779	4.0000	25.5310	Reinf 62.57 ksi	1.4	
4	6.9167	12	0.4353	23.7745	25.7604	Reinf 62.64 ksi	0.8	
5	22.5000	12	0.4104	25.7604	31.3880	Reinf 62.64 ksi	2.8	
6	10.5033	12	0.4057	4.9200	34.0150	Reinf 63.01 ksi	1.5	
7	20.2500	12	0.4269	31.9730	37.2170	Reinf 63.05 ksi	3.2	
8	1.6667	12	0.4968	37.2170	37.6333	Reinf 63.20 ksi	0.3	
9	17.0833	12	0.4074	37.6333	41.9000	Reinf 63.25 ksi	3.0	
Socket						Reinf 63.16 ksi		
15.0								



<p><b>Paul J. Ford and Company</b> 250 E. Broad Street Suite 600 Columbus, OH 43215 Phone: 614.221.6679 FAX: 614.448.4105</p>	<p><b>Job: 131' Monopole / HRT 100 943239</b></p>		
	<p>Project: <b>PJF# 37515-1502.003.7805 / BU# 806376</b></p>		
	<p>Client: Crown Castle International</p>	<p>Drawn by: Chris Poelking</p>	<p>App'd:</p>
	<p>Code: TIA/EIA-222-F</p>	<p>Date: 05/04/15</p>	<p>Scale: NTS</p>
	<p>Path:</p>	<p>Dwg No. E-1</p>	

# Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev F

## Site Data

BU#: 806376
Site Name: HRT 100 943239
App #:
Pole Manufacturer: Other

## Reactions

Moment:	59.76	ft-kips
Axial:	1.88	kips
Shear:	5.11	kips
Elevation:	110	feet

## Bolt Data

Qty:	10			
Diameter (in.):	1	Bolt Fu:	120	
Bolt Material:	A325	Bolt Fy:	92	
N/A:	75	<-- Disregard	Bolt Fty:	44.00
N/A:	55	<-- Disregard		
Circle (in.):	19.45			

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

## Flange Bolt Results

Bolt Tension Capacity, B:	46.07 kips
Max Bolt directly applied T:	14.56 Kips
Min. PL "tc" for B cap. w/o Pry:	1.286 in
Min PL "treq" for actual T w/ Pry:	0.542 in
Min PL "t1" for actual T w/o Pry:	0.723 in
T allowable w/o Prying:	46.07 kips
Prying Force, Q:	0.00 kips
Total Bolt Tension=T+Q:	14.56 kips
Non-Prying Bolt Stress Ratio, T/B:	31.6% <b>Pass</b>

Rigid
Service, ASD
Fty*ASIF

$\alpha < 0$  case

## Plate Data

Diam:	21.95	in
Thick, t:	1.375	in
Grade (Fy):	50	ksi
Strength, Fu:	65	ksi
Single-Rod B-eff:	4.99	in

## Exterior Flange Plate Results

Flexural Check	
Compression Side Plate Stress:	11.4 ksi
Allowable Plate Stress:	50.0 ksi
Compression Plate Stress Ratio:	22.9% <b>Pass</b>
<b>No Prying</b>	
Tension Side Stress Ratio, (treq/t)^2:	15.5% <b>Pass</b>

Rigid
Service ASD
0.75*Fy*ASIF
Comp. Y.L. Length:
11.71

## Stiffener Data (Welding at Both Sides)

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

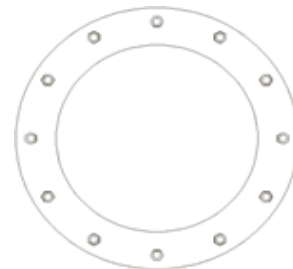
n/a

## 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
----------------------------	-----



## Pole Data

Diam:	15.53	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

## Stress Increase Factor

ASIF:	1.333
-------	-------

\* 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

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

## TIA Rev F

### Site Data

BU#: 806376
Site Name: HRT 100 943239
App #:
Pole Manufacturer: <i>Other</i>

### Reactions

Moment:	2246	ft-kips
Axial:	27	kips
Shear:	26	kips

### Anchor Rod Data

Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	49.88	in

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

### Anchor Rod Results

Maximum Rod Tension:	177.9 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	91.2% <b>Pass</b>

Rigid
Service, ASD
Fty*ASIF

### Plate Data

Diam:	55.88	in
Thick:	2.5	in
Grade:	60	ksi
Single-Rod B-eff:	11.23	in

### Base Plate Results

Base Plate Stress:	39.3 ksi	Flexural Check
Allowable Plate Stress:	60.0 ksi	
Base Plate Stress Ratio:	65.4% <b>Pass</b>	

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length:
27.06

### Stiffener Data (Welding at both sides)

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

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

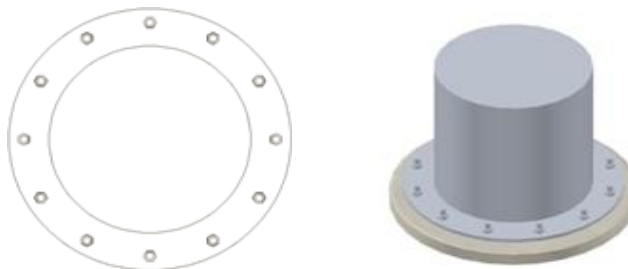
Pole Punching Shear Check:	n/a
----------------------------	-----

### Pole Data

Diam:	41.9	in
Thick:	0.344	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

### Stress Increase Factor

ASIF:	1.333
-------	-------



\* 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

Foundation Loads:

Pole weight or tower leg compression = 27 (kips)  
 Horizontal load at top of pier = 26 (kips)  
 Overturning moment at top of pier = 2246 (ft-kips)

Design criteria:

Safety factor against overturning = 1.5

Soil Properties:

Soil density = 115 (pcf)  
 Allowable soil bearing = 5 (ksf)  
 Depth to water table = 12 (ft)

Dimensions:

Pier shape (round or square) R ("R" or "S")  
 Pier width = 6 (ft)  
 Pier height above grade = 0.5 (ft)  
 depth to bottom of footing = 8 (ft)  
 Footing thickness = 3 (ft)  
 Footing width = 22 (ft)  
 Footing length = 22 (ft)

Concrete:

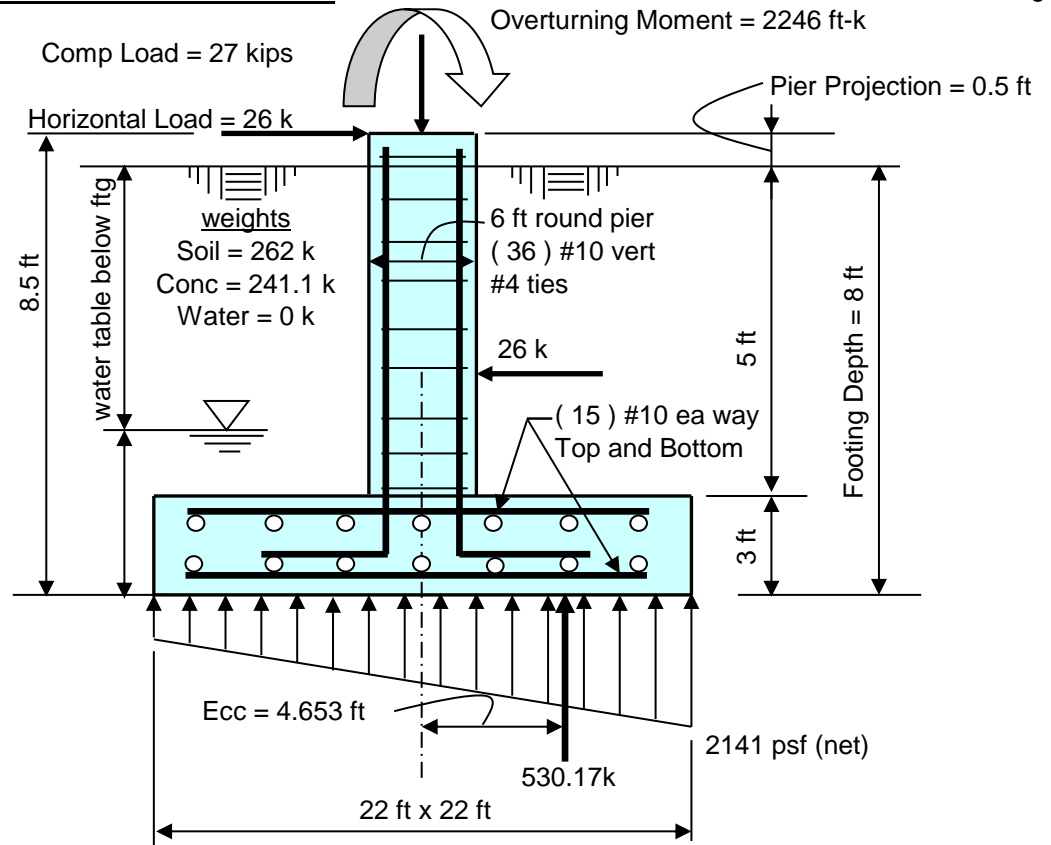
Concrete strength = 3 (ksi)  
 Rebar strength = 60 (ksi)  
 ultimate load factor = 1.3

Reinforcing Steel:

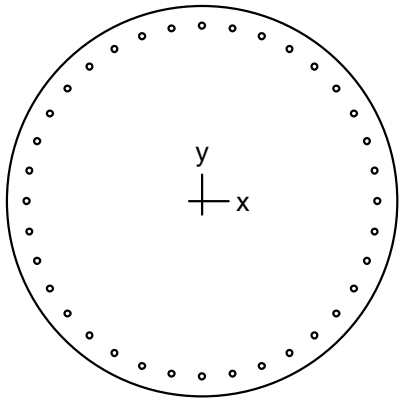
Pad  
 minimum cover over rebar = 3 inches  
 size of pad rebar = #10 bar  
 quantity of pad rebar = 15 (ea direction)

Reinforcing Steel:

Pier  
 size of vert rebar in pier = #10 bar  
 vertical rebar quantity = 36  
 size of pier ties = #4 bar  
 minimum cover over rebar = 3 inches  
 Total volume of concrete = 59.5 cu yd



Summary of analysis results	
Maximum Net Soil Bearing = 2.141 ksf Allowable Net Soil Bearing = 5 ksf <b>Soil Bearing Stress Ratio = 0.43 Okay</b>	Ult Bending Shear Capacity = 110 psi Ult Bending Shear Stress = 29 psi <b>Bending Shear Stress Ratio = 0.27 Okay</b>
Ftg Overturning Resistance = 5832 ft-kips Overturning Moment = 2467 ft-kips Required Overturning Safety Factor = 1.5 Overturning Safety Factor = 2.364 <b>Ratio = 0.63 Okay</b>	Pad Bending Moment Capacity = 2595 ft-k Pad Bending Moment = 1054 ft-k <b>Bending Moment Stress Ratio = 0.41 OK</b>



72 in diam.

Code: ACI 318-08

Units: English

Run axis: About X-axis

Run option: Investigation

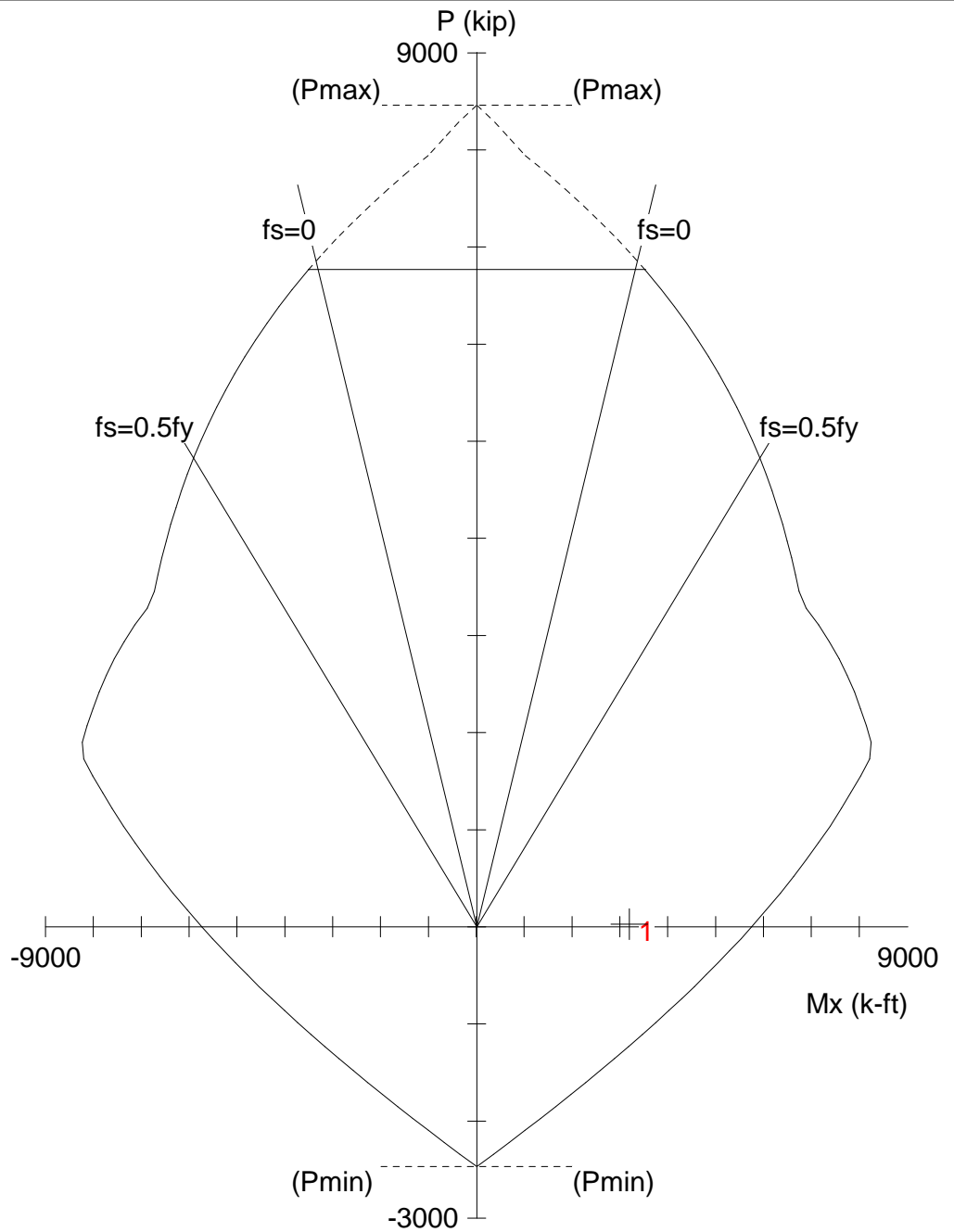
Slenderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 05/04/15

Time: 11:24:22



spColumn v4.80. Licensed to: Paul J. Ford and Company. License ID: 63551-1046614-4-1E6CD-2369D

File: G:\TOWER\375\_Crown\_Castle\2015\37515-1502\_806376\_HRT 100 94323...\37515-1502.003.7805 - Foundation Reinforcement.col

Project: 37512-1659

Column:

$f'_c = 3$  ksi

$f_y = 60$  ksi

Engineer: DSK

$A_g = 4071.5$  in<sup>2</sup>

36 #10 bars

$E_c = 3122$  ksi

$E_s = 29000$  ksi

$A_s = 45.72$  in<sup>2</sup>

$\rho = 1.12\%$

$f_c = 2.55$  ksi

$X_o = 0.00$  in

$I_x = 1.31917e+006$  in<sup>4</sup>

$e_u = 0.003$  in/in

$Y_o = 0.00$  in

$I_y = 1.31917e+006$  in<sup>4</sup>

Beta1 = 0.85

Min clear spacing = 4.37 in

Clear cover = 3.00 in

Confinement: Tied

$\phi(a) = 0.8$ ,  $\phi(b) = 0.9$ ,  $\phi(c) = 0.65$

```

                oooooo          o
                oo  oo          oo
ooooo  oooooo  oo          oooooo  oo  oo  o oooooo  o ooooo
oo  o  oo  oo  oo          oo  oo  oo  oo  oo  oo  oo  oo  oo
oo          oo  oo  oo          oo  oo  oo  oo  oo  oo  oo  oo
ooooo  oo  oo  oo          oo  oo  oo  oo  oo  oo  oo  oo  oo
          oo  oooooo  oo          oo  oo  oo  oo  oo  oo  oo  oo
o  oo  oo  oo          oo  oo  oo  oo  oo  oo  oo  oo  oo  oo
ooooo  oo          oooooo  oooooo  ooo  oooooo  o  oo  oo  oo  oo (TM)

```

```

=====
                        spColumn v4.80 (TM)
Computer program for the Strength Design of Reinforced Concrete Sections
Copyright © 1988-2011, STRUCTUREPOINT, LLC.
All rights reserved
=====

```

Licensee stated above acknowledges that STRUCTUREPOINT (SP) is not and cannot be responsible for either the accuracy or adequacy of the material supplied as input for processing by the spColumn computer program. Furthermore, STRUCTUREPOINT neither makes any warranty expressed nor implied with respect to the correctness of the output prepared by the spColumn program. Although STRUCTUREPOINT has endeavored to produce spColumn error free the program is not and cannot be certified infallible. The final and only responsibility for analysis, design and engineering documents is the licensee's. Accordingly, STRUCTUREPOINT disclaims all responsibility in contract, negligence or other tort for any analysis, design or engineering documents prepared in connection with the use of the spColumn program.

General Information:

=====  
File Name: G:\TOWER\375\_Crown\_Castle\2015\3751...\37515-1502.003.7805 - Foundation Reinforcement.col  
Project: 37512-1659  
Column: Engineer: DSK  
Code: ACI 318-08 Units: English  
  
Run Option: Investigation Slenderness: Not considered  
Run Axis: X-axis Column Type: Structural

Material Properties:

=====  
f'c = 3 ksi fy = 60 ksi  
Ec = 3122.02 ksi Es = 29000 ksi  
Ultimate strain = 0.003 in/in  
Beta1 = 0.85

Section:

=====  
Circular: Diameter = 72 in  
  
Gross section area, Ag = 4071.5 in^2  
Ix = 1.31917e+006 in^4 Iy = 1.31917e+006 in^4  
rx = 18 in ry = 18 in  
Xo = 0 in Yo = 0 in

Reinforcement:

=====  
Bar Set: ASTM A615  
Size Diam (in) Area (in^2) Size Diam (in) Area (in^2) Size Diam (in) Area (in^2)  
-----  
# 3 0.38 0.11 # 4 0.50 0.20 # 5 0.63 0.31  
# 6 0.75 0.44 # 7 0.88 0.60 # 8 1.00 0.79  
# 9 1.13 1.00 # 10 1.27 1.27 # 11 1.41 1.56  
# 14 1.69 2.25 # 18 2.26 4.00

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.  
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Layout: Circular  
Pattern: All Sides Equal (Cover to longitudinal reinforcement)  
Total steel area: As = 45.72 in^2 at rho = 1.12%  
Minimum clear spacing = 4.37 in

36 #10 Cover = 3 in

Factored Loads and Moments with Corresponding Capacities:

=====  
-----

No.	Pu kip	Mux k-ft	PhiMnx k-ft	PhiMn/Mu NA	depth in	Dt in	depth in	eps_t	Phi
1	27.00	3185.33	5786.61	1.817	15.56	68.37	0.01018	0.900	

-----

\*\*\* End of output \*\*\*