

September 27, 2016

VIA EMAIL AND OVERNIGHT DELIVERY

Ms. Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: T-Mobile Northeast LLC – CTHA539A
Notice of Exempt Modification
719 George Washington Turnpike, Burlington, CT
LAT: 41-45-59" N
LNG: -72-57-42" W

Dear Ms. Bachman:

T-Mobile Northeast LLC ("T-Mobile") currently maintains six (6) antennas at the 175' level on the existing 179' tall monopole located at 719 George Washington Turnpike in Burlington, CT. The tower is owned by the Burlington Fire Department. T-Mobile now intends to install three (3) new 700 MHz antennas. These antennas would be installed at the 175' level of the tower.

The existing facility consists of a 179 foot monopole tower. While the online docket for the Connecticut Siting Council does not provide a docket or petition number for approval of this structure, it does reference this structure in connection with a notices of intent captioned EM-VER-008-020-025-108-130-131-050315, TS-CING-020-050913, EM-POCKET-020-080930, EM-VER-020-111202, EM-VER-020-111228, EM-AT&T-020-121001, EM-AT&T-020-140114, EM-METROPCS-020-140912 and EM-METROPCS-020-150323.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. 16-50j-72(b)(2). In accordance with R.C.S.A. 16-50j-73, a copy of this letter is being sent to the First Selectman Theodore Shafer, and the property owner, the Town of Burlington.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. 16-50j-72(b)(s).

1. The proposed modifications will not result in an increase in the height of the existing structure. T-Mobile proposes to install three (3) new antennas at a centerline height of 175' on the existing 179' monopole.
2. The proposed modifications will not require the extension of the site boundary. T-

Mobile does not propose any equipment modifications at grade. Thus, there will be no effect on the site compound or T-Mobile's leased area.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria. The incremental effect of the proposed changes will be negligible.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard. As indicated in the attached power density calculations, T-Mobile's operations at the site will result in a power density of 1.06%; the combined site operations will result in a total power density of 4.68%.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site. T-Mobile will install new antennas on the existing low-profile platform.
6. The existing structure and its foundation can support the proposed loading. As indicated in the attached structural analysis the subject tower is adequate to support the proposed T-Mobile equipment upgrade.

For the foregoing reasons, T-Mobile respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitute an exempt modification under R.C.S.A. 16-50j-72(b)(2).

Respectfully submitted,

By: 

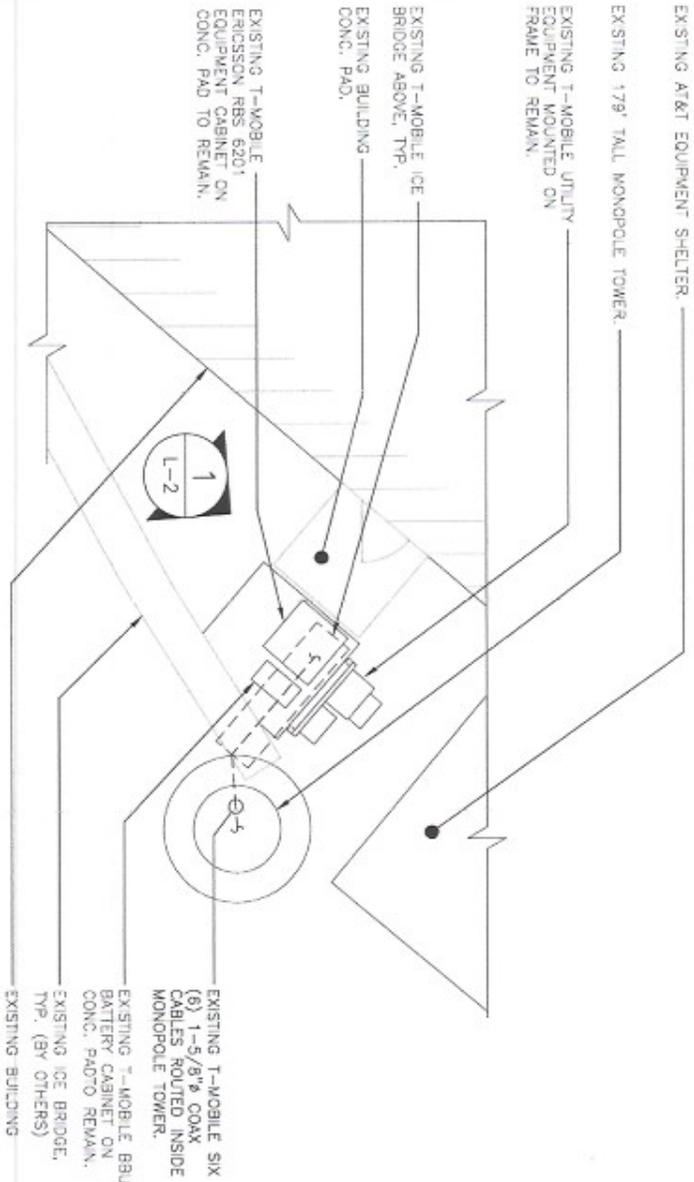
Eric Dahl, Agent for T-Mobile
860-227-1975
edahl@comcast.net

Attachments

cc: Town of Burlington, First Selectman Theodore Shafer

NOTES:

1. PROPOSED T-MOBILE INSTALLATION SHALL CONSIST OF THE ADDITION OF THREE (3) DIRECTIONAL PANEL ANTENNAS TO THE EXISTING SIX (6) DIRECTIONAL PANEL ANTENNAS MOUNTED AT A CENTERLINE ELEVATION OF ±175' AGL ON A 179' TALL MONOPOLE.

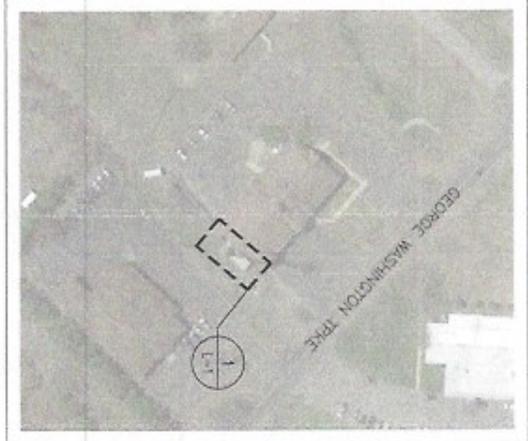


1 SITE PLAN
 SCALE: 3/16" = 1'
 APPROXIMATE NORTH

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.

TOWER COORDINATES: LAT.: 41°-45'-59" LONG.: 72°-57'-42"
GROUND ELEVATION: 780' ± A.M.S.L.
COORDINATES AND GROUND ELEVATION REFERENCED FROM CSC WEB LOG.



1 SITE KEY PLAN
 SCALE: 1" = 150'
 APPROXIMATE NORTH

NO.	DATE	BY	DESCRIPTION
1	08/21/18	JAVI	ISSUED FOR PERMIT REVIEW
2	08/21/18	JAVI	ISSUED FOR PERMIT REVIEW
3	08/21/18	JAVI	ISSUED FOR PERMIT REVIEW
4	08/21/18	JAVI	ISSUED FOR PERMIT REVIEW
5	08/21/18	JAVI	ISSUED FOR PERMIT REVIEW

PROFESSIONAL ENGINEER SEAL

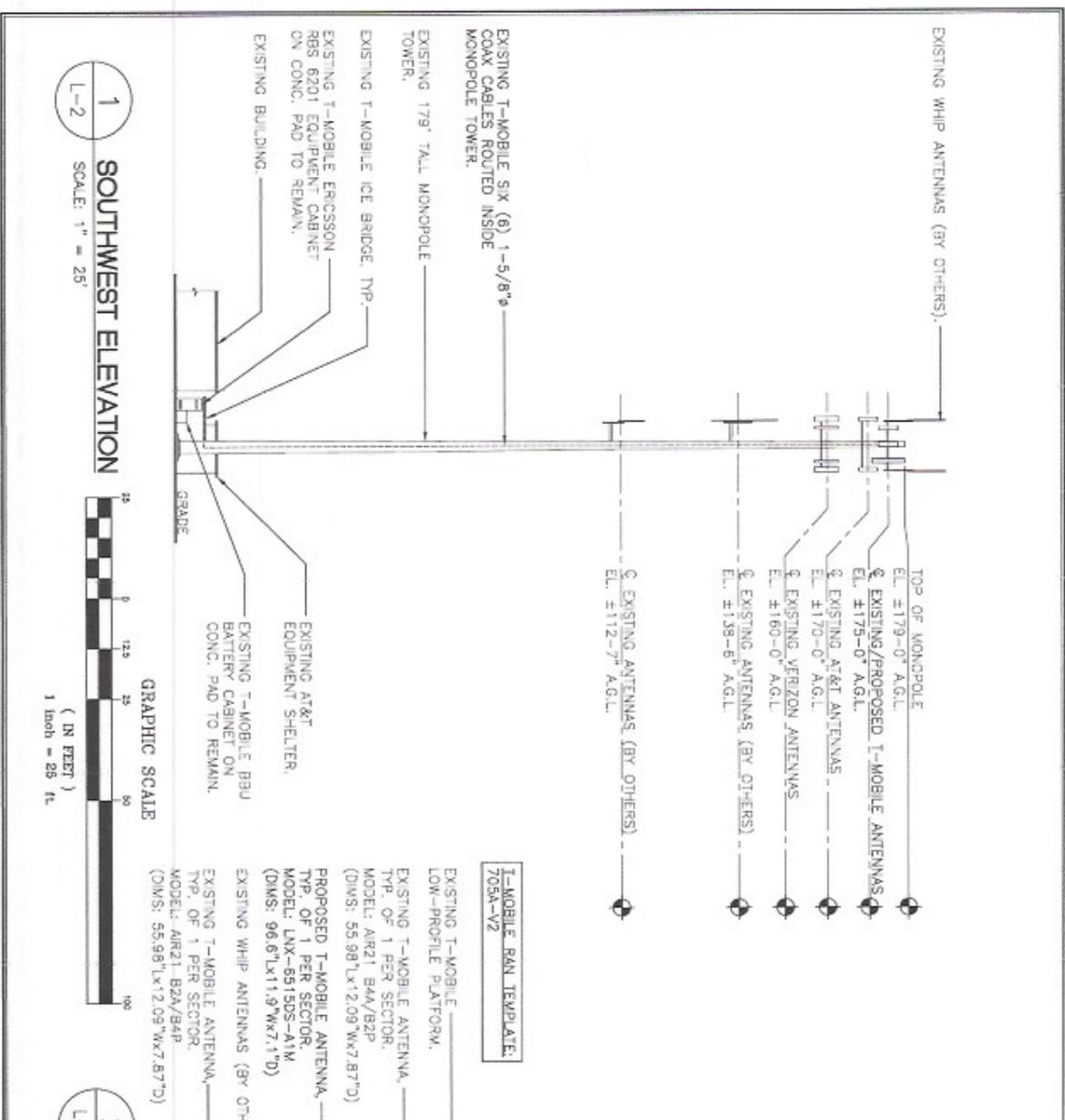
CEN TEK engineering
 Centered on Solutions™
 www.CenTekEng.com
 (860) 498-0280
 (820) 498-0282 fax
 45-2 North Bedford Road, Bedford, CT 06445

Cellco Partnership d/b/a Verizon Wireless
BURLINGTON F.D.
 SITE ID: CTHA539A
 719 GEORGE WASHINGTON TPKE
 BURLINGTON, CT 06013

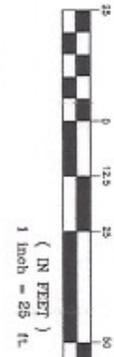
DATE: 08/21/18
 DRAWN BY: JAVI
 CHECKED BY: JAVI
 DATE: 08/21/18
1 SITE PLAN

LEASE EXHIBIT

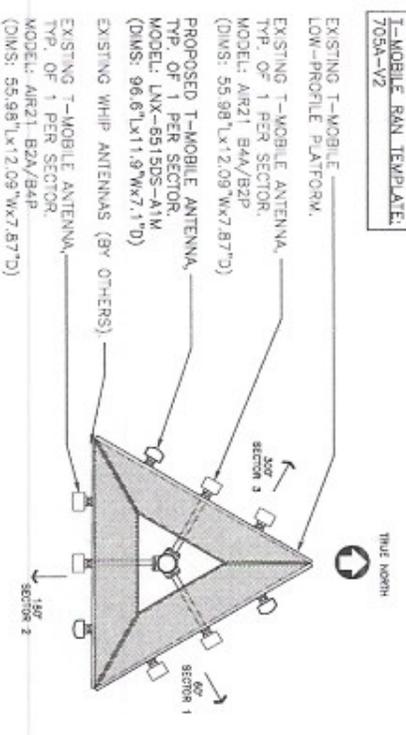
THIS LEASE PLAN IS DIAGRAMMATIC IN NATURE AND IS INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION AND SIZE OF THE PROPOSED WIRELESS COMMUNICATION FACILITY. THE SITE LAYOUT WILL BE FINALIZED UPON COMPLETION OF SITE SURVEY AND FACILITY DESIGN.



1 SOUTHWEST ELEVATION
SCALE: 1" = 25'



2 ANTENNA LAYOUT PLAN
NOT TO SCALE



L-2	Cellco Partnership d/b/a Verizon Wireless BURLINGTON F.D. SITE ID: CTHA539A 719 GEORGE WASHINGTON TPKE BURLINGTON, CT 06013	CEN TEK engineering Centered on Solutions™ www.Centeking.com (203) 490-0560 2000 490-5000 Fax 53-2 North Branford Road, Branford, CT 06405	APPROVAL, CHECK, SEAL 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>REV.</th> <th>DATE</th> <th>BY</th> <th>CHKD.</th> <th>DESCRIPTION</th> </tr> <tr> <td>1</td> <td>08/20/18</td> <td>AS</td> <td>AS</td> <td>ISSUED FOR CLIENT COMMENTS</td> </tr> <tr> <td>2</td> <td>08/23/18</td> <td>AS</td> <td>AS</td> <td>ISSUED FOR CLIENT COMMENTS</td> </tr> <tr> <td>3</td> <td>08/27/18</td> <td>AS</td> <td>AS</td> <td>ISSUED FOR CLIENT WORK</td> </tr> </table>	REV.	DATE	BY	CHKD.	DESCRIPTION	1	08/20/18	AS	AS	ISSUED FOR CLIENT COMMENTS	2	08/23/18	AS	AS	ISSUED FOR CLIENT COMMENTS	3	08/27/18	AS	AS	ISSUED FOR CLIENT WORK
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3	08/27/18	AS	AS	ISSUED FOR CLIENT WORK																				

Structural Analysis Report

180-ft Existing EEI Monopole

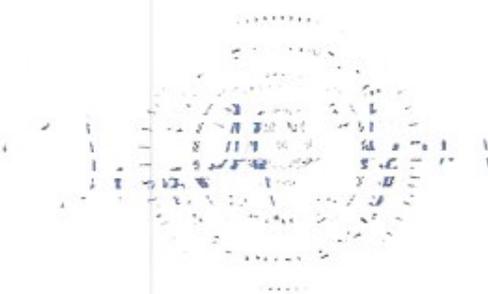
*Proposed T-Mobile
Antenna Upgrade*

T-Mobile Site Ref: CTHA539A

*719 George Washington Turnpike
Burlington, CT*

CEN TEK Project No. 16118.00

Date: August 24, 2016



Prepared for:
*T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002*

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Introduction

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna upgrade proposed by T-Mobile on the existing monopole (tower) located in Burlington, Connecticut.

The host tower is a 180-ft tall, four-section, eighteen sided, tapered monopole, originally designed and manufactured by Engineered Endeavors Incorporated (EEI); project no. 13628 dated September 15, 2005. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural analysis report prepared by URS Corporation job no; 36922256.00000 (VZ5-098), dated November 7, 2011. The tower was previously reinforced per the structural analysis and reinforcement design prepared by Atlantis Group dated October 8, 2014.

Antenna and appurtenance information were obtained from a previous structural report prepared by Centek job no. 16001.09 dated February 16, 2016, visual verification from grade conducted by Centek personnel on July 29, 2016 and a T-Mobile RF data sheet.

The tower is made up of four (4) tapered vertical sections consisting of A572-65 pole sections. The tower sections are slip joint connected. The diameter of the pole (flat-flat) is 19.50-in at the top and 56.25-in at the base.

T-Mobile proposes the installation of three (3) panel antennas mounted to the existing low profile platform. 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, proposed and future loads considered in this analysis consist of the following:

- **TOWN (EXISTING):**
Antennas: Three (3) 20-ft Omni-directional whip antennas mounted to the T-Mobile low profile platform with an elevation of 191-ft above grade level.
Coax Cables: Three (3) 1-5/8" \varnothing coax cables running on the inside of the existing monopole.
- **AT&T (EXISTING):**
Antennas: Six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrester mounted to one (1) universal ring mount with a RAD center elevation of 170-ft above grade level.
Coax Cables: One (1) fiber cable and two (2) dc control cables running on the inside of the existing monopole.
- **AT&T (EXISTING):**
Antennas: Six (6) Powerwave 7770.00 panel antennas, three (3) Powerwave P65-17-XLH-RR panel antennas, six (6) LGP21401 TMA's and six (6) LGP13519 diplexers mounted on a low profile platform with a RAD center elevation of 170-ft above grade level.
Coax Cables: Twelve (12) 1-5/8" \varnothing coax cables running on the inside of the existing monopole

- **VERIZON (EXISTING TO REMAIN):**
Antennas: Six (6) RFS APL866513 panel antennas, six (6) Andrew SBNHH-1D65B panel antennas, three (3) Alcatel-Lucent RRH2x60-700 remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads, three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads, two (2) Raycap RC2DC-3315-PF-48 main distribution boxes and six (6) RFS FD9R6004/2C-3L Diplexers mounted on a low profile platform with a RAD center elevation of 160-ft above grade level.
Coax Cables: Twelve (12) 1-5/8" \varnothing coax cables and two (2) 1-5/8" \varnothing fiber cables running inside the monopole.
- **TOWN (EXISTING):**
Antennas: One (1) 20-ft dipole antenna mounted on a 3-ft standoff with an elevation of 138.5-ft above grade level.
Coax Cables: One (1) 1-5/8" \varnothing coax cable running on the inside of the existing monopole.
- **TOWN (EXISTING):**
Antennas: One (1) 8-ft Omni-directional whip antenna and one (1) 3-ft yagi mounted on a 3-ft standoff with an elevation of 132.5-ft above grade level.
Coax Cables: One (1) 1-5/8" \varnothing and one (1) 1/2" \varnothing coax cables running on the inside of the existing monopole.
- **TOWN (EXISTING):**
Antennas: One (1) 10-ft dipole antenna mounted on a 3-ft standoff with an elevation of 112.5-ft above grade level.
Coax Cables: One (1) 1-5/8" \varnothing coax cable running on the inside of the existing monopole.
- **T-MOBILE (EXISTING TO REMAIN):**
Antennas: Six (6) Ericsson AIR21 panel antennas mounted on a low profile platform with a RAD center elevation of 179-ft above grade level.
Coax Cables: Six (6) 1-5/8" \varnothing coax cables and one (1) 1-1/4" fiber cable running inside the monopole.
- **T-MOBILE (PROPOSED):**
Antennas: Three (3) Andrew LNX-6515DS panel antennas mounted on a low profile platform with a RAD center elevation of 179-ft above grade level.

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 or reinforcement drawings.
- 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 to be installed as indicated in this report.

Analysis

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

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of 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).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC¹ and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

Tower Loading

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 on the tower structure and its components.

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile) Burlington; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile) <i>TIA/EIA wind speed controls.</i>	<i>[Section 16 of TIA/EIA-222-F-96]</i> <i>[Appendix K of the 2005 CT Building Code Supplement]</i>
Load Cases:	<u>Load Case 1</u> ; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. <u>Load Case 2</u> ; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed. <u>Load Case 3</u> ; Seismic – not checked	<i>[Section 2.3.16 of TIA/EIA-222-F-96]</i> <i>[Section 2.3.16 of TIA/EIA-222-F-96]</i> <i>[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type</i>

¹ The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software *tnxTower*. 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.

- Calculated stresses were found to be within allowable limits. In Load Case 1, per *tnxTower* "Section Capacity Table", this tower was found to be at **99.5%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L1)	139.50'-179.00'	99.5%	PASS

(1) Wall thickness increased in tower section 2 to account for reinforcement design prepared by Atlantis Group for T-Mobile dated 10.8.14.

Foundation and Anchors

The existing foundation consists of a 7.5 \varnothing x 28.0-ft long reinforced concrete caisson. The sub-grade conditions used in the analysis of the existing foundation were obtained from the the aforementioned URS structural report dated November 7, 2011. The base of the tower is connected to the foundation by means of (18) 2.25" \varnothing , ASTM A615-75 anchor bolts embedded into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	26 kips
	Compression	43 kips
	Moment	3471 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	68.4%	PASS
	Lateral Deflection	0.61 in. ⁽¹⁾	PASS

(2) Lateral deflection typically limited to 1.0 in. for monopole tower structures.

*Standard Conditions for Furnishing of
Professional Engineering Services on
Existing Structures*

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an uncorroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

CENTEK Engineering, Inc.
Structural Analysis – 180-ft EEI Monopole
T-Mobile Antenna Upgrade – CTHA539A
Burlington, CT
August 24, 2016

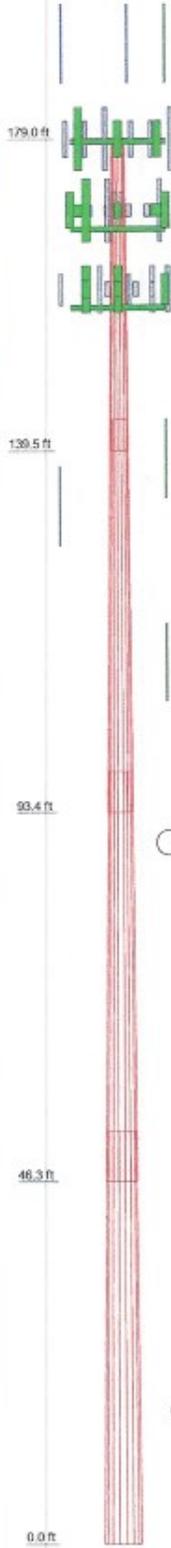
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	38.50	18	0.1875	4.00	18.5000	26.0456	A572-65	1.9
2	50.10	18	0.4000	5.20	26.8051	37.5377	A572-65	6.9
3	52.28	18	0.3750	6.39	36.6237	47.1230	A572-65	8.7
4	52.70	18	0.3750	44.9878	56.2500		A572-65	10.7
								28.2



DESIGNED APPURTENANCE LOADING

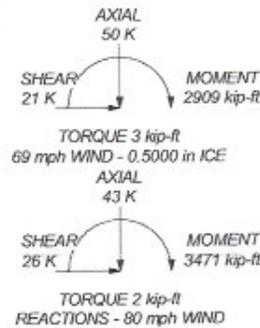
TYPE	ELEVATION	TYPE	ELEVATION
20' x 3" Dia Omni (Town Existing)	191	SBNH4-1D65B (Verizon Existing)	160
20' x 3" Dia Omni (Town Existing)	191	SBNH4-1D65B (Verizon Existing)	160
20' x 3" Dia Omni (Town Existing)	191	APL866513-42T0 (Verizon Existing)	160
AIR21 B2A/B4P (T-Mobile Existing)	179	APL866513-42T0 (Verizon Existing)	160
AIR21 B4A/B2P (T-Mobile Existing)	179	SBNH4-1D65B (Verizon Existing)	160
AIR21 B2A/B4P (T-Mobile Existing)	179	SBNH4-1D65B (Verizon Existing)	160
AIR21 B4A/B2P (T-Mobile Existing)	179	APL866513-42T0 (Verizon Existing)	160
AIR21 B2A/B4P (T-Mobile Existing)	179	APL866513-42T0 (Verizon Existing)	160
AIR21 B4A/B2P (T-Mobile Existing)	179	SBNH4-1D65B (Verizon Existing)	160
LNK-651SDS (T-Mobile Proposed)	179	SBNH4-1D65B (Verizon Existing)	160
LNK-651SDS (T-Mobile Proposed)	179	APL866513-42T0 (Verizon Existing)	160
LNK-651SDS (T-Mobile Proposed)	179	(2) FD9R6004C-3L Diplexer (Verizon Existing)	160
EEL 14-ft Low Profile Platform (T-Mobile Existing)	179	(2) FD9R6004C-3L Diplexer (Verizon Existing)	160
(2) RRUS-11 (ATI Existing)	170	(2) FD9R6004C-3L Diplexer (Verizon Existing)	160
(2) RRUS-11 (ATI Existing)	170	RRH4x5/2x90-AWS (Verizon Existing)	160
(2) RRUS-11 (ATI Existing)	170	RRH4x5/2x90-AWS (Verizon Existing)	160
OC9-48-60-18-8F Surge Arrestor (ATI Existing)	170	RRH4x5/2x90-AWS (Verizon Existing)	160
Valmont Uni-Tri Bracket (ATI Existing)	170	RRH4x30-B13 (Verizon Existing)	160
7770.00 (ATI Existing)	170	RRH4x30-B13 (Verizon Existing)	160
P65-17-XLH-RR (ATI Existing)	170	RRH2x60-PCS (Verizon Existing)	160
7770.00 (ATI Existing)	170	RRH2x60-PCS (Verizon Existing)	160
7770.00 (ATI Existing)	170	RRH2x60-PCS (Verizon Existing)	160
P65-17-XLH-RR (ATI Existing)	170	RC2DC-3315-PF-48 (Verizon Existing)	160
7770.00 (ATI Existing)	170	RC2DC-3315-PF-48 (Verizon Existing)	160
7770.00 (ATI Existing)	170	EEL 14-ft Low Profile Platform (Verizon Existing)	158
(2) LGP21401 TMA (ATI Existing)	170	20' 4-Bay Dipole (Town Existing)	138.5
(2) LGP21401 TMA (ATI Existing)	170	3' Pipe Mount Side Arm (Town Existing)	138.5
(2) LGP21401 TMA (ATI Existing)	170	3' Pipe Mount Side Arm (Town Existing)	132.5
(2) LPG13519 Diplexer (ATI Existing)	170	8' x 3" Dia Omni (Town Existing)	132.5
(2) LPG13519 Diplexer (ATI Existing)	170	3' Yagi (Town Existing)	132.5
(2) LPG13519 Diplexer (ATI Existing)	170	10' Dipole (Town Existing)	112.5
EEL 14-ft Low Profile Platform (ATI Existing)	168	3' Pipe Mount Side Arm (Town Existing)	112.5
APL866513-42T0 (Verizon Existing)	160		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
5. Welds are fabricated with ER-70S-6 electrodes.
6. Wall thickness increased in tower section 2 to account for reinforcement design per Alliantis Group drawings dated 10.8.14
7. TOWER RATING: 99.5%



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: 16118.00 - CTHA539A		
	Project: 180" EEI Monopole - 719 George Washington Tpk., Burlington, CT		
	Client: T-Mobile	Drawn by: T.JL	App'd:
	Code: TIA/EIA-222-F	Date: 08/24/16	Scale: NTS
Path:	Draw No: E-1		

**RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL
TO NON-IONIZING EMISSIONS**

T-Mobile Existing Facility

Site ID: CTHA539A

**Burlington Fire Department Flagpole
719 George Washington Tpke
Burlington, CT 06013**

September 2, 2016

EBI Project Number: 6216003936

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	4.68 %

September 2, 2016

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CTHA539A – Burlington Fire Department Flagpole**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **719 George Washington Tpke, Burlington, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The general population exposure limit for the 700 MHz Band is approximately 467 $\mu\text{W}/\text{cm}^2$, and the general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) bands is 1000 $\mu\text{W}/\text{cm}^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.



Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **719 George Washington Tpke, Burlington, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

- 1) 2 UMTS channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 2) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel
- 3) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.
- 4) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation 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.



- 5) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 6) The antennas used in this modeling are the **Ericsson AIR21 B4A/B2P** & **Ericsson AIR21 B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 B4A/B2P** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Ericsson AIR21 B2A/B4P** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 7) The antenna mounting height centerline of the proposed antennas is **179 feet** above ground level (AGL).
- 8) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.
- 9) All calculations were done with respect to uncontrolled / general public threshold limits.



T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	179	Height (AGL):	179	Height (AGL):	179
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	2	Channel Count	2	Channel Count	2
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A1 MPE%	0.56	Antenna B1 MPE%	0.56	Antenna C1 MPE%	0.56
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	179	Height (AGL):	179	Height (AGL):	179
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	2	Channel Count	2	Channel Count	2
Total TX Power(W):	60	Total TX Power(W):	60	Total TX Power(W):	60
ERP (W):	2,334.27	ERP (W):	2,334.27	ERP (W):	2,334.27
Antenna A2 MPE%	0.28	Antenna B2 MPE%	0.28	Antenna C2 MPE%	0.28
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	179	Height (AGL):	179	Height (AGL):	179
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power(W):	30	Total TX Power(W):	30	Total TX Power(W):	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A3 MPE%	0.22	Antenna B3 MPE%	0.22	Antenna C3 MPE%	0.22

Site Composite MPE%	
Carrier	MPE%
T-Mobile (Per Sector Max)	1.06 %
Public Safety	0.85 %
AT&T	1.28 %
Verizon	1.49 %
Site Total MPE %:	4.68 %

T-Mobile Sector A Total:	1.06 %
T-Mobile Sector B Total:	1.06 %
T-Mobile Sector C Total:	1.06 %
Site Total:	4.68 %

T-Mobile_per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu\text{W}/\text{cm}^2$)	Frequency (MHz)	Allowable MPE ($\mu\text{W}/\text{cm}^2$)	Calculated % MPE
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	179	5.61	AWS - 2100 MHz	1000	0.56%
T-Mobile PCS - 1950 MHz UMTS	2	1,167.14	179	2.80	PCS - 1950 MHz	1000	0.28%
T-Mobile 700 MHz LTE	1	865.21	179	1.04	700 MHz	467	0.22%
					Total:		1.06%



Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	1.06 %
Sector B:	1.06 %
Sector C:	1.06 %
T-Mobile Per Sector Maximum:	1.06 %
Site Total:	4.68 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **4.68%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.