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

December 7, 2012

Melanie Howlett
HPC Wireless Services
46 Mill Plain Road, Floor 2
Danbury, CT 06811

RE: **EM-CING-111-121116** – New Cingular Wireless PCS, LLC notice of intent to modify an existing telecommunications facility located at 170 Mount Tobe Road, Plymouth, Connecticut.

Dear Ms. Howlett:

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:

- The coax lines and accessory equipment shall be installed in accordance with the recommendations made in the Structural Analysis Report prepared by FDH Engineering dated August 29, 2012 and stamped by Christopher Murphy; and
- Not more than 45 days following completion of the antenna installation, AT&T shall provide documentation certifying that its installation complied with the engineer's recommendation.
- 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 more 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 November 14, 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 with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

Linda Roberts UHB

Linda Roberts
Executive Director

LR/CDM/cm

c: The Honorable Vincent Festa, Jr., Mayor, Town of Plymouth
Khara Dodds, Town Planner, Town of Plymouth

EM-CING-111-121116

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

November 14, 2012

ORIGINAL

RECEIVED
NOV 16 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
170 Mount Tobe Road, Plymouth

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 Mayor of the Town of Plymouth.

AT&T plans to modify the existing wireless communications facility owned by SBA Towers, Inc. and located at 170 Mount Tobe Road, Plymouth (coordinates 41°-37'-48" N, 72°-03'-24" 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 on new mounts attached to the existing platform, and six (6) RRUS (remote radio units) behind the LTEs, all at a centerline height of approximately 108'. One (1) Surge Arrestor will also be added to the platform supporting arm at a centerline height of approximately 108'. 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 160' structure.

2. AT&T will place related equipment in an existing Equipment Shelter and mount a new GPS antenna on 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 2.76%; the combined site operations will result in a total power density of approximately 35.07%.

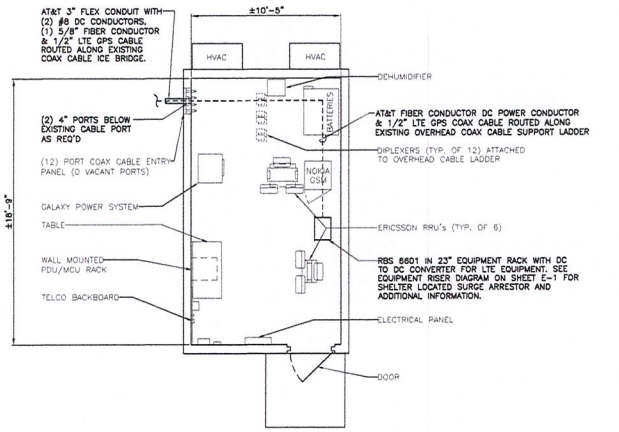
Please contact me by phone at (203) 610-1071, or by e-mail at mhowlett@optonline.net, if there are any questions concerning this matter. Thank you for your consideration.

Respectfully yours,

Melanie J. Howlett

Attachments

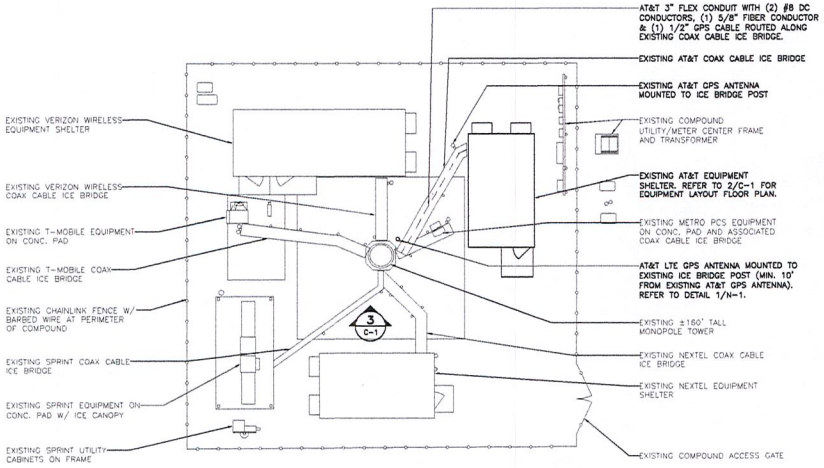
cc: Honorable Vincent Festa, Mayor, Town of Plymouth
Walker T. and Susan A. McDonald (underlying property owners)



2 C-1 **EQUIPMENT BUILDING FLOOR PLAN**
SCALE: 1/4" = 1'-0"

APPROX. NORTH

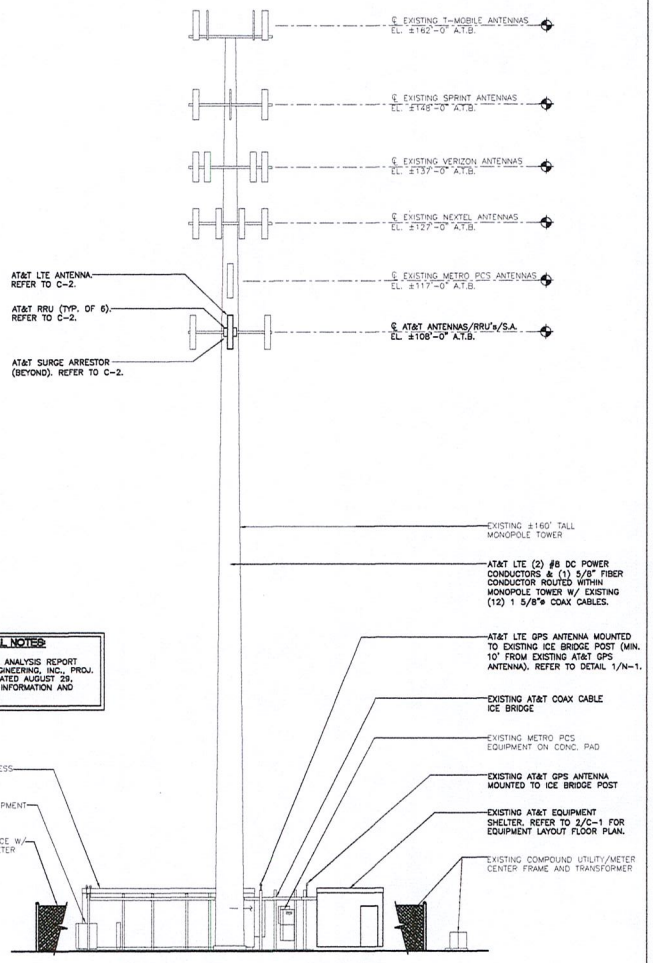
GRAPHIC SCALE
4 0 2 4 8 16
(IN FEET)
1 inch = 4 ft.



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:

REFER TO STRUCTURAL ANALYSIS REPORT PREPARED BY FDH ENGINEERING, INC., PROJ. NO. 12-04783E S2, DATED AUGUST 29, 2012 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

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	
1	11/01/12	HMR	DEB	CONSTRUCTION – CLIENT REVIEW
0	08/14/12	CLT	DEB	CONSTRUCTION – CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.Centekeng.com

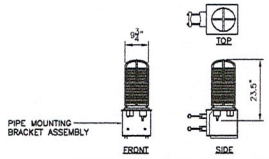
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY LTE UPGRADE
CT1126
PLYMOUTH-170 MT. TOBE ROAD
170 MOUNT TOBE ROAD
PLYMOUTH, CT 06782

DATE:	11/01/12
SCALE:	AS NOTED
JOB NO.	12063.C017

PLANS AND ELEVATION

C-1

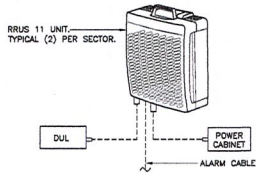
Sheet No. 3 of 8



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.

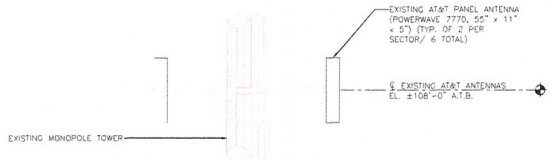
6 C-2 SURGE ARRESTOR DETAIL
NOT TO SCALE



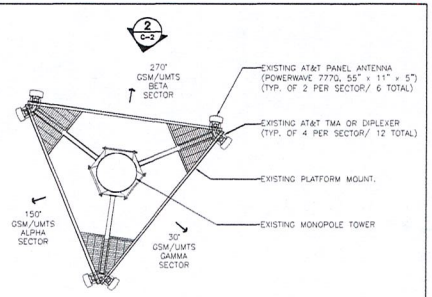
RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRUS 11	17.8"L x 17.3"W x 7.2"D	BAND 4: 44 LBS. BAND 12: 50 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. SIDE: 0" MIN.

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

7 C-2 RRU DETAIL
NOT TO SCALE

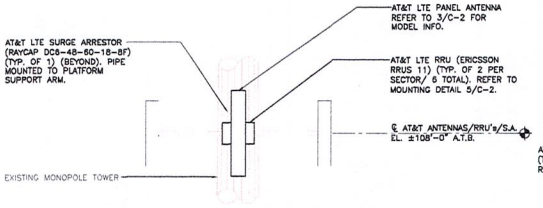


2 C-2 EXISTING ANTENNA SECTOR ELEVATION
SCALE: 1/4" = 1'-0"

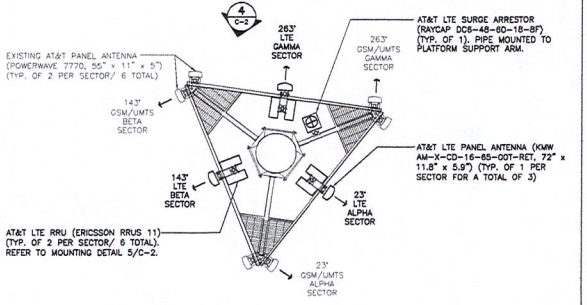


1 C-2 EXISTING ANTENNA PLAN
SCALE: 1/4" = 1'-0"

APPROX. NORTH



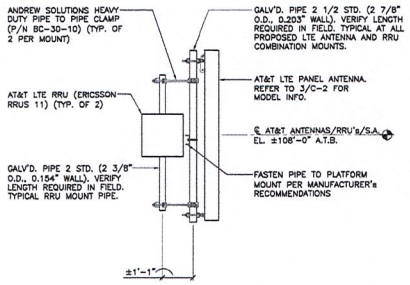
4 C-2 PROPOSED LTE ANTENNA SECTOR ELEVATION
SCALE: 1/4" = 1'-0"

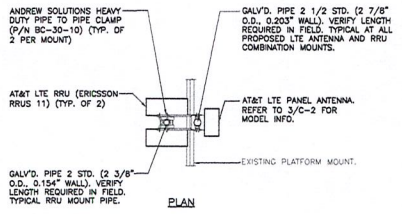


3 C-2 PROPOSED ANTENNA PLAN
SCALE: 1/4" = 1'-0"

APPROX. NORTH

NOTES:
1. ROTATE EXISTING GSM/UMTS ANTENNAS TO MATCH LTE ANTENNA ORIENTATIONS AT EACH PLATFORM FACE.
2. PROVIDE MOUNTING PIPES, CROSSOVERS & ASSOCIATED HARDWARE TO COMPLETE THE PROPOSED UPGRADE.
3. REFER TO STRUCTURAL ANALYSIS AND FINAL AT&T RFDS PRIOR TO INSTALLATION OF ANTENNAS AND COAX.





5 C-2 LTE ANTENNA/RRU MOUNT DETAILS
SCALE: 1/2" = 1'-0"

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

REV.	DATE	DRAWN BY	CHK'D BY	
1	11/01/12	HMR	DEB	CONSTRUCTION - CLIENT REVIEW
0	09/14/12	CLT	DEB	CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.Centekeng.com

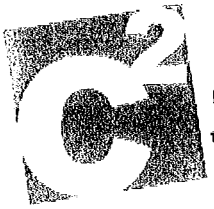
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY LTE UPGRADE
CT1126
PLYMOUTH-170 MT. TOBE ROAD
170 MOUNT TOBE ROAD
PLYMOUTH, CT 06782

DATE:	11/01/12
SCALE:	AS NOTED
JOB NO.	12063.CD17

LTE EQUIPMENT DETAILS

C-2

Sheet No. 4 of 5



Systems

C Squared Systems, LLC
65 Dartmouth Drive, Unit A3
Auburn, NH 03032
(603) 644-2800
support@csquaredsystems.com

Calculated Radio Frequency Emissions

at&t

CT1126

(Plymouth 2)

170 Mount Tobe Road, Plymouth, CT 06782

October 10, 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 170 Mount Tobe Road in Plymouth, CT. The coordinates of the tower are 41° 37' 48.12" N, 73° 3' 23.35" 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 UMTS	*108*	*880*	*1*	*500*	*0.0154*	*0.5867*	*2.63%*
Cingular GSM	*108*	*880*	*4*	*296*	*0.0365*	*0.5867*	*6.22%*
Cingular GSM	*108*	*1930*	*2*	*427*	*0.0263*	*1.0000*	*2.63%*
T-Mobile	162	1935	8	151	0.0166	1.0000	1.66%
Sprint	148	1962.5	11	351	0.0634	1.0000	6.34%
Pocket	117	2130	3	631	0.0497	1.0000	4.97%
Nextel	127	851	9	100	0.0201	0.5673	3.54%
Verizon PCS	137	1970	7	252	0.0338	1.0000	3.38%
Verizon cellular	137	869	9	258	0.0445	0.5793	7.68%
Verizon AWS	137	2145	1	664	0.0127	1.0000	1.27%
Verizon LTE	137	698	1	845	0.0162	0.4653	3.48%
AT&T UMTS	108	880	2	565	0.0035	0.5867	0.59%
AT&T UMTS	108	1900	2	875	0.0054	1.0000	0.54%
AT&T LTE	108	734	1	1313	0.0040	0.4893	0.83%
AT&T GSM	108	880	1	283	0.0009	0.5867	0.15%
AT&T GSM	108	1900	4	525	0.0065	1.0000	0.65%
						Total	**35.07%**

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 29, 2012.

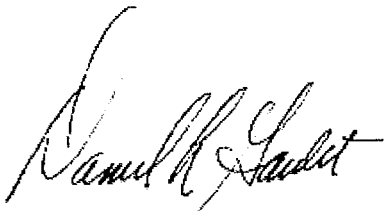
5. Conclusion

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 **35.07% 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

October 10, 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[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.

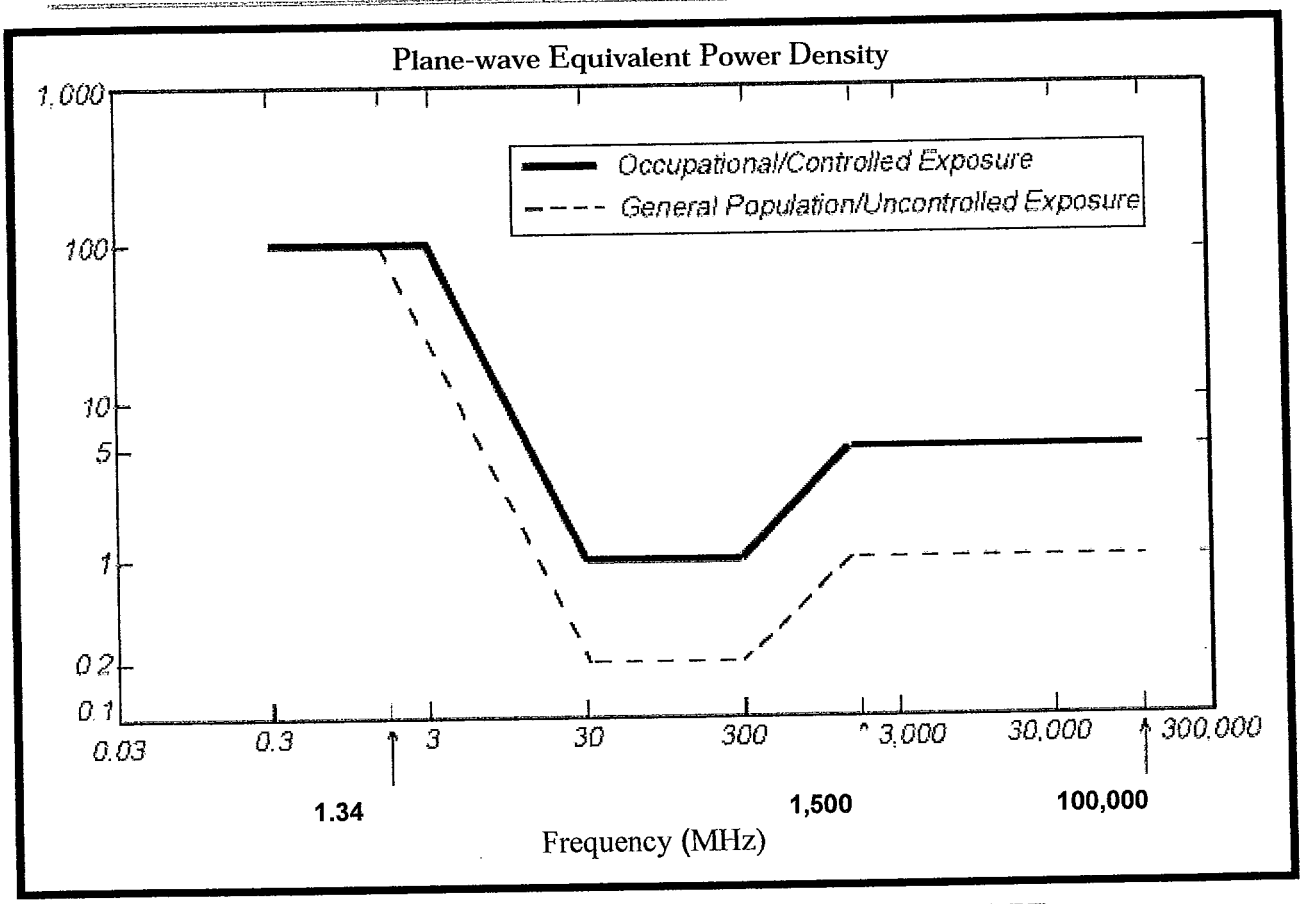
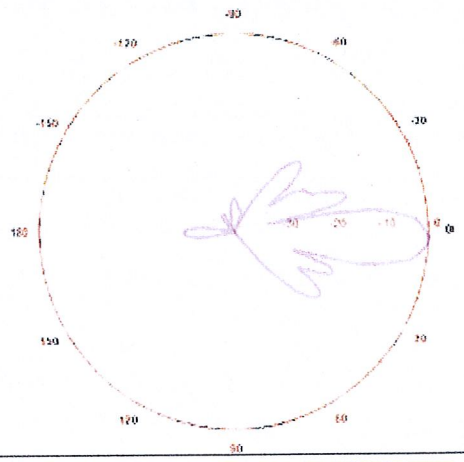


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

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

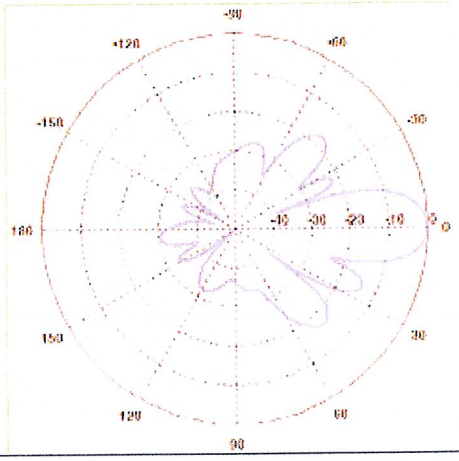
700 MHz

Manufacturer:	KMW
Model #:	AM-X-CD-16-65-00T-RET
Frequency Band:	698-806 MHz
Gain:	13.35 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"



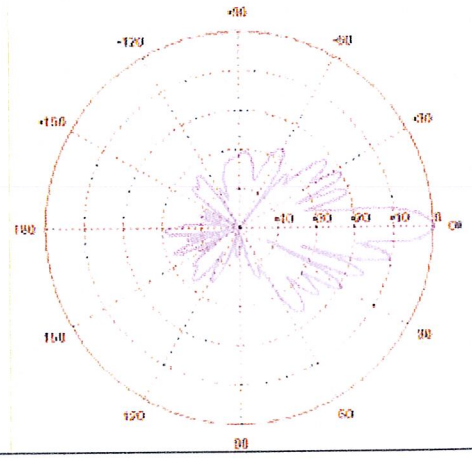
850 MHz

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" 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" x 11.0" x 5.0"



FDH Engineering, Inc., 6521 Meridien Drive, Raleigh, NC 27616, Ph. 919.755.1012, Fax 919.755.1031

Structural Analysis for SBA Network Services, Inc.

160' Monopole Tower

SBA Site Name: South Plymouth
SBA Site ID: CT03538-S
AT&T Site ID: CT1126
AT&T Site Name: Plymouth 2

FDH Project Number 12-04783E S2

Analysis Results

Tower Components	74.4%	Sufficient
Foundation	75.5%	Sufficient

Prepared By:

Tyler Mora, EI
Project Engineer

Reviewed By:

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

FDH Engineering, Inc.
6521 Meridien Drive
Raleigh, NC 27616
(919) 755-1012
info@fdh-inc.com

STATE OF CONNECTICUT
Christopher Michael Murphy
No. 25842
LICENSED
PROFESSIONAL ENGINEER

August 29, 2012

Prepared pursuant to TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures & 2005 Connecticut Building Code

TABLE OF CONTENTS

EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the monopole located in Plymouth, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads pursuant to the *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, TIA/EIA-222-F and* 2005 Connecticut Building Code. Information pertaining to the existing/proposed antenna loading, current tower geometry, geotechnical data, foundation dimensions, and member sizes was obtained from:

- ❑ Paul J. Ford & Company (Job No. 29201-1019) original design drawings dated August 21, 2001
- ❑ Jaworski Geotech, Inc. (Project No. 00244G) Geotechnical Evaluation dated July 31, 2001
- ❑ SBA Network Services, Inc.

The *basic design wind speed* per the *TIA/EIA-222-F* standards and 2005 Connecticut Building Code is 80 mph without ice and 28 mph with 1" radial ice. Ice is considered to increase in thickness with height.

Conclusions

With the existing and proposed antennas from AT&T in place at 108 ft, the tower meets the requirements of the *TIA/EIA-222-F* standards and 2005 Connecticut Building Code provided the **Recommendations** listed below are satisfied. Furthermore, provided the foundation was designed and constructed to support the original design reactions (see Paul J. Ford & Co. Job No. 29201-1019), the foundation should have the necessary capacity to support the existing and proposed loading. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Engineering, Inc. is accurate (i.e., the steel data, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the *TIA/EIA-222-F* standards and 2005 Connecticut Building Code are met with the existing and proposed loading in place, we have the following recommendations:

1.. The coax should be installed inside the pole's shaft.
2. RRU/RRH stipulation: The proposed equipment may be installed in any arrangement as determined by the client.

APPURTENANCE LISTING

The proposed and existing antennas with their corresponding cables/coax lines are shown in **Table 1**. *If the actual layout determined in the field deviates from the layout, FDH Engineering, Inc. should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

Existing Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
162	(6) EMS RR90-17-02DP (6) TMAs	(12) 1-5/8"	T-Mobile	160	(1) Low Profile Platform
148	(3) RFS APXVSPP18-C-A20 (3) ALU 1900 MHz RRUs (3) ALU 800 MHz RRUs (3) ALU 800 MHz Filters (4) RFS ACU-A20-N RETs	(3) 1-1/4"	Sprint	148	(1) Low Profile Platform
137	(6) Antel LPA-80080/6CF (3) Antel BXA-70063/6CF-2 (3) Antel BXA-171085/8BF-2 (6) RFS FDR6004/2C-3L Diplexers	(12) 1-5/8"	Verizon	137	(1) Low Profile Platform
127	(12) Decibel DB844H90E-XY	(12) 1-5/8"	Nextel	127	(1) Low Profile Platform
117	(3) RFS APXV18-206515S-C	(6) 1-5/8"	Pocket	117	(3) Pipe Mount
108	(6) Powerwave 7770 (3) CSS DUO1417-8686-40 (6) Powerwave LGP21401 TMAs (6) Powerwave LGP21903 Diplexers	(12) 1-5/8"	AT&T	108	(1) Low Profile Platform
75	(1) GPS	(1) 1/2"	T-Mobile	75	(1) Pipe Mount

Proposed Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
108	(6) Powerwave 7770 (3) CSS DUO1417-8686-40 (3) KMW AM-X-CD-16-65-00T-RET (6) Powerwave LGP21401 TMAs (6) Powerwave LGP21903 Diplexers (6) Ericsson RRUS-11 RRUs (1) Andrew ABT-DFDM-ADBH Surge Arrestor (1) Raycap DC6-48-60-18-8F Surge Arrestor	(12) 1-5/8" (1) 3" Conduit (1) 7/16" fiber line (2) 3/4" DC cables	AT&T	108	(1) Low Profile Platform

RESULTS

The following yield strength of steel for individual members was used for analysis:

Table 2 - Material Strength

Member Type	Yield Strength
Tower Shaft Sections	65 ksi
Base Plate	55 ksi
Anchor Bolts	75 ksi

Table 3 displays the summary of the ratio (as a percentage) of force in the member to their capacities. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. *Note: Capacities up to 105% are considered acceptable.* **Table 4** displays the maximum foundation reactions.

If the assumptions outlined in this report differ from actual field conditions, FDH Engineering, Inc. should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the existing or proposed appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information

Table 3 - Summary of Working Percentage of Structural Components

Section No.	Elevation ft	Component Type	Size	% Capacity	Pass Fail
L1	160 - 119.25	Pole	TP32.763x24x0.25	33.5	Pass
L2	119.25 - 78.5	Pole	TP41.025x31.3491x0.3125	66.7	Pass
L3	78.5 - 38.75	Pole	TP48.947x39.2711x0.375	74.4	Pass
L4	38.75 - 0	Pole	TP56.53x46.8531x0.4375	73.1	Pass
		Anchor Bolts	(20) 2.25"Φ w/ BC=64"	63.4	Pass
		Base Plate	64" Sq. x 3" thk. PL	58.5	Pass

*Capacities include a 1/3 allowable increase for wind.

Table 4 - Maximum Base Reactions

Base Reactions	Current Analysis (TIA/EIA-222-F)	Original Design (TIA/EIA-222-F)
Axial	48 k *	37 k
Shear	30 k	38 k
Moment	3,359 k-ft	4,450 k-ft

*Per our experience with foundations of similar type, the axial loading should not control the foundation analysis

GENERAL COMMENTS

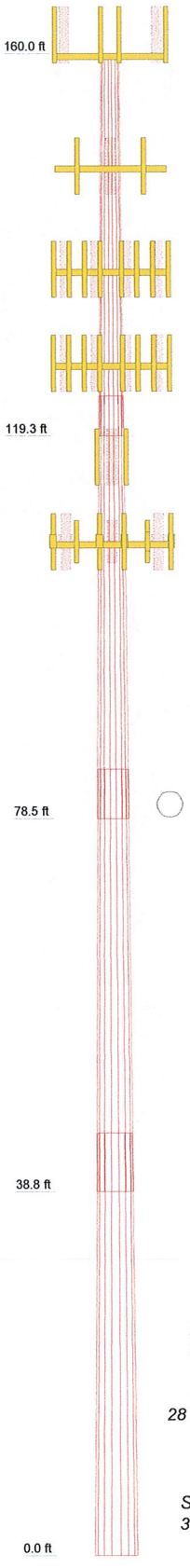
This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Engineering, Inc. should be notified immediately to perform a revised analysis.

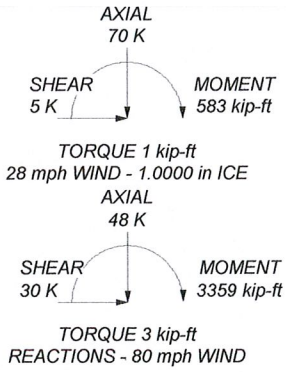
LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Engineering, Inc.

APPENDIX

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	40.75	18	0.2500	4.25	24.0000	32.7630		3.1
2	45.00	18	0.3125	5.25	31.3491	41.0250		5.4
3	45.00	18	0.3750	6.25	39.2711	48.8470	A607-65	8.0
4	45.00	18	0.4375		46.8531	56.5300		10.9
								27.4





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) RR90-17-02DP w/Mount Pipe	160	(2) LPA-80080/6CF W/Mount Pipe	137
(2) RR90-17-02DP w/Mount Pipe	160	(1) Low Profile Platform	137
(2) RR90-17-02DP w/Mount Pipe	160	BXA-70063/6CF-2 w/ Mount Pipe	137
(2) TMA	160	BXA-70063/6CF-2 w/ Mount Pipe	137
(2) TMA	160	(4) DB844H90E-XY w/ Mount Pipe	127
(2) TMA	160	(4) DB844H90E-XY w/ Mount Pipe	127
(1) Low Profile Platform	160	(4) DB844H90E-XY w/ Mount Pipe	127
Empty Mount Pipe	160	(1) Low Profile Platform	127
Empty Mount Pipe	160	RFS APXV18-206515S-C w/Mount Pipe	117
Empty Mount Pipe	160		
RFS APXVSPP18-C-A20 w/Mount Pipe	148	(3) Pipe Mounts	117
		RFS APXV18-206515S-C w/Mount Pipe	117
ALU 1900 RRUs	148		
ALU 1900 RRUs	148	RFS APXV18-206515S-C w/Mount Pipe	117
ALU 1900 RRUs	148		
ALU 800 RRU	148	AM-X-CD-16-65-00T-RET w/ Mount Pipe	108
ALU 800 RRU	148	AM-X-CD-16-65-00T-RET w/ Mount Pipe	108
ALU 800 RRU	148		
ALU 800 Filter	148	AM-X-CD-16-65-00T-RET w/ Mount Pipe	108
ALU 800 Filter	148		
ALU 800 Filter	148	(2) LGP21401 TMA	108
RFS ACU-A20-N RET	148	(2) LGP21401 TMA	108
RFS ACU-A20-N RET	148	(2) LGP21401 TMA	108
(2) RFS ACU-A20-N RET	148	(2) LGP21903 Diplexer	108
(1) Low Profile Platform	148	(2) LGP21903 Diplexer	108
RFS APXVSPP18-C-A20 w/Mount Pipe	148	(2) LGP21903 Diplexer	108
		(2) RRUS-11	108
RFS APXVSPP18-C-A20 w/Mount Pipe	148	(2) RRUS-11	108
		(2) RRUS-11	108
(3) Empty Mount Pipe	148	ABT-DFDM-ADBH	108
(3) Empty Mount Pipe	148	DC6-48-60-18-8F Surge Arrestor	108
(3) Empty Mount Pipe	148	(1) Low Profile Platform	108
BXA-70063/6CF-2 w/ Mount Pipe	137	(2) 7770 w/ Mount Pipe	108
BXA-171085/8BF-2 w/ Mount Pipe	137	DUO1417-8686-40 w/ Mount Pipe	108
BXA-171085/8BF-2 w/ Mount Pipe	137	(2) 7770 w/ Mount Pipe	108
BXA-171085/8BF-2 w/ Mount Pipe	137	(2) 7770 w/ Mount Pipe	108
(2) FDR6004/2C-3L	137	DUO1417-8686-40 w/ Mount Pipe	108
(2) FDR6004/2C-3L	137	DUO1417-8686-40 w/ Mount Pipe	108
(2) FDR6004/2C-3L	137	GPS	75
(2) LPA-80080/6CF W/Mount Pipe	137	(1) Pipe Mount	75
(2) LPA-80080/6CF W/Mount Pipe	137		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	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: 74.4%

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

Job: South Plymouth, CT - CT03538-S			
Project: 12-04783E S2			
Client: SBA Network Services, Inc.	Drawn by: Tyler Mora, EI	App'd:	
Code: TIA/EIA-222-F	Date: 08/29/12	Scale: NTS	
Path:		Dwg No. E-1	