EMPIRE telecom

January 28, 2015

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

Regarding:	Notice of Exempt Modification – Addition of 3 radio heads previously approved
Property Address:	123 Costello Road, Newington, CT (the "Property")
Applicant:	AT&T Mobility ("AT&T")

Dear Ms. Bachman:

AT&T currently maintains a wireless telecommunications facility on an existing 145 foot Monopole ("tower") location on the Property. AT&T's facility consists of nine (9) wireless telecommunications antenna at 105 feet. The tower is controlled by Crown Castle, LLC. The Council approved the previous application on May 18th 2012 reference number EM-CING-094-120430. This application (attached) granted AT&T the use of 6 radio heads at this location. The approval expired one year from the issue date. During that time AT&T made the changes to the site per the approval but only installed three (3) of the six (6) radio heads that they received approval. AT&T would now like to install the additional three (3) radio heads that were originally approved under EM-CING-094-120430.

Please accept this application as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72 (b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to the Mayor, Town Manager, and Town Planner of the Town of Newington. A copy of this letter is also being sent to Crown Castle, LLC, the owner of the structure that AT&T is located.

The planned modifications to AT&T's facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The planned modifications will not result in an increase in the height of the existing structure. AT&T's additional, previously approved 3 radio heads will be installed at 105 foot level of the 145 foot monopole.
2. The proposed modifications will not involve any changes to ground-mounted equipment and, therefore will not require an extension of the site boundary.
3. The proposed modification will not increase the noise level at the facility by six decibel or more, or to levels that exceed state and local criteria.
4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety

16 Esquire Road, Billerica, MA 01862 Mobile 617-639-4908 Email: Dcooper@empiretelecomm.com

EMPIRE telecom

standard. An RF emissions calculation (attached) for AT&T's modified facility was provided in the application which led to the May 18th 2012 Decision.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The tower and its foundation can support AT&T's proposed modifications. (Please see attached Structural analysis completed by Paul J Ford and Company, dated April 13, 2012).

For the foregoing reasons AT&T respectfully requests that the proposed addition of 3 radio heads previously approved be allowed within the exempt modifications under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

David P. Cooper
Director of Site Acquisition
Empire Telecom

CC: Mayor Stephen Woods, Mayor, Town of Newington
John Salomone, Town Manager, Town of Newington
Craig Minor, Town Planner, Town of Newington
Crown Castle, LLC

16 Esquire Road, Billerica, MA 01862 Mobile 617-639-4908 Email: Dcooper@empiretelecomm.com

CT 1107

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

May 18, 2012

Jennifer Young Gaudet
HPC Wireless Services
46 Mill Plain Road, Floor 2
Danbury, CT 06811

RE: **EM-CING-094-120430** – New Cingular Wireless PCS, LLC (AT&T) notice of intent to modify an existing telecommunications facility located at 123 Costello Road, Newington, Connecticut.

Dear Ms. Gaudet:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated April 27, 2012. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

April 30, 2012

The Honorable Stephen Woods
Mayor
Town of Newington
131 Cedar Street
Newington, CT 06111

RE: **EM-CING-094-120430** – New Cingular Wireless PCS, LLC (AT&T) notice of intent to modify an existing telecommunications facility located at 123 Costello Road, Newington, Connecticut.

Dear Mayor Woods:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by May 14, 2012.

Thank you for your cooperation and consideration.

Very truly yours,

Linda Roberts

Linda Roberts
Executive Director

LR/cm

Enclosure: Notice of Intent

c: John L. Salomone, Town Manager, Town of Newington
Edmund Meehan, Town Planner, Town of Newington

EM-CING-094-120430

HPC Wireless Services
46 Mill Plain Rd.
Floor 2
Danbury, CT, 06811
P.: 203.797.1112

HPC
WIRELESS SERVICES

April 27, 2012

VIA OVERNIGHT COURIER

Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051
Attn: Ms. Linda Roberts, Executive Director

Re: New Cingular Wireless PCS, LLC – exempt modification
123 Costello Road, Newington, Connecticut

Dear Ms. Roberts:

This letter and attachments are submitted on behalf of New Cingular Wireless PCS, LLC ("AT&T"). AT&T is making modifications to certain existing sites in its Connecticut system in order to implement LTE technology. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction that constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and attachments is being sent to the Mayor of the Town of Newington.

AT&T plans to modify the existing wireless communications facility owned by Crown Castle and located at 123 Costello Road in the Town of Newington (coordinates 41°-39'-18.71" N, 72°-43'-17.2" W). Attached are a compound plan and elevation depicting the planned changes, and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration. Also included is a power density report reflecting the modification to AT&T's operations at the site.

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes ("C.G.S.") Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in R.C.S.A. Section 16-50j-72(b)(2).

1. AT&T will add three (3) LTE panel antennas to its existing platform at a center line of approximately 105'. Six (6) RRHs (remote radio heads) and a surge arrestor will

be mounted to the tower behind the antennas. AT&T will also place a DC power and fiber run from the equipment to the antennas, up the tower along the existing coaxial cable run. The proposed modifications will not extend the height of the 145' structure.

2. The proposed changes will not extend the site boundaries. AT&T will install related equipment within its existing shelter and will mount a GPS antenna to the shelter. These changes will be within the existing compound and will have no effect on the site boundaries.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more. The incremental effect of the proposed changes will be negligible.

4. The changes to the facility will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site. As indicated on the attached report prepared by C Squared Systems, LLC, AT&T's operations at the site will result in a power density of approximately 2.92%; the combined site operations will result in a total power density of approximately 54.0%.

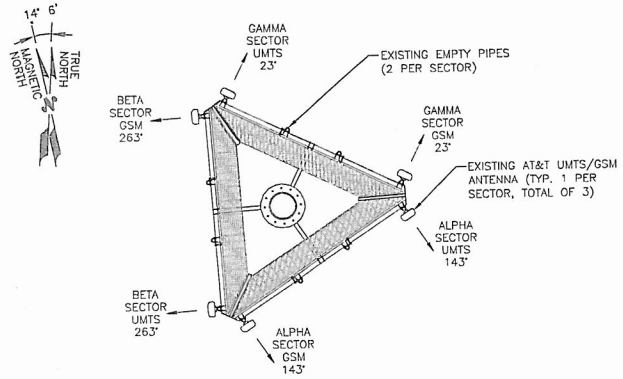
Please feel free to contact me by phone at (860) 798-7454 or by e-mail at jgaudet@hpcwireless.com with questions concerning this matter. Thank you for your consideration.

Respectfully yours,

Jennifer Young Gaudet

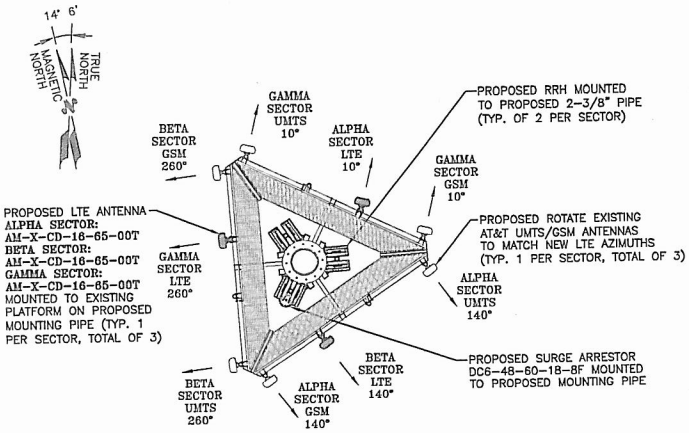
Jennifer Young Gaudet

cc: Honorable Steven Woods, Mayor, Town of Newington
Costello Industries, Inc. (underlying property owner)



EXISTING GSM/UMTS ANTENNA PLAN

SCALE: N.T.S.

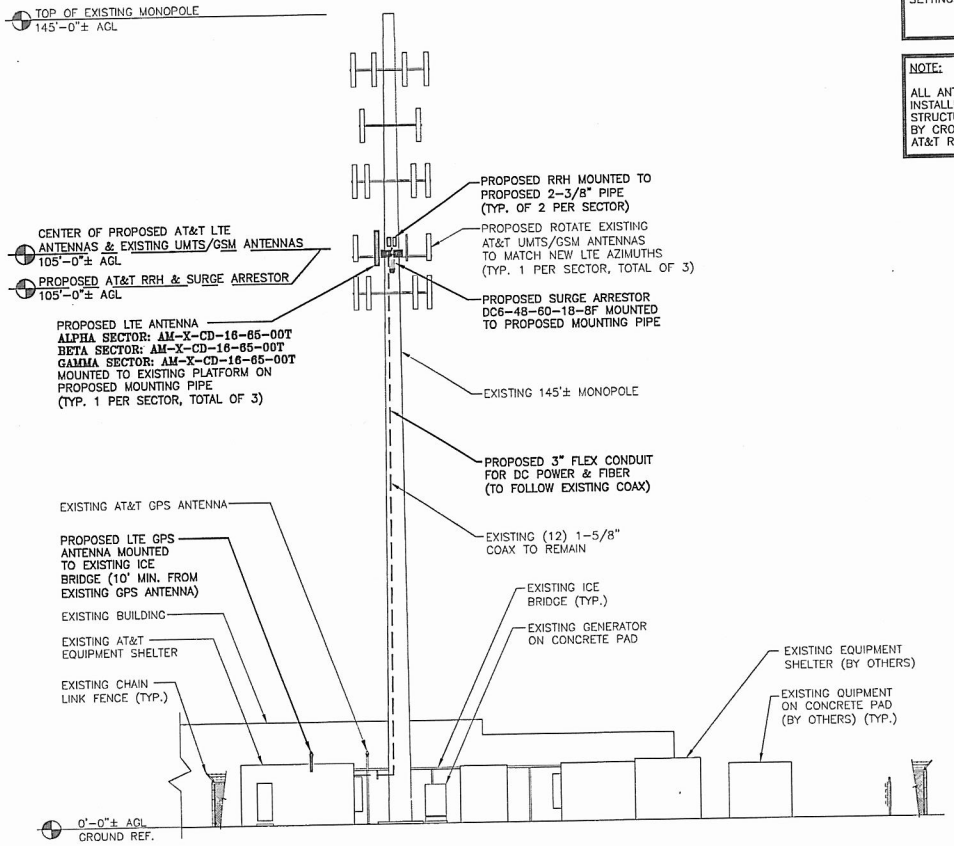


PROPOSED LTE ANTENNA PLAN

SCALE: N.T.S.

NOTES:

1. REFER TO RF CONFIG & SECTOR SCHEMATICS FOR QUANTITY REQUIRED PER SECTOR



EAST ELEVATION

SCALE: 3/32"=1'-0"

0 5'-4" 10'-8" 21'-4" 32'-0"

NOTE:

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:

ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE AND FINAL AT&T RF DATA SHEET.

Hudson Design Groupuc
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 2-101
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

NEXLINK GLOBAL SERVICES
a UniTek GLOBAL SERVICES company
800 MARSHALL PHELPS ROAD UNIT#: 2A
WINDSOR, CT 06095

SITE NUMBER: CT1108
SITE NAME: NEWINGTON - ROUTE 15
CROWN CASTLE ID: 881364
123 COSTELLO ROAD
NEWINGTON, CT 06111
HARTFORD COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	04/23/12	ISSUED FOR CONSTRUCTION	CBZ	DC	DPH
0	04/04/12	ISSUED FOR REVIEW	JG	DC	DPH

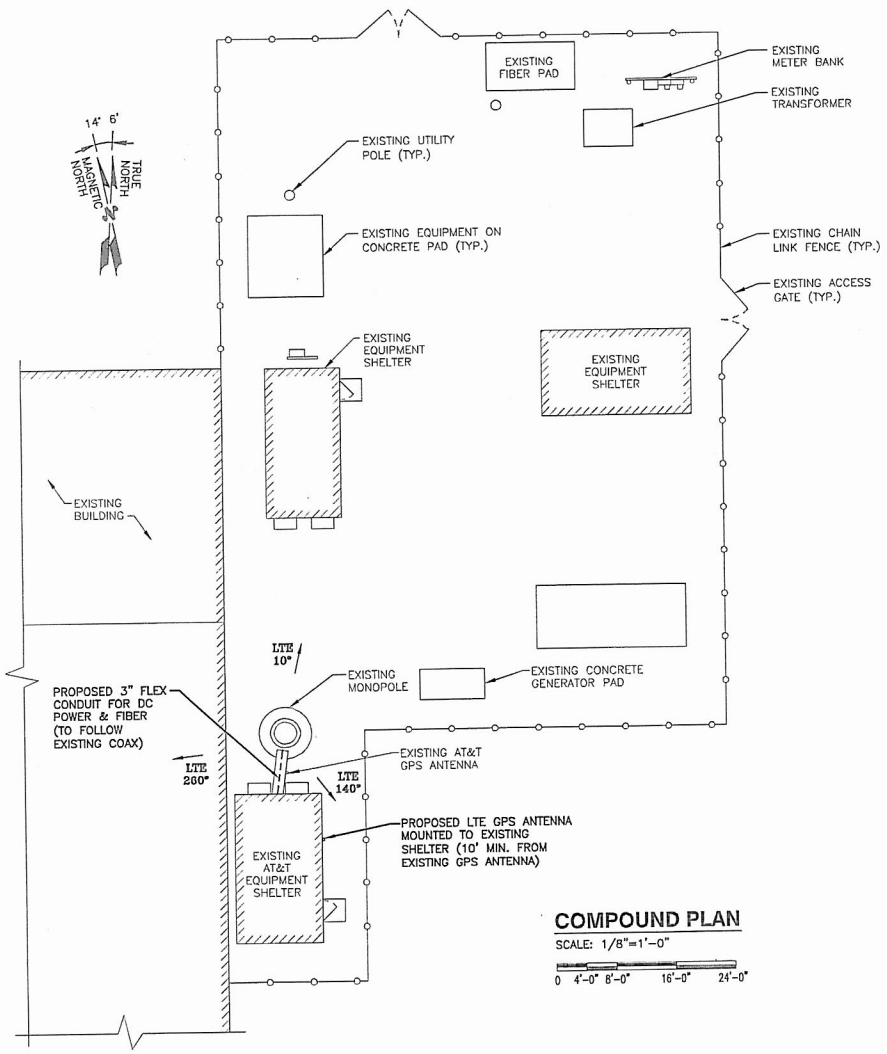
SCALE: AS SHOWN | DESIGNED BY: DC | DRAWN BY: JG

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 24173
LICENSED PROFESSIONAL ENGINEER

AT&T

ELEVATION & EQUIPMENT PLAN (LTE)

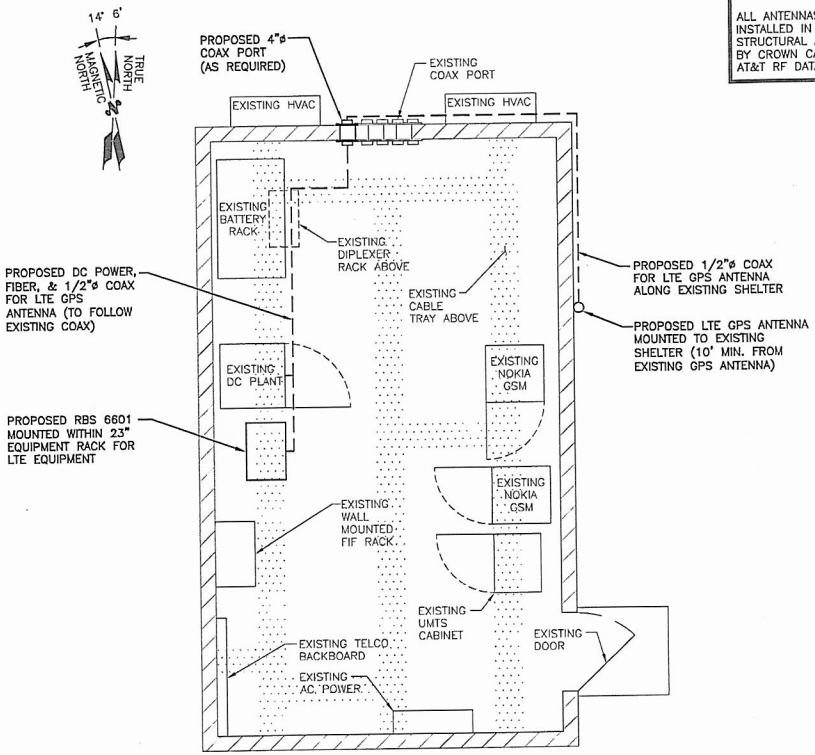
JOB NUMBER	DRAWING NUMBER	REV
1108.01	A-2	1



COMPOUND PLAN

SCALE: 1/8"=1'-0"

0 4'-0" 8'-0" 16'-0" 24'-0"



EQUIPMENT PLAN

SCALE: 1/2"=1'-0"

0 1'-0" 2'-0" 4'-0" 6'-0"

NOTE:

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:

ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE AND FINAL AT&T RF DATA SHEET.

Hudson Design Group LLC
1600 OSGOOD STREET
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SITE NUMBER: CT1108
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123 COSTELLO ROAD
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HARTFORD COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

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0	04/04/12	ISSUED FOR REVIEW	JG	DC	DPH

SCALE: AS SHOWN | DESIGNED BY: DC | DRAWN BY: JG

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 24178
LICENSED PROFESSIONAL ENGINEER

AT&T

COMPOUND PLAN (LTE)

JOB NUMBER	DRAWING NUMBER	REV
1108.01	A-1	1

CT 1108

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

Date: **May 13, 2014**

Patrick Byrum
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:	***Sprint PCS* Co-Locate**	**Scenario 2.5A**
	Carrier Site Number:	CT23XC555
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	881364
	Crown Castle Site Name:	Newington
	Crown Castle JDE Job Number:	286441
	Crown Castle Work Order Number:	758924
	Crown Castle Application Number:	245688 Rev. 1
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-2220_R1
Site Data:	**123 Costelo Road, Newington, Hartford County, CT**	
	Latitude *41° 39' 18.72"*, Longitude *-72° 43' 17.19"*	
	145 Foot - Monopole Tower	

Dear Patrick Byrum,

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 646105, in accordance with application 245688, revision 1.

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

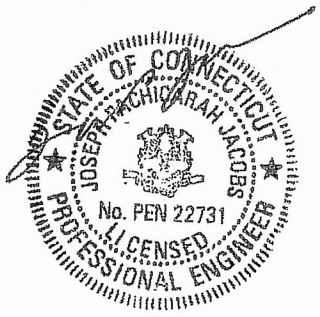
LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, and 2005 CT State Building Code 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:

Lohengri Gimeno
Project Engineer



tnxTower Report - version 6.1.4.1

MAY 14 2014

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

Date: **May 13, 2014**

Patrick Byrum
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:	***Sprint PCS* Co-Locate**	**Scenario 2.5A**
	Carrier Site Number:	CT23XC555
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	881364
	Crown Castle Site Name:	Newington
	Crown Castle JDE Job Number:	286441
	Crown Castle Work Order Number:	758924
	Crown Castle Application Number:	245688 Rev. 1
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-2220_R1
Site Data:	**123 Costelo Road, Newington, Hartford County, CT** **Latitude *41° 39' 18.72"*, Longitude *-72° 43' 17.19"*** **145 Foot - Monopole Tower**	

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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 TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, and 2005 CT State Building Code 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:

Lohengri Gimeno
Project Engineer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 145 ft Monopole tower designed by SUMMIT in October of 1997. The tower was originally designed for a wind speed of 75 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of 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
124.0	124.0	3	alcatel lucent	TD-RRH8x20-25	1	1-1/4	-
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
133.0	139.0	2	andrew	VHLP2.5-11	3 6 9	1/2 5/16 * 1-1/4	1
		2	dragonwave	HORIZON COMPACT			
		3	kathrein	840 10054 w/ Mount Pipe			
	135.0	1	motorola	TIMING 2000			
		3	samsung telecommunications	WIMAX DAP HEAD			
	134.0	9	decibel	DB844H90E-XY w/ Mount Pipe			
124.0	133.0	1	tower mounts	Platform Mount [LP 401-1]	3	1-1/4	1
	124.0	3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	IBC1900BB-1			
		3	rfs celwave	IBC1900HG-2A			
		1	tower mounts	Platform Mount [LP 401-1]			
122.0	122.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz	-	-	1
		1	tower mounts	Pipe Mount [PM 601-3]			
	118.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
114.0	116.0	1	lucent	KS24019-L112A	1 13	1/2 1-5/8	1
	114.0	3	alcatel lucent	RRH2x40-AWS			
		2	andrew	LNX-6514DS-T4M w/ Mount Pipe			
		3	antel	BXA-171063/8CF-EDIN-2 w/ Mount Pipe			
		3	antel	BXA-185063/8CF w/ Mount Pipe			
		3	antel	BXA-80063/4CFx5 w/ Mount Pipe			
		1	kathrein	800 10735 K w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 401-1]			
105.0	105.0	6	ericsson	RRUS-11	1 2 12	3/8 3/4 1-5/8	1
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP2140X			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 303-1]			
94.0	95.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	13	1-5/8	1
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
	94.0	1	tower mounts	Platform Mount [LP 401-1]			
87.0	87.0	3	kathrein	742 213	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
77.0	77.0	1	symmetricom	58532A	1	1/2	1
		1	tower mounts	Side Arm Mount [SO 701-1]			

* 2" Conduit

Notes:
1) Existing Equipment
2) Equipment to be removed

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. Clarence Welti, 8/10/1999	1425352	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit, 5153, 8/11/1999	1425473	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit, 5153, 8/10/1999	1425417	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) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

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	145 - 130	Pole	TP26.77x24x0.1875	1	-2.688	822.430	6.0	Pass
L2	130 - 84.75	Pole	TP35.27x26.77x0.25	2	-16.707	1409.767	62.3	Pass
L3	84.75 - 44.25	Pole	TP42.26x33.9247x0.3125	3	-24.931	2112.858	90.7	Pass
L4	44.25 - 0	Pole	TP49.83x40.6625x0.375	4	-38.217	3060.155	96.7	Pass
							Summary	
						Pole (L4)	96.7	Pass
						Rating =	96.7	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	79.0	Pass
1	Base Plate	0	78.9	Pass
1	Base Foundation Steel	0	60.1	Pass
1,2	Base Foundation Soil Interaction	0	67.1	Pass
1	Flange Connection	130	8.2	Pass

Structure Rating (max from all components) =	96.7%

Notes:
1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.
2) According to the procedures prescribed and agreed to by the Crown Castle Engineering Foundation Committee, held in January 2010, the existing caisson foundation was analyzed using the methodology in the software 'PLS-Caisson' (Version 8.10, or newer, by Power Line Systems, Inc.). Per the methods in PLS-Caisson, the soil reactions of cohesive soils are calculated using 8CD independent of the depth of the soil layer. The depth of soil to be ignored at the top of the caisson is the greater of the geotechnical report's recommendation, the frost depth of the site or half of the caisson diameter.

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:

3) Tower is located in Hartford County, Connecticut.
4) Basic wind speed of 80 mph.
5) Nominal ice thickness of 1.2500 in.
6) Ice thickness is considered to increase with height.
7) Ice density of 56.000 pcf.
8) A wind speed of 38 mph is used in combination with ice.
9) Deflections calculated using a wind speed of 50 mph.
10) A non-linear (P-delta) analysis was used.
11) Pressures are calculated at each section.
12) Stress ratio used in pole design is 1.333.
13) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

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	145.000-130.000	15.000	0.000	18	24.0000	26.7700	0.1875	0.7500	A572-65 (65 ksi)
L2	130.000-84.750	45.250	4.500	18	26.7700	35.2700	0.2500	1.0000	A572-65 (65 ksi)
L3	84.750-44.250	45.000	5.250	18	33.9247	42.2600	0.3125	1.2500	A572-65 (65 ksi)
L4	44.250-0.000	49.500		18	40.6625	49.8300	0.3750	1.5000	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	24.3702	14.1714	1015.2211	8.4534	12.1920	83.2694	2031.7780	7.0871	3.8940	20.768
	27.1830	15.8199	1412.3200	9.4368	13.5992	103.8535	2826.4984	7.9115	4.3815	23.368
L2	27.1830	21.0436	1869.8421	9.4146	13.5992	137.4969	3742.1446	10.5238	4.2715	17.086
	35.8141	27.7884	4305.5913	12.4321	17.9172	240.3055	8616.8481	13.8968	5.7675	23.07
L3	35.2944	33.3391	4758.6642	11.9323	17.2337	276.1248	9523.5899	16.6727	5.4207	17.346

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
	42.9119	41.6067	9249.3804	14.8914	21.4681	430.8434	18510.9314	20.8073	6.8878	22.041
L4	42.2771	47.9523	9833.0478	14.3021	20.6566	476.0251	19679.0341	23.9807	6.4966	17.324
	50.5987	58.8638	18188.8926	17.5565	25.3136	718.5412	36401.7186	29.4375	8.1101	21.627

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 145.000-130.000				1	1	1		
L2 130.000-84.750				1	1	1		
L3 84.750-44.250				1	1	1		
L4 44.250-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
LDF6-50 (1 1/4" foam)	C	No	Inside Pole	133.000 - 0.000	9	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
**								
LDF4-50A (1/2" foam)	C	No	Inside Pole	133.000 - 0.000	3	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
9207 (5/16")	C	No	Inside Pole	133.000 - 0.000	6	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
2" Conduit	C	No	Inside Pole	133.000 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
***								
HB114-21U3M12-XXXF(1-1/4")	C	No	Inside Pole	124.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
HB114-1-08U4-M5J(1	C	No	CaAa (Out Of	124.000 - 0.000	1	No Ice	0.154	0.001

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
1/4")			Face)			1/2" Ice	0.254	0.002
						1" Ice	0.354	0.004
						2" Ice	0.554	0.010
						4" Ice	0.954	0.028
HB114-1-08U4-M5J(1 1/4")	C	No	CaAa (Out Of Face)	124.000 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.010
						4" Ice	0.000	0.028
***								
LDF4-50A(1/2")	C	No	Inside Pole	114.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
LDF7-50A(1-5/8")	C	No	Inside Pole	114.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	114.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
***								
LCF158-50A(1-5/8")	C	No	Inside Pole	105.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
FB-L98B-002-75000(3/8")	C	No	Inside Pole	105.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	105.000 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
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LDF7-50A (1 5/8" foam)	C	No	Inside Pole	94.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	C	No	CaAa (Out Of Face)	94.000 - 0.000	1	No Ice	0.163	0.001
						1/2" Ice	0.263	0.002
						1" Ice	0.362	0.004
						2" Ice	0.562	0.010
						4" Ice	0.962	0.029
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AVA7-50(1-5/8)	C	No	CaAa (Out Of Face)	87.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.010
						4" Ice	0.000	0.030
***								
LDF4-50A (1/2" foam)	C	No	Inside Pole	77.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	145.000-130.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.026
L2	130.000-84.750	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	7.547	1.238
L3	84.750-44.250	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	12.818	2.093
L4	44.250-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	14.005	2.288

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	145.000-130.000	A	1.483	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.026
L2	130.000-84.750	A	1.439	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	21.506	2.029
L3	84.750-44.250	A	1.354	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	36.130	4.543
L4	44.250-0.000	A	1.250	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	37.974	4.743

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	145.000-130.000	0.0000	0.0000	0.0000	0.0000
L2	130.000-84.750	-0.2109	0.1218	-0.5009	0.2892
L3	84.750-44.250	-0.3742	0.2161	-0.8567	0.4946
L4	44.250-0.000	-0.3796	0.2192	-0.8679	0.5011

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(3) DB844H90E-XY w/ Mount Pipe	A	From Face	4.000 0.000 1.000	0.000	133.000	No Ice 1/2" Ice 1" Ice 2" Ice	3.299 3.690 4.119 5.007 6.920	4.921 5.596 6.284 7.712 10.833	0.032 0.072 0.117 0.228 0.557

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(3) DB844H90E-XY w/ Mount Pipe	B	From Face	4.000 0.000 1.000	0.000	133.000	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.299 3.690 4.119 5.007 6.920	4.921 5.596 6.284 7.712 10.833	0.032 0.072 0.117 0.228 0.557
(3) DB844H90E-XY w/ Mount Pipe	C	From Face	4.000 0.000 1.000	0.000	133.000	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.299 3.690 4.119 5.007 6.920	4.921 5.596 6.284 7.712 10.833	0.032 0.072 0.117 0.228 0.557
HORIZON COMPACT	A	From Face	4.000 0.000 6.000	0.000	133.000	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.841 0.966 1.099 1.392 2.082	0.429 0.525 0.629 0.863 1.435	0.012 0.018 0.026 0.048 0.122
HORIZON COMPACT	B	From Face	4.000 0.000 6.000	0.000	133.000	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.841 0.966 1.099 1.392 2.082	0.429 0.525 0.629 0.863 1.435	0.012 0.018 0.026 0.048 0.122
840 10054 w/ Mount Pipe	A	From Face	4.000 0.000 2.000	0.000	133.000	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.413 5.833 6.263 7.156 9.093	2.385 2.917 3.466 4.614 7.316	0.051 0.088 0.129 0.230 0.533
840 10054 w/ Mount Pipe	B	From Face	4.000 0.000 2.000	0.000	133.000	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.413 5.833 6.263 7.156 9.093	2.385 2.917 3.466 4.614 7.316	0.051 0.088 0.129 0.230 0.533
840 10054 w/ Mount Pipe	C	From Face	4.000 0.000 2.000	0.000	133.000	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.413 5.833 6.263 7.156 9.093	2.385 2.917 3.466 4.614 7.316	0.051 0.088 0.129 0.230 0.533
TIMING 2000	A	From Face	4.000 0.000 2.000	0.000	133.000	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.126 0.177 0.237 0.383 0.778	0.126 0.177 0.237 0.383 0.778	0.001 0.002 0.005 0.014 0.052
WIMAX DAP HEAD	A	From Face	4.000 0.000 2.000	0.000	133.000	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.804 1.988 2.180 2.589 3.512	0.778 0.918 1.067 1.391 2.143	0.033 0.045 0.058 0.094 0.201
WIMAX DAP HEAD	B	From Face	4.000 0.000 2.000	0.000	133.000	4" Ice No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.804 1.988 2.180 2.589 3.512	0.778 0.918 1.067 1.391 2.143	0.033 0.045 0.058 0.094 0.201
WIMAX DAP HEAD	C	From Face	4.000 0.000 2.000	0.000	133.000	No Ice 1/2" Ice 1" Ice	1.804 1.988 2.180 2.589	0.778 0.918 1.067 1.391	0.033 0.045 0.058 0.094

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	3.512	2.143	0.201
						4" Ice			
Platform Mount [LP 401-1]	C	None		0.000	133.000	No Ice	24.330	24.330	1.645
						1/2" Ice	30.220	30.220	2.030
						1" Ice	36.110	36.110	2.415
						2" Ice	47.890	47.890	3.184
						4" Ice	71.450	71.450	4.723
***									
APXVTM14-C-120 w/ Mount Pipe	A	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	7.134	4.959	0.077
						1/2" Ice	7.662	5.754	0.131
						1" Ice	8.183	6.472	0.193
						2" Ice	9.256	8.010	0.338
						4" Ice	11.526	11.412	0.752
APXVTM14-C-120 w/ Mount Pipe	B	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	7.134	4.959	0.077
						1/2" Ice	7.662	5.754	0.131
						1" Ice	8.183	6.472	0.193
						2" Ice	9.256	8.010	0.338
						4" Ice	11.526	11.412	0.752
APXVTM14-C-120 w/ Mount Pipe	C	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	7.134	4.959	0.077
						1/2" Ice	7.662	5.754	0.131
						1" Ice	8.183	6.472	0.193
						2" Ice	9.256	8.010	0.338
						4" Ice	11.526	11.412	0.752
TD-RRH8x20-25	A	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	4.720	1.703	0.070
						1/2" Ice	5.014	1.920	0.097
						1" Ice	5.316	2.145	0.128
						2" Ice	5.948	2.622	0.201
						4" Ice	7.314	3.680	0.397
TD-RRH8x20-25	B	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	4.720	1.703	0.070
						1/2" Ice	5.014	1.920	0.097
						1" Ice	5.316	2.145	0.128
						2" Ice	5.948	2.622	0.201
						4" Ice	7.314	3.680	0.397
TD-RRH8x20-25	C	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	4.720	1.703	0.070
						1/2" Ice	5.014	1.920	0.097
						1" Ice	5.316	2.145	0.128
						2" Ice	5.948	2.622	0.201
						4" Ice	7.314	3.680	0.397
Platform Mount [LP 401-1]	C	None		0.000	124.000	No Ice	24.330	24.330	1.645
						1/2" Ice	30.220	30.220	2.030
						1" Ice	36.110	36.110	2.415
						2" Ice	47.890	47.890	3.184
						4" Ice	71.450	71.450	4.723
6'x2" Pipe Mount	A	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	1.200	1.200	0.072
						1/2" Ice	1.802	1.802	0.081
						1" Ice	2.170	2.170	0.095
						2" Ice	2.932	2.932	0.134
						4" Ice	4.568	4.568	0.268
6'x2" Pipe Mount	B	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	1.200	1.200	0.072
						1/2" Ice	1.802	1.802	0.081
						1" Ice	2.170	2.170	0.095
						2" Ice	2.932	2.932	0.134
						4" Ice	4.568	4.568	0.268
6'x2" Pipe Mount	C	From Face	4.000 0.000	0.000	124.000	No Ice	1.200	1.200	0.072
						1/2"	1.802	1.802	0.081

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			Ice	2.170	2.170	0.095
						1" Ice	2.932	2.932	0.134
						2" Ice	4.568	4.568	0.268
						4" Ice			
***									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	8.498	6.946	0.083
						1/2" Ice	9.149	8.127	0.151
						1" Ice	9.767	9.021	0.227
						2" Ice	11.031	10.844	0.406
						4" Ice	13.679	14.851	0.909
APXVSPP18-C-A20 w/ Mount Pipe	B	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	8.498	6.946	0.083
						1/2" Ice	9.149	8.127	0.151
						1" Ice	9.767	9.021	0.227
						2" Ice	11.031	10.844	0.406
						4" Ice	13.679	14.851	0.909
APXVSPP18-C-A20 w/ Mount Pipe	C	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	8.498	6.946	0.083
						1/2" Ice	9.149	8.127	0.151
						1" Ice	9.767	9.021	0.227
						2" Ice	11.031	10.844	0.406
						4" Ice	13.679	14.851	0.909
IBC1900BB-1	A	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	1.127	0.533	0.022
						1/2" Ice	1.273	0.647	0.030
						1" Ice	1.427	0.770	0.039
						2" Ice	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
IBC1900BB-1	B	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	1.127	0.533	0.022
						1/2" Ice	1.273	0.647	0.030
						1" Ice	1.427	0.770	0.039
						2" Ice	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
IBC1900BB-1	C	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	1.127	0.533	0.022
						1/2" Ice	1.273	0.647	0.030
						1" Ice	1.427	0.770	0.039
						2" Ice	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
IBC1900HG-2A	A	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	1.127	0.533	0.022
						1/2" Ice	1.273	0.647	0.030
						1" Ice	1.427	0.770	0.039
						2" Ice	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
IBC1900HG-2A	B	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	1.127	0.533	0.022
						1/2" Ice	1.273	0.647	0.030
						1" Ice	1.427	0.770	0.039
						2" Ice	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
IBC1900HG-2A	C	From Face	4.000 0.000 0.000	0.000	124.000	No Ice	1.127	0.533	0.022
						1/2" Ice	1.273	0.647	0.030
						1" Ice	1.427	0.770	0.039
						2" Ice	1.761	1.041	0.065
						4" Ice	2.534	1.688	0.147
***									
PCS 1900MHz 4x45W-65MHz	A	From Face	1.000 0.000 0.000	0.000	122.000	No Ice	2.709	2.611	0.060
						1/2" Ice	2.948	2.847	0.083
						1" Ice	3.195	3.092	0.110
						2" Ice	3.716	3.608	0.173
						4" Ice	4.862	4.744	0.347

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
PCS 1900MHz 4x45W-65MHz	B	From Face	1.000 0.000 0.000	0.000	122.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.709 2.948 3.195 3.716 4.862	2.611 2.847 3.092 3.608 4.744	0.060 0.083 0.110 0.173 0.347
PCS 1900MHz 4x45W-65MHz	C	From Face	1.000 0.000 0.000	0.000	122.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.709 2.948 3.195 3.716 4.862	2.611 2.847 3.092 3.608 4.744	0.060 0.083 0.110 0.173 0.347
800MHz 2X50W RRH W/FILTER	A	From Face	1.000 0.000 -4.000	0.000	122.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.401 2.613 2.833 3.300 4.337	2.254 2.460 2.675 3.132 4.148	0.064 0.086 0.111 0.172 0.338
800MHz 2X50W RRH W/FILTER	B	From Face	1.000 0.000 -4.000	0.000	122.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.401 2.613 2.833 3.300 4.337	2.254 2.460 2.675 3.132 4.148	0.064 0.086 0.111 0.172 0.338
800MHz 2X50W RRH W/FILTER	C	From Face	1.000 0.000 -4.000	0.000	122.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.401 2.613 2.833 3.300 4.337	2.254 2.460 2.675 3.132 4.148	0.064 0.086 0.111 0.172 0.338
Pipe Mount [PM 601-3]	C	None		0.000	122.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.390 5.480 6.570 8.750 13.110	4.390 5.480 6.570 8.750 13.110	0.195 0.237 0.280 0.365 0.534
***									
LNX-6514DS-T4M w/ Mount Pipe	A	From Face	4.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.449 9.044 9.631 10.834 13.352	6.885 7.951 8.809 10.576 14.482	0.056 0.124 0.199 0.376 0.871
800 10735 K w/ Mount Pipe	B	From Face	4.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.968 9.646 10.298 11.615 14.367	5.489 6.710 7.688 9.563 13.514	0.055 0.118 0.189 0.358 0.844
LNX-6514DS-T4M w/ Mount Pipe	C	From Face	4.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.449 9.044 9.631 10.834 13.352	6.885 7.951 8.809 10.576 14.482	0.056 0.124 0.199 0.376 0.871
BXA-185063/8CF w/ Mount Pipe	A	From Face	4.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.181 3.559 3.963 4.855 6.773	2.997 3.614 4.236 5.529 8.423	0.028 0.059 0.095 0.186 0.473
BXA-185063/8CF w/ Mount Pipe	B	From Face	4.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice	3.181 3.559 3.963	2.997 3.614 4.236	0.028 0.059 0.095

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	4.855	5.529	0.186
						2" Ice	6.773	8.423	0.473
						4" Ice			
BXA-185063/8CF w/ Mount Pipe	C	From Face	4.000 0.000 0.000	0.000	114.000	No Ice	3.181	2.997	0.028
						1/2" Ice	3.559	3.614	0.059
							3.963	4.236	0.095
						1" Ice	4.855	5.529	0.186
						2" Ice	6.773	8.423	0.473
						4" Ice			
BXA-80063/4CFx5 w/ Mount Pipe	A	From Face	4.000 0.000 0.000	0.000	114.000	No Ice	5.399	3.616	0.028
						1/2" Ice	5.844	4.217	0.070
							6.299	4.834	0.118
						1" Ice	7.240	6.161	0.233
						2" Ice	9.261	9.183	0.573
						4" Ice			
BXA-80063/4CFx5 w/ Mount Pipe	B	From Face	4.000 0.000 0.000	0.000	114.000	No Ice	5.399	3.616	0.028
						1/2" Ice	5.844	4.217	0.070
							6.299	4.834	0.118
						1" Ice	7.240	6.161	0.233
						2" Ice	9.261	9.183	0.573
						4" Ice			
BXA-80063/4CFx5 w/ Mount Pipe	C	From Face	4.000 0.000 0.000	0.000	114.000	No Ice	5.399	3.616	0.028
						1/2" Ice	5.844	4.217	0.070
							6.299	4.834	0.118
						1" Ice	7.240	6.161	0.233
						2" Ice	9.261	9.183	0.573
						4" Ice			
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	A	From Face	4.000 0.000 0.000	0.000	114.000	No Ice	3.140	3.510	0.029
						1/2" Ice	3.515	4.130	0.062
							3.915	4.757	0.100
						1" Ice	4.804	6.059	0.196
						2" Ice	6.715	9.095	0.492
						4" Ice			
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	B	From Face	4.000 0.000 0.000	0.000	114.000	No Ice	3.140	3.510	0.029
						1/2" Ice	3.515	4.130	0.062
							3.915	4.757	0.100
						1" Ice	4.804	6.059	0.196
						2" Ice	6.715	9.095	0.492
						4" Ice			
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	C	From Face	4.000 0.000 0.000	0.000	114.000	No Ice	3.140	3.510	0.029
						1/2" Ice	3.515	4.130	0.062
							3.915	4.757	0.100
						1" Ice	4.804	6.059	0.196
						2" Ice	6.715	9.095	0.492
						4" Ice			
(2) FD9R6004/2C-3L	A	From Face	4.000 0.000 0.000	0.000	114.000	No Ice	0.367	0.085	0.003
						1/2" Ice	0.451	0.136	0.005
							0.543	0.196	0.009
						1" Ice	0.755	0.343	0.020
						2" Ice	1.281	0.740	0.063
						4" Ice			
(2) FD9R6004/2C-3L	B	From Face	4.000 0.000 0.000	0.000	114.000	No Ice	0.367	0.085	0.003
						1/2" Ice	0.451	0.136	0.005
							0.543	0.196	0.009
						1" Ice	0.755	0.343	0.020
						2" Ice	1.281	0.740	0.063
						4" Ice			
(2) FD9R6004/2C-3L	C	From Face	4.000 0.000 0.000	0.000	114.000	No Ice	0.367	0.085	0.003
						1/2" Ice	0.451	0.136	0.005
							0.543	0.196	0.009
						1" Ice	0.755	0.343	0.020
						2" Ice	1.281	0.740	0.063
						4" Ice			
RRH2x40-AWS	A	From Face	4.000 0.000	0.000	114.000	No Ice	2.976	1.596	0.044
						1/2"	3.236	1.824	0.063

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			Ice	3.505	2.061	0.085
						1" Ice	4.068	2.560	0.138
						2" Ice	5.297	3.661	0.292
						4" Ice			
RRH2x40-AWS	B	From Face	4.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.976 3.236 3.505 4.068 5.297	1.596 1.824 2.061 2.560 3.661	0.044 0.063 0.085 0.138 0.292
RRH2x40-AWS	C	From Face	4.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.976 3.236 3.505 4.068 5.297	1.596 1.824 2.061 2.560 3.661	0.044 0.063 0.085 0.138 0.292
KS24019-L112A	B	From Face	4.000 0.000 2.000	0.000	114.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.156 0.225 0.302 0.484 0.951	0.156 0.225 0.302 0.484 0.951	0.005 0.007 0.009 0.018 0.056
DB-T1-6Z-8AB-0Z	B	From Face	4.000 0.000 0.000	0.000	114.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.600 5.915 6.240 6.914 8.365	2.333 2.558 2.791 3.284 4.373	0.044 0.080 0.120 0.213 0.455
Platform Mount [LP 401-1]	C	None		0.000	114.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.330 30.220 36.110 47.890 71.450	24.330 30.220 36.110 47.890 71.450	1.645 2.030 2.415 3.184 4.723
***									
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.304 7.479 8.368 10.179 14.024	0.074 0.139 0.212 0.385 0.874
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.304 7.479 8.368 10.179 14.024	0.074 0.139 0.212 0.385 0.874
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.304 7.479 8.368 10.179 14.024	0.074 0.139 0.212 0.385 0.874
(2) 7770.00 w/ Mount Pipe	A	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665
(2) 7770.00 w/ Mount Pipe	B	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) 7770.00 w/ Mount Pipe	C	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665
(2) RRUS-11	A	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.249 3.491 3.741 4.268 5.426	1.373 1.551 1.738 2.138 3.042	0.048 0.068 0.092 0.150 0.310
(2) RRUS-11	B	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.249 3.491 3.741 4.268 5.426	1.373 1.551 1.738 2.138 3.042	0.048 0.068 0.092 0.150 0.310
(2) RRUS-11	C	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.249 3.491 3.741 4.268 5.426	1.373 1.551 1.738 2.138 3.042	0.048 0.068 0.092 0.150 0.310
(2) LGP2140X	A	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.260 1.416 1.581 1.936 2.750	0.378 0.493 0.617 0.890 1.541	0.014 0.021 0.030 0.055 0.135
(2) LGP2140X	B	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.260 1.416 1.581 1.936 2.750	0.378 0.493 0.617 0.890 1.541	0.014 0.021 0.030 0.055 0.135
(2) LGP2140X	C	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.260 1.416 1.581 1.936 2.750	0.378 0.493 0.617 0.890 1.541	0.014 0.021 0.030 0.055 0.135
DC6-48-60-18-8F	A	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.567 2.798 3.038 3.543 4.658	2.567 2.798 3.038 3.543 4.658	0.019 0.041 0.067 0.129 0.299
6'x2" Pipe Mount	A	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.200 1.802 2.170 2.932 4.568	1.200 1.802 2.170 2.932 4.568	0.072 0.081 0.095 0.134 0.268
6'x2" Pipe Mount	B	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.200 1.802 2.170 2.932 4.568	1.200 1.802 2.170 2.932 4.568	0.072 0.081 0.095 0.134 0.268
6'x2" Pipe Mount	C	From Face	4.000 0.000 0.000	0.000	105.000	No Ice 1/2" Ice 1" Ice 2" Ice	1.200 1.802 2.170 2.932 4.568	1.200 1.802 2.170 2.932 4.568	0.072 0.081 0.095 0.134 0.268

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
Platform Mount [LP 303-1]	C	None		0.000	105.000	No Ice	14.660	14.660	1.250
						1/2" Ice	18.870	18.870	1.481
						1" Ice	23.080	23.080	1.713
						2" Ice	31.500	31.500	2.175
						4" Ice	48.340	48.340	3.101
***									
Platform Mount [LP 401-1]	C	None		0.000	94.000	No Ice	24.330	24.330	1.645
						1/2" Ice	30.220	30.220	2.030
						1" Ice	36.110	36.110	2.415
						2" Ice	47.890	47.890	3.184
						4" Ice	71.450	71.450	4.723
(2) 6'x2" Pipe Mount	A	From Face	4.000 0.000 0.000	0.000	94.000	No Ice	1.200	1.200	0.072
						1/2" Ice	1.802	1.802	0.081
						1" Ice	2.170	2.170	0.095
						2" Ice	2.932	2.932	0.134
						4" Ice	4.568	4.568	0.268
(2) 6'x2" Pipe Mount	B	From Face	4.000 0.000 0.000	0.000	94.000	No Ice	1.200	1.200	0.072
						1/2" Ice	1.802	1.802	0.081
						1" Ice	2.170	2.170	0.095
						2" Ice	2.932	2.932	0.134
						4" Ice	4.568	4.568	0.268
(2) 6'x2" Pipe Mount	C	From Face	4.000 0.000 0.000	0.000	94.000	No Ice	1.200	1.200	0.072
						1/2" Ice	1.802	1.802	0.081
						1" Ice	2.170	2.170	0.095
						2" Ice	2.932	2.932	0.134
						4" Ice	4.568	4.568	0.268
***									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	4.000 0.000 1.000	0.000	94.000	No Ice	6.825	5.642	0.112
						1/2" Ice	7.347	6.480	0.169
						1" Ice	7.863	7.257	0.233
						2" Ice	8.926	8.864	0.383
						4" Ice	11.175	12.293	0.807
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	4.000 0.000 1.000	0.000	94.000	No Ice	6.825	5.642	0.112
						1/2" Ice	7.347	6.480	0.169
						1" Ice	7.863	7.257	0.233
						2" Ice	8.926	8.864	0.383
						4" Ice	11.175	12.293	0.807
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	4.000 0.000 1.000	0.000	94.000	No Ice	6.825	5.642	0.112
						1/2" Ice	7.347	6.480	0.169
						1" Ice	7.863	7.257	0.233
						2" Ice	8.926	8.864	0.383
						4" Ice	11.175	12.293	0.807
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Face	4.000 0.000 1.000	0.000	94.000	No Ice	6.815	5.633	0.112
						1/2" Ice	7.337	6.472	0.169
						1" Ice	7.853	7.248	0.232
						2" Ice	8.916	8.854	0.383
						4" Ice	11.165	12.280	0.806
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Face	4.000 0.000 1.000	0.000	94.000	No Ice	6.815	5.633	0.112
						1/2" Ice	7.337	6.472	0.169
						1" Ice	7.853	7.248	0.232
						2" Ice	8.916	8.854	0.383
						4" Ice	11.165	12.280	0.806
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Face	4.000 0.000	0.000	94.000	No Ice	6.815	5.633	0.112
						1/2"	7.337	6.472	0.169

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			1.000			Ice	7.853	7.248	0.232
						1" Ice	8.916	8.854	0.383
						2" Ice	11.165	12.280	0.806
						4" Ice			
KRY 112 144/1	A	From Face	4.000 0.000 1.000	0.000	94.000	No Ice	0.408	0.204	0.011
						1/2"	0.497	0.273	0.014
						Ice	0.594	0.351	0.019
						1" Ice	0.815	0.533	0.032
						2" Ice	1.359	0.999	0.082
						4" Ice			
KRY 112 144/1	B	From Face	4.000 0.000 1.000	0.000	94.000	No Ice	0.408	0.204	0.011
						1/2"	0.497	0.273	0.014
						Ice	0.594	0.351	0.019
						1" Ice	0.815	0.533	0.032
						2" Ice	1.359	0.999	0.082
						4" Ice			
KRY 112 144/1	C	From Face	4.000 0.000 1.000	0.000	94.000	No Ice	0.408	0.204	0.011
						1/2"	0.497	0.273	0.014
						Ice	0.594	0.351	0.019
						1" Ice	0.815	0.533	0.032
						2" Ice	1.359	0.999	0.082
						4" Ice			
***									
742 213	A	From Face	1.000 0.000 0.000	0.000	87.000	No Ice	5.135	2.869	0.022
						1/2"	5.609	3.483	0.047
						Ice	6.090	3.946	0.078
						1" Ice	7.074	4.893	0.158
						2" Ice	9.130	6.876	0.394
						4" Ice			
742 213	B	From Face	1.000 0.000 0.000	0.000	87.000	No Ice	5.135	2.869	0.022
						1/2"	5.609	3.483	0.047
						Ice	6.090	3.946	0.078
						1" Ice	7.074	4.893	0.158
						2" Ice	9.130	6.876	0.394
						4" Ice			
742 213	C	From Face	1.000 0.000 0.000	0.000	87.000	No Ice	5.135	2.869	0.022
						1/2"	5.609	3.483	0.047
						Ice	6.090	3.946	0.078
						1" Ice	7.074	4.893	0.158
						2" Ice	9.130	6.876	0.394
						4" Ice			
Pipe Mount [PM 601-3]	C	None		0.000	87.000	No Ice	4.390	4.390	0.195
						1/2"	5.480	5.480	0.237
						Ice	6.570	6.570	0.280
						1" Ice	8.750	8.750	0.365
						2" Ice	13.110	13.110	0.534
						4" Ice			
***									
58532A	A	From Face	2.000 0.000 0.000	0.000	77.000	No Ice	0.221	0.221	0.000
						1/2"	0.290	0.290	0.003
						Ice	0.367	0.367	0.006
						1" Ice	0.548	0.548	0.017
						2" Ice	1.014	1.014	0.060
						4" Ice			
Side Arm Mount [SO 701-1]	A	None		0.000	77.000	No Ice	0.850	1.670	0.065
						1/2"	1.140	2.340	0.079
						Ice	1.430	3.010	0.093
						1" Ice	2.010	4.350	0.121
						2" Ice	3.170	7.030	0.177
						4" Ice			

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
VHLP2.5-11	A	Paraboloid w/Shroud (HP)	From Face	4.000 0.000 6.000	0.000		133.000	2.917	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.680 7.070 7.460 8.230 9.780	0.048 0.080 0.120 0.190 0.340
VHLP2.5-11	C	Paraboloid w/Shroud (HP)	From Face	4.000 0.000 6.000	0.000		133.000	2.917	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.680 7.070 7.460 8.230 9.780	0.048 0.080 0.120 0.190 0.340

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 145.000-130.000	137.364	1.503	0.025	31.731	A	0.000	31.731	31.731	100.00	0.000	0.000
					B	0.000	31.731		100.00	0.000	0.000
					C	0.000	31.731		100.00	0.000	0.000
L2 130.000-84.750	106.682	1.398	0.023	116.971	A	0.000	116.971	116.971	100.00	0.000	0.000
					B	0.000	116.971		100.00	0.000	0.000
					C	0.000	116.971		100.00	0.000	7.547
L3 84.750-44.250	64.300	1.21	0.020	129.968	A	0.000	129.968	129.968	100.00	0.000	0.000
					B	0.000	129.968		100.00	0.000	0.000
					C	0.000	129.968		100.00	0.000	12.818
L4 44.250-0.000	21.465	1	0.016	168.638	A	0.000	168.638	168.638	100.00	0.000	0.000
					B	0.000	168.638		100.00	0.000	0.000
					C	0.000	168.638		100.00	0.000	14.005

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_z	q_z ksf	t_z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 145.000-130.000	137.364	1.503	0.005	1.4833	35.440	A	0.000	35.440	35.440	100.00	0.000	0.000
						B	0.000	35.440		100.00	0.000	0.000
						C	0.000	35.440		100.00	0.000	0.000
L2 130.000-84.750	106.682	1.398	0.005	1.4390	127.824	A	0.000	127.824	127.824	100.00	0.000	0.000
						B	0.000	127.824		100.00	0.000	0.000
						C	0.000	127.824		100.00	0.000	21.506
L3 84.750-44.250	64.300	1.21	0.004	1.3542	139.681	A	0.000	139.681	139.681	100.00	0.000	0.000
						B	0.000	139.681		100.00	0.000	0.000
						C	0.000	139.681		100.00	0.000	36.130
L4 44.250-0.000	21.465	1	0.004	1.2500	178.625	A	0.000	178.625	178.625	100.00	0.000	0.000
						B	0.000	178.625		100.00	0.000	0.000
						C	0.000	178.625		100.00	0.000	37.974

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 145.000-130.000	137.364	1.503	0.010	31.731	A	0.000	31.731	31.731	100.00	0.000	0.000
					B	0.000	31.731		100.00	0.000	0.000
					C	0.000	31.731		100.00	0.000	0.000
L2 130.000-84.750	106.682	1.398	0.009	116.971	A	0.000	116.971	116.971	100.00	0.000	0.000
					B	0.000	116.971		100.00	0.000	0.000
					C	0.000	116.971		100.00	0.000	7.547
L3 84.750-44.250	64.300	1.21	0.008	129.968	A	0.000	129.968	129.968	100.00	0.000	0.000
					B	0.000	129.968		100.00	0.000	0.000
					C	0.000	129.968		100.00	0.000	12.818
L4 44.250-0.000	21.465	1	0.006	168.638	A	0.000	168.638	168.638	100.00	0.000	0.000
					B	0.000	168.638		100.00	0.000	0.000
					C	0.000	168.638		100.00	0.000	14.005

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
15	Dead+Wind 0 deg+Ice
16	Dead+Wind 30 deg+Ice
17	Dead+Wind 60 deg+Ice
18	Dead+Wind 90 deg+Ice
19	Dead+Wind 120 deg+Ice
20	Dead+Wind 150 deg+Ice
21	Dead+Wind 180 deg+Ice
22	Dead+Wind 210 deg+Ice
23	Dead+Wind 240 deg+Ice
24	Dead+Wind 270 deg+Ice
25	Dead+Wind 300 deg+Ice
26	Dead+Wind 330 deg+Ice
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
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	145 - 130	Pole	Max Tension	30	0.000	-0.000	0.001
			Max. Compression	14	-6.991	0.723	-0.180
			Max. Mx	5	-2.693	-24.592	-1.305
			Max. My	2	-2.690	1.156	25.107
			Max. Vy	5	4.848	-24.592	-1.305
			Max. Vx	2	-4.888	1.156	25.107
			Max. Torque	3			0.749
L2	130 - 84.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-37.473	1.633	-0.158
			Max. Mx	5	-16.702	-604.627	-5.062
			Max. My	2	-16.709	3.646	604.332
			Max. Vy	5	22.751	-604.627	-5.062
			Max. Vx	2	-22.687	3.646	604.332
			Max. Torque	3			1.190
L3	84.75 - 44.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-50.719	5.479	-2.298
			Max. Mx	5	-24.931	-1593.133	-7.685
			Max. My	2	-24.935	5.130	1590.501
			Max. Vy	5	26.355	-1593.133	-7.685
			Max. Vx	2	-26.291	5.130	1590.501
			Max. Torque	3			1.268
L4	44.25 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-69.720	10.766	-5.340
			Max. Mx	5	-38.217	-2970.872	-10.882
			Max. My	2	-38.217	6.989	2965.425
			Max. Vy	5	29.238	-2970.872	-10.882
			Max. Vx	2	-29.177	6.989	2965.425
			Max. Torque	3			1.336

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	69.720	-0.000	0.000
	Max. H_x	11	38.244	29.133	-0.028
	Max. H_z	2	38.244	0.022	29.140
	Max. M_x	2	2965.425	0.022	29.140
	Max. M_z	5	2970.872	-29.202	-0.054
	Max. Torsion	3	1.336	-14.554	25.303
	Min. Vert	5	38.244	-29.202	-0.054
	Min. H_x	5	38.244	-29.202	-0.054
	Min. H_z	8	38.244	-0.089	-29.087
	Min. M_x	8	-2958.948	-0.089	-29.087
	Min. M_z	11	-2963.606	29.133	-0.028
	Min. Torsion	9	-1.335	14.591	-25.201

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	38.244	0.000	0.000	0.614	1.353	0.000
Dead+Wind 0 deg - No Ice	38.244	-0.022	-29.140	-2965.425	6.989	-1.285
Dead+Wind 30 deg - No Ice	38.244	14.554	-25.303	-2576.484	-1475.915	-1.336
Dead+Wind 60 deg - No Ice	38.244	25.284	-14.589	-1483.092	-2570.652	-0.574
Dead+Wind 90 deg - No Ice	38.244	29.202	0.054	10.882	-2970.872	0.338
Dead+Wind 120 deg - No Ice	38.244	25.240	14.590	1488.513	-2566.665	0.704
Dead+Wind 150 deg - No Ice	38.244	14.584	25.203	2565.581	-1484.292	0.927

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 180 deg - No Ice	38.244	0.089	29.087	2958.948	-13.849	1.101
Dead+Wind 210 deg - No Ice	38.244	-14.591	25.201	2563.055	1484.026	1.335
Dead+Wind 240 deg - No Ice	38.244	-25.257	14.573	1482.086	2569.511	0.582
Dead+Wind 270 deg - No Ice	38.244	-29.133	0.028	2.335	2963.606	-0.330
Dead+Wind 300 deg - No Ice	38.244	-25.161	-14.621	-1491.778	2557.997	-0.526
Dead+Wind 330 deg - No Ice	38.244	-14.547	-25.224	-2567.410	1481.739	-0.934
Dead+Ice	69.720	0.000	-0.000	5.340	10.766	-0.000
Dead+Wind 0 deg+Ice	69.720	-0.009	-8.921	-954.958	12.783	-0.437
Dead+Wind 30 deg+Ice	69.720	4.453	-7.742	-828.485	-467.248	-0.427
Dead+Wind 60 deg+Ice	69.720	7.735	-4.463	-474.690	-821.259	-0.182
Dead+Wind 90 deg+Ice	69.720	8.934	0.017	8.565	-950.779	0.111
Dead+Wind 120 deg+Ice	69.720	7.726	4.468	487.264	-820.545	0.255
Dead+Wind 150 deg+Ice	69.720	4.465	7.719	836.329	-470.178	0.342
Dead+Wind 180 deg+Ice	69.720	0.026	8.907	963.651	6.353	0.388
Dead+Wind 210 deg+Ice	69.720	-4.462	7.716	835.260	490.464	0.425
Dead+Wind 240 deg+Ice	69.720	-7.727	4.459	484.860	841.949	0.183
Dead+Wind 270 deg+Ice	69.720	-8.916	0.004	5.487	969.792	-0.109
Dead+Wind 300 deg+Ice	69.720	-7.706	-4.476	-477.702	839.182	-0.207
Dead+Wind 330 deg+Ice	69.720	-4.456	-7.725	-826.379	490.490	-0.342
Dead+Wind 0 deg - Service	38.244	-0.009	-11.382	-1159.130	3.593	-0.506
Dead+Wind 30 deg - Service	38.244	5.685	-9.884	-1007.151	-576.296	-0.527
Dead+Wind 60 deg - Service	38.244	9.876	-5.699	-579.577	-1004.394	-0.227
Dead+Wind 90 deg - Service	38.244	11.406	0.021	4.644	-1160.820	0.134
Dead+Wind 120 deg - Service	38.244	9.859	5.699	582.471	-1002.837	0.278
Dead+Wind 150 deg - Service	38.244	5.697	9.845	1003.655	-579.575	0.365
Dead+Wind 180 deg - Service	38.244	0.035	11.361	1157.387	-4.561	0.432
Dead+Wind 210 deg - Service	38.244	-5.700	9.844	1002.657	581.180	0.524
Dead+Wind 240 deg - Service	38.244	-9.866	5.693	579.950	1005.657	0.228
Dead+Wind 270 deg - Service	38.244	-11.379	0.011	1.298	1159.680	-0.130
Dead+Wind 300 deg - Service	38.244	-9.829	-5.711	-582.973	1001.153	-0.205
Dead+Wind 330 deg - Service	38.244	-5.682	-9.853	-1003.599	580.290	-0.366

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.000	-38.244	0.000	0.000	38.244	0.000	0.000%
2	-0.022	-38.244	-29.141	0.022	38.244	29.140	0.000%
3	14.554	-38.244	-25.303	-14.554	38.244	25.303	0.000%
4	25.284	-38.244	-14.589	-25.284	38.244	14.589	0.000%
5	29.203	-38.244	0.054	-29.202	38.244	-0.054	0.002%
6	25.240	-38.244	14.590	-25.240	38.244	-14.590	0.000%
7	14.584	-38.244	25.203	-14.584	38.244	-25.203	0.000%
8	0.089	-38.244	29.088	-0.089	38.244	-29.087	0.002%
9	-14.591	-38.244	25.201	14.591	38.244	-25.201	0.000%
10	-25.257	-38.244	14.573	25.257	38.244	-14.573	0.000%
11	-29.133	-38.244	0.028	29.133	38.244	-0.028	0.002%
12	-25.161	-38.244	-14.621	25.161	38.244	14.621	0.000%
13	-14.547	-38.244	-25.224	14.547	38.244	25.224	0.000%
14	0.000	-69.720	0.000	-0.000	69.720	0.000	0.000%
15	-0.009	-69.720	-8.922	0.009	69.720	8.921	0.001%
16	4.453	-69.720	-7.742	-4.453	69.720	7.742	0.000%
17	7.735	-69.720	-4.463	-7.735	69.720	4.463	0.000%
18	8.935	-69.720	0.017	-8.934	69.720	-0.017	0.001%
19	7.726	-69.720	4.468	-7.726	69.720	-4.468	0.000%
20	4.465	-69.720	7.719	-4.465	69.720	-7.719	0.000%
21	0.026	-69.720	8.908	-0.026	69.720	-8.907	0.001%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
22	-4.462	-69.720	7.716	4.462	69.720	-7.716	0.000%
23	-7.728	-69.720	4.459	7.727	69.720	-4.459	0.000%
24	-8.917	-69.720	0.004	8.916	69.720	-0.004	0.001%
25	-7.706	-69.720	-4.476	7.706	69.720	4.476	0.000%
26	-4.456	-69.720	-7.725	4.456	69.720	7.725	0.000%
27	-0.009	-38.244	-11.383	0.009	38.244	11.382	0.003%
28	5.685	-38.244	-9.884	-5.685	38.244	9.884	0.000%
29	9.877	-38.244	-5.699	-9.876	38.244	5.699	0.000%
30	11.407	-38.244	0.021	-11.406	38.244	-0.021	0.003%
31	9.859	-38.244	5.699	-9.859	38.244	-5.699	0.000%
32	5.697	-38.244	9.845	-5.697	38.244	-9.845	0.000%
33	0.035	-38.244	11.362	-0.035	38.244	-11.361	0.002%
34	-5.700	-38.244	9.844	5.700	38.244	-9.844	0.000%
35	-9.866	-38.244	5.693	9.866	38.244	-5.693	0.000%
36	-11.380	-38.244	0.011	11.379	38.244	-0.011	0.003%
37	-9.829	-38.244	-5.711	9.829	38.244	5.711	0.000%
38	-5.682	-38.244	-9.853	5.682	38.244	9.853	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	8	0.00000001	0.00005448
3	Yes	10	0.00000001	0.00008119
4	Yes	10	0.00000001	0.00008438
5	Yes	7	0.00002646	0.00010750
6	Yes	10	0.00000001	0.00008561
7	Yes	10	0.00000001	0.00008249
8	Yes	7	0.00002648	0.00008738
9	Yes	10	0.00000001	0.00008569
10	Yes	10	0.00000001	0.00008251
11	Yes	7	0.00002648	0.00007854
12	Yes	10	0.00000001	0.00008304
13	Yes	10	0.00000001	0.00008552
14	Yes	4	0.00000001	0.00000563
15	Yes	7	0.00010892	0.00004384
16	Yes	8	0.00000001	0.00007094
17	Yes	8	0.00000001	0.00007891
18	Yes	7	0.00010893	0.00002632
19	Yes	8	0.00000001	0.00008212
20	Yes	8	0.00000001	0.00007448
21	Yes	7	0.00010890	0.00003549
22	Yes	8	0.00000001	0.00008780
23	Yes	8	0.00000001	0.00007920
24	Yes	7	0.00010889	0.00002536
25	Yes	8	0.00000001	0.00007831
26	Yes	8	0.00000001	0.00008494
27	Yes	6	0.00009149	0.00012686
28	Yes	8	0.00000001	0.00006856
29	Yes	8	0.00000001	0.00007536
30	Yes	6	0.00009149	0.00008393
31	Yes	8	0.00000001	0.00007737
32	Yes	8	0.00000001	0.00007069
33	Yes	6	0.00009149	0.00009570
34	Yes	8	0.00000001	0.00007915
35	Yes	8	0.00000001	0.00007176
36	Yes	6	0.00009149	0.00007835
37	Yes	8	0.00000001	0.00007207
38	Yes	8	0.00000001	0.00007770

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	145 - 130	36.365	30	1.921	0.004
L2	130 - 84.75	30.341	30	1.914	0.004
L3	89.25 - 44.25	15.069	30	1.557	0.002
L4	49.5 - 0	4.698	30	0.866	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
139.000	VHLP2.5-11	30	33.951	1.923	0.004	76821
133.000	(3) DB844H90E-XY w/ Mount Pipe	30	31.542	1.919	0.004	38173
124.000	APXVTM14-C-120 w/ Mount Pipe	30	27.952	1.894	0.003	15690
122.000	PCS 1900MHz 4x45W-65MHz	30	27.161	1.885	0.003	13489
114.000	LNX-6514DS-T4M w/ Mount Pipe	30	24.036	1.834	0.003	8641
105.000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	30	20.627	1.753	0.002	6152
94.000	Platform Mount [LP 401-1]	30	16.680	1.623	0.002	4550
87.000	742 213	30	14.328	1.524	0.002	3942
77.000	58532A	30	11.232	1.364	0.001	3385

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	145 - 130	92.939	5	4.908	0.011
L2	130 - 84.75	77.550	5	4.891	0.009
L3	89.25 - 44.25	38.532	5	3.982	0.004
L4	49.5 - 0	12.018	5	2.215	0.002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
139.000	VHLP2.5-11	5	86.771	4.912	0.011	30637
133.000	(3) DB844H90E-XY w/ Mount Pipe	5	80.618	4.904	0.010	15222
124.000	APXVTM14-C-120 w/ Mount Pipe	5	71.446	4.841	0.009	6242
122.000	PCS 1900MHz 4x45W-65MHz	5	69.425	4.817	0.008	5364
114.000	LNX-6514DS-T4M w/ Mount Pipe	5	61.442	4.689	0.007	3432
105.000	AM-X-CD-16-65-00T-RET w/ Mount Pipe	5	52.734	4.483	0.006	2440
94.000	Platform Mount [LP 401-1]	5	42.648	4.151	0.005	1801
87.000	742 213	5	36.639	3.898	0.004	1557
77.000	58532A	5	28.726	3.488	0.003	1333

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	145 - 130 (1)	TP26.77x24x0.1875	15.000	0.000	0.0	39.000	15.8199	-2.688	616.977	0.004
L2	130 - 84.75 (2)	TP35.27x26.77x0.25	45.250	0.000	0.0	39.000	27.1176	-16.707	1057.590	0.016
L3	84.75 - 44.25 (3)	TP42.26x33.9247x0.3125	45.000	0.000	0.0	39.000	40.6421	-24.931	1585.040	0.016
L4	44.25 - 0 (4)	TP49.83x40.6625x0.375	49.500	0.000	0.0	39.000	58.8638	-38.217	2295.690	0.017

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	145 - 130 (1)	TP26.77x24x0.1875	25.478	2.944	39.000	0.075	0.000	0.000	39.000	0.000
L2	130 - 84.75 (2)	TP35.27x26.77x0.25	604.759	31.718	39.000	0.813	0.000	0.000	39.000	0.000
L3	84.75 - 44.25 (3)	TP42.26x33.9247x0.3125	1593.150	46.512	39.000	1.193	0.000	0.000	39.000	0.000
L4	44.25 - 0 (4)	TP49.83x40.6625x0.375	2970.892	49.615	39.000	1.272	0.000	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	145 - 130 (1)	TP26.77x24x0.1875	4.919	0.311	26.000	0.024	0.573	0.032	26.000	0.001
L2	130 - 84.75 (2)	TP35.27x26.77x0.25	22.701	0.837	26.000	0.064	0.491	0.013	26.000	0.000
L3	84.75 - 44.25 (3)	TP42.26x33.9247x0.3125	26.355	0.648	26.000	0.050	0.269	0.004	26.000	0.000
L4	44.25 - 0 (4)	TP49.83x40.6625x0.375	29.238	0.497	26.000	0.038	0.338	0.003	26.000	0.000

Pole Interaction Design Data

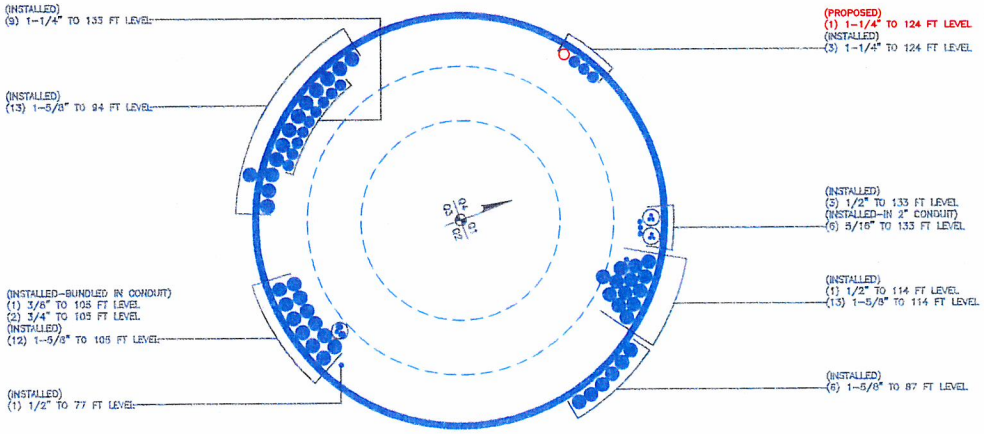
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	145 - 130 (1)	0.004	0.075	0.000	0.024	0.001	0.080 ✔	1.333	H1-3+VT ✔
L2	130 - 84.75 (2)	0.016	0.813	0.000	0.064	0.000	0.830 ✔	1.333	H1-3+VT ✔
L3	84.75 - 44.25 (3)	0.016	1.193	0.000	0.050	0.000	1.209 ✔	1.333	H1-3+VT ✔
L4	44.25 - 0 (4)	0.017	1.272	0.000	0.038	0.000	1.289 ✔	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	145 - 130	Pole	TP26.77x24x0.1875	1	-2.688	822.430	6.0	Pass
L2	130 - 84.75	Pole	TP35.27x26.77x0.25	2	-16.707	1409.767	62.3	Pass
L3	84.75 - 44.25	Pole	TP42.26x33.9247x0.3125	3	-24.931	2112.858	90.7	Pass
L4	44.25 - 0	Pole	TP49.83x40.6625x0.375	4	-38.217	3060.155	96.7	Pass
							Summary	
						Pole (L4)	96.7	Pass
						RATING =	**96.7**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

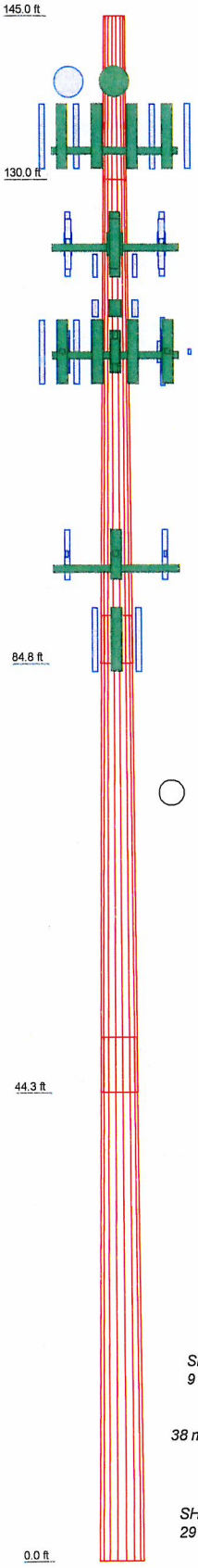


APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4
Length (ft)	15.000	45.250	45.000	49.500
Number of Sides	18	18	16	18
Thickness (in)	0.1875	0.2500	0.3125	0.3750
Socket Length (ft)		4.500	5.250	
Top Dia (in)	24.0000	26.7700	33.9247	40.6625
Bot Dia (in)	26.7700	35.2700	42.2600	49.8300
Grade	A572-65			
Weight (K)	0.8	3.8	5.7	9.0

Total Weight (K): 19.3



AXIAL
70 K

SHEAR
9 K

MOMENT
972 kip-ft

TORQUE 0 kip-ft
38 mph WIND - 1.2500 in ICE

AXIAL
38 K

SHEAR
29 K

MOMENT
2971 kip-ft

TORQUE 1 kip-ft
REACTIONS - 80 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(3) DB844H90E-XY w/ Mount Pipe	133	(2) FD9R6004/2C-3L	114
(3) DB844H90E-XY w/ Mount Pipe	133	(2) FD9R6004/2C-3L	114
(3) DB844H90E-XY w/ Mount Pipe	133	RRH2x40-AWS	114
HORIZON COMPACT	133	RRH2x40-AWS	114
HORIZON COMPACT	133	RRH2x40-AWS	114
840 10054 w/ Mount Pipe	133	KS24019-L112A	114
840 10054 w/ Mount Pipe	133	DB-T1-6Z-8AB-0Z	114
840 10054 w/ Mount Pipe	133	Platform Mount [LP 401-1]	114
TIMING 2000	133	LNX-6514DS-T4M w/ Mount Pipe	114
WIMAX DAP HEAD	133	800 10735 K w/ Mount Pipe	114
WIMAX DAP HEAD	133	AM-X-CD-16-65-00T-RET w/ Mount Pipe	105
WIMAX DAP HEAD	133	(2) 7770.00 w/ Mount Pipe	105
Platform Mount [LP 401-1]	133	(2) 7770.00 w/ Mount Pipe	105
VHLP2.5-11	133	(2) 7770.00 w/ Mount Pipe	105
VHLP2.5-11	133	(2) RRUS-11	105
APXVTM14-C-120 w/ Mount Pipe	124	(2) RRUS-11	105
TD-RRH8x20-25	124	(2) RRUS-11	105
TD-RRH8x20-25	124	(2) LGP2140X	105
TD-RRH8x20-25	124	(2) LGP2140X	105
Platform Mount [LP 401-1]	124	(2) LGP2140X	105
6'x2" Pipe Mount	124	DC6-48-60-18-8F	105
6'x2" Pipe Mount	124	6'x2" Pipe Mount	105
6'x2" Pipe Mount	124	6'x2" Pipe Mount	105
APXVSPP18-C-A20 w/ Mount Pipe	124	6'x2" Pipe Mount	105
APXVSPP18-C-A20 w/ Mount Pipe	124	Platform Mount [LP 303-1]	105
APXVSPP18-C-A20 w/ Mount Pipe	124	AM-X-CD-16-65-00T-RET w/ Mount Pipe	105
IBC1900BB-1	124	AM-X-CD-16-65-00T-RET w/ Mount Pipe	105
IBC1900BB-1	124	(2) 6'x2" Pipe Mount	94
IBC1900BB-1	124	(2) 6'x2" Pipe Mount	94
IBC1900HG-2A	124	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	94
IBC1900HG-2A	124		
IBC1900HG-2A	124	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	94
APXVTM14-C-120 w/ Mount Pipe	124		
APXVTM14-C-120 w/ Mount Pipe	124	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	94
PCS 1900MHz 4x45W-65MHz	122		
800MHz 2X50W RRH W/FILTER	122	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	94
800MHz 2X50W RRH W/FILTER	122		
800MHz 2X50W RRH W/FILTER	122	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	94
Pipe Mount [PM 601-3]	122		
PCS 1900MHz 4x45W-65MHz	122	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	94
PCS 1900MHz 4x45W-65MHz	122		
LNX-6514DS-T4M w/ Mount Pipe	114	KRY 112 144/1	94
BXA-185063/8CF w/ Mount Pipe	114	KRY 112 144/1	94
BXA-185063/8CF w/ Mount Pipe	114	KRY 112 144/1	94
BXA-185063/8CF w/ Mount Pipe	114	Platform Mount [LP 401-1]	94
BXA-80063/4CFx5 w/ Mount Pipe	114	(2) 6'x2" Pipe Mount	94
BXA-80063/4CFx5 w/ Mount Pipe	114	742 213	87
BXA-80063/4CFx5 w/ Mount Pipe	114	Pipe Mount [PM 601-3]	87
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	114	742 213	87
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	114	742 213	87
BXA-171063/8CF-EDIN-2 w/ Mount Pipe	114	58532A	77
(2) FD9R6004/2C-3L	114	Side Arm Mount [SO 701-1]	77

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 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: 96.7%

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

Job: 145-Ft Monopole; Newington; Newington, CT			
Project: PJF# 37513-2220_R1; BU# 881364			
Client: Crown Castle	Drawn by: Lohengri Gimeno	App'd:	
Code: TIA/EIA-222-F	Date: 05/14/14	Scale: NTS	
Path: T:\375_Crown_Castle\2013\37513-2220 BU 881364\WO 758924 BU 881364 (7606)\37513-2220_R1.er		Dwg No. E-1	

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

Site Data

BU#: *881364*
Site Name: *Newington*
App #:

Pole Manufacturer:	Other

Bolt Data			
Qty:	18		
Diameter (in.):	0.75	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	Bolt Fty: 44.00
N/A:	55	<-- Disregard	
Circle (in.):	30		

Plate Data		
Diam:	34	in
Thick, t:	1.5	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.72	in

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

Pole Data		
Diam:	26.77	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	25.478	ft-kips
Axial:	2.688	kips
Shear:	4.919	kips
Elevation:	130	feet

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

Flange Bolt Results

		Rigid
Bolt Tension Capacity, B:	25.91 kips	Service, ASD
Max Bolt directly applied T:	2.12 Kips	Fty*ASIF
Min. PL "tc" for B cap. w/o Pry:	1.071 in	
Min PL "treq" for actual T w/ Pry:	0.226 in	
Min PL "t1" for actual T w/o Pry:	0.306 in	
T allowable w/o Prying:	25.91 kips	α'<0 case
Prying Force, Q:	0.00 kips	
Total Bolt Tension=T+Q:	2.12 kips	
Non-Prying Bolt Stress Ratio, T/B:	8.2% Pass	

Exterior Flange Plate Results Flexural Check

		Rigid
Compression Side Plate Stress:	1.4 ksi	Service ASD
Allowable Plate Stress:	36.0 ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	3.9% Pass	Comp. Y.L. Length:
No Prying		13.54
Tension Side Stress Ratio, (treq/t)^2:	2.3% Pass	

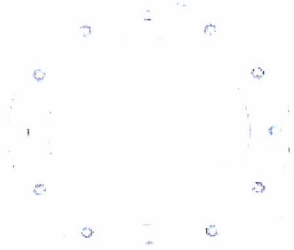
n/a

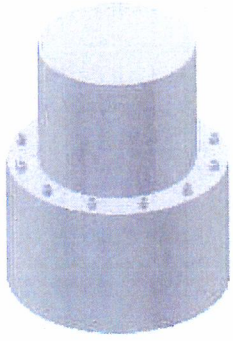
Stiffener Results

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

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

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

Site Data

BU#: *881364*
Site Name: *Newington*
App #:

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	57	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	56	in
Thick:	3	in
Grade:	50	ksi
Clip Distance:	16	in

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
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

Pole Data		
Diam:	49.83	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	2971	ft-kips
Unfactored Axial, P:	38	kips
Unfactored Shear, V:	29	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	154.0 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	79.0% Pass

Base Plate Results Flexural Check

Base Plate Stress:	39.4 ksi
Allowable PL Bending Stress:	50.0 ksi
Base Plate Stress Ratio:	78.9% Pass

PL Ref. Data
Yield Line (in): 29.37
Max PL Length: 29.37

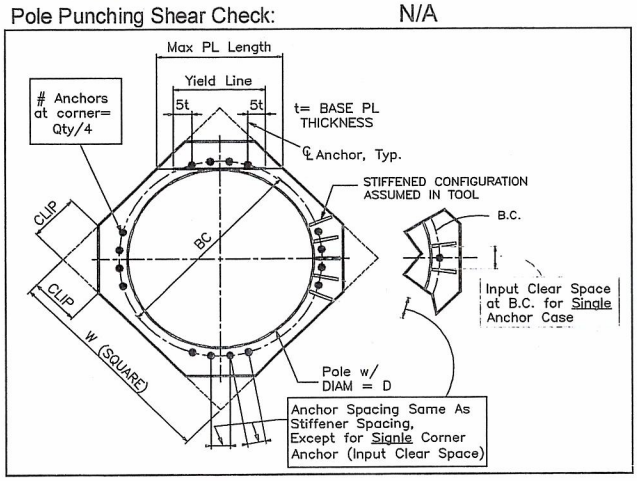
N/A - Unstiffened

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



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

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

Job Number: 37513-2220_R1
Site Number: BU 881364
Site Name: Newington

By: lgr
Date: 5/14/2014

DRILLED PIER SOIL AND STEEL ANALYSIS - TIA/EIA-222-F

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	2971.0		k-ft
Shear, V =	29.0		kips
Axial Load, P =	38.0		kips
OTM =	2985.5	0.0	k-ft @ Ground

Safety Factors / Load Factors / Φ Factors

Tower Type =	Monopole DP
ACI Code =	ACI 318-02
Seismic Design Category =	D
Reference Standard =	TIA/EIA-222-F
Use 1.3 Load Factor?	Yes
Load Factor =	1.30

Drilled Pier Parameters

Diameter =	7 ft
Height Above Grade =	0.5 ft
Depth Below Grade =	25 ft
fc' =	3 ksi
εc =	0.003 in/in
Mat Ftdn. Cap Width =	ft
Mat Ftdn. Cap Length =	ft
Depth Below Grade =	ft

	Safety Factor	Φ Factor
Soil Lateral Resistance =	2.00	0.75
Skin Friction =	2.00	0.75
End Bearing =	2.00	0.75
Concrete Wt. Resist Uplift =	1.25	

Load Combinations Checked per TIA/EIA-222-F

1. Ult. Skin Friction/2.00 + Ult. End Bearing/2.00
+ Effective Soil Wt. - Buoyant Conc. Wt. ≥ Comp.
2. Ult. Skin Friction/2.00 + Buoyant Conc. Wt./1.25 ≥ Uplift
3. Ult. Skin Friction/1.50 + Buoyant Conc. Wt./1.50 ≥ Uplift

Steel Parameters

Number of Bars =	28
Rebar Size =	#11
Rebar Fy =	60 ksi
Rebar MOE =	29000 ksi
Tie Size =	#5
Side Clear Cover to Ties =	4 in

Soil Parameters

Water Table Depth =	10.00 ft
Depth to Ignore Soil =	3.50 ft
Depth to Full Cohesion =	0 ft
Full Cohesion Starts at?	Ground

Above Full Cohesion Lateral Resistance = 4(Cohesion)(Dia)(H)
Below Full Cohesion Lateral Resistance = 8(Cohesion)(Dia)(H)

Direct Embed Pole Shaft Parameters

Dia @ Grade =	in
Dia @ Depth Below Grade =	in
Number of Sides =	
Thickness =	in
Fy =	ksi
Backfill Condition =	

Maximum Capacity Ratios

Maximum Soil Ratio =	100.0%
Maximum Steel Ratio =	100.0%

Define Soil Layers

Note: Cohesion = Undrained Shear Strengh = Unconfined Compressive Strength / 2

Layer	Thickness ft	Unit Weight pcf	Cohesion psf	Friction Angle degrees	Soil Type	Ultimate End Bearing psf	Comp. Ult. Skin Friction psf	Tension Ult. Skin Friction psf	Depth ft
1	12	125		34	Sand				12
2	16	125		30	Sand	12000			28
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	16.90	ft, from Grade
Bending Moment, M =	3475.58	k-ft, from COR
Resisting Moment, Ma =	5180.94	k-ft, from COR

MOMENT RATIO = 67.1% OK

Shear, V =	29.00	kips
Resisting Shear, Va =	43.23	kips

SHEAR RATIO = 67.1% OK

Soil Results: Uplift

Uplift, T =	0.00	kips
Allowable Uplift Cap., Ta =	88.95	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, C =	38.00	kips
Allowable Comp. Cap., Ca =	203.97	kips

COMPRESSION RATIO = 18.6% OK

Steel Results (ACI 318-02):

Minimum Steel Area =	18.47	sq in
Actual Steel Area =	43.68	sq in
Allowable Min Axial, Pa =	-1814.40	kips, Where Ma = 0 k-ft
Allowable Max Axial, Pa =	6656.37	kips, Where Ma = 0 k-ft

Axial Load, P =	69.75	kips @ 5.00 ft Below Grade
Moment, M =	3116.49	k-ft @ 5.00 ft Below Grade
Allowable Moment, Ma =	5187.51	k-ft

MOMENT RATIO = 60.1% OK

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *BU 881364*
Site Name: *Newington*
App #:

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties

Concrete:

Pier Diameter =	7.0	ft
Concrete Area =	5541.8	in^2

Reinforcement:

Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	6.11	ft
Vert. Cage Diameter =	73.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	28	
As Total=	43.68	in^2
A s/ Aconc, Rho:	0.0079	0.79%

ACI 10.5 , ACI 21.10.4, and IBC 1810.

Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.79%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	8653.28	kips
at Mu=(ϕ=0.65)Mn=	5213.79	ft-kips
Max Tu, (φ=0.9) Tn =	2358.72	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	3116.49	ft-kips (* **Note**)
Max. Service Shaft P:	69.75	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	**Shaft Factored Loads**		
1.30	Mu:	4051.437	ft-kips
1.30	Pu:	90.675	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code= 2002

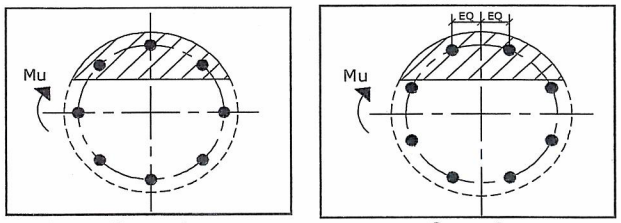
Seismic Properties

Seismic Design Category = D
Seismic Risk = **High**

Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **2**



Case 1 Case 2

Dist. From Edge to Neutral Axis: **16.14** in
Extreme Steel Strain, εt: **0.0116**
εt > 0.0050, Tension Controlled
Reduction Factor,φ: **0.900**

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	90.68	kips
Drilled Shaft Moment Capacity, φMn:	**6743.76**	ft-kips
Drilled Shaft Superimposed Mu:	**4051.44**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR: 60.1%

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support@csquaredsystems.com

Calculated Radio Frequency Emissions

at&t

CT1108 (Newington 3)

123 Costello Road, Newington, CT

April 20, 2012

Table of Contents

List of Tables

List of Figures

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed modifications to the existing AT&T antenna arrays mounted on the monopole tower located at 123 Costello Road in Newington, CT. The coordinates of the tower are: 41°39'18.72"N, 72° 43'17.19"W.

AT&T is proposing the following modifications:

1) Install three new panel antennas for LTE

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{1.6^2 \times EIRP}{4\pi \times R^2} \right) \text{x Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and power, and that all channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the finished modifications.

4. Calculation Results

Table 1 below outlines the power density information for the site. Because the proposed AT&T antennas are directional in nature, the majority of the RF power is focused out towards the horizon. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to Attachment C for the vertical pattern of the proposed AT&T antennas. The calculated results for AT&T in Table 1 include a nominal 10 dB off-beam pattern loss to account for the lower relative gain below the antennas.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	%MPE
Cingular UMTS	*105*	*1935*	*1*	*500*	*0.0163*	*1.0000*	*1.63%*
Cingular	*105*	*880*	*2*	*296*	*0.0193*	*0.5867*	*3.29%*
Cingular	*105*	*1930*	*2*	*427*	*0.0279*	*1.0000*	*2.79%*
Verizon	114	869	9	326	0.0812	0.5793	14.01%
Verizon	114	1970	3	451	0.0374	1.0000	3.74%
Verizon	114	757	1	848	0.0235	0.5047	4.65%
Pocket	87	2130	3	631	0.0899	1.0000	8.99%
Clearwire	133	2496	2	153	0.0062	1.0000	0.62%
Clearwire	133	11 GHz	1	211	0.0043	1.0000	0.43%
Sprint	125	1962.5	11	250	0.0633	1.0000	6.33%
Nextel	135	851	9	100	0.0178	0.5673	3.13%
T-Mobile GSM	95	1945	8	120	0.0382	1.0000	3.82%
T-Mobile UMTS	95	2100	2	677	0.0539	1.0000	5.39%
AT&T UMTS	105	880	2	565	0.0037	0.5867	0.63%
AT&T UMTS	105	1900	2	875	0.0057	1.0000	0.57%
AT&T LTE	105	734	1	1313	0.0043	0.4893	0.88%
AT&T GSM	105	880	1	283	0.0009	0.5867	0.16%
AT&T GSM	105	1900	4	525	0.0068	1.0000	0.68%
						Total	54.0%

Table 1: Carrier Information[1,2]

[1] The existing CSC filing for Cingular should be removed and replaced with the updated AT&T technologies and values provided in Table 1. The power density information for carriers other than AT&T was taken directly from the CSC database dated 1/10/2012. Please note that %MPE values listed are rounded to two decimal points. The total %MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not identically match the total value reflected in the table.

[2] In the case where antenna models are not uniform across all 3 sectors for the same frequency band, the antenna model with the highest gain was used for the calculations to present a worse-case scenario.

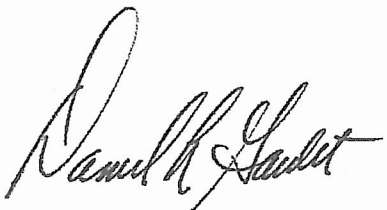
5. Conclusion

The above analysis verifies that emissions from the existing site will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed transmit antennas at the existing facility is well below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at ground level is **54.0% of the FCC limit**.

As noted previously, obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the finished modifications.

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.



Daniel L. Goulet
C Squared Systems, LLC

April 20, 2012
Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure[3]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $|E|^2$, $|H|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure[4]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $|E|^2$, $|H|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 2: FCC Limits for Maximum Permissible Exposure (MPE)

[3] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure

[4] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

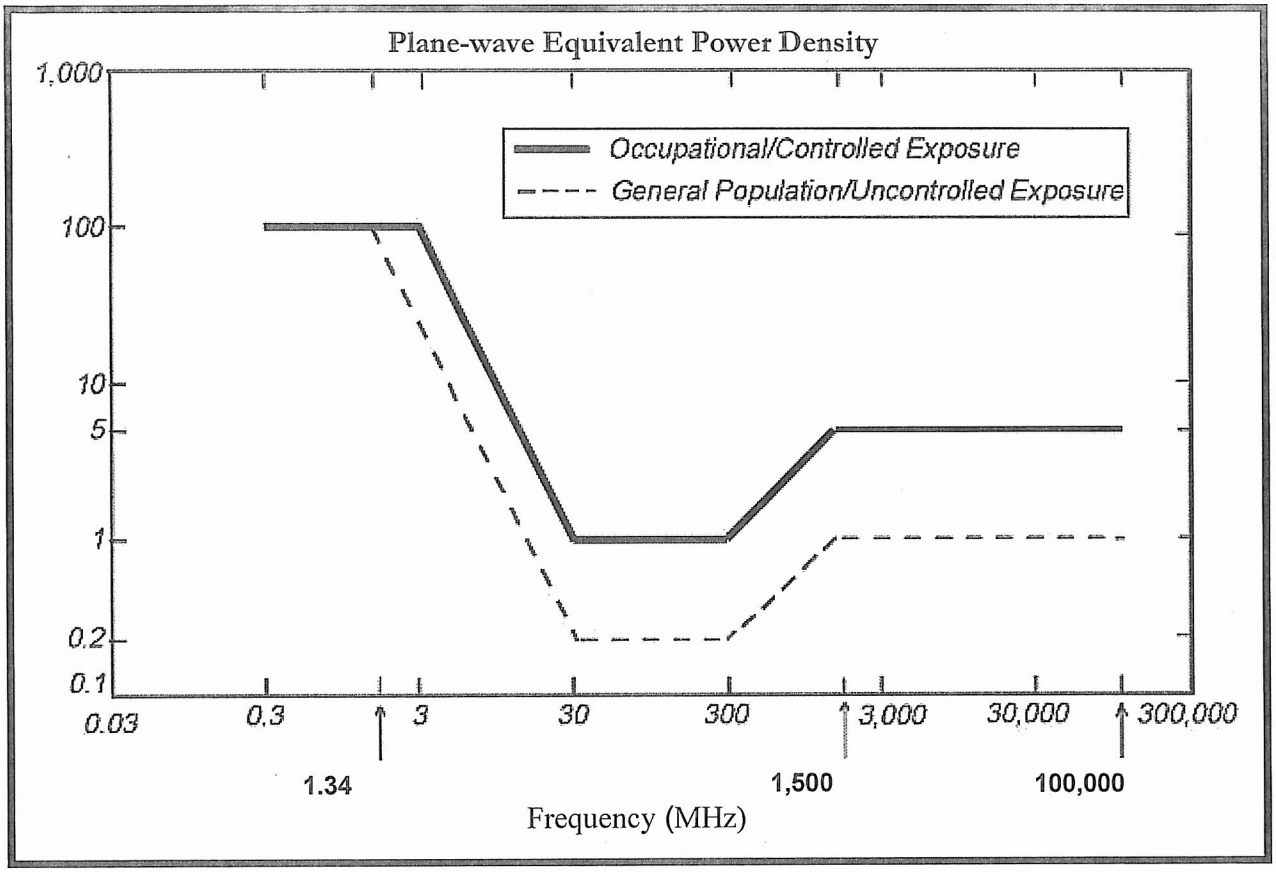
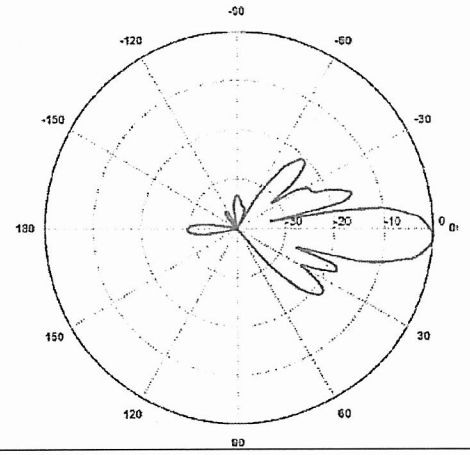


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: AT&T Antenna Data Sheets and Electrical Patterns

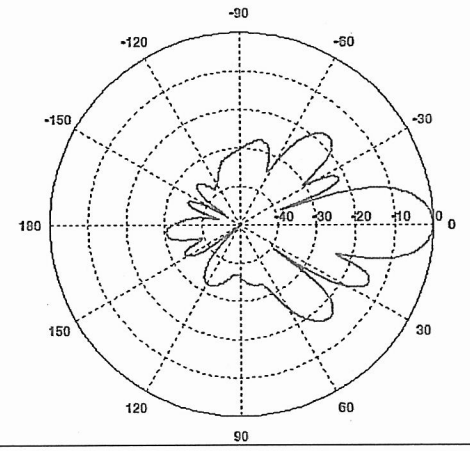
700 MHz

Manufacturer:	KMW
Model #:	AM-X-CD-16-65-00T
Frequency Band:	698-806 MHz
Gain:	13.4 dBd
Vertical Beamwidth:	12.3°
Horizontal Beamwidth:	65°
Polarization:	Dual Linear ±45°
Size L x W x D:	72"×11.8"×5.9"



850 MHz

Manufacturer:	Powerwave
Model #:	7770.00
Frequency Band:	824-896 MHz
Gain:	11.4 dBd
Vertical Beamwidth:	15°
Horizontal Beamwidth:	85°
Polarization:	Dual Linear ±45°
Size L x W x D:	55.4" x 11.0" x 5.0"



1900 MHz

Manufacturer:	Powerwave
Model #:	7770.00
Frequency Band:	1850-1990 MHz
Gain:	13.4 dBd
Vertical Beamwidth:	7°
Horizontal Beamwidth:	90°
Polarization:	Dual Linear ±45°
Size L x W x D:	55.4" x 11.0" x 5.0"