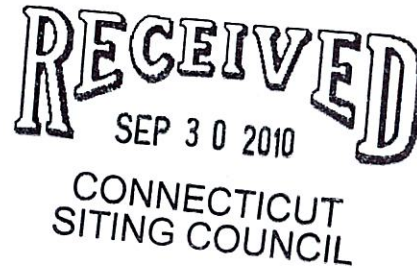




EM-T-MOBILE-011-100930

ORIGINAL

September 29, 2010



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

Re: T-Mobile Northeast, LLC – exempt modification  
8 Hoskins Road, a/k/a 5-7 Saint Andrews Street, Bloomfield, Connecticut

Dear Ms. Roberts:

This letter and attachments are submitted on behalf of T-Mobile Northeast, LLC (“T-Mobile”). T-Mobile plans to install antennas and related equipment at the Connecticut Light & Power Company tower site at 8 Hoskins Road, a/k/a 5-7 Saint Andrews Street in Bloomfield (coordinates 41°53’34” N, -72°45’56” W). Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction which 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 Bloomfield.

T-Mobile will install nine panel antennas at the 107.5’ level of the tower. Up to 24 coax coaxial cables will also be installed. T-Mobile’s equipment cabinets will be placed on a concrete pad within the compound; an existing abandoned pad will be extended to accommodate the T-Mobile cabinets. Attached are a compound plan and elevation depicting the planned changes. Also attached are a structural analysis confirming the structural sufficiency of the tower to accommodate the proposed changes.

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. The height of the overall structure will be unaffected. The top of the tower extends to approximately 180’; T-Mobile’s proposed antennas will be located with a center line of 107.5’ AGL.
2. The addition of T-Mobile’s equipment will not require any extension of the site boundaries. All equipment will be located within the existing fenced compound.
3. The proposed changes will not increase the noise level at the existing facility by six decibels or more. The incremental effect of the additional cabinets 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 power density calculation, T-Mobile's operations at the site will result in a power density of 11.169%; the combined site operations will result in a total power density of 19.929%.

Please feel free to call me at (860) 798-7454 with questions concerning this matter.  
Thank you for your consideration.

Respectfully yours,



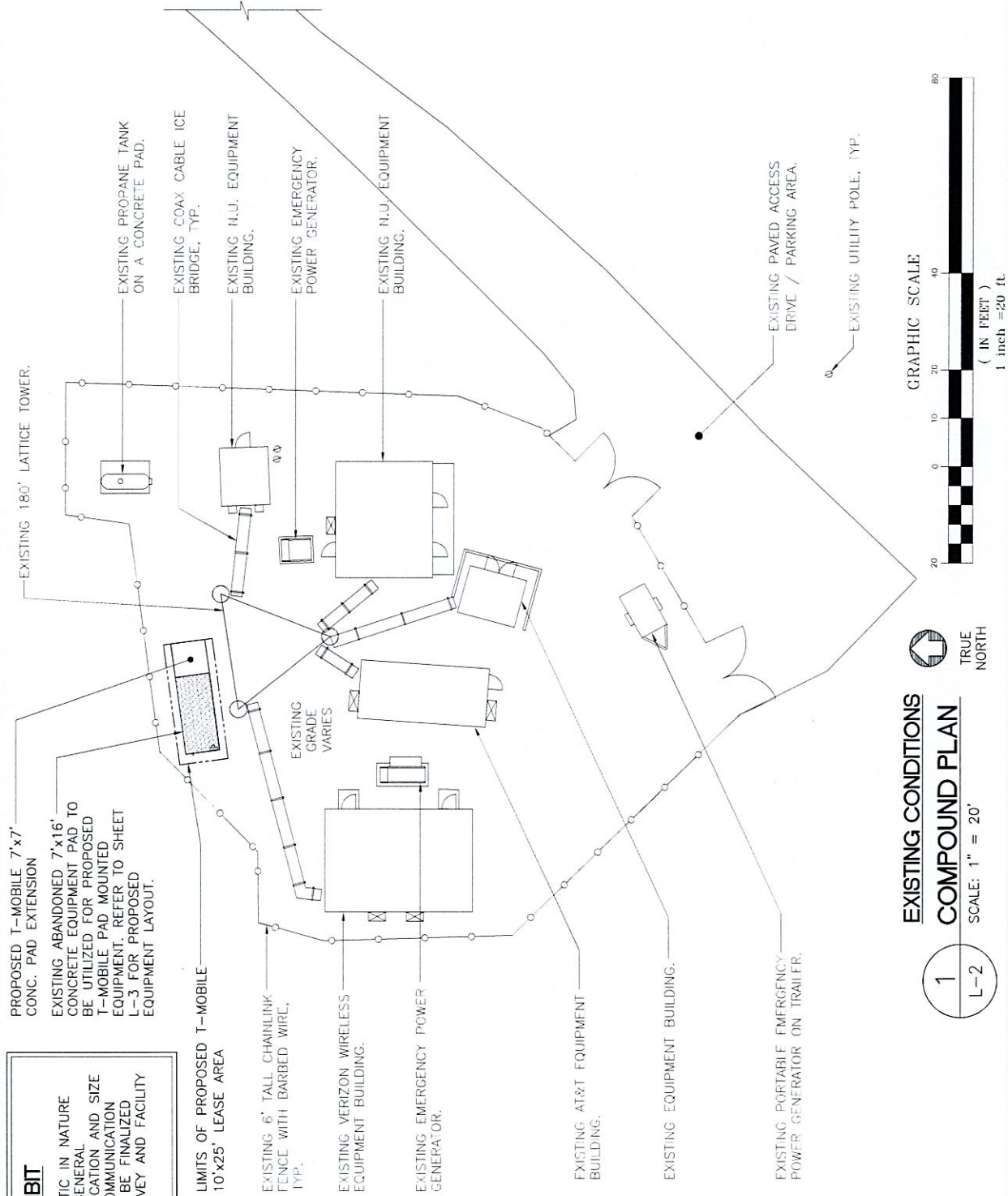
Jennifer Young Gaudet

cc: Honorable Sydney T. Schulman, Mayor, Town of Bloomfield  
Connecticut Light & Power Company (underlying property owner)

Attachments

# LEASE EXHIBIT

THIS LEASE PLAN IS DIAGRAMMATIC IN NATURE AND IS INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION AND SIZE OF THE PROPOSED WIRELESS COMMUNICATION FACILITY. THE SITE LAYOUT WILL BE FINALIZED UPON COMPLETION OF SITE SURVEY AND FACILITY DESIGN.



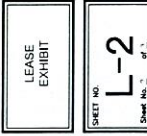
EXISTING CONDITIONS

1 COMPOUND PLAN

SCALE: 1" = 20'

1 L-2

DESIGNED BY:	CFC
DRAWN BY:	DMD
CHECKED BY:	CFC
DATE:	06/25/10
SCALE:	AS SHOWN
JOB NO.:	10104
PROJECT NO.:	10104
PROJECT NAME:	CTHA142
PROJECT LOCATION:	TARIFFVILLE NU
PROJECT TYPE:	COMMUNICATIONS TOWER
PROJECT STATUS:	PROPOSED
PROJECT DESCRIPTION:	PROPOSED WIRELESS COMMUNICATION FACILITY
PROJECT REVISIONS:	
REVISION:	DATE: 06/25/10
BY:	CFC
DESCRIPTION:	LEASE EXHIBIT - CLIENT REVIEW
REVISION:	DATE: 06/25/10
BY:	CFC
DESCRIPTION:	LEASE EXHIBIT - CLIENT REVIEW







**Structural Analysis Report**

*180' Existing Andrew Lattice Tower*

*Proposed T-Mobile Antenna Installation*

*T-Mobile Site Ref: CTHA142*

*5-7 Saint Andrews St.  
Bloomfield, CT*

*CEN TEK Project No. 10104*

*~~Date: July 21, 2010~~*

*Rev 1: August 20, 2010*



**Prepared for:**

T-Mobile Towers  
4 Sylvan Way  
Parsippany, NJ 07054

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## Introduction

The purpose of this report is to summarize the results of the non-linear, P- $\Delta$  structural analysis of the antenna installation/modification proposed by T-Mobile on the existing self supporting lattice tower located in Bloomfield, Connecticut.

The host tower is a 180-ft, three legged, tapered lattice tower originally designed and manufactured by Andrew Corporation. The tower geometry, structure member sizes and foundation information were taken from the original manufacturers drawings. Tower reinforcements were taken from a structural analysis report prepared by All-Points Technology Corp. dated September 4, 2007. Antenna and appurtenance inventory were taken from a tower mapping report prepared by CSB communications, LLC dated May 28, 2008 and a T-Mobile RF data sheet.

The tower is made of nine (9) tapered vertical sections consisting of bent plate legs. Diagonal lateral support bracing consists of structural steel angle shapes. The vertical tower sections are connected by bolted splice plates while the legs and bracing are connected by welded and bolted gusset connections. The width of the tower face is 8.5-ft at the top and 24.0-ft at the base.

T-Mobile proposes the installation of nine (9) panel antennas on three (3) 12-ft T-Frame sector mounts. Northeast Utilities Systems also proposes the installation of one (1) 6' dish. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

## Antenna and Appurtenance Summary

The existing tower was designed to support several communication antennas. The existing, proposed and future loads considered in this analysis consist of the following:

- STATE POLICE (EXISTING):  
Antenna: One (1) 3-ft whip antenna pipe mounted with an elevation of  $\pm 190.5$ -ft above the tower base.  
Coax Cable: One (1) 1-1/4"  $\varnothing$  coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- NORTHEAST UTILITIES SYSTEM (Existing):  
Antenna: One (1) Decibel DB201 ground plain antenna pipe mounted with an elevation of  $\pm 183.5$ -ft above the tower base.  
Coax Cable: One (1) 1-5/8"  $\varnothing$  coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- BLOOMFIELD POLICE DEPT. (Existing):  
Antenna: One (1) 10' dipole antenna pipe mounted with an elevation of  $\pm 177$ -ft above the tower base.  
Coax Cable: One (1) 7/8"  $\varnothing$  coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- **NORTHEAST UTILITIES SYSTEM (Existing):**  
Antenna: One (1) 7-ft whip antenna pipe mounted with an elevation of ±180-ft above the tower base.  
Coax Cable: One (1) 7/8" Ø coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **STATE POLICE (Existing):**  
Antenna: One (1) 4-ft x 3-in Ø Omni-directional (whip) antenna pipe mounted with an elevation of ±180-ft above the tower base.  
Coax Cable: One (1) 1-1/4" Ø coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **STATE POLICE (Existing):**  
Antenna: One (1) 6-ft Ø dish antenna pipe mounted with an elevation of ±180-ft above the tower base.  
Coax Cable: One (1) EW63 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **NORTHEAST UTILITIES SYSTEM (Existing):**  
Antenna: One (1) 8-ft Ø dish antenna pipe mounted with an elevation of ±177.5-ft above the tower base.  
Coax Cable: One (1) EW63 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **BLOOMFIELD POLICE DEPT. (Existing):**  
Antenna: One (1) 19-ft x 3-in Ø Omni-directional (whip) antenna pipe mounted with an elevation of ±175-ft above the tower base.  
Coax Cable: Two (2) 7/8" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **STATE POLICE (Existing):**  
Antenna: One (1) 8-ft Ø dish antenna pipe mounted with an elevation of ±174.75-ft above the tower base.  
Coax Cable: Two (2) EW63 coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **NORTHEAST UTILITIES SYSTEM (Existing):**  
Antenna: One (1) 4-ft panel antenna pipe mounted with an elevation of ±169.5-ft above the tower base.  
Coax Cable: One (1) 1-5/8" Ø coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **NORTHEAST UTILITIES SYSTEM (Existing):**  
Antenna: One (1) 8-ft Ø dish antenna pipe mounted with an elevation of ±164.83-ft above the tower base.  
Coax Cable: One (1) EW63 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.



- BLOOMFIELD POLICE DEPT. (Existing):  
Antenna: One (1) 3'x6' paraflector antenna pipe mounted with an elevation of  $\pm 163.5$ -ft above the tower base.  
Coax Cable: One (1) 7/8"  $\varnothing$  coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):  
Antenna: One (1) 22-ft x 3-in  $\varnothing$  Omni-directional (whip) antenna pipe mounted with an elevation of  $\pm 158.25$ -ft above the tower base.  
Coax Cable: One (1) 7/8"  $\varnothing$  coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- AT&T (Existing):  
Antennas: Six (6) CSS DUO4-8686 and three (3) Powerwave 7770 panel antennas and nine (9) TMAs mounted on three (3) boom gates with a RAD center elevation of  $\pm 158$ -ft above the existing tower base.  
Coax Cables: Twelve (12) 1-5/8"  $\varnothing$  coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):  
Antenna: Two (2) empty 10-ft x 4-in pipe mount with an elevation of  $\pm 155.25$ -ft above the tower base.
- VERIZON (Existing):  
Antennas: Six (6) Decibel DB844H90 and six (6) Decibel DB948F85T2E-M panel antennas mounted on three (3) boom gates with a RAD center elevation of  $\pm 150$ -ft above the existing tower base.  
Coax Cables: Twelve (12) 1-5/8"  $\varnothing$  coax cables running on the face of the existing tower configured in 2 rows of 6 cables as specified in Section 3 of this report.
- UNKNOWN (Existing):  
Antenna: One (1) 4-ft  $\varnothing$  dish antenna pipe mounted with an elevation of  $\pm 144.5$ -ft above the tower base.  
Coax Cable: One (1) EW90 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- NORTHEAST UTILITIES SYSTEM (Existing):  
Antenna: One (1) 10-ft  $\varnothing$  dish antenna pipe mounted with an elevation of  $\pm 135$ -ft above the tower base.  
Coax Cable: One (1) EW63 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- STATE POLICE (Existing):  
Antenna: One (1) 4-ft  $\varnothing$  dish antenna pipe mounted with an elevation of  $\pm 135$ -ft above the tower base.  
Coax Cable: One (1) EW90 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- **NORTHEAST UTILITIES SYSTEM (Existing):**  
Antenna: One (1) 8-ft Ø dish antenna pipe mounted with an elevation of ±123.5-ft above the tower base.  
Coax Cable: One (1) WE65 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **UNKNOWN (Existing):**  
Antenna: Two (2) empty 10-ft x 4-in pipe mounts with an elevation of ±125-ft above the tower base.
- **NORTHEAST UTILITIES SYSTEM (Existing):**  
Antenna: One (1) 10-ft x 3-in Ø Omni-directional (whip) antenna mounted on a 8-ft x 1-ft sector frame with an elevation of ±127.67-ft above the tower base.  
Coax Cable: One (1) 1/2" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **NORTHEAST UTILITIES SYSTEM (Existing):**  
Antenna: One (1) 8-ft x 3-in Ø Omni-directional (whip) antenna mounted on the 8-ft x 1-ft sector frame with an elevation of ±126.25-ft above the tower base.  
Coax Cable: One (1) 7/8" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **NORTHEAST UTILITIES SYSTEM (Existing):**  
Antenna: One (1) 13-ft x 10-ft yagi antenna mounted on the 8-ft x 1-ft sector frame with an elevation of ±116-ft above the tower base.  
Coax Cable: One (1) 1/2" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **NORTHEAST UTILITIES SYSTEM (Existing):**  
Antenna: One (1) 21-ft x 3-in Ø Omni-directional (whip) antenna mounted on a 3-ft side arm with an elevation of ±120.5-ft above the tower base.  
Coax Cable: One (1) 7/8" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **UNKNOWN (Existing):**  
Antenna: Two (2) empty 4-ft pipe mounts with an elevation of ±115.5-ft above the tower base.
- **UNKNOWN (Existing):**  
Antenna: One (1) 21-ft x 3-in Ø Omni-directional (whip) antenna pipe mounted with an elevation of ±99-ft above the tower base.  
Coax Cable: One (1) 7/8" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **NORTHEAST UTILITIES SYSTEM (Existing):**  
Antenna: One (1) 8-ft Ø dish antenna pipe mounted with an elevation of ±96-ft above the tower base.  
Coax Cable: One (1) EW63 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.



- UNKNOWN (Existing):  
Antenna: Two (2) empty 10-ft pipe mounts with an elevation of  $\pm 95.5$ -ft above the tower base.
- UNKNOWN (Existing):  
Antenna: One (1) empty 4-ft pipe mount with an elevation of  $\pm 94.72$ -ft above the tower base.
- NORTHEAST UTILITIES SYSTEM (Existing):  
Antenna: One (1) 11-ft x 3-in  $\varnothing$  Omni-directional (whip) antenna mounted on a 4-ft side arm with an elevation of  $90\pm$ -ft above the tower base.  
Coax Cable: One (1)  $1/2$ "  $\varnothing$  coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):  
Antenna: One (1) empty 4-ft pipe mount with an elevation of  $\pm 80.58$ -ft above the tower base.
- NORTHEAST UTILITIES SYSTEM (Existing):  
Antenna: One (1) 12-ft yagi antenna mounted on the 8-ft x 1-ft sector frame with an elevation of  $\pm 76.33$ -ft above the tower base.  
Coax Cable: One (1)  $1/2$ "  $\varnothing$  coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- BLOOMFIELD POLICE DEPT. (Existing):  
Antenna: One (1) 1.5-ft  $\varnothing$  dish antenna pipe mounted with an elevation of  $\pm 71$ -ft above the tower base.  
Coax Cable: Two (2)  $1-5/8$ "  $\varnothing$  coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- NORTHEAST UTILITIES SYSTEM (Existing):  
Antenna: One (1) 13-ft x 3-in  $\varnothing$  Omni-directional (whip) antenna pipe mounted with an elevation of  $70.33\pm$ -ft above the tower base.  
Coax Cable: One (1)  $1/2$ "  $\varnothing$  coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- BLOOMFIELD POLICE DEPT. (Existing):  
Antenna: One (1) 20-ft dipole antenna mounted on a 4-ft pipe mount with an elevation of  $66.33\pm$ -ft above the tower base.  
Coax Cable: One (1)  $7/8$ "  $\varnothing$  coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):  
Antenna: Two (2) empty 11-ft pipe mounts with an elevation of  $\pm 65.83$ -ft above the tower base.
- NORTHEAST UTILITIES SYSTEM (Existing):  
Antenna: One (1) 11-ft x 3-in  $\varnothing$  Omni-directional (whip) antenna mounted on a 4-ft pipe mount with an elevation of  $61.33\pm$ -ft above the tower base.  
Coax Cable: One (1)  $1/2$ "  $\varnothing$  coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.



- **NORTHEAST UTILITIES SYSTEM (Existing):**  
Antenna: One (1) 13.5-ft x 3-in Ø Omni-directional (whip) antenna mounted on a 4-ft pipe mount with an elevation of 48.33±-ft above the tower base.  
Coax Cable: One (1) 1/2" Ø coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **NORTHEAST UTILITIES SYSTEM (Proposed):**  
Antenna: One (1) 6-ft Ø dish antenna pipe mounted with an elevation of ±171-ft above the tower base.  
Coax Cable: One (1) EW63 coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **T-MOBILE (Proposed):**  
Antennas: Nine (9) RFS APX16DWV-16DWVS panel antennas mounted on three (3) Vamont 12-ft T-Frames P/N 860115 with a RAD center elevation of ±107.5-ft above the existing tower base.  
Coax Cables: Twenty-four (24) 1-5/8" Ø coax cables running on a face of the existing tower configured in 2 rows of 12 cables as specified in Section 3 of this report.

### Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- **All coax cables shall be routed as specified on in Section 3 of this report.**

## A n a l y s i s

The existing tower was analyzed using a comprehensive computer program entitled RISATower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower legs, and the model assumes that the leg members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for 85 mph basic wind speed (fastest mile) with no ice and 85mph with ½ inch accumulative ice to determine stresses in members as per guidelines of Northeast Utilities Substation Standard (NU SUB-090), TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

## T o w e r   L o a d i n g

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½" radial ice tower structure and its components.

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	NU SUB-090; v = 85 mph (fastest mile)	[Northeast Utilities Substation Standard 090]
	Bloomfield; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	NU-SUB-090 wind speed controls	
Load Cases:	<u>Load Case 1</u> ; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design of monopole towers.	[Northeast Utilities Substation Standard 090]
	<u>Load Case 2</u> ; 85 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. This load case typically controls the design of lattice towers.	[Northeast Utilities Substation Standard 090]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type



## Tower Capacity

Tower stresses were calculated utilizing the structural analysis software RISATower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- **With the proposed tower reinforcements** outlined in section 3 of this report calculated stresses were found to be within allowable limits. In Load Case 2, per RISATower "Section Capacity Table", this tower was found to be at **98.0%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T7)	40'-0" - 60'-0"	95.9%	PASS
Top Girt (T7)	40'-0" - 60'-0"	98.0%	PASS

- The tower deflection (twist and sway) was found to exceed the limit of the NU SUB-90 standard. The tower in its existing condition already exceeded this limit.

Deflection (degrees)	Existing	Proposed	Allowable <sup>(1)</sup>
Sway (Tilt)	0.7249	0.7041	0.5
Twist	0.1723	0.1422	0.5

Note 1: NU SUB-90 Standard limit for deflection.

## Foundation and Anchors

The existing foundation consists of three (3) 3.5-ft Ø x 4' long reinforced concrete piers on three (3) 9.5-ft square x 2.5' thick reinforced concrete pads with (16) rock anchors per pad bearing directly on existing sub grade. The existing foundation locations and dimensions were taken from the original design drawing prepared by Andrew Corp. drawing no. SF-3719-01 dated September 8, 1993. Tower legs are connected to the three (3) piers by means of eight (8) 1-1/2" Ø, ASTM A36 anchor bolts per leg, embedded into the concrete foundation structure.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:



- The tower leg reactions developed from the governing Load Case 2 of the proposed reinforced tower condition were used in the verification of the foundation and anchor bolts:

Leg Reactions	Vector	Proposed Load (kips)
Leg	Shear	52
	Compression	472
	Uplift	385

- The anchor bolts were found to be within allowable limits.

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	88.6%	PASS

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS) <sup>(1)</sup>	Proposed Loading (FS) <sup>(1)</sup>	Result
(3) Reinf. Conc. Pad and Pier w Rock Anchors	Uplift	2.00	5.13	PASS
	Bearing Pressure	8.00 ksf	7.1 ksf	PASS

Note 1: FS denotes Factor of Safety

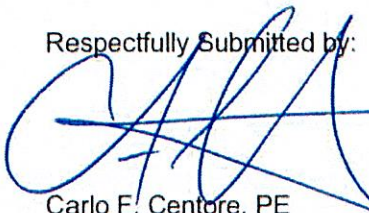
## Conclusion

This analysis shows with that the proposed reinforcements indicated on drawings S-1 & S-2 located within Section 3 of this report the subject tower **is adequate** to support the proposed antenna configuration.

The analysis is based, in part, on the information provided to this office by T-Mobile. If the existing conditions are different than the information in this report, CENTEK Engineering, Inc. must be contacted for resolution of any potential issues.

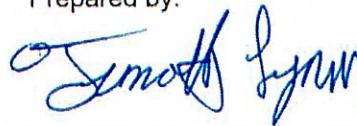
Please feel free to call with any questions or comments.

Respectfully Submitted by:

  
Carlo F. Centore, PE  
Principal ~ Structural Engineer



Prepared by:

  
Timothy J. Lynn, EIT  
Structural Engineer

## Technical Memo

To: Ray Vergati  
From: Michael Lucey - Radio Frequency Engineer  
cc: Jason Overbey  
Subject: Power Density Report for CTHA142A  
Date: September 28, 2010

---

### 1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the T-Mobile PCS/UMTS antenna installation on a Self Support Tower at 5-7 St Andrews Street, Bloomfield, CT. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from locations surrounding the transmitting location.

### 2. Discussion:

The following assumptions were used in the calculations:

- 1) The emissions from T-Mobile transmitters are in the (1940-1950),(2140-2145) & (2110-2120) MHz frequency Bands.
- 2) The antenna array consists of three sectors, with 3 antennas per sector.
- 3) The model number of the GSM antennas are APX16DWV-16DWV.
- 3) The model number for UMTS antenna is APX16DWV-16DWV.
- 4) GSM antenna center line height is 107 ft.
- 4) UMTS antenna center line height is 107 ft.
- 5) The maximum transmit power from any GSM sector is 2599.68 Watts Effective Radiated Power (EIRP) assuming 8 channels per sector.
- 5) The maximum transmit power from any UMTS sector is 2593.52 Watts Effective Radiated Power (EIRP) assuming 2 channels per sector.
- 6) All the antennas are simultaneously transmitting and receiving, 24 hours a day.
- 7) Power levels emitting from the antennas are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
- 8) The average ground level of the studied area does not change significantly with respect to the transmitting location

Equations given in "FCC OET Bulletin 65, Edition 97-01" were then used with the above information to perform the calculations.

### 3. Conclusion:

Based on the above worst case assumptions, the power density calculation from the T-Mobile PCS antenna installation on a Self Support Tower at 5-7 St Andrews Street, Bloomfield, CT, is 0.11 mW/cm<sup>2</sup>. This value represents 11.169% of the Maximum Permissible Exposure (MPE) standard of 1 milliwatt per square centimeter (mW/cm<sup>2</sup>) set forth in the FCC/ANSI/IEEE C95.1-1991. The current MPE of this facility is 8.76% and the T-Mobile installation would bring this facility to 19.929% of the standard.

Furthermore the proposed antenna location for T-Mobile will not interfere with existing public safety communications, AM or FM radio broadcasts, TV, Police Communications, HAM Radio communications or any other signals in the area.

**Connecticut Market****T-Mobile****Worst Case Power Density**

Site: CTHA142A  
 Site Address: 5-7 St Andrews Street  
 Town: Bloomfield  
 Tower Height: 180 ft.  
 Facility Style: Self Support Tower

GSM Data		UMTS Data	
Base Station TX output	20 W	Base Station TX output	40 W
Number of channels	8	Number of channels	2
Antenna Model	APX16DWV-16DWV	Antenna Model	APX16DWV-16DWV
Cable Size	1 5/8 in.	Cable Size	1 5/8 in.
Cable Length	120 ft.	Cable Length	120 ft.
Antenna Height	107.0 ft.	Antenna Height	107.0 ft.
Ground Reflection	1.6	Ground Reflection	1.6
Frequency	1945.0 MHz	Frequency	2.1 GHz
Jumper & Connector loss	4.50 dB	Jumper & Connector loss	1.50 dB
Antenna Gain	18.0 dBi	Antenna Gain	18.0 dBi
Cable Loss per foot	0.0116 dB	Cable Loss per foot	0.0116 dB
Total Cable Loss	1.3920 dB	Total Cable Loss	1.3920 dB
Total Attenuation	5.8920 dB	Total Attenuation	2.8920 dB
Total EIRP per Channel (In Watts)	55.12 dBm 324.96 W	Total EIRP per Channel (In Watts)	61.13 dBm 1296.76 W
Total EIRP per Sector (In Watts)	64.15 dBm 2599.68 W	Total EIRP per Sector (In Watts)	64.14 dBm 2593.52 W
nsg	12.1080	nsg	15.1080
Power Density (S) = 0.055911 mW/cm <sup>2</sup>		Power Density (S) = 0.055779 mW/cm <sup>2</sup>	
		8 11.1690%	
Equation Used :			
$S = \frac{(1000)(gpf)^2 (Power)^{10 \left(\frac{\ln(10)}{10}\right)}}{4 \pi (R)^2}$			
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**Co-Location Total**

Carrier	% of Standard
Verizon	5.1000 %
Verizon	0.9800 %
Cingular UMTS	1.2800 %
Cingular GSM	0.7600 %
Cingular GSM	0.6400 %
Total Excluding T-Mobile	8.7600 %
T-Mobile	11.1690
Total % MPE for Site	19.9290%