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

November 23, 2012

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

RE: **EM-CING-143-121108** – New Cingular Wireless PCS, LLC notice of intent to modify an existing telecommunications facility located at 1925 East Main Street, Torrington, 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 September 11, 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 less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated November 6, 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 MHB

Linda Roberts
Executive Director

LR/CDM/cm

c: The Honorable Ryan J. Bingham, Mayor, City of Torrington
Martin Connor, City Planner, City of Torrington

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

November 9, 2012

The Honorable Ryan J. Bingham
Mayor
City of Torrington
140 Main Street
Torrington, CT 06790-5245

RE: **EM-CING-143-121108** - New Cingular Wireless PCS, LLC notice of intent to modify an existing telecommunications facility located at 1925 East Main Street, Torrington, Connecticut.

Dear Mayor Bingham:

The Connecticut Siting Council (Council) received a request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72. A copy of which has already been provided to you.

If you have any questions or comments regarding the proposal, please call me or inform the Council by November 23, 2012.

Thank you for your cooperation and consideration.

Very truly yours,

LRoberts

Linda Roberts
Executive Director

LR/cm

c: Martin Connor, City Planner, City of Torrington

EM-CING-143-121108

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

November 6, 2012

VIA OVERNIGHT COURIER

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

Re: New Cingular Wireless PCS, LLC – Exempt Modification
1925 East Main Street, Torrington, 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 Mayor of the City of Torrington.

AT&T plans to modify the existing wireless communications facility owned by S BA Towers, Inc. and located at 1925 East Main Street, Torrington (coordinates 41° -49'-23.8" N, 73°-04'-36.11" 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 pipe mounts attached to the existing platform, and rotate the existing GSM/UMTS antennas to match the LTEs Azimuths, at a centerline height of approximately 95'. Six (6) RRHs (remote radio units) will be placed on new mounts behind the LTE antennas, and a Surge Arrestor on a new

mounting pipe attached to the platform support arm, also at a centerline height of approximately 95'. AT&T will also place a DC power and fiber run along the existing coaxial cable run. These changes will not extend the height of the approximately 153' structure.

2. AT&T will place related equipment in an existing Equipment Shelter and mount a new GPS antenna on the existing Equipment Room. 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 3.57%; the combined site operations will result in a total power density of approximately 47.66%.

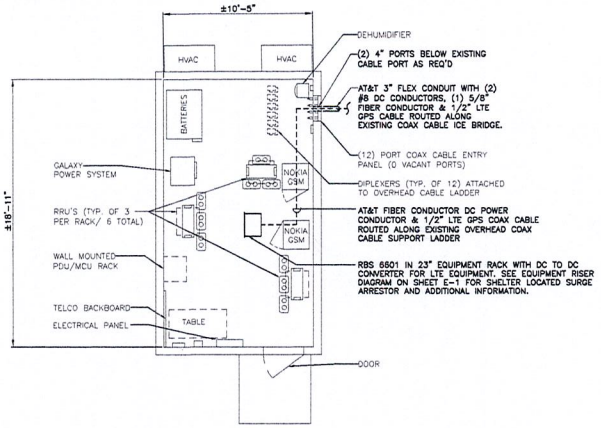
Please do not hesitate to contact me by phone at (203) 610-1071, or by e-mail at mjhowlett@optonline.net, if there are any questions concerning this matter. Thank you for your consideration.

Respectfully yours,

Melanie J. Howlett

Attachments

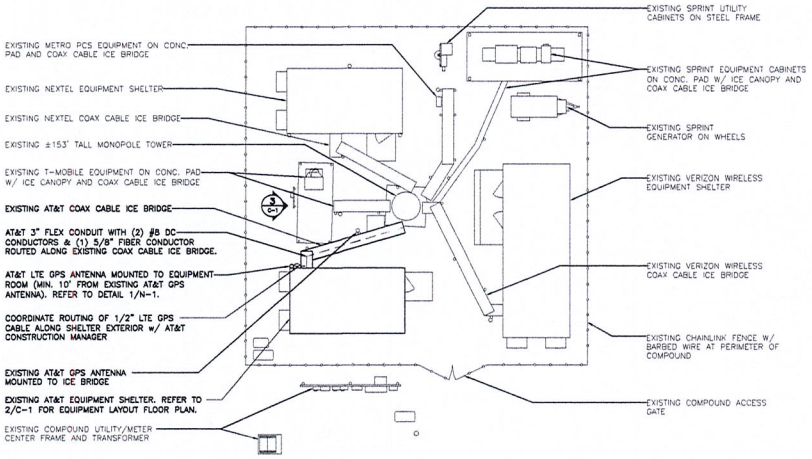
cc: Honorable Ryan J. Bingham, Mayor, City of Torrington
T.E. P Incorporated (underlying property owner)



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

APPROX. NORTH

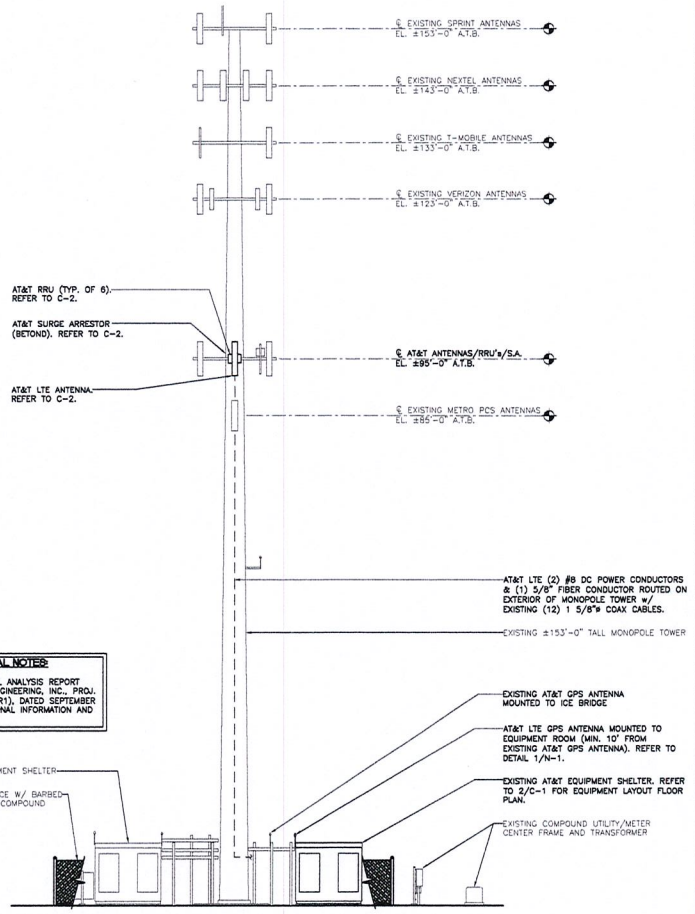
GRAPHIC SCALE
4 0 2 4 8 16
(IN FEET)
1 inch = 4 ft.



2 / C-1 **EAST ELEVATION**
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. 12-04781E S3 (R1), DATED SEPTEMBER 11, 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:	DEB
DRAWN BY:	HMR
CHK'D BY:	CFC

REV.	DATE	DRAWN BY	CHK'D BY	
1	10/31/12	HMR	DEB	CONSTRUCTION – CLIENT REVIEW
0	09/16/12	CLT	DEB	CONSTRUCTION – CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

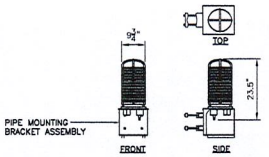
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.Centekeng.com

AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY LTE UPGRADE
CT11118
TORRINGTON EAST MAIN STREET
1925 EAST MAIN STREET
TORRINGTON, CT 06790

DATE: 10/31/12
SCALE: AS NOTED
JOB NO. 12063.C015

PLANS AND ELEVATION

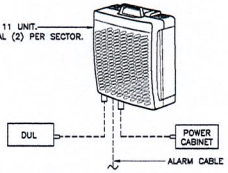
C-1
Sheet No. 3 of 5



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.

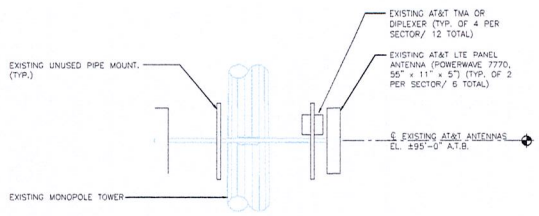
6 / C-2 SURGE ARRESTOR DETAIL
NOT TO SCALE



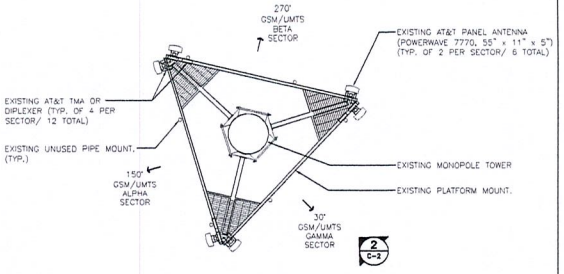
RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRUS 11	17.8"L x 17.3"W x 7.2"D	BAND 4: 44 LBS. BAND 12: 50 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. SIDE: 0" MIN.

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

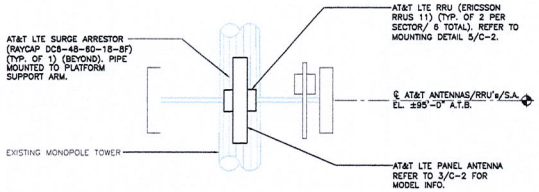


2 / C-2 EXISTING ANTENNA SECTOR ELEVATION
SCALE: 1/4" = 1'-0"

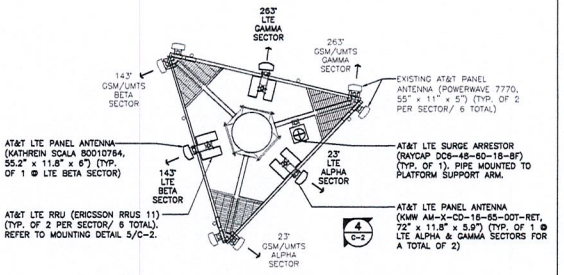


1 / C-2 EXISTING ANTENNA PLAN
SCALE: 1/4" = 1'-0"

APPROX. NORTH



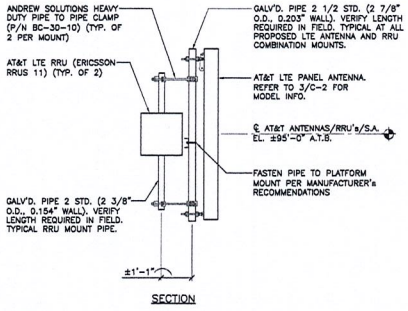
4 / C-2 PROPOSED LTE ANTENNA SECTOR ELEVATION
SCALE: 1/4" = 1'-0"



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

REV.	DATE	DRAWN BY	CHK'D BY	
1	10/31/12	HMR	DEB	CONSTRUCTION – CLIENT REVIEW
0	08/16/12	CJT	DEB	CONSTRUCTION – CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

(203) 488-0580
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AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY LTE UPGRADE
CT1118
TORRINGTON EAST MAIN STREET
1925 EAST MAIN STREET
TORRINGTON, CT 06790

DATE: 10/31/12
SCALE: AS NOTED
JOB NO. 12063.C015

LTE EQUIPMENT DETAILS

C-2

Sheet No. 4 of 6

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

Calculated Radio Frequency Emissions

at&t

CT1118

(Torrington)

1931 East Main Street, Torrington, CT 06790

a.k.a (1925-1930 East Main Street)

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 1931 East Main Street in Torrington, CT. The coordinates of the tower are 41° 49' 23.79" N, 73° 4' 36.10" 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	*95*	*880*	*1*	*500*	*0.0199*	*0.5867*	*3.40%*
Cingular GSM	*95*	*880*	*4*	*296*	*0.0472*	*0.5867*	*8.04%*
Cingular GSM	*95*	*1930*	*2*	*427*	*0.0340*	*1.0000*	*3.40%*
Nextel	143	851	9	100	0.0158	0.5673	2.79%
VoiceStream	133	1930	4	294	0.0239	1.0000	2.39%
Sprint	153	1962.5	11	349	0.0590	1.0000	5.90%
Pocket	85	2130	3	631	0.0942	1.0000	9.42%
Verizon	120	875	9	200	0.0449	0.5833	7.70%
Verizon PCS	120	1970	9	485	0.1090	1.0000	10.90%
Town	No RF information available, %MPE estimated						5.00%
AT&T UMTS	95	880	2	565	0.0045	0.5867	0.77%
AT&T UMTS	95	1900	2	875	0.0070	1.0000	0.70%
AT&T LTE	95	734	1	1313	0.0052	0.4893	1.07%
AT&T GSM	95	880	1	283	0.0011	0.5867	0.19%
AT&T GSM	95	1900	4	525	0.0084	1.0000	0.84%
						Total	**47.66%**

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 September 11, 2012.

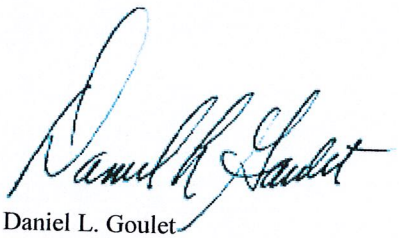
5. Conclusion

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 **47.66% 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.

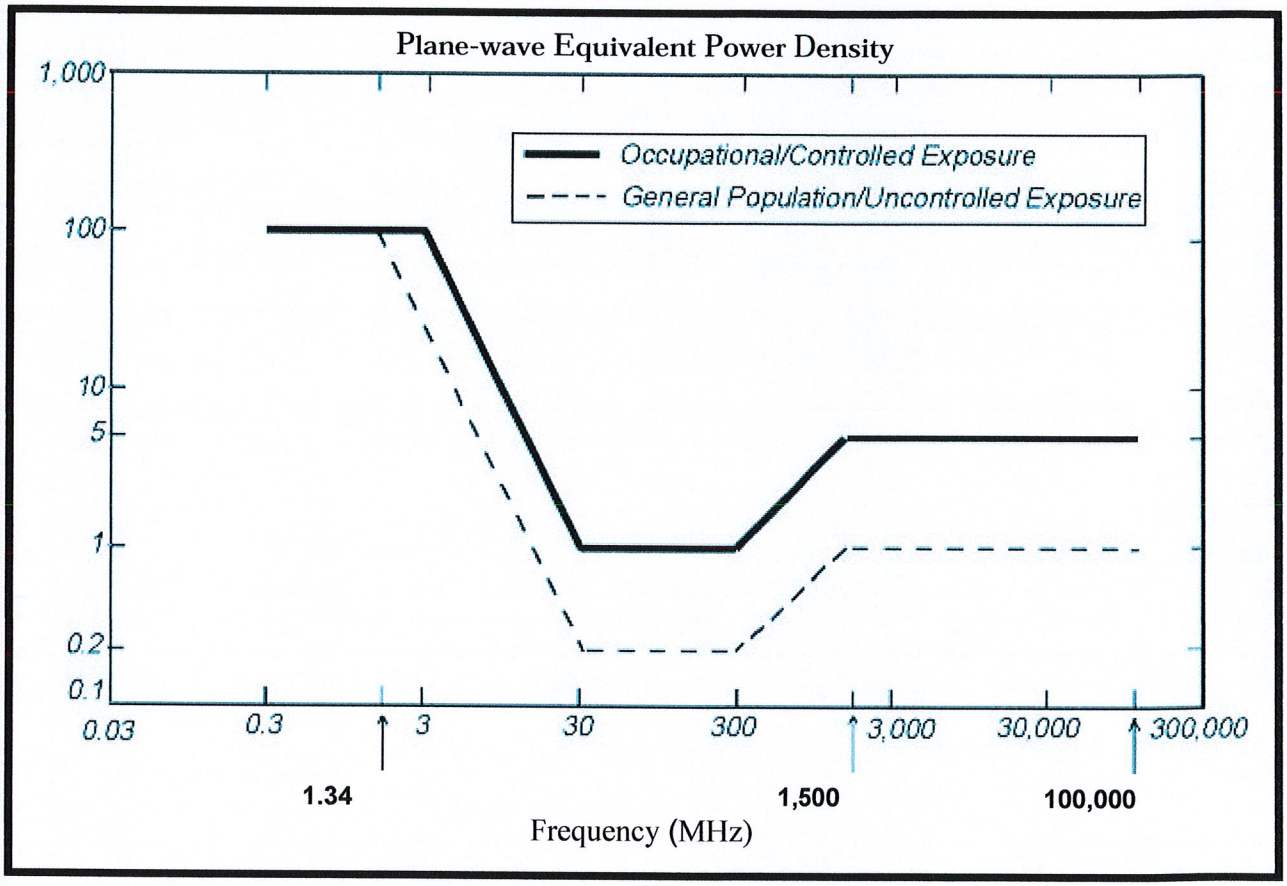
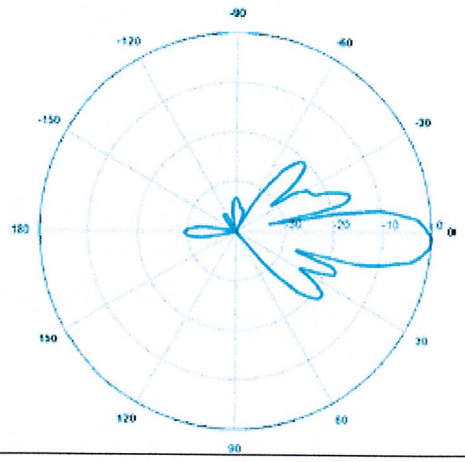


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

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

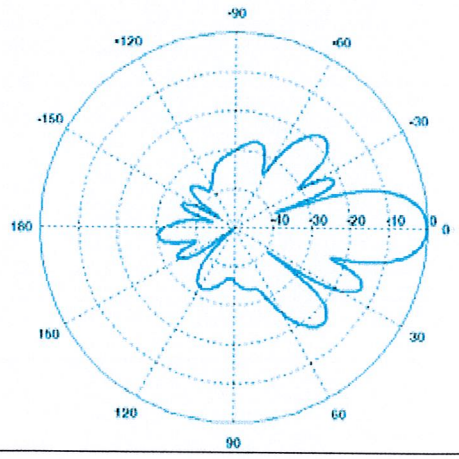
700 MHz

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"



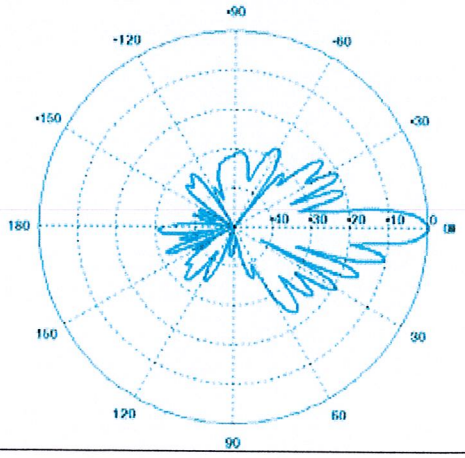
850 MHz

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

Structural Analysis for SBA Network Services, Inc.

153' Monopole Tower

SBA Site Name: Torrington
SBA Site ID: CT01499-S
AT&T Site ID: CT1118
AT&T Site Name: Torrington

FDH Project Number 12-04781E S3 (R1)

Analysis Results

Tower Components	96.2%	Sufficient
Foundation	99.9%	Sufficient

Prepared By:

David Zambrano
Project Engineer

Reviewed By:

Christopher M Murphy, PE
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STATE OF CONNECTICUT
Christopher Michael Murphy
No. 25842
LICENSED
PROFESSIONAL ENGINEER
9/11/12

September 11, 2012

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

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EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the monopole located in Torrington, 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:

- Fred A. Nudd Corporation (Project No. 7783) original design drawings dated August 18, 2000
- Vertical Structures, Inc. (Job No. 2003-007-015) structural analysis and modification drawings dated September 9, 2003
- 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 95 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 Fred A. Nudd Project No. 7783), 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 proposed coax should be installed inside the pole's shaft but may be installed on the exterior of the monopole shaft in a single row.
2. The existing TMAs and diplexers should be installed directly behind the proposed and existing panel antennas.

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[1]	Carrier	Mount Elevation (ft)	Mount Type
153	(3) RFS APXVSPP18-C-A20 w/ Mount Pipe (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	153	(1) Low Profile Platform
143	(12) Decibel DB844H90E-XY w/ Mount Pipe	(12) 1-1/4"	Nextel	143	(1) Low Profile Platform
133	(6) EMS RR90-17-02DP w/ Mount Pipe	(12) 1-5/8"	T-Mobile	133	(1) Low Profile Platform
123	(6) Antel LPA-80063/6CF w/ Mount Pipe (6) Antel LPA-171063-12CF w/ Mount Pipe (2) Antel BXA-70063-6CF-2 w/ Mount Pipe (1) RFS APX75-866514-T6 w/ Mount Pipe	(12) 1-5/8" (6) 1-5/8"[2]	Verizon	123	(1) Low Profile Platform
110	(1) 10' Omni	(1) 1/2"	Torrington PD	105	(1) Standoff
95	(3) CSS DUO1417-8686-40 w/ Mount Pipe (6) Powerwave 7770 w/ Mount Pipe (6) Powerwave LGP21401 TMAs (6) Powerwave LGP21903 Diplexers	(12) 1-5/8"[3]	AT&T	95	(1) Low Profile Platform
85	(3) RFS APXV18-206517S-C	(6) 1-5/8"[4]	Pocket	85	(3) Pipe Mounts
70	(1) GPS	(1) 1/2"	---	70	(1) Standoff

1. The existing coax are installed inside the pole's shaft, unless otherwise noted
2. Verizon's coax to 123 ft are installed outside the pole's shaft in a single row
3. AT&T's coax to 95 ft are installed outside the pole's shaft in a single row
4. Pocket's coax to 85 ft are installed outside the pole's shaft in a single row

Proposed Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
95	(3) CSS DUO1417-8686-40 w/ Mount Pipe (6) Powerwave 7770 w/ Mount Pipe (1) Kathrein 800 10764 w/ Mount Pipe (2) KMW AM-X-CD-16-65-001-RET w/ Mount Pipe (6) Powerwave LGP21401 TMAs (6) Powerwave LGP21903 Diplexers (6) Ericsson RRUS-11 RRUs (1) Andrew ABT-DF-DMADBH Surge Arrestor (1) Raycap DC6-48-60-18-8F Surge Arrestor	(12) 1-5/8 (1) 7/16 Fiber[1] (2) 3/4 DC[1]	AT&T	95	(1) Low Profile Platform

1. Coax installed inside 3" Flex Conduit.

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
Flange Plate	50 ksi
Flange Bolts	Fu = 120 ksi (assumed)
Base Plate	50 ksi
Anchor Bolts	Fu = 125 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. **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	153 - 150	Pole	TP26.25x24x0.25	1.9	Pass
		Flange Bolts	(18) .5" Ø on 27" Ø BC	7.1	Pass
		Flange Plate	30" Ø x .5" thk PL	3.9	Pass
L2	150 - 110	Pole	TP35.25x26.25x0.25	36.6	Pass
L3	110 - 65	Pole	TP45.375x33.625x0.3125	68.1	Pass
L4	65 - 21	Pole	TP55.275x43.34x0.3125	96.2	Pass
L5	21 - 0	Pole	TP60x52.9791x0.375	84.7	Pass
		Anchor Bolts	(18) 2" Ø w/ 67" Ø BC	83.6	Pass
		Base Plate	73" Ø x 1.5" thk. PL w/ Stiffeners	65.9	Pass

* Capacities include 1/3 allowable stress increase for wind per *TIA/EIA-222-F*.

Table 4 - Maximum Base Reactions

Base Reactions	Current Analysis *(TIA/EIA-222-F)*	Original Design *(TIA/EIA-222-F)*
Axial	42 k	---
Shear	37 k	31 k
Moment	3,688 k-ft	3,692 k-ft

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.

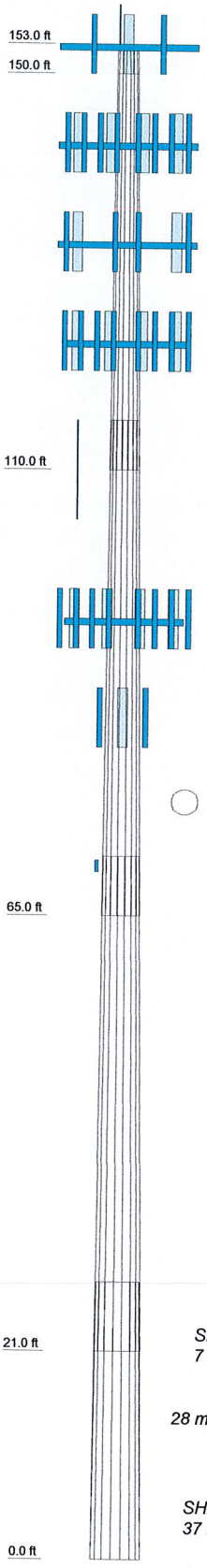
LIMITATIONS

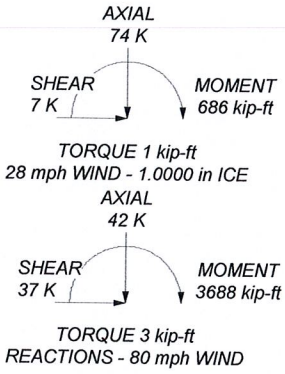
All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided 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	1	2	3	4	5
Length (ft)	3.00	40.00	50.00	50.00	28.00
Number of Sides	18	18	18	18	18
Thickness (in)	0.2500	0.2500	0.3125	0.3125	0.3750
Socket Length (ft)		5.00	6.00	7.00	
Top Dia (in)	24.0000	26.2500	33.6250	43.3400	52.9791
Bot Dia (in)	26.2500	35.2500	45.3750	55.2750	60.0000
Grade			A572-65		
Weight (K)	0.2	3.3	6.6	8.3	6.4

24.7





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	153	APX75-866514-T6 w/ Mount Pipe	123
APXVSPP18-C-A20 w/Mount Pipe	153	(1) Low Profile Platform	123
APXVSPP18-C-A20 w/Mount Pipe	153	10' Omni	105
APXVSPP18-C-A20 w/Mount Pipe	153	(1) Standoff	105
ALU 1900 RRU	153	CSS DUO1417-8686-40 w/ Mount Pipe	95
ALU 1900 RRU	153		
ALU 1900 RRU	153	CSS DUO1417-8686-40 w/ Mount Pipe	95
ALU 800 RRU	153		
ALU 800 RRU	153	CSS DUO1417-8686-40 w/ Mount Pipe	95
ALU 800 RRU	153		
ALU 800 Filter	153	(2) Powerwave 7770 w/ Mount Pipe	95
ALU 800 Filter	153	(2) Powerwave 7770 w/ Mount Pipe	95
ALU 800 Filter	153	(2) Powerwave 7770 w/ Mount Pipe	95
ACU-A20-N RET	153	800 10764 w/ Mount Pipe	95
(2) ACU-A20-N RET	153	KMW AM-X-CD-16-65-001-RET w/ Mount Pipe	95
ACU-A20-N RET	153		
(1) Low Profile Platform	153	KMW AM-X-CD-16-65-001-RET w/ Mount Pipe	95
(2) Empty Mount Pipe	153		
(2) Empty Mount Pipe	153	(2) LGP21401 TMA	95
(2) Empty Mount Pipe	153	(2) LGP21401 TMA	95
(4) DB844H90E-XY w/Mount Pipe	143	(2) LGP21401 TMA	95
(4) DB844H90E-XY w/Mount Pipe	143	(2) LGP21903 Diplexer	95
(4) DB844H90E-XY w/Mount Pipe	143	(2) LGP21903 Diplexer	95
(1) Low Profile Platform	143	(2) LGP21903 Diplexer	95
(2) RR90-17-02DP w/Mount Pipe	133	(2) RRUS-11	95
(2) RR90-17-02DP w/Mount Pipe	133	(2) RRUS-11	95
(2) RR90-17-02DP w/Mount Pipe	133	(2) RRUS-11	95
(1) Low Profile Platform	133	Andrew ABT-DF-DMADBH Surge Arrestor	95
(2) LPA-80063/6CF w/ Mount Pipe	123	DC6-48-60-18-8F Surge Arrestor	95
(2) LPA-80063/6CF w/ Mount Pipe	123	(1) Low Profile Platform	95
(2) LPA-80063/6CF w/ Mount Pipe	123	APXV18-206517S-C w/Mount Pipe	85
(2) LPA-171063-12CF w/ Mount Pipe	123	APXV18-206517S-C w/Mount Pipe	85
(2) LPA-171063-12CF w/ Mount Pipe	123	APXV18-206517S-C w/Mount Pipe	85
(2) LPA-171063-12CF w/ Mount Pipe	123	GPS	70
BXA-70063-6CF-2 w/ Mount Pipe	123	Standoff	70
BXA-70063-6CF-2 w/ Mount Pipe	123		

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: 96.2%

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Tower Analysis

Job: Torrington CT01499-S		
Project: 12-04781E S3 (R1)		
Client: SBA	Drawn by: John Wood	App'd:
Code: TIA/EIA-222-F	Date: 09/11/12	Scale: NTS
Path: \\fdh-server\Projects\2012 Projects\4 - App\12-04781E\Torrington, CT\S3- SA_ATT\Analysis\R1\Torrington-CT - CT01499-S.eri		Dwg No. E-1