HPC Wireless Services
46 Mill Plain Rd.
EM-CING-066-121018

HPC WIRELESS SERVICES

October 16, 2012

RECEIVED
OCT 18 2012
CONNECTICUT
SITING COUNCIL

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
64 Hungerford Lane, Harwinton, 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 Section 16-50j-73 of the Regulations of Connecticut State Agencies ("R.S.C.A."), 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 First Selectman of the Town of Harwinton.

AT&T plans to modify the existing wireless communications facility owned by Crown Castle and located at 64 Hungerford Lane, Harwinton (coordinates 41°-45-26.2" N, 73°-03'-9.7" 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 remove and replace existing mounts, relocate six (6) existing UMTS/GSM antennas and mounts, add three (3) LTE panel antennas and one (1) surge arrestor to new mounts behind the LTE antennas at a center line height of approximately 158'. Six (6) RRHS (remote radio units) will be mounted to new side arms at a centerline

height of approximately 154'. AT&T will also place a DC power and fiber run from the equipment to the antennas along the existing coaxial cable run. These changes will not extend the height of the approximately 178' structure.

2. AT&T will place related equipment in the existing equipment shelter located on the existing concrete pad, and will also mount a new GPS antenna to the existing ice bridge post. 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 (6) 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 1.29%; the combined site operations will result in a total power density of approximately 20.65%.

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.

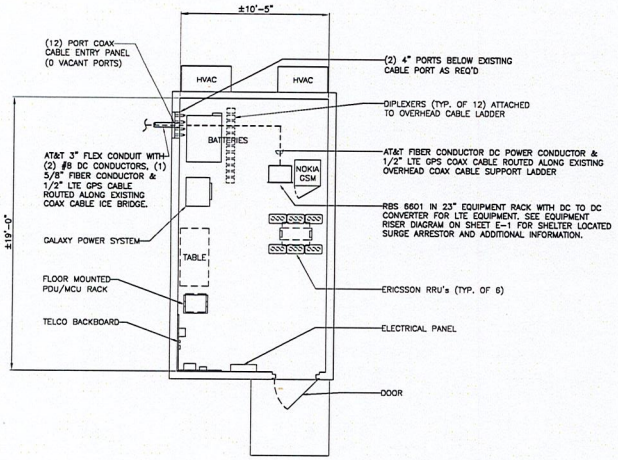
Respectfully yours,

Jennifer Young Gaudet

Jennifer Young Gaudet

Attachments

cc: Honorable Michael R. Criss, First Selectman, Town of Harwinton
Upper Buckley Broad Casting Corp of Connecticut (underlying property owner)



2/C-1 EQUIPMENT BUILDING FLOOR PLAN

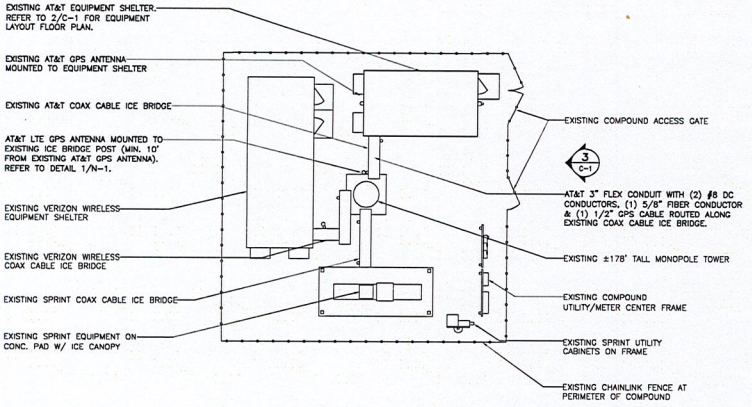
SCALE: 1/4" = 1'-0"

APPROX. NORTH

GRAPHIC SCALE

4 0 2 4 8 16

(IN FEET)
1 inch = 4 ft.



1/C-1 COMPOUND PLAN

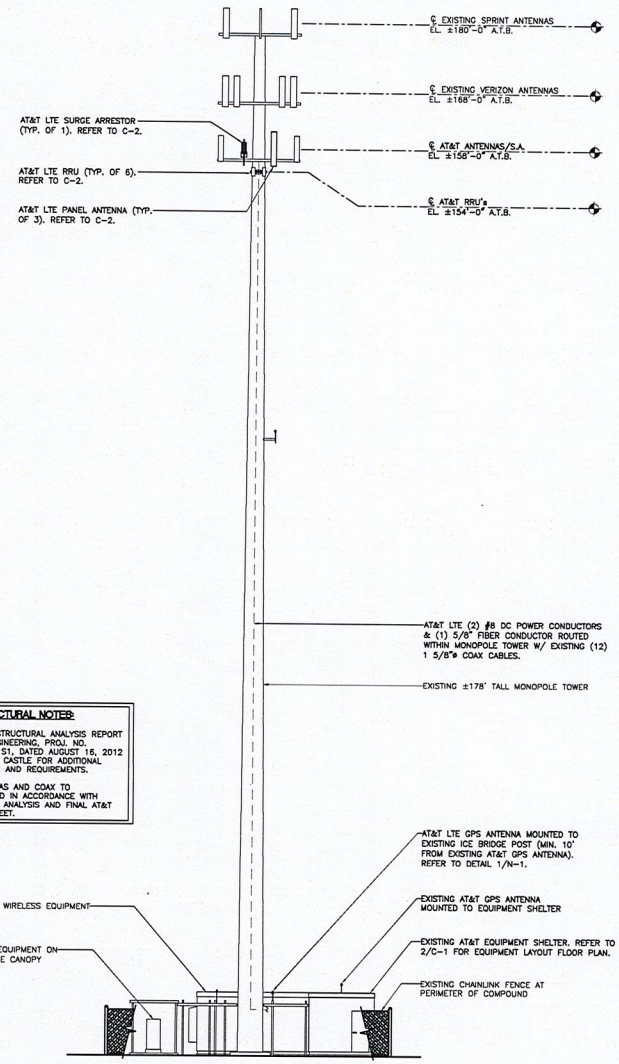
SCALE: 1" = 10'-0"

APPROX. NORTH

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.



TOWER STRUCTURAL NOTES:

1. REFER TO STRUCTURAL ANALYSIS REPORT BY FDH ENGINEERING, PROJ. NO. 12-08387E S1, DATED AUGUST 16, 2012 FOR CROWN CASTLE FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS AND FINAL AT&T RF DATA SHEET.

3/C-1 EAST ELEVATION

SCALE: 1" = 10'-0"

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.

DESIGNED BY:	HMR
DRAWN BY:	HMR
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	
2	10/8/12	HMR	DEB	CONSTRUCTION – CLIENT REVIEW
1	10/3/12	CLT	DEB	CONSTRUCTION – CLIENT REVIEW
0	08/15/12	CLT	DEB	CONSTRUCTION – CLIENT REVIEW

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(203) 488-8587 Fax
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Branford, CT 06405
www.CentekEng.com

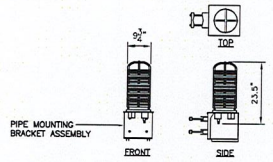
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY LTE UPGRADE
CT1178
CROWN SITE # 876369
HARWINTON - HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

DATE:	10/8/12
SCALE:	AS NOTED
JOB NO.	12063.C029

PLANS AND ELEVATION

C-1

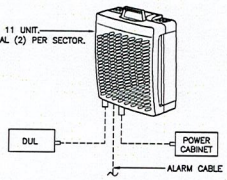
Sheet No. 3 of 6



SITE TYPE	ARRESTOR MAKE/MODEL	QTY REQUIRED	ARRESTOR LOCATION	WEIGHT
	MAKE: RAYCAP (SQUID) MODEL: DC6-48-60-18-8F	(1) PER SITE	TOWER, ADJACENT TO AT&T ANTENNAS AND RRUs.	20 LBS. (WITHOUT MOUNT)

NOTES:
1. CONTRACTOR TO COORDINATE FINAL SURGE ARRESTOR MODEL SELECTION(S) WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.
2. CONTRACTOR TO INSTALL ARRESTOR IN CONFORMANCE WITH MANUFACTURERS RECOMMENDATIONS.

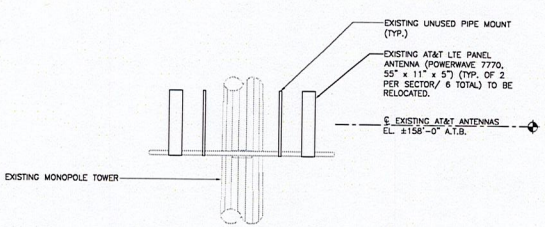
7 C-2 SURGE ARRESTOR DETAIL
NOT TO SCALE



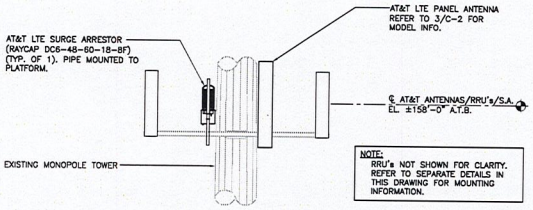
RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRUS 11	17.8"L x 17.3"W x 7.2"D	BAND 4: 44 LBS. BAND 12: 50 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. SIDE: 0" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

8 C-2 RRU DETAIL
NOT TO SCALE



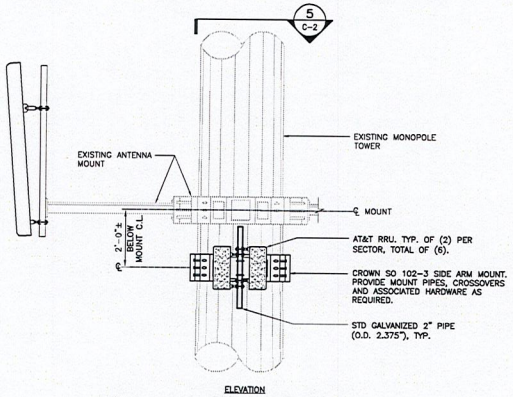
2 C-2 EXISTING ANTENNA SECTOR ELEVATION
SCALE: 1/4" = 1'-0"



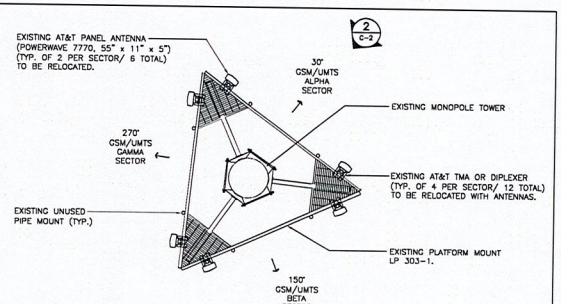
4 C-2 PROPOSED LTE ANTENNA SECTOR ELEVATION
SCALE: 1/4" = 1'-0"

NOTE:
1. REFER TO CROWN CASTLE AND FINAL AT&T RF DATA SHEET PRIOR TO INSTALLATION OF TOWER MOUNTED LTE RELATED ANTENNAS, CABLES AND RELATED EQUIPMENT.
2. COORDINATE ANTENNA CENTERLINE ELEVATION, RRU/SURGE ARRESTOR MOUNTING ELEVATION, ATTACHMENT HARDWARE WITH CROWN CASTLE.

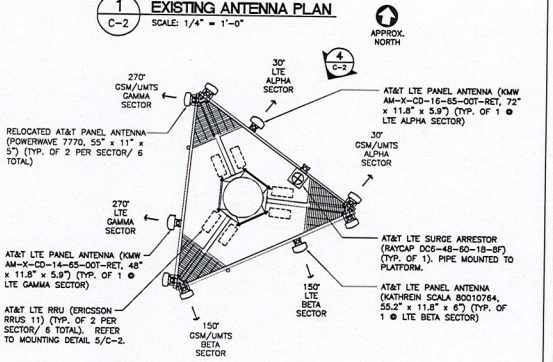
NOTES:
1. PROVIDE MOUNTING PIPES, CROSSOVERS & ASSOCIATED HARDWARE TO COMPLETE THE PROPOSED UPGRADE.



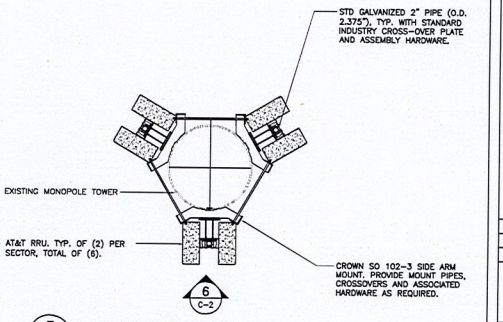
6 C-2 RRU MOUNTING DETAIL
NOT TO SCALE



1 C-2 EXISTING ANTENNA PLAN
SCALE: 1/4" = 1'-0"



3 C-2 PROPOSED ANTENNA PLAN
SCALE: 1/4" = 1'-0"
APPROX. NORTH



5 C-2 RRU MOUNTING PLAN
NOT TO SCALE

DESIGNED BY:	HMR
DRAWN BY:	HMR
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	
2	10/8/12	SMR	DEB	CONSTRUCTION - CLIENT REVIEW
1	10/5/12	SMR	DEB	CONSTRUCTION - CLIENT REVIEW
0	08/17/12	KS1	DEB	CONSTRUCTION - CLIENT REVIEW

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at&t

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HARWINTON - HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

DATE:	10/8/12
SCALE:	AS NOTED
JOB NO.	12063.0029

LTE EQUIPMENT DETAILS

C-2

Sheet No. 4 of 6

Date: **August 16, 2012**

Eva Morales
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

FDH Engineering, Inc
6521 Meridien Drive
Raleigh, NC 27616
(919) 755-1012

Subject: **Structural Analysis Report**

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT1178
	Carrier Site Name:	HARWINTON-64 HUNGERFORD LANE
Crown Castle Designation:	**Crown Castle BU Number:**	876369
	Crown Castle Site Name:	HARWINTON / BUCKLEY BROADCASTI
	Crown Castle JDE Job Number:	199133
	Crown Castle Work Order Number:	518602
	Crown Castle Application Number:	157861 Rev. 2
Engineering Firm Designation:	**FDH Engineering, Inc Project Number:**	12-08387E S1
Site Data:	**64 Hungerford Lane, Harwinton, Litchfield County, CT** **Latitude *41° 45' 26.15"*, Longitude *-73° 3' 9.2"*** **178 Foot - Monopole Tower**	

Dear Eva Morales,

FDH Engineering, Inc 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 481007, in accordance with application 157861, revision 2.

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

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

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code and based upon a wind speed of 80 mph fastest mile.

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

We at *FDH Engineering, Inc* 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:

Will Hammond, EI
Project Engineer

Reviewed by:

Christopher M. Murphy

Christopher M. Murphy,PE
President
CT PE License No. 25842

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 178 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in April of 2001. The tower was originally designed for a wind speed of 85 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, 28.1 mph with 1 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
156.0	158.0	1	kathrein	800 10764 w/ Mount Pipe	3	3/8	-
		1	kmw communications	AM-X-CD-14-65-00T-RET w/ Mount Pipe			
		1	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
154.0	154.0	1	crown mounts	Side Arm Mount [SO 102-3]	-	-	-
		6	ericsson	RRUS-11			

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
178.0	180.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	3	1-1/4	2
		9	rfs celwave	ACU-A20-N			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
	178.0	1	crown mounts	Platform Mount [LP 712-1]	-	-	1
176.0	176.0	3	alcatel lucent	1900MHz RRH (25MHz)	-	-	2
		3	alcatel lucent	800MHZ RRH			
		1	crown mounts	Side Arm Mount [SO 102-3]			
166.0	168.0	3	antel	BXA-171085-12BF-2 w/ Mount Pipe	-	-	2
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		6	antel	LPA-80080/6CF w/ Mount Pipe	12	1-5/8	1
	166.0	1	crown mounts	Platform Mount [LP 303-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
156.0	158.0	6	powerwave technologies	7770.00 w/ Mount Pipe	12	1-5/8	1
		12	powerwave technologies	LGP2140X			
	156.0	1	crown mounts	Platform Mount [LP 303-1]			
75.0	76.0	1	lucent	KS24019-L112A	1	1/2	1
	75.0	1	crown mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
178	178	12	DAPA	48000	-	-
168	168	12	DAPA	48000	-	-
158	158	12	DAPA	48000	-	-
148	148	12	DAPA	48000	-	-
138	138	12	DAPA	48000	-	-
128	128	12	DAPA	48000	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E., P.C. dated 3/29/01	1532983	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEI dated 4/17/01	2150286	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEI dated 4/16/01	2150280	CCISITES

3.1) Analysis Method

tnxTower (version 6.0.4.0), 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. FDH Engineering, Inc 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	178 - 129.87	Pole	TP29.64x19.5x0.25	1	-8.87	1175.45	74.1	Pass
L2	129.87 - 84.8307	Pole	TP38.5x28.2446x0.375	2	-16.38	2290.41	74.8	Pass
L3	84.8307 - 41.2839	Pole	TP46.8x36.6403x0.4375	3	-26.89	3250.65	73.5	Pass
L4	41.2839 - 0	Pole	TP54.5x44.5913x0.5	4	-42.62	4455.18	68.5	Pass
							Summary	
						Pole (L2)	74.8	Pass
						RATING =	**74.8**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	64.1	Pass
1	Base Plate	0	76.0	Pass
1	Base Foundation	0	52.1	Pass

Structure Rating (max from all components) =	**74.8%**

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

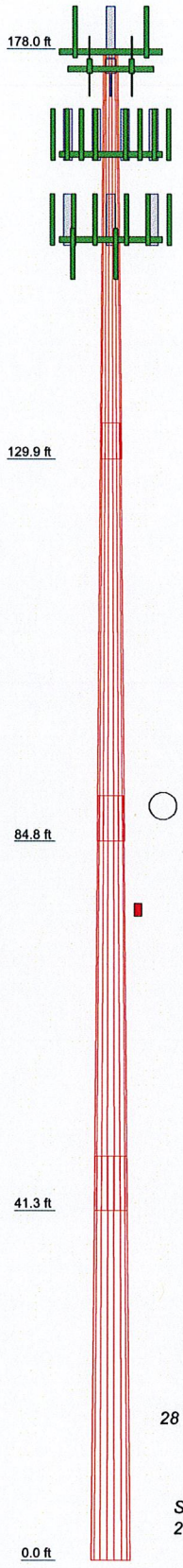
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4
Length (ft)	48.13	49.29	48.88	47.70
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3750	0.4375	0.5000
Socket Length (ft)	4.25	5.33	6.42	
Top Dia (in)	19.5000	28.2446	36.6403	44.5913
Bot Dia (in)	29.6400	38.5000	46.8000	54.5000
Grade	A572-65			
Weight (K)	3.2	6.6	9.5	12.6



AXIAL
61 K
SHEAR
4 K
MOMENT
601 kip-ft
TORQUE 0 kip-ft
28 mph WIND - 1.0000 in ICE
AXIAL
43 K
SHEAR
26 K
MOMENT
3336 kip-ft
TORQUE 1 kip-ft
REACTIONS - 80 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
800 EXTERNAL NOTCH FILTER	178	BXA-70063-6CF-2 w/ Mount Pipe	166
(3) ACU-A20-N	178	BXA-70063-6CF-2 w/ Mount Pipe	166
APXVSPP18-C-A20 w/ Mount Pipe	178	BXA-70063-6CF-2 w/ Mount Pipe	166
800 EXTERNAL NOTCH FILTER	178	(2) FD9R6004/2C-3L	166
800 EXTERNAL NOTCH FILTER	178	(2) FD9R6004/2C-3L	166
(3) ACU-A20-N	178	(2) FD9R6004/2C-3L	166
(3) ACU-A20-N	178	Platform Mount [LP 303-1]	166
APXVSPP18-C-A20 w/ Mount Pipe	178	(2) 7770.00 w/ Mount Pipe	156
APXVSPP18-C-A20 w/ Mount Pipe	178	(4) LGP2140X	156
(3) Empty Mount Pipe	178	(2) 7770.00 w/ Mount Pipe	156
(3) Empty Mount Pipe	178	(4) LGP2140X	156
(3) Empty Mount Pipe	178	(2) 7770.00 w/ Mount Pipe	156
Platform Mount [LP 712-1]	178	(4) LGP2140X	156
1900MHz RRH (25MHz)	176	Platform Mount [LP 303-1]	156
800MHZ RRH	176	Empty Mount Pipe	156
1900MHz RRH (25MHz)	176	Empty Mount Pipe	156
1900MHz RRH (25MHz)	176	Empty Mount Pipe	156
800MHZ RRH	176	AM-X-CD-16-65-00T-RET w/ Mount Pipe	156
800MHZ RRH	176		
Side Arm Mount [SO 102-3]	176	800 10764 w/ Mount Pipe	156
(2) Empty Mount Pipe	176	DC6-48-60-18-8F	156
(2) Empty Mount Pipe	176	AM-X-CD-14-65-00T-RET w/ Mount Pipe	156
(2) Empty Mount Pipe	176		
(2) LPA-80080/6CF w/ Mount Pipe	166	(2) RRUS-11	154
(2) LPA-80080/6CF w/ Mount Pipe	166	(2) RRUS-11	154
(2) LPA-80080/6CF w/ Mount Pipe	166	(2) RRUS-11	154
BXA-171085-12BF-2 w/ Mount Pipe	166	Side Arm Mount [SO 102-3]	154
BXA-171085-12BF-2 w/ Mount Pipe	166	KS24019-L112A	75
BXA-171085-12BF-2 w/ Mount Pipe	166	Side Arm Mount [SO 701-1]	75

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Litchfield 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 28 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 74.8%

FDH Engineering, Inc
6521 Meridien Drive
Raleigh, NC 27616
Phone: (919) 755-1012
FAX: (919) 755-1031
Consulting Engineers

Job: BU: 876369			
Project: 12-08387ES1			
Client: Crown Castle	Drawn by: Will Hammond	App'd:	
Code: TIA/EIA-222-F	Date: 08/16/12	Scale: NTS	
Path: \FDH SERVER\Projects\2012 Projects\8 - August\12-08387ES\Hampton Bucklin Broadcasting, CT\S1 - SA ATT\Analysis\ATAN9.eri		Dwg No. E-1	

Tower Input Data

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

Tower is located in Litchfield County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 28 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline 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				

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	178.00-129.87	48.13	4.25	18	19.5000	29.6400	0.2500	1.0000	A572-65 (65 ksi)
L2	129.87-84.83	49.29	5.33	18	28.2446	38.5000	0.3750	1.5000	A572-65 (65 ksi)
L3	84.83-41.28	48.88	6.42	18	36.6403	46.8000	0.4375	1.7500	A572-65 (65 ksi)
L4	41.28-0.00	47.70		18	44.5913	54.5000	0.5000	2.0000	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	19.8008	15.2749	715.1161	6.8338	9.9060	72.1902	1431.1733	7.6389	2.9920	11.968
	30.0972	23.3210	2544.9728	10.4335	15.0571	169.0212	5093.2943	11.6627	4.7766	19.107
L2	29.5783	33.1718	3255.1319	9.8937	14.3483	226.8659	6514.5470	16.5891	4.3111	11.496
	39.0939	45.3783	8333.0732	13.5344	19.5580	426.0698	16677.1113	22.6935	6.1160	16.309
L3	38.3312	50.2721	8324.3325	12.8520	18.6133	447.2255	16659.6183	25.1408	5.6787	12.98
	47.5220	64.3801	17483.2823	16.4587	23.7744	735.3827	34989.5695	32.1962	7.4668	17.067
L4	46.6327	69.9729	17185.9367	15.6524	22.6524	758.6812	34394.4870	34.9931	6.9681	13.936
	55.3408	85.6980	31571.5320	19.1700	27.6860	1140.3428	63184.6066	42.8571	8.7120	17.424

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 178.00-129.87				1	1	1		
L2 129.87-84.83				1	1	1		
L3 84.83-41.28				1	1	1		
L4 41.28-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
WR-VG122ST-BRDA(3/8)	B	Surface Ar (CaAa)	156.00 - 0.00	2	2	0.000 0.010	0.3850		0.20

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 plf
LDF7-50A(1-5/8")	A	No	Inside Pole	166.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
LDF7-50A(1-5/8")	B	No	Inside Pole	156.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
LDF4-50A(1/2")	C	No	Inside Pole	75.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
HB114-1-0813U4-M5J(1 1/4")	C	No	Inside Pole	178.00 - 0.00	3	No Ice	0.00	1.20
						1/2" Ice	0.00	1.20
						1" Ice	0.00	1.20
						2" Ice	0.00	1.20
						4" Ice	0.00	1.20
***								
FB-L98B-002-75000(3/8")	B	No	Inside Pole	156.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06

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	178.00-129.87	A	0.000	0.000	0.000	0.000	0.36
		B	0.000	0.000	2.012	0.000	0.27
		C	0.000	0.000	0.000	0.000	0.17
L2	129.87-84.83	A	0.000	0.000	0.000	0.000	0.44
		B	0.000	0.000	3.468	0.000	0.46
		C	0.000	0.000	0.000	0.000	0.16
L3	84.83-41.28	A	0.000	0.000	0.000	0.000	0.43
		B	0.000	0.000	3.353	0.000	0.45
		C	0.000	0.000	0.000	0.000	0.16
L4	41.28-0.00	A	0.000	0.000	0.000	0.000	0.41
		B	0.000	0.000	3.179	0.000	0.43
		C	0.000	0.000	0.000	0.000	0.15

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	178.00-129.87	A	1.202	0.000	0.000	0.000	0.000	0.36
		B		0.000	0.000	21.106	0.000	0.34
		C		0.000	0.000	0.000	0.000	0.17
L2	129.87-84.83	A	1.151	0.000	0.000	0.000	0.000	0.44
		B		0.000	0.000	36.379	0.000	0.59
		C		0.000	0.000	0.000	0.000	0.16
L3	84.83-41.28	A	1.080	0.000	0.000	0.000	0.000	0.43
		B		0.000	0.000	34.001	0.000	0.56
		C		0.000	0.000	0.000	0.000	0.16
L4	41.28-0.00	A	1.000	0.000	0.000	0.000	0.000	0.41
		B		0.000	0.000	30.674	0.000	0.52
		C		0.000	0.000	0.000	0.000	0.15

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	178.00-129.87	0.0594	-0.0335	0.3175	-0.1789
L2	129.87-84.83	0.0991	-0.0558	0.5149	-0.2901
L3	84.83-41.28	0.0994	-0.0560	0.5292	-0.2982
L4	41.28-0.00	0.0996	-0.0561	0.5270	-0.2969

Discrete Tower Loads

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
800 EXTERNAL NOTCH FILTER	A	From Leg	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
(3) ACU-A20-N	A	From Leg	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.08 0.12 0.17 0.30 0.67	0.14 0.19 0.25 0.40 0.80	0.00 0.00 0.00 0.01 0.04
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.22 0.41 0.91
800 EXTERNAL NOTCH FILTER	B	From Leg	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
800 EXTERNAL NOTCH FILTER	C	From Leg	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
(3) ACU-A20-N	B	From Leg	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.08 0.12 0.17 0.30 0.67	0.14 0.19 0.25 0.40 0.80	0.00 0.00 0.00 0.01 0.04
(3) ACU-A20-N	C	From Leg	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.08 0.12 0.17 0.30 0.67	0.14 0.19 0.25 0.40 0.80	0.00 0.00 0.00 0.01 0.04
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	178.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.22 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00	0.0000	178.00	No Ice 1/2" Ice	8.50 9.15	6.95 8.13	0.08 0.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.00			1" Ice	9.77	9.02	0.22
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
(3) Empty Mount Pipe	A	From Leg	4.00	0.0000	178.00	No Ice	1.40	1.40	0.03
			0.00			1/2" Ice	2.13	2.13	0.04
			0.00			1" Ice	2.68	2.68	0.06
						2" Ice	3.56	3.56	0.10
						4" Ice	5.42	5.42	0.26
(3) Empty Mount Pipe	B	From Leg	4.00	0.0000	178.00	No Ice	1.40	1.40	0.03
			0.00			1/2" Ice	2.13	2.13	0.04
			0.00			1" Ice	2.68	2.68	0.06
						2" Ice	3.56	3.56	0.10
						4" Ice	5.42	5.42	0.26
(3) Empty Mount Pipe	C	From Leg	4.00	0.0000	178.00	No Ice	1.40	1.40	0.03
			0.00			1/2" Ice	2.13	2.13	0.04
			0.00			1" Ice	2.68	2.68	0.06
						2" Ice	3.56	3.56	0.10
						4" Ice	5.42	5.42	0.26
Platform Mount [LP 712-1]	C	None		0.0000	178.00	No Ice	24.53	24.53	1.34
						1/2" Ice	29.94	29.94	1.65
						1" Ice	35.35	35.35	1.96
						2" Ice	46.17	46.17	2.58
						4" Ice	67.81	67.81	3.82
**									
1900MHz RRH (25MHz)	A	From Leg	2.00	0.0000	176.00	No Ice	2.91	3.80	0.09
			0.00			1/2" Ice	3.14	4.06	0.12
			0.00			1" Ice	3.39	4.34	0.15
						2" Ice	3.91	4.91	0.24
						4" Ice	5.05	6.15	0.45
800MHZ RRH	A	From Leg	2.00	0.0000	176.00	No Ice	2.49	2.07	0.05
			0.00			1/2" Ice	2.71	2.27	0.07
			0.00			1" Ice	2.93	2.48	0.10
						2" Ice	3.41	2.93	0.16
						4" Ice	4.46	3.93	0.32
1900MHz RRH (25MHz)	B	From Leg	2.00	0.0000	176.00	No Ice	2.91	3.80	0.09
			0.00			1/2" Ice	3.14	4.06	0.12
			0.00			1" Ice	3.39	4.34	0.15
						2" Ice	3.91	4.91	0.24
						4" Ice	5.05	6.15	0.45
1900MHz RRH (25MHz)	C	From Leg	2.00	0.0000	176.00	No Ice	2.91	3.80	0.09
			0.00			1/2" Ice	3.14	4.06	0.12
			0.00			1" Ice	3.39	4.34	0.15
						2" Ice	3.91	4.91	0.24
						4" Ice	5.05	6.15	0.45
800MHZ RRH	B	From Leg	2.00	0.0000	176.00	No Ice	2.49	2.07	0.05
			0.00			1/2" Ice	2.71	2.27	0.07
			0.00			1" Ice	2.93	2.48	0.10
						2" Ice	3.41	2.93	0.16
						4" Ice	4.46	3.93	0.32
800MHZ RRH	C	From Leg	2.00	0.0000	176.00	No Ice	2.49	2.07	0.05
			0.00			1/2" Ice	2.71	2.27	0.07
			0.00			1" Ice	2.93	2.48	0.10
						2" Ice	3.41	2.93	0.16
						4" Ice	4.46	3.93	0.32
Side Arm Mount [SO 102-3]	C	None		0.0000	176.00	No Ice	3.00	3.00	0.08
						1/2" Ice	3.48	3.48	0.11
						1" Ice	3.96	3.96	0.14

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	4.92	4.92	0.20
						4" Ice	6.84	6.84	0.32
(2) Empty Mount Pipe	A	From Leg	2.00 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.40 2.13 2.68 3.56 5.42	1.40 2.13 2.68 3.56 5.42	0.03 0.04 0.06 0.10 0.26
(2) Empty Mount Pipe	B	From Leg	2.00 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.40 2.13 2.68 3.56 5.42	1.40 2.13 2.68 3.56 5.42	0.03 0.04 0.06 0.10 0.26
(2) Empty Mount Pipe	C	From Leg	2.00 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.40 2.13 2.68 3.56 5.42	1.40 2.13 2.68 3.56 5.42	0.03 0.04 0.06 0.10 0.26
**									
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(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.56 5.11 5.61 6.65 8.83	10.73 11.99 12.97 14.98 19.22	0.05 0.11 0.19 0.36 0.86
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.56 5.11 5.61 6.65 8.83	10.73 11.99 12.97 14.98 19.22	0.05 0.11 0.19 0.36 0.86
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.56 5.11 5.61 6.65 8.83	10.73 11.99 12.97 14.98 19.22	0.05 0.11 0.19 0.36 0.86
BXA-171085-12BF-2 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.97 5.52 6.04 7.09 9.36	5.23 6.39 7.26 9.05 12.82	0.04 0.08 0.14 0.27 0.67
BXA-171085-12BF-2 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.97 5.52 6.04 7.09 9.36	5.23 6.39 7.26 9.05 12.82	0.04 0.08 0.14 0.27 0.67
BXA-171085-12BF-2 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.97 5.52 6.04 7.09 9.36	5.23 6.39 7.26 9.05 12.82	0.04 0.08 0.14 0.27 0.67
BXA-70063-6CF-2 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
BXA-70063-6CF-2 w/ Mount Pipe	B	From Leg	4.00 0.00	0.0000	166.00	No Ice 1/2" Ice	7.97 8.61	5.80 6.95	0.04 0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.00			1" Ice	9.22	7.82	0.17
						2" Ice	10.46	9.60	0.34
						4" Ice	13.07	13.37	0.80
BXA-70063-6CF-2 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
(2) FD9R6004/2C-3L	A	From Leg	4.00 0.00 2.00	0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	B	From Leg	4.00 0.00 2.00	0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	C	From Leg	4.00 0.00 2.00	0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
Platform Mount [LP 303-1]	C	None		0.0000	166.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.66 18.87 23.08 31.50 48.34	14.66 18.87 23.08 31.50 48.34	1.25 1.48 1.71 2.18 3.10
**									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(4) LGP2140X	A	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.26 1.42 1.58 1.94 2.75	0.38 0.49 0.62 0.89 1.54	0.01 0.02 0.03 0.05 0.13
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(4) LGP2140X	B	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.26 1.42 1.58 1.94 2.75	0.38 0.49 0.62 0.89 1.54	0.01 0.02 0.03 0.05 0.13
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(4) LGP2140X	C	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice 1/2" Ice 1" Ice	1.26 1.42 1.58	0.38 0.49 0.62	0.01 0.02 0.03

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
						2" Ice	1.94	0.89	0.05
						4" Ice	2.75	1.54	0.13
Platform Mount [LP 303-1]	C	None		0.0000	156.00	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
						2" Ice	31.50	31.50	2.18
						4" Ice	48.34	48.34	3.10
Empty Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	156.00	No Ice	1.40	1.40	0.03
						1/2" Ice	2.13	2.13	0.04
						1" Ice	2.68	2.68	0.06
						2" Ice	3.56	3.56	0.10
						4" Ice	5.42	5.42	0.26
Empty Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	156.00	No Ice	1.40	1.40	0.03
						1/2" Ice	2.13	2.13	0.04
						1" Ice	2.68	2.68	0.06
						2" Ice	3.56	3.56	0.10
						4" Ice	5.42	5.42	0.26
Empty Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	156.00	No Ice	1.40	1.40	0.03
						1/2" Ice	2.13	2.13	0.04
						1" Ice	2.68	2.68	0.06
						2" Ice	3.56	3.56	0.10
						4" Ice	5.42	5.42	0.26
*									
*									
*									
KS24019-L112A	B	From Leg	2.00 0.00 1.00	0.0000	75.00	No Ice	0.16	0.16	0.01
						1/2" Ice	0.22	0.22	0.01
						1" Ice	0.30	0.30	0.01
						2" Ice	0.48	0.48	0.02
						4" Ice	0.95	0.95	0.06
Side Arm Mount [SO 701-1]	B	From Leg	1.00 0.00 0.00	0.0000	75.00	No Ice	0.85	1.67	0.07
						1/2" Ice	1.14	2.34	0.08
						1" Ice	1.43	3.01	0.09
						2" Ice	2.01	4.35	0.12
						4" Ice	3.17	7.03	0.18
****									
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice	8.50	6.30	0.07
						1/2" Ice	9.15	7.48	0.14
						1" Ice	9.77	8.37	0.21
						2" Ice	11.03	10.18	0.38
						4" Ice	13.68	14.02	0.87
800 10764 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice	6.20	4.29	0.06
						1/2" Ice	6.69	4.99	0.11
						1" Ice	7.18	5.66	0.16
						2" Ice	8.19	7.10	0.30
						4" Ice	10.33	10.30	0.67
DC6-48-60-18-8F	B	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice	2.57	4.32	0.02
						1/2" Ice	2.80	4.60	0.05
						1" Ice	3.04	4.88	0.09
						2" Ice	3.54	5.49	0.17
						4" Ice	4.66	6.80	0.38
AM-X-CD-14-65-00T-RET w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	156.00	No Ice	5.74	4.02	0.03
						1/2" Ice	6.20	4.63	0.08
						1" Ice	6.66	5.28	0.13
						2" Ice	7.62	6.68	0.25
						4" Ice	9.67	9.74	0.61
****									

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft ft ft	°	ft		ft^2	ft^2	K
(2) RRUS-11	C	From Leg	0.00	0.0000	154.00	No Ice	2.94	1.52	0.05
			2.00			1/2" Ice	3.17	1.69	0.08
			0.00			1" Ice	3.41	1.88	0.10
						2" Ice	3.91	2.27	0.16
						4" Ice	5.02	3.16	0.32
(2) RRUS-11	C	From Leg	0.00	0.0000	154.00	No Ice	2.94	1.52	0.05
			2.00			1/2" Ice	3.17	1.69	0.08
			0.00			1" Ice	3.41	1.88	0.10
						2" Ice	3.91	2.27	0.16
						4" Ice	5.02	3.16	0.32
(2) RRUS-11	C	From Leg	0.00	0.0000	154.00	No Ice	2.94	1.52	0.05
			2.00			1/2" Ice	3.17	1.69	0.08
			0.00			1" Ice	3.41	1.88	0.10
						2" Ice	3.91	2.27	0.16
						4" Ice	5.02	3.16	0.32
Side Arm Mount [SO 102-3]	C	None		0.0000	154.00	No Ice	3.00	3.00	0.08
						1/2" Ice	3.48	3.48	0.11
						1" Ice	3.96	3.96	0.14
						2" Ice	4.92	4.92	0.20
						4" Ice	6.84	6.84	0.32

Load Combinations

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

Comb. No.	Description
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	178 - 129.87	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-19.71	0.62	1.02
			Max. Mx	11	-8.90	501.95	-3.71
			Max. My	2	-8.92	-3.78	499.57
			Max. Vy	11	-16.08	501.95	-3.71
			Max. Vx	2	-15.94	-3.78	499.57
			Max. Torque	11			-1.09
L2	129.87 - 84.8307	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-29.29	0.46	1.11
			Max. Mx	11	-16.39	1279.59	-12.34
			Max. My	2	-16.41	-12.47	1271.34
			Max. Vy	11	-19.32	1279.59	-12.34
			Max. Vx	2	-19.19	-12.47	1271.34
			Max. Torque	11			-1.10
L3	84.8307 - 41.2839	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-42.20	0.02	1.07
			Max. Mx	11	-26.90	2168.72	-21.09
			Max. My	2	-26.90	-21.35	2155.26
			Max. Vy	11	-22.46	2168.72	-21.09
			Max. Vx	2	-22.34	-21.35	2155.26
			Max. Torque	11			-1.11
L4	41.2839 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-60.85	-0.21	1.20
			Max. Mx	11	-42.62	3314.00	-30.84
			Max. My	2	-42.62	-31.15	3294.99
			Max. Vy	11	-25.49	3314.00	-30.84
			Max. Vx	2	-25.38	-31.15	3294.99
			Max. Torque	11			-1.05

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	17	60.85	-3.80	2.20

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. H_x	11	42.63	25.47	-0.20
	Max. H_z	2	42.63	-0.20	25.35
	Max. M_x	2	3294.99	-0.20	25.35
	Max. M_z	5	3313.78	-25.47	0.20
	Max. Torsion	5	1.04	-25.47	0.20
	Min. Vert	1	42.63	0.00	0.00
	Min. H_x	5	42.63	-25.47	0.20
	Min. H_z	8	42.63	0.20	-25.35
	Min. M_x	8	-3294.15	0.20	-25.35
	Min. M_z	11	-3314.00	25.47	-0.20
	Min. Torsion	11	-1.05	25.47	-0.20

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	42.63	0.00	0.00	-0.40	0.09	0.00
Dead+Wind 0 deg - No Ice	42.63	0.20	-25.35	-3294.99	-31.15	0.02
Dead+Wind 30 deg - No Ice	42.63	12.91	-22.06	-2869.14	-1683.89	-0.50
Dead+Wind 60 deg - No Ice	42.63	22.16	-12.85	-1674.70	-2885.37	-0.89
Dead+Wind 90 deg - No Ice	42.63	25.47	-0.20	-31.68	-3313.78	-1.04
Dead+Wind 120 deg - No Ice	42.63	21.96	12.50	1619.82	-2854.27	-0.91
Dead+Wind 150 deg - No Ice	42.63	12.56	21.86	2837.20	-1629.83	-0.54
Dead+Wind 180 deg - No Ice	42.63	-0.20	25.35	3294.15	31.37	-0.02
Dead+Wind 210 deg - No Ice	42.63	-12.91	22.06	2868.29	1684.10	0.50
Dead+Wind 240 deg - No Ice	42.63	-22.16	12.85	1673.86	2885.58	0.90
Dead+Wind 270 deg - No Ice	42.63	-25.47	0.20	30.84	3314.00	1.05
Dead+Wind 300 deg - No Ice	42.63	-21.96	-12.50	-1620.65	2854.49	0.91
Dead+Wind 330 deg - No Ice	42.63	-12.56	-21.86	-2838.04	1630.06	0.53
Dead+Ice+Temp	60.85	-0.00	-0.00	-1.20	-0.21	0.00
Dead+Wind 0 deg+Ice+Temp	60.85	0.03	-4.36	-595.31	-4.67	0.08
Dead+Wind 30 deg+Ice+Temp	60.85	2.21	-3.79	-517.97	-302.59	-0.02
Dead+Wind 60 deg+Ice+Temp	60.85	3.80	-2.20	-302.19	-519.48	-0.13
Dead+Wind 90 deg+Ice+Temp	60.85	4.38	-0.03	-5.80	-597.23	-0.19
Dead+Wind 120 deg+Ice+Temp	60.85	3.78	2.16	291.80	-515.00	-0.21
Dead+Wind 150 deg+Ice+Temp	60.85	2.16	3.76	510.85	-294.83	-0.17
Dead+Wind 180 deg+Ice+Temp	60.85	-0.03	4.36	592.67	4.29	-0.08
Dead+Wind 210 deg+Ice+Temp	60.85	-2.21	3.79	515.34	302.21	0.02
Dead+Wind 240 deg+Ice+Temp	60.85	-3.80	2.20	299.56	519.10	0.13
Dead+Wind 270 deg+Ice+Temp	60.85	-4.38	0.03	3.16	596.84	0.19
Dead+Wind 300 deg+Ice+Temp	60.85	-3.78	-2.16	-294.43	514.62	0.21
Dead+Wind 330 deg+Ice+Temp	60.85	-2.16	-3.76	-513.49	294.45	0.17
Dead+Wind 0 deg - Service	42.63	0.08	-9.90	-1289.26	-12.12	0.01
Dead+Wind 30 deg - Service	42.63	5.04	-8.62	-1122.70	-658.68	-0.20
Dead+Wind 60 deg - Service	42.63	8.65	-5.02	-655.43	-1128.72	-0.35
Dead+Wind 90 deg - Service	42.63	9.95	-0.08	-12.66	-1296.30	-0.41
Dead+Wind 120 deg - Service	42.63	8.58	4.88	633.40	-1116.50	-0.36
Dead+Wind 150 deg - Service	42.63	4.91	8.54	1109.62	-637.51	-0.21
Dead+Wind 180 deg - Service	42.63	-0.08	9.90	1288.40	12.34	-0.01
Dead+Wind 210 deg - Service	42.63	-5.04	8.62	1121.84	658.91	0.20
Dead+Wind 240 deg - Service	42.63	-8.65	5.02	654.57	1128.95	0.35
Dead+Wind 270 deg - Service	42.63	-9.95	0.08	11.80	1296.52	0.41
Dead+Wind 300 deg - Service	42.63	-8.58	-4.88	-634.26	1116.73	0.36
Dead+Wind 330 deg - Service	42.63	-4.91	-8.54	-1110.48	637.73	0.21

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	0.00	-42.63	0.00	0.00	42.63	0.00	0.000%
2	0.20	-42.63	-25.35	-0.20	42.63	25.35	0.000%
3	12.91	-42.63	-22.06	-12.91	42.63	22.06	0.000%
4	22.16	-42.63	-12.85	-22.16	42.63	12.85	0.000%
5	25.47	-42.63	-0.20	-25.47	42.63	0.20	0.000%
6	21.96	-42.63	12.50	-21.96	42.63	-12.50	0.000%
7	12.56	-42.63	21.86	-12.56	42.63	-21.86	0.000%
8	-0.20	-42.63	25.35	0.20	42.63	-25.35	0.000%
9	-12.91	-42.63	22.06	12.91	42.63	-22.06	0.000%
10	-22.16	-42.63	12.85	22.16	42.63	-12.85	0.000%
11	-25.47	-42.63	0.20	25.47	42.63	-0.20	0.000%
12	-21.96	-42.63	-12.50	21.96	42.63	12.50	0.000%
13	-12.56	-42.63	-21.86	12.56	42.63	21.86	0.000%
14	0.00	-60.85	0.00	0.00	60.85	0.00	0.000%
15	0.03	-60.85	-4.36	-0.03	60.85	4.36	0.000%
16	2.21	-60.85	-3.79	-2.21	60.85	3.79	0.000%
17	3.80	-60.85	-2.20	-3.80	60.85	2.20	0.000%
18	4.38	-60.85	-0.03	-4.38	60.85	0.03	0.000%
19	3.78	-60.85	2.16	-3.78	60.85	-2.16	0.000%
20	2.16	-60.85	3.76	-2.16	60.85	-3.76	0.000%
21	-0.03	-60.85	4.36	0.03	60.85	-4.36	0.000%
22	-2.21	-60.85	3.79	2.21	60.85	-3.79	0.000%
23	-3.80	-60.85	2.20	3.80	60.85	-2.20	0.000%
24	-4.38	-60.85	0.03	4.38	60.85	-0.03	0.000%
25	-3.78	-60.85	-2.16	3.78	60.85	2.16	0.000%
26	-2.16	-60.85	-3.76	2.16	60.85	3.76	0.000%
27	0.08	-42.63	-9.90	-0.08	42.63	9.90	0.000%
28	5.04	-42.63	-8.62	-5.04	42.63	8.62	0.000%
29	8.65	-42.63	-5.02	-8.65	42.63	5.02	0.000%
30	9.95	-42.63	-0.08	-9.95	42.63	0.08	0.000%
31	8.58	-42.63	4.88	-8.58	42.63	-4.88	0.000%
32	4.91	-42.63	8.54	-4.91	42.63	-8.54	0.000%
33	-0.08	-42.63	9.90	0.08	42.63	-9.90	0.000%
34	-5.04	-42.63	8.62	5.04	42.63	-8.62	0.000%
35	-8.65	-42.63	5.02	8.65	42.63	-5.02	0.000%
36	-9.95	-42.63	0.08	9.95	42.63	-0.08	0.000%
37	-8.58	-42.63	-4.88	8.58	42.63	4.88	0.000%
38	-4.91	-42.63	-8.54	4.91	42.63	8.54	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	5	0.00000001	0.00001873
3	Yes	6	0.00000001	0.00003725
4	Yes	6	0.00000001	0.00003841
5	Yes	5	0.00000001	0.00004884
6	Yes	6	0.00000001	0.00003588
7	Yes	6	0.00000001	0.00003678
8	Yes	5	0.00000001	0.00002478
9	Yes	6	0.00000001	0.00003811

10	Yes	6	0.00000001	0.00003702
11	Yes	5	0.00000001	0.00000924
12	Yes	6	0.00000001	0.00003715
13	Yes	6	0.00000001	0.00003618
14	Yes	4	0.00000001	0.00000001
15	Yes	6	0.00000001	0.00001887
16	Yes	6	0.00000001	0.00002127
17	Yes	6	0.00000001	0.00002135
18	Yes	6	0.00000001	0.00001887
19	Yes	6	0.00000001	0.00002077
20	Yes	6	0.00000001	0.00002077
21	Yes	6	0.00000001	0.00001870
22	Yes	6	0.00000001	0.00002117
23	Yes	6	0.00000001	0.00002119
24	Yes	6	0.00000001	0.00001892
25	Yes	6	0.00000001	0.00002104
26	Yes	6	0.00000001	0.00002095
27	Yes	5	0.00000001	0.00000338
28	Yes	5	0.00000001	0.00008609
29	Yes	5	0.00000001	0.00009117
30	Yes	5	0.00000001	0.00000903
31	Yes	5	0.00000001	0.00008042
32	Yes	5	0.00000001	0.00008405
33	Yes	5	0.00000001	0.00000414
34	Yes	5	0.00000001	0.00008967
35	Yes	5	0.00000001	0.00008519
36	Yes	5	0.00000001	0.00000561
37	Yes	5	0.00000001	0.00008615
38	Yes	5	0.00000001	0.00008194

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	178 - 129.87	48.146	35	2.5957	0.0037
L2	134.12 - 84.8307	26.095	29	2.0140	0.0021
L3	90.1641 - 41.2839	11.037	29	1.2205	0.0008
L4	47.7005 - 0	2.956	29	0.5732	0.0003

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	800 EXTERNAL NOTCH FILTER	35	48.146	2.5957	0.0039	22693
176.00	1900MHz RRH (25MHz)	35	47.073	2.5720	0.0038	22693
166.00	(2) LPA-80080/6CF w/ Mount Pipe	35	41.737	2.4525	0.0034	9455
156.00	(2) 7770.00 w/ Mount Pipe	29	36.530	2.3277	0.0030	5156
154.00	(2) RRUS-11	29	35.513	2.3017	0.0029	4726
75.00	KS24019-L112A	29	7.456	0.9676	0.0005	3599

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	178 - 129.87	122.688	10	6.6221	0.0089
L2	134.12 - 84.8307	66.580	4	5.1408	0.0053
L3	90.1641 - 41.2839	28.188	4	3.1174	0.0021
L4	47.7005 - 0	7.554	4	1.4648	0.0007

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	800 EXTERNAL NOTCH FILTER	10	122.688	6.6221	0.0104	9116
176.00	1900MHz RRH (25MHz)	10	119.959	6.5619	0.0101	9116
166.00	(2) LPA-80080/6CF w/ Mount Pipe	10	106.387	6.2577	0.0089	3797
156.00	(2) 7770.00 w/ Mount Pipe	4	93.139	5.9398	0.0077	2068
154.00	(2) RRUS-11	4	90.551	5.8736	0.0075	1895
75.00	KS24019-L112A	4	19.045	2.4719	0.0014	1415

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	178 - 129.87 (1)	TP29.64x19.5x0.25	48.13	0.00	0.0	39.000	22.6105	-8.87	881.81	0.010
L2	129.87 - 84.8307 (2)	TP38.5x28.2446x0.375	49.29	0.00	0.0	39.000	44.0575	-16.38	1718.24	0.010
L3	84.8307 - 41.2839 (3)	TP46.8x36.6403x0.4375	48.88	0.00	0.0	39.000	62.5281	-26.89	2438.60	0.011
L4	41.2839 - 0 (4)	TP54.5x44.5913x0.5	47.70	0.00	0.0	39.000	85.6980	-42.62	3342.22	0.013

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	178 - 129.87 (1)	TP29.64x19.5x0.25	504.58	38.120	39.000	0.977	0.00	0.000	39.000	0.000
L2	129.87 - 84.8307 (2)	TP38.5x28.2446x0.375	1288.22	38.501	39.000	0.987	0.00	0.000	39.000	0.000
L3	84.8307 - 41.2839 (3)	TP46.8x36.6403x0.4375	2183.76	37.787	39.000	0.969	0.00	0.000	39.000	0.000
L4	41.2839 - 0 (4)	TP54.5x44.5913x0.5	3336.17	35.107	39.000	0.900	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$

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	178 - 129.87 (1)	TP29.64x19.5x0.25	16.21	0.717	26.000	0.055	1.05	0.039	26.000	0.001
L2	129.87 - 84.8307 (2)	TP38.5x28.2446x0.375	19.46	0.442	26.000	0.034	1.05	0.015	26.000	0.001
L3	84.8307 - 41.2839 (3)	TP46.8x36.6403x0.4375	22.61	0.362	26.000	0.028	0.89	0.007	26.000	0.000
L4	41.2839 - 0 (4)	TP54.5x44.5913x0.5	25.64	0.299	26.000	0.023	0.89	0.005	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	178 - 129.87 (1)	0.010	0.977	0.000	0.055	0.001	0.988 ✔	1.333	H1-3+VT ✔
L2	129.87 - 84.8307 (2)	0.010	0.987	0.000	0.034	0.001	0.997 ✔	1.333	H1-3+VT ✔
L3	84.8307 - 41.2839 (3)	0.011	0.969	0.000	0.028	0.000	0.980 ✔	1.333	H1-3+VT ✔
L4	41.2839 - 0 (4)	0.013	0.900	0.000	0.023	0.000	0.913 ✔	1.333	H1-3+VT ✔

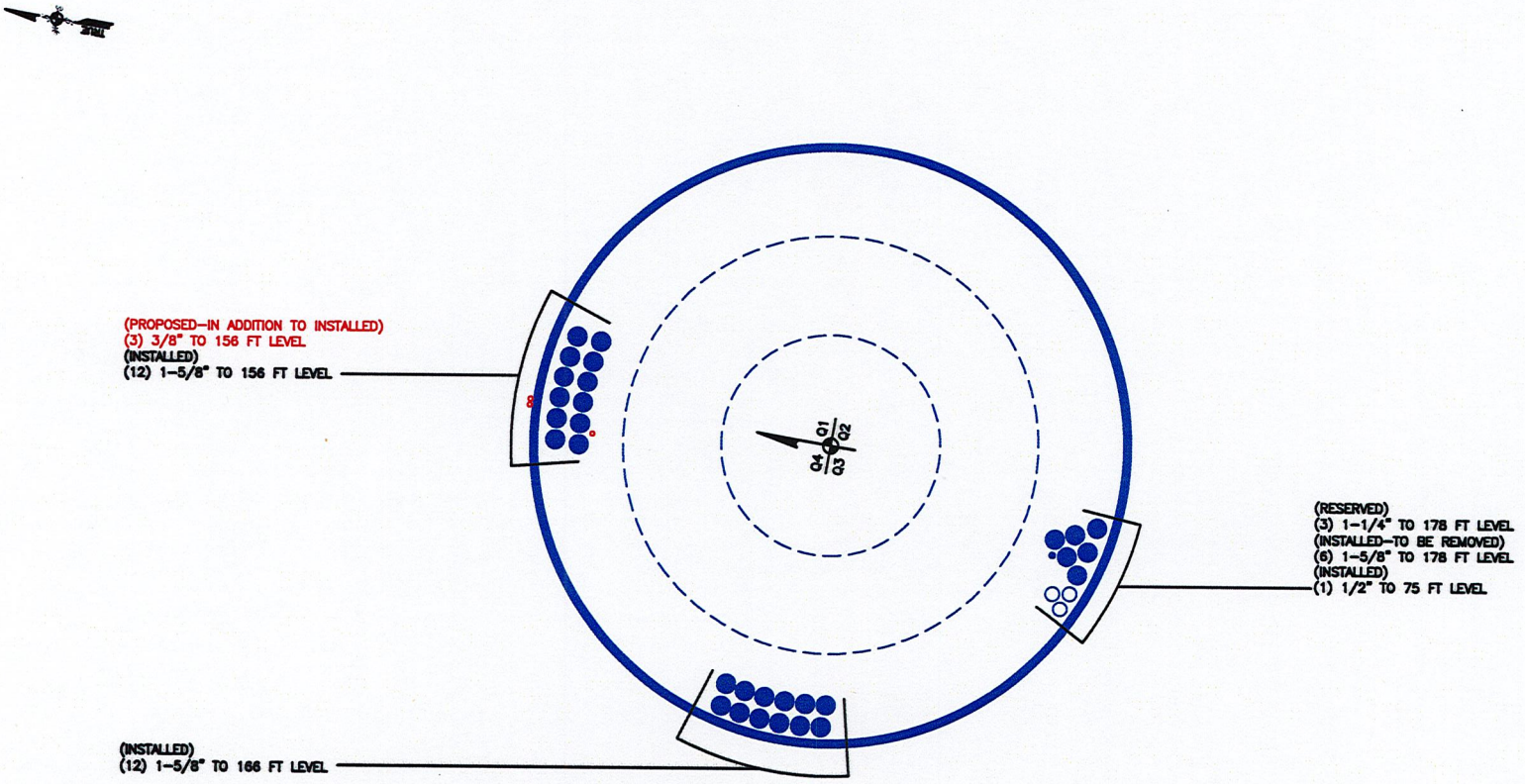
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	178 - 129.87	Pole	TP29.64x19.5x0.25	1	-8.87	1175.45	74.1	Pass
L2	129.87 - 84.8307	Pole	TP38.5x28.2446x0.375	2	-16.38	2290.41	74.8	Pass
L3	84.8307 - 41.2839	Pole	TP46.8x36.6403x0.4375	3	-26.89	3250.65	73.5	Pass
L4	41.2839 - 0	Pole	TP54.5x44.5913x0.5	4	-42.62	4455.18	68.5	Pass
							Summary	
						Pole (L2)	74.8	Pass
						RATING =	**74.8**	**Pass**

Program Version 6.0.4.0 - 1/27/2012 File://FDH-SERVER/Projects/2012 Projects/8 - August/12-08387E/Harwinton Buckley Broadcasting, CT/S1 - SA, ATT/Analysis/876369.eri

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876369 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

Project No. *12-08387E S1*
Site Name: *Harwinton/Buckley Broadca*
Site ID: *876369*

Pole Manufacturer:	*Other*

Reactions		
Moment:	3336	ft-kips
Axial:	43	kips
Shear:	26	kips

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

Anchor Rod Data		
Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	63	in

Anchor Rod Results

		Rigid
Maximum Rod Tension:	124.9 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	64.1% **Pass**	

Plate Data		
Diam:	69	in
Thick:	2.25	in
Grade:	60	ksi
Single-Rod B-eff:	8.65	in

Base Plate Results

	Flexural Check	Rigid
Base Plate Stress:	45.6 ksi	Service ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	76.0% **Pass**	Y.L. Length: 31.60

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:	Both	
Groove Depth:	0.25	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	5	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	50	ksi
Weld str.:	70	ksi

n/a

Stiffener Results

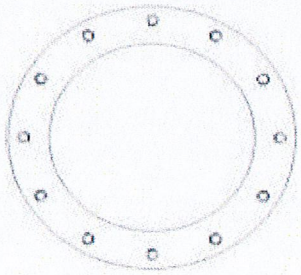
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

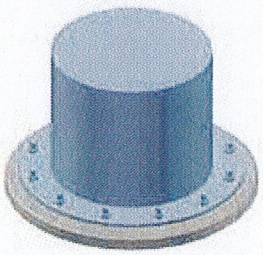
Pole Data		
Diam:	54.5	in
Thick:	0.5	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Pole Results

Pole Punching Shear Check: n/a

Stress Increase Factor		
ASIF:	1.333	





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

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

(Bearing and Stability Checks) Tool for TIA Rev F or G - Any application (MP, SST, GT)

Site Data

Site Name: *Harwinton/Buckley Broadcastin*
App #: *157861 Rev 2*

Enter Load Factors Below:		
For P (DL)	1.2	<---- Enter Factor
For P,V, and M (WL)	1.35	<---- Enter Factor

Pad & Pier Data		
Base PL Dist. Above Pier:	6	in
Pier Dist. Above Grade:	12	in
Pad Bearing Depth, D:	6.5	ft
Pad Thickness, T:	3	ft
Pad Width=Length, L:	28	ft
Pier Cross Section Shape:	Round	<--Pull Down
Enter Pier Diameter:	7.9	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	49.02	ft^2
Pier Height:	4.50	ft
Soil (above pad) Height:	3.50	ft

Soil Parameters		
Unit Weight, γ:	125.0	pcf
Ultimate Bearing Capacity, qn:	8.00	ksf
Strength Reduct. factor, ϕ:	1	
Angle of Friction, Φ:	38.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	8.00	ksf
Passive Pres. Coeff., Kp	4.20	

Forces/Moments due to Wind and Lateral Soil		
Factored Pad Passive Force:	220.7	kips
Pad Force Location Above D:	1.35	ft
ϕ(Passive Pressure Moment):	297.94	ft-kips
Factored O.T. M(WL), "1.6W":	4784.4	ft-kips
Factored OT (MW-Msoil), M1	4486.46	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	2.73	ft
Sum of Soil Wedges Wt:	38.51	kips
Soil Wedges ecc, K1:	10.29	ft
Ftg+Soil above Pad wt:	707.4	kips
Unfactored (Total ftg-soil Wt):	745.95	kips
1.2D. **No Soil Wedges.**	900.53	kips
0.9D. **With Soil Wedges**	710.06	kips

Resistance due to Cohesion (Vertical)		
ϕ*(1/2*Cu)(Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	43	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	26	kips
Unfactored WL Moment, M:	3336	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	51.6	kips
0.90	0.9D+1.6W, Pu:	38.7	kips
1.35	Vu:	35.1	kips
	Mu:	4503.6	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(No Soil Wedges) [Reaction+Conc+Soil]	900.53	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	4486.46	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	4.98	ft
Orthogonal qu=	1.97	ksf
qu/ϕ*qn Ratio=	**24.58%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	3.52	ft
Diagonal qu=	2.90	ksf
qu/ϕ*qn Ratio=	**36.25%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(w/ Soil Wedges) [Reaction+Conc+Soil]	710.06	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	4129.69	ft-kips

Orthogonal ecc3 = M2/P2 =	5.82	ft
Ortho Non Bearing Length,NBL=	16.37	ft
Orthogonal qu=	1.66	ksf
Diagonal qu=	2.57	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	3336.00		
M Orthogonal:	6646.92	**50.19%**	**Pass**
M Diagonal:	6408.93	**52.05%**	**Pass**

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Calculated Radio Frequency Emissions

CT1178

(Harwinton – 64 Hungerford Lane)

64 Hungerford Lane, Harwinton, CT 06791

October 1, 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 64 Hungerford Lane in Harwinton, CT. The coordinates of the tower are 41° 45' 26.1" N, 73° 03' 09.2" W.

AT&T is proposing the following modifications:

1) Install three multi-band (700/850/1900/2100 MHz) antennas for their LTE network (one per sector).

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 patterns 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	*158*	*880*	*6*	*296*	*0.0256*	*0.5867*	*4.36%*
Cingular	*158*	*1930*	*3*	*427*	*0.0185*	*1.0000*	*1.85%*
Verizon PCS	170	1970	7	256	0.0223	1.0000	2.23%
Verizon Cellular	170	869	9	323	0.0362	0.5793	6.24%
Verizon AWS	170	2145	1	639	0.0080	1.0000	0.80%
Verizon LTE	170	698	2	760	0.0189	0.4653	4.06%
Sprint	180	1950	11	494	0.0603	1.0000	6.03%
AT&T UMTS	158	880	2	565	0.0016	0.5867	0.28%
AT&T UMTS	158	1900	2	875	0.0025	1.0000	0.25%
AT&T LTE	158	734	1	1313	0.0019	0.4893	0.39%
AT&T GSM	158	880	1	283	0.0004	0.5867	0.07%
AT&T GSM	158	1900	4	525	0.0030	1.0000	0.30%
						Total	20.65%

Table 1: Carrier Information[1] [2] [3]

[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 7/26/2012. 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 reflect the total value listed 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.

[3] Antenna height listed for AT&T is in reference to the FDH Engineering Structural Analysis dated August 16, 2012.

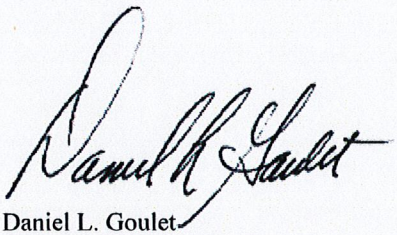
5. Conclusion

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 **20.65% 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.



October 1, 2012

Daniel L. Goulet
C Squared Systems, LLC

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[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)
0.3-3.0	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[5]

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)

[4] 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.

[5] 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.

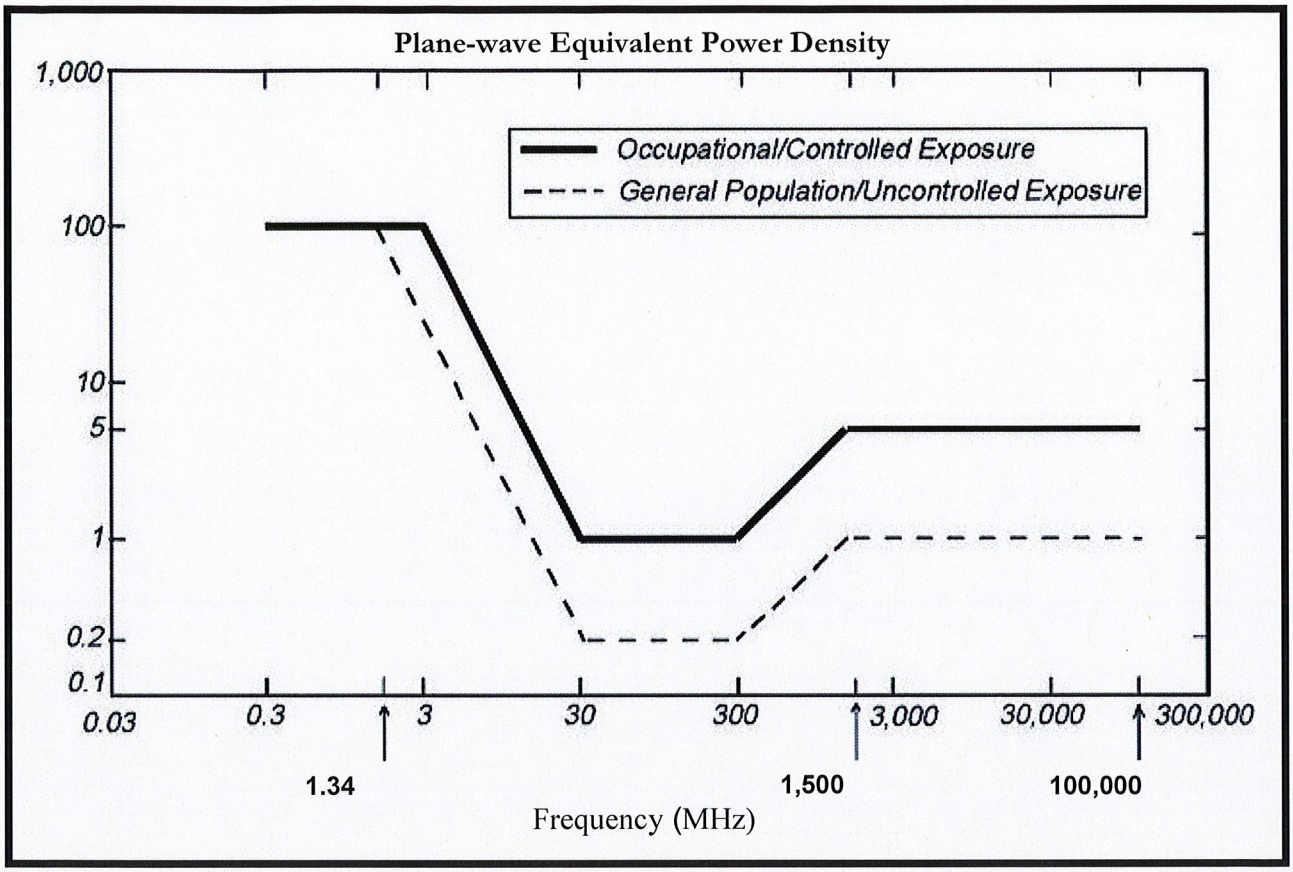
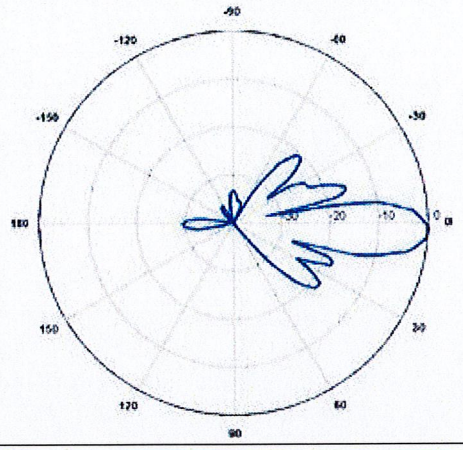


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

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

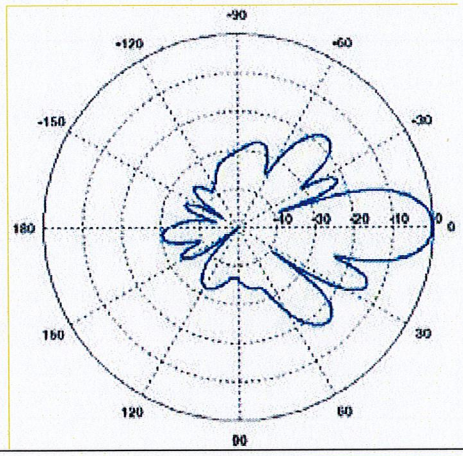
700 MHz

Manufacturer:	KMW
Model #:	AM-X-CD-16-65-00T-RET
Frequency Band:	698-806 MHz
Gain:	13.4 dBd
Vertical Beamwidth:	12.3°
Horizontal Beamwidth:	65°
Polarization:	Dual Slant ± 45°
Size L x W x D:	72.0" x 11.8" x 5.9"



850 MHz

Manufacturer:	Powerwave
Model #:	7770.00
Frequency Band:	824-896 MHz
Gain:	11.5 dBd
Vertical Beamwidth:	15°
Horizontal Beamwidth:	82°
Polarization:	Dual Linear ± 45°
Size L x W x D:	55.0" 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:	86°
Polarization:	Dual Linear ± 45°
Size L x W x D:	55.0" x 11.0" x 5.0"