August 31, 2015

Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification
181 Garden Circle
Waterbury, CT
N 41° 34' 10.99"
W 73° 01' 1.56"
T-Mobile Site #: CT11392B_L700

Members of the Siting Council:

On behalf of T-Mobile, SBA Communications is submitting an exempt modification application to the Connecticut Siting council for modification of existing equipment at a tower facility located at 181 Garden Circle, Waterbury, CT.

The 181 Garden Circle facility consists of a 279' Guyed Tower owned and operated by SBA Properties, LLC. In order to accommodate technological changes and enhance system performance in the State of Connecticut, T-Mobile plans to modify the equipment configurations at many of its existing cell sites. 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 chief elected official of the municipality in which the affected cell site is located (Waterbury Mayor Neil M. O'Leary.) Please note that SBA is the property owner.

As part of T-Mobile's L700 project, T-Mobile desires to upgrade their equipment to meet the new standards of 4G technology. The new equipment will allow customers to download files and browse the internet at a high rate of speed while also allowing their phones to be compatible with the latest 4G technology.

Attached is a summary of the planned modifications, including power density calculations reflecting the change in T-Mobile's operations at the site along with the required fee of $625.

The changes to the facility do not constitute modifications 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 or altered. 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 overall height of the structure will be unaffected.

2. The proposed changes will not extend the site boundaries. There will be no effect on the site compound other than the new equipment cabinets.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more.

4. The changes in radio frequency power density 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.

For the foregoing reasons, SBA Communications on behalf of T-Mobile, respectfully submits that he proposed changes at the referenced site constitute exempt modifications under R.C.S.A. Section 16-50j-72(b)(2).

Please feel free to call me at 508.251.0720 x 3804 with any questions you may have concerning this matter.

Thank you,

Kri Pelletier
SBA Communications Corporation
33 Boston Post Road West Suite 320
Marlborough, MA 01752
508-251-0720 x 3804 + T
508-251-1755 + F
203-446-7700 + C
kpelletier@sbasite.com

T-Mobile Equipment Modification
181 Garden Circle, Waterbury, CT
Site number CT11392B_L700

Tower Owner: SBA Properties, LLC
Equipment Configuration: Guyed Tower

Current and/or approved:

- (3) Ericsson Air B2A B4P
- (3) Ericsson Air B4A B2P
- (3) Ericsson KRY 112 114/1 TMAs
- (12) 1-5/8" Lines
- (1) 1-5/8" Fiber

Planned Modifications:

- (3) Commscope LNX-6515DS
- (3) RFS APX16PV-16PVL
- (3) Ericsson Double TMA 17/21
- (3) Ericsson KRY 112 114-1
- (3) Kathrein 782 11056
- (18) 1-5/8"
- (1) 1-5/8" Fiber

Structural Information:

The attached structural analysis demonstrates that the tower and foundation will have adequate structural capacity to accommodate the proposed modifications.

Power Density:

The anticipated Maximum Composite contributions from the T-Mobile facility are 1.40% of the allowable FCC established general public limit. The anticipated composite MPE value for this site assuming all carriers present is 15.74% of the allowable FCC established general public limit sampled at the ground level.

Site Composite MPE%	
Carrier	MPE%
T-Mobile (Per Sector Max)	1.40 %
Sky Tel 1	0.34 %
Sky Tel 2	0.40 %
Sky Tel 3	0.40 %
Bell South	0.18 %
Arch 1	0.67 %
Arch 2	0.57 %
Mobile com 1	0.73 %
Mobile Com 2	0.72 %
Fedex	0.17 %
#7	0.06 %
CL&P	3.74 %
MediaFLO	0.52 %
CL&P (150 MHz)	2.81 %
CL&P (50 MHz)	3.02 %
CL&P (5 GHz)	0.00 %
Site Total MPE %:	**15.74 %**

August 31, 2015

Neil M. O'Leary, Mayor
City of Waterbury
City Hall Building
235 Grand St.
Waterbury, CT 06702

RE: Telecommunications Facility @ 181 Garden Circle, Waterbury, CT

Dear Mayor O'Leary,

In order to accommodate technological changes and enhance system performance in the State of Connecticut, T-Mobile will be changing its equipment configuration at certain cell sites.

As required by Regulations of Connecticut State Agencies (R.C.S.A.) Section 16-50j-73, the Connecticut Siting Council has been notified of the changes and will review T-Mobile's proposal. Please accept this letter as notification under Section 16-50j-73 of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2).

The accompanying letter to the Siting Council fully describes T-Mobile's proposal for the referenced cell site. However, if you have any questions or require any further information on our plans or the Siting Council's procedures, please call me at 508.251.0720 x 3804.

Thank you,

Kri Pelletier
SBA Communications Company
33 Boston Post Road West Suite 320
Marlborough, MA 01752
508-251-0720 x 3804 + T
508-251-1755 + F
203-446-7700 + C
kpelletier@sbasite.com

SBA Network Services, LLC

Waterbury

To: CONNECTICUT SITING COUNCIL 129986

Check Number: 2097391
Date: 07/07/2015

Invoice Number	Invoice Date	Description	Gross Amount	Taxes Withheld	Net Amount
PRSF07061504	07/08/2015	CSC Fee CT11392B_L700	$625.00	$0.00	$625.00
			$625.00	$0.00	$625.00

SBA Network Services, LLC
8051 Congress Avenue
Boca Raton, FL 33487-1307
(561) 995-7670

Wells Fargo Bank

2097391

061209756 129986

DATE **AMOUNT**

07/07/2015 $625.00

Void After 120 Days

Six Hundred Twenty Five Dollars And 00 Cents

Pay to the Order of:

CONNECTICUT SITING COUNCIL
ACCOUNTS RECEIVABLE
TEN FRANKLIN SQUARE

NEW BRITAIN, CT 06051

Brenda Lazarus

⑈2097391⑈ ⑆061209756⑆ 2079900424566⑈

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

T-Mobile Existing Facility

Site ID: CT11392B

Waterbury/ Hill St.
181 Garden Circle
Waterbury, CT 06704

August 31, 2015

EBI Project Number: 6215004534

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	15.74 %

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
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August 31, 2015

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

Emissions Analysis for Site: **CT11392B – Waterbury/ Hill St.**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **181 Garden Circle, Waterbury, 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 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ 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 ($\mu W/cm^2$). The general population exposure limit for the 700 MHz Band is approximately 467 $\mu W/cm^2$, and the general population exposure limit for the PCS and AWS bands is 1000 $\mu W/cm^2$. 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 **181 Garden Circle, Waterbury, 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 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 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.

4) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

5) 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.

6) For the following calculations the sample point was the top of a six 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.

7) The antennas used in this modeling are the **Ericsson APX16PV-16PVL-C-A20** 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 APX16PV-16PVL-C-A20** has a maximum gain of **16.3 dBd** at its main lobe. 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.

8) The antenna mounting height centerline of the proposed antennas is **182 feet** above ground level (AGL).

9) 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.

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 APX16PV-16PVL-C-A20	Make / Model:	Ericsson APX16PV-16PVL-C-A20	Make / Model:	Ericsson APX16PV-16PVL-C-A20
Gain:	16.3 dBd	Gain:	16.3 dBd	Gain:	16.3 dBd
Height (AGL):	182	Height (AGL):	182	Height (AGL):	182
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	6	Channel Count	6	# PCS Channels:	6
Total TX Power:	240	Total TX Power:	240	# AWS Channels:	240
ERP (W):	10,237.91	ERP (W):	10,237.91	ERP (W):	10,237.91
Antenna A1 MPE%	1.19	Antenna B1 MPE%	1.19	Antenna C1 MPE%	1.19
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
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):	182	Height (AGL):	182	Height (AGL):	182
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power:	30	Total TX Power:	30	Total TX Power:	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A2 MPE%	0.22	Antenna B2 MPE%	0.22	Antenna C2 MPE%	0.22

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile (Per Sector Max)	**1.40 %**
Sky Tel 1	0.34 %
Sky Tel 2	0.40 %
Sky Tel 3	0.40 %
Bell South	0.18 %
Arch 1	0.67 %
Arch 2	0.57 %
Mobile com 1	0.73 %
Mobile Com 2	0.72 %
Fedex	0.17 %
#7	0.06 %
CL&P	3.74 %
MediaFLO	0.52 %
CL&P (150 MHz)	2.81 %
CL&P (50 MHz)	3.02 %
CL&P (5 GHz)	0.00 %
Site Total MPE %:	**15.74 %**

T-Mobile Sector 1 Total:	1.40 %
T-Mobile Sector 2 Total:	1.40 %
T-Mobile Sector 3 Total:	1.40 %
Site Total:	15.74 %

T-Mobile _per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
T-Mobile 2100 MHz (AWS) LTE	**2**	**2559.48**	**182**	**0.59**	**2100**	**1000**	**0.30 %**
T-Mobile 700 MHz LTE	**1**	**865.21**	**182**	**1.00**	**700**	**467**	**0.21 %**
T-Mobile 1900 MHz (PCS) UMTS	**2**	**1279.74**	**182**	**2.97**	**1900**	**1000**	**0.30 %**
T-Mobile 2100 MHz (AWS) UMTS	**2**	**1279.74**	**182**	**2.97**	**2100**	**1000**	**0.30 %**
						Total:	**4.31%**

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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 1:	1.40 %
Sector 2:	1.40 %
Sector 3 :	1.40 %
T-Mobile Per Sector Maximum:	1.40 %
Site Total:	15.74 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **15.74%** 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.

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803

Velocitel, Inc. d.b.a. FDH Velocitel, 6521 Meridien Dr. Raleigh, NC 27616, Ph. 919.755.1012, Fax 919.755.1031

Structural Analysis for SBA Network Services, Inc.

279' Guyed Tower (280' AGL)

SBA Site Name: Waterbury 2
SBA Site ID: CT04877-A-23
T-Mobile Site ID: CT11392B

FDH Velocitel Project Number 15BWYO1400

Analysis Results

Tower Components	84.3%	Sufficient
Foundation	64.7%	Sufficient

Prepared By:

Cary J. Webb, PE
Project Engineer II

Reviewed By:

Dennis D. Abel, PE
Director of Structural Engineering
CT PE License No. 23247

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

STATE OF CONNECTICUT DENNIS D. ABEL No. 23247 LICENSED PROFESSIONAL ENGINEER

08-06-2015

August 6, 2015

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

TABLE OF CONTENTS

EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Velocitel performed a structural analysis of the existing guyed tower located in Waterbury, 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 State Building Code*. Information pertaining to the existing/proposed antenna loading, current tower geometry, the member sizes, and foundation dimensions was obtained from:

- Stainless, Inc. (Report No. 3329) original design drawings dated March 2, 1987
- Paul J. Ford and Co. (Job No. A00-T155) Tower Modifications dated July 20, 2001
- FDH, Inc. (Job No. 06-0886T) EIA/TIA Inspection Report dated September 27, 2006
- FDH Engineering, Inc. (Project No. 11-02333E S1) Modification Drawings for a 280' Guyed Tower dated March 30, 2011
- FDH Engineering, Inc. (Project No. 11-02333E S1) Post Construction Inspection Report dated April 14, 2011
- FDH, Inc. (Job No. 11-03114T C1) TIA Inspection Report dated April 13, 2011
- FDH Engineering, Inc. (Project No. 12-09101E S3) Modification Drawings for a 280' Guyed Tower dated March 21, 2013
- FDH Engineering, Inc. (Project No. 1301631700) TIA Inspection Report dated July 22, 2013
- FDH Engineering, Inc. (Project No. 1301631700) Modification Inspection Report dated July 22, 2013
- SBA Network Services, Inc.

The *basic design wind speed* per the *TIA/EIA-222-F* standards and *2005 Connecticut State Building Code* is 85 mph without ice and 38 mph with 3/4" radial ice. Ice is considered to increase in thickness with height.

Conclusions

With the existing and proposed antennas from T-Mobile in place at 182 ft., the tower meets the requirements of the *TIA/EIA-222-F standards* and *2005 Connecticut State Building Code* provided the **Recommendations** listed below are satisfied. Furthermore, provided the foundations were designed and constructed to support the design reactions (see PJF Job No. A00-T155), the foundations should have the necessary capacity to support both the proposed and existing 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 Velocitel 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.

Recommendation

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

1. Coax lines must be installed as shown in **Figure 1**.
2. The proposed TMAs should be installed directly behind the proposed 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 Velocitel should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

Existing Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
--	--	--	--	285[1]	(1) 1.5' Standoff[1]
--	--	--	--	284[1]	(1) 3.6' Pipe Mount[1]
285	(1) 4' x 2.4"ø Omni	(1) 7/8"	Arch	283[1]	(1) 5' Pipe Mount[1]
--	--			280.5	(1) 8' Platform w/ Handrail
268.5	(1) Dielectric DCRT-4	(1) 7/8"	Full Power Radio	268.5	Direct
262	(1) Dielectric TLP-12A-1E	(1) 3.5"	MediaFlo	262	(1) 3' Standoff
256	(1) 14' x 2.3" ø Omni	(1) 7/8"	- - -	249.5	(1) 4.7' Standoff
238.5	(1) 7.5' x 1" ø Omni	(1) 7/8"	- - -	235	(1) 3' Standoff
182	(3) Ericsson Air B2A B4P (3) Ericsson Air B4A B2P (3) Ericsson KRY 112 114/1 TMAs	(12) 1-5/8" (1) 1-5/8" Fiber	T-Mobile	181.5	(3) 8' T-Frames
135	(1) Andrew VHLP800-11-6GR	(1) 3/8"	North East Utilities	135	Direct Mount
132	(1) Telewave ANT150F2 Omni	(1) 7/8"		129.5	(1) 2' Standoff
130	(1) RFS MA0528-28AN Dish	(1) 7/8		130	Direct Mount
127.5	(1) Telewave ANT150F2 Omni	(1) 7/8"		119.5	(1) 2' Standoff
112.5	(2) Antel BCD 87010N Omnis	(2) 7/8"	Velocita	107.5	(2) 16" Standoffs
101.5	(1) RFS SP4-107BC1C1R Dish	(1) EW90	North East Utilities	101	(1) 4' Pipe Mount
98	(1) RFS PAD8-65AC Dish	(1) EW63		97.5	(1) 6' Pipe Mount
99.5	(1) Decibel DB586-Y Omni	(2) 7/8" (1) 1/4"		96.5	(1) 4' Standoff
96.5	(1) TX RX 422-94C-05742-05BW				
94.5	(1) Decibel DB586-Y Omni (Inverted)				
94	(1) RFS PAD6-65BC Dish	(1) EW63		94	(1) 4' Pipe Mount
8	(1) Channel Master 3040646 Dish	(1) RG-6	Arch Cab 1	8	(1) 2' Standoff

1. Empty 1.5' Standoff, 3.6' Pipe Mount and (1) 4' x 2.4" ø with 5' Pipe mount are mounted on the 8' Platform w/ Handrails at 280.5'

Proposed Carrier Final Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
182	(3) Commscope LNX-6515DS (3) RFS APX16PV-16PVL (3) Ericsson Double TMA 17/21 (3) Ericsson KRY 112 114-1 (3) Kathrein 782 11056	(18) 1-5/8" (1) 1-5/8" Fiber	T-Mobile	181.5	(3) 8' T-Frames

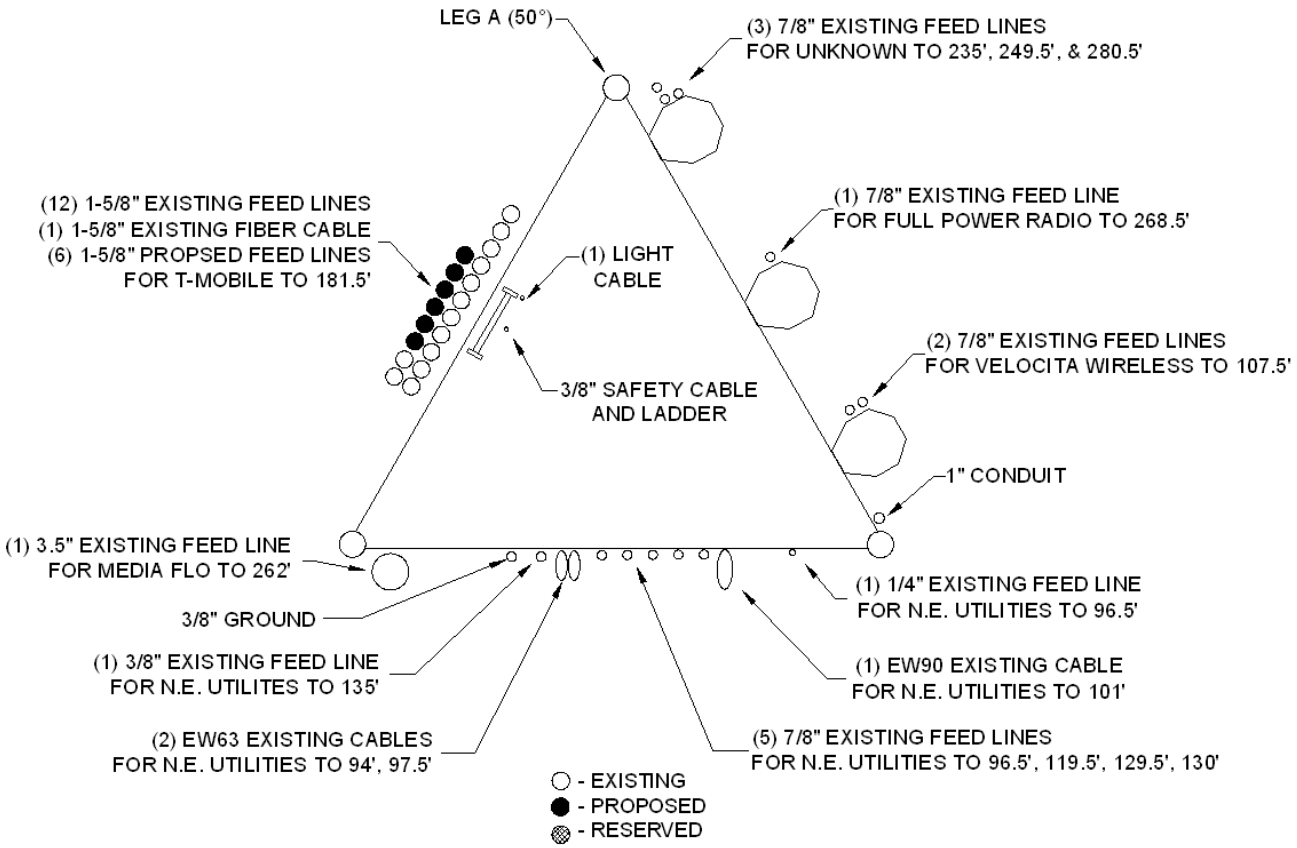


Figure 1 – Feed Lines Layout

RESULTS

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

Table 2 - Material Strength

Member Type	Yield Strength
Legs	36 ksi
Bracing	36 ksi

Table 3 displays the summary of the ratio (as a percentage) of force in the member to their capacities. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. *Note: Capacities up to 100% are considered acceptable.* **Table 4** displays the maximum foundation reactions. **Table 5** displays the maximum antenna rotations at service wind speeds (dishes only).

If the assumptions outlined in this report differ from actual field conditions, FDH Velocitel 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
T1	280 - 260	Leg	2 1/4	18.7	Pass
		Diagonal	2L2x2x3/16x3/8	18.3 30.7 (b)	Pass
		Horizontal	P1.5x.120	5.5 6.1 (b)	Pass
		Top Girt	P1.5x.120	6.8 7.5 (b)	Pass
T2	260 - 245	Leg	2 1/4	37.5 38.1 (b)	Pass
		Diagonal	2L2x2x3/16x3/8	23.1 44.5 (b)	Pass
		Horizontal	P1.5x.120	9.8 14.0 (b)	Pass
		Guy A@250	3/4	52.3	Pass
		Guy B@250	3/4	51.3	Pass
		Guy C@250	3/4	52.5	Pass
		Top Guy Pull-Off@250	2L2x2x3/16x3/8	34.5 36.2 (b)	Pass
		Torque Arm Top@250	2L2 1/2x2x3/16x3/8	36.1	Pass
		Torque Arm Bottom@250	2L2 1/2x2x3/16x3/8	83.5	Pass
T3	245 - 240	Leg	2 1/4	34.1	Pass
		Diagonal	2L2x2x3/16x3/8	20.7 35.5 (b)	Pass
		Bottom Guy Pull-Off@250	2L2x2x3/16x3/8	14.8	Pass
T4	240 - 225	Leg	2 1/4	43.3	Pass
		Diagonal	L2 1/2x2 1/2x3/16	46.7 54.2 (b)	Pass
		Horizontal	P1.5x.120	5.0	Pass

Section No.	Elevation ft	Component Type	Size	% Capacity*	Pass Fail
				5.6 (b)	
T5	225 - 185	Leg	2 1/4	50.4	Pass
		Diagonal	P1.5x.120	54.9	Pass
		Horizontal	P1.5x.120	5.9 6.5 (b)	Pass
T6	185 - 175	Leg	2 1/4	45.3	Pass
		Diagonal	L2 1/2x2 1/2x3/16	61.5 79.9 (b)	Pass
		Horizontal	P1.5x.120	9.5 12.1 (b)	Pass
T7	175 - 155	Leg	2 1/2	53.2	Pass
		Diagonal	2L2x2x3/16x3/8	37.0 61.2 (b)	Pass
		Horizontal	P1.5x.120	8.5 9.5 (b)	Pass
T8	155 - 140	Leg	2 1/2	54.6	Pass
		Diagonal	2L2x2x3/16x3/8	32.0 51.4 (b)	Pass
		Horizontal	P1.5x.120	8.7 9.7 (b)	Pass
		Guy A@155	7/8	63.9	Pass
		Guy B@155	7/8	64.2	Pass
		Guy C@155	7/8	62.6	Pass
		Top Guy Pull-Off@155	2L2x2x3/16x3/8	29.7 81.4 (b)	Pass
T9	140 - 125	Leg	2 1/2	54.0	Pass
		Diagonal	2L2x2x3/16x3/8	24.1 36.5 (b)	Pass
		Horizontal	P1.5x.120	8.7 9.7 (b)	Pass
T10	125 - 100	Leg	2 1/2	63.5	Pass
		Diagonal	P1.5x.120	67.0	Pass
		Horizontal	P1.5x.120	10.1 11.3 (b)	Pass
T11	100 - 75	Leg	2 1/2	63.0	Pass
		Diagonal	2L2x2x3/16x3/8	34.8 56.0 (b)	Pass
		Horizontal	P1.5x.120	10.1 14.6 (b)	Pass
T12	75 - 50	Leg	2 1/2	60.5	Pass
		Diagonal	2L2x2x3/16x3/8	24.5 40.5 (b)	Pass
		Horizontal	P1.5x.120	9.6	Pass
		Guy A@75	9/16	83.3	Pass
		Guy B@75	9/16	83.8	Pass
		Guy C@75	9/16	78.7	Pass
		Top Guy Pull-Off@75	2L2x2x3/16x3/8	22.7 62.2 (b)	Pass
T13	50 - 25	Leg	2 1/2	63.7	Pass
		Diagonal	P1.5x.120	61.5	Pass
		Horizontal	P1.5x.120	10.1	Pass
T14	25 - 20	Leg	2 1/2	64.2	Pass
		Diagonal	P1.5x.120	65.4	Pass
		Horizontal	P1.5x.120	10.2	Pass
T15	20 - 15	Leg	2 1/2	64.9	Pass
		Diagonal	P1.5x.120	70.4	Pass
		Horizontal	P1.5x.120	10.3	Pass
T16	15 - 10	Leg	2 1/2	65.3	Pass

Section No.	Elevation ft	Component Type	Size	% Capacity*	Pass Fail
		Diagonal	P1.5x.120	84.3	Pass
		Horizontal	P1.5x.120	10.4	Pass
T17	10 - 5	Leg	2 1/2	66.0	Pass
		Diagonal	L2x2x3/8	52.2	Pass
		Horizontal	P1.5x.120	10.5	Pass
T18	5 - 1	Leg	2 1/2	57.0	Pass
		Diagonal	P1.5x.120	79.2	Pass
		Horizontal	P1.5x.120	10.6	Pass
		Bottom Girt	2C6x8.2	1.0	Pass

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

Table 4 - Maximum Base Reactions

	Current Analysis *(TIA/EIA-222-F)*		Modification Design *(TIA/EIA-222-F)*	
Reaction	Horizontal	Vertical	Horizontal	Vertical
Tower Base	3 k	137 k	5 k	212 k
Inner Anchor	44 k	51 k	68 k	80 k

Table 5 - Maximum Antenna Rotations at Service Wind Speeds

Centerline Elevation (ft)	Antenna	Tilt (deg)*	Twist (deg)*
135	(1) Andrew VHLP800-11-6GR	0.0308	0.2870
130	(1) RFS MA0528-28AN Dish	0.0338	0.2690
101.5	(1) RFS SP4-107BC1C1R Dish	0.0720	0.2555
98	(1) RFS PAD8-65AC Dish	0.0760	0.2503
94	(1) RFS PAD6-65BC Dish	0.0796	0.2394
8	(1) Channel Master 3040646 Dish	0.1233	0.0442

*Allowable tilt and twist values to be determined by the carrier.

GENERAL COMMENTS

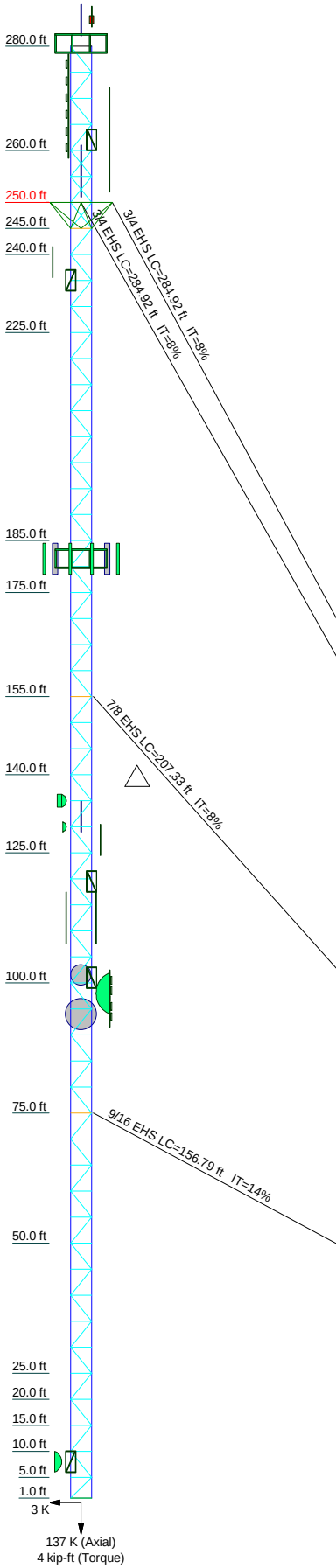
This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading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

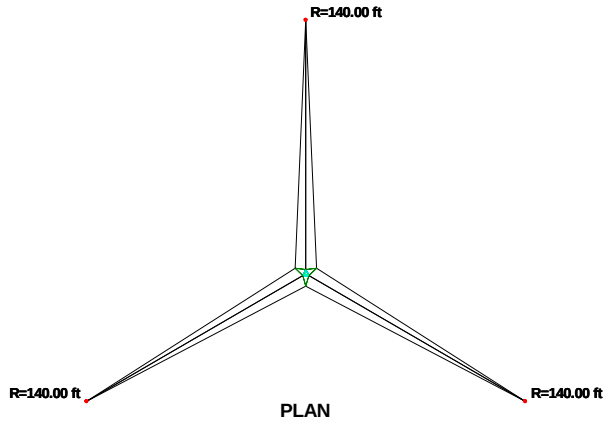
LIMITATIONS

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 Velocitel.

APPENDIX

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18
Legs				SR 2 1/4							SR 2 1/2							
Leg Grade					A36													
Diagonals					2L2x2x3/16x3/8					P1.5x.120		2L2x2x3/16x3/8					B	C
Diagonal Grade					A36													
Top Girts	P1.5x.120								N.A.									
Bottom Girts																		D
Horizontals										P1.5x.120								
Top Guy Pull-Offs	N.A.	E	N.A.					E		N.A.		2L2x2x3/16x3/8	N.A.					
Bot Guy Pull-Offs	N.A.	E	N.A.							N.A.								
Face Width (ft)									4									
# Panels @ (ft)											55 @ 5							F
Weight (K)	1.3	1.7	0.4	0.8	2.1	0.6	1.5	1.1	1.1	1.5	1.8	1.9	1.5	0.3	0.3	0.3	0.4	0.4





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(1) 1.5' Standoff	285	782 11056	181.5
3.6' x 2.4" Pipe Mount	284	782 11056	181.5
Lightning Rod	283.7	782 11056	181.5
Beacon	283.7	(3) 8' T-Frames	181.5
4' x 2.4" ø Omni	283	Andrew VHLP800-11-6GR Dish	135
5'x2.4" Pipe Mount	283	MA0528-28AN	130
8' Platform w/handrail	280.5	ANT150F2 Omni	129.5
DCRT-4	268.5	2' Standoff	129.5
TLP-12A-1E	262	ANT150F2 Omni	119.5
(3) 3' Standoff	262	2' Standoff	119.5
14' x 2.3" Omni	249.5	1.25' Standoff	107.5
(1) 4.7' Standoff	249.5	1.25' Standoff	107.5
7.5'x1" Omni	235	BCD87010N	107.5
(1) 3' Standoff	235	BCD87010N	107.5
LNX-6515DS w/ Mount Pipe	181.5	SP4-107BC1C1R	101
LNX-6515DS w/ Mount Pipe	181.5	4'x4.5" Pipe Mount	101
LNX-6515DS w/ Mount Pipe	181.5	PAD8-65AC	97.5
APX16PV-16PVL w/ Mount Pipe	181.5	6'x4.5" Pipe Mount	97.5
APX16PV-16PVL w/ Mount Pipe	181.5	DB586-Y	96.5
APX16PV-16PVL w/ Mount Pipe	181.5	DB586-Y	96.5
Double TMA 17/21	181.5	422-94C-05742-05BW	96.5
Double TMA 17/21	181.5	PAD6-65BC	94
Double TMA 17/21	181.5	4' Pipe Mount	94
KRY 112 114-1 Double TMA	181.5	2' Standoff	8
KRY 112 114-1 Double TMA	181.5	3040646	8
KRY 112 114-1 Double TMA	181.5		

SYMBOL LIST

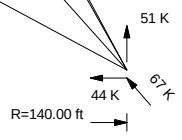
MARK	SIZE	MARK	SIZE
A	L2 1/2x2 1/2x3/16	D	2C6x8.2
B	L2x2x3/8	E	2L2x2x3/16x3/8
C	P1.5x.120	F	1 @ 4

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

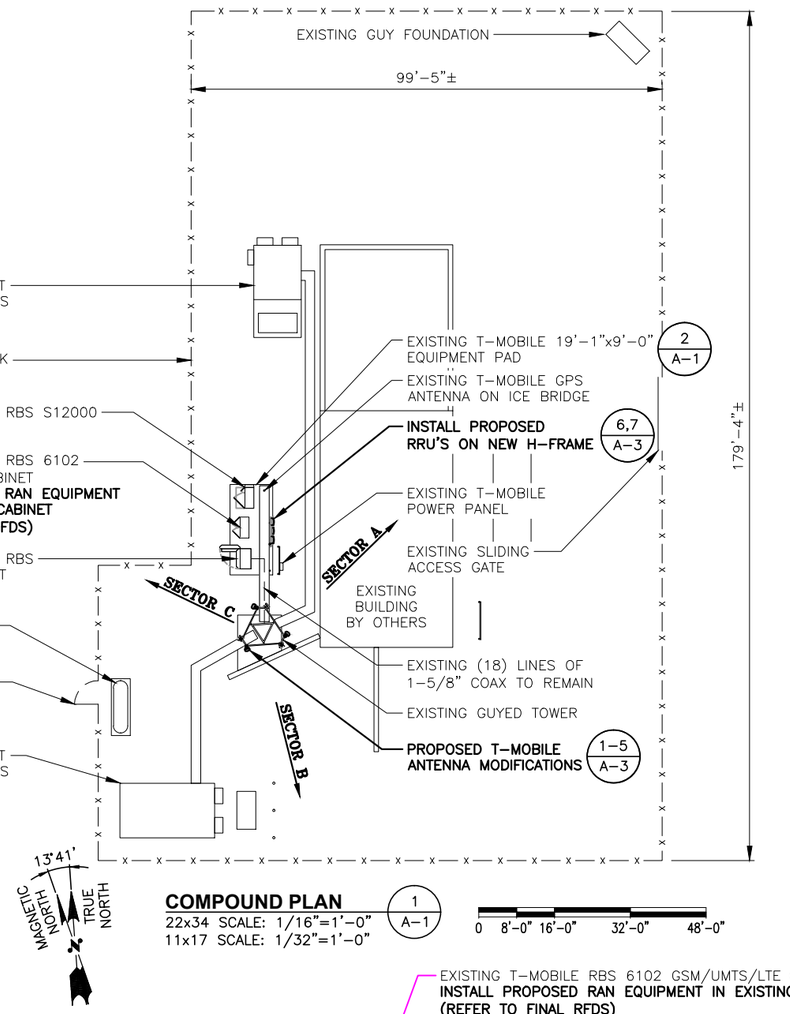
1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. Guy wire pull offs are assumed to be adequate to support the existing and proposed loading.
6. TOWER RATING: 84.3%



FDH VELOCITEL ENGINEERING INNOVATION
Tower Analysis

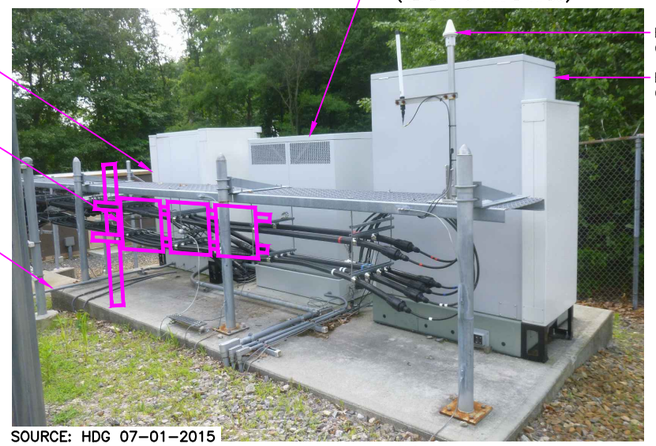
FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
Phone: 9197551012
FAX: 9197551031

Job: ***Waterbury 2, CT04877-A-23***			
Project: ***15BWYO1400***			
Client: SBA Network Services, Inc.	Drawn by: Cary Webb	App'd:	
Code: TIA/EIA-222-F	Date: 08/06/15	Scale: NTS	
Path:		Dwg No. E-1	



COMPOUND PLAN 1 A-1
22x34 SCALE: 1/16"=1'-0"
11x17 SCALE: 1/32"=1'-0"

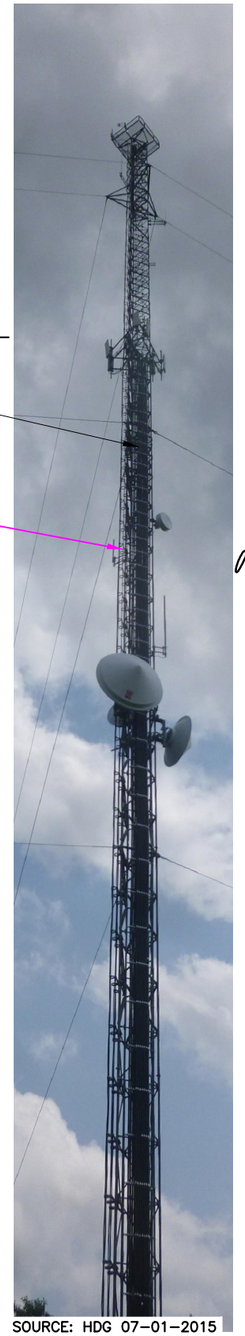
0 8'-0" 16'-0" 32'-0" 48'-0"



SOURCE: HDG 07-01-2015

EQUIPMENT PHOTO DETAIL 2 A-1
SCALE: N.T.S

2 A-2 1-5 A-3 **T-MOBILE T-ARM MOUNT**
ELEV. = 182.5'± A.G.L (SBA*)



SOURCE: HDG 07-01-2015

ELEVATION PHOTO DETAIL 3 A-1
SCALE: N.T.S

STRUCTURAL NOTES:
PRIOR TO COMMENCING CONSTRUCTION, GC SHALL REFER TO TOWER STRUCTURAL ANALYSIS PROVIDED BY SBA TO DETERMINE IF THERE ANY SUPPLEMENTAL OR SPECIAL INSTALLATION REQUIREMENTS FOR TOWER TOP EQUIPMENT AND FOR CABLE BUNDLING, SHIELDING, MOUNTING, OR RELOCATION ARRANGEMENTS.

ANTENNA MOUNT STRUCTURAL ASSESSMENT REQUIREMENT:
ENGINEER OF RECORD HAS MADE A VISUAL ASSESSMENT ONLY AND DETERMINED THAT THE EXISTING ANTENNA MOUNT IS ADEQUATE TO ACCOMMODATE ADDITIONAL EQUIPMENT LOADS. STRUCTURAL DESIGNS AND DETAILS AS SHOWN HEREIN FOR STRUCTURAL MODIFICATIONS OF THE EXISTING ANTENNA MOUNT ARE PRELIMINARY ONLY AND FINAL CONSTRUCTION DETAILS ARE SUBJECT TO CHANGE PENDING THE COMPLETION OF AN ANTENNA MOUNT STRUCTURAL ASSESSMENT.

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STATE OF CONNECTICUT
DANIEL P. HAMM
No. 24178
LICENSED PROFESSIONAL ENGINEER
Daniel P. Hamm

CHECKED BY: BB

APPROVED BY: DPH

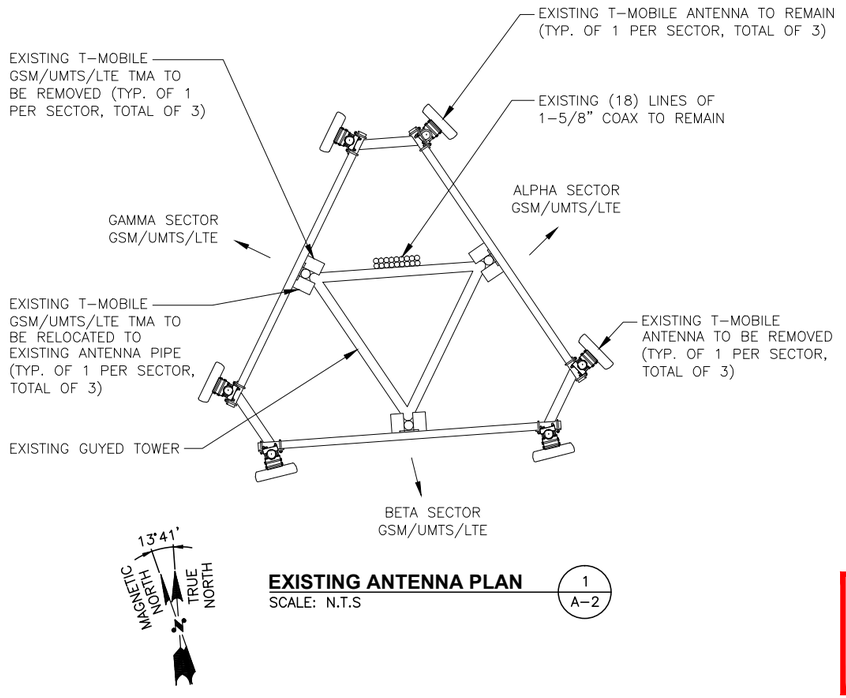
SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	07/17/15	ISSUED FOR CONSTRUCTION	JA

SITE NUMBER:
CT11392B
SITE NAME:
WATERBURY/HILL ST.
SITE ADDRESS:
181 GARDEN CIRCLE
WATERBURY, CT 06704
NEW HAVEN COUNTY

SHEET TITLE
COMPOUND & ELEVATION PLAN

SHEET NUMBER
A-1



EXISTING ANTENNA PLAN (1 / A–2)
SCALE: N.T.S

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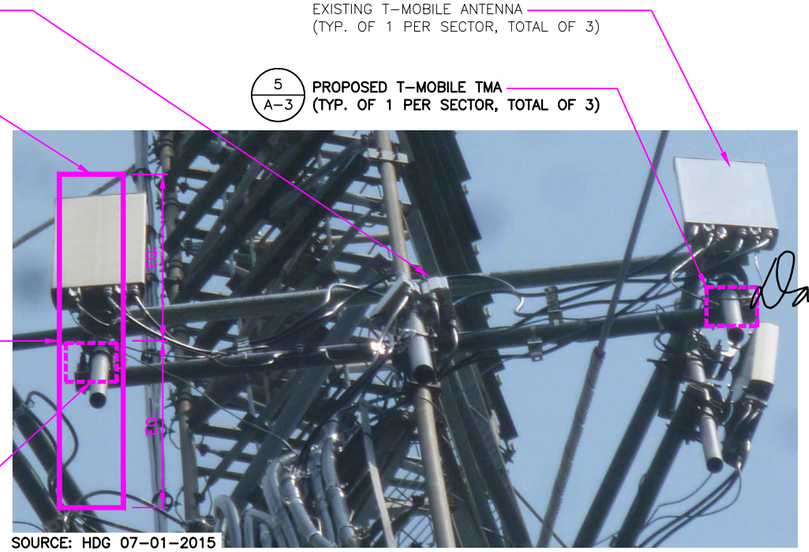
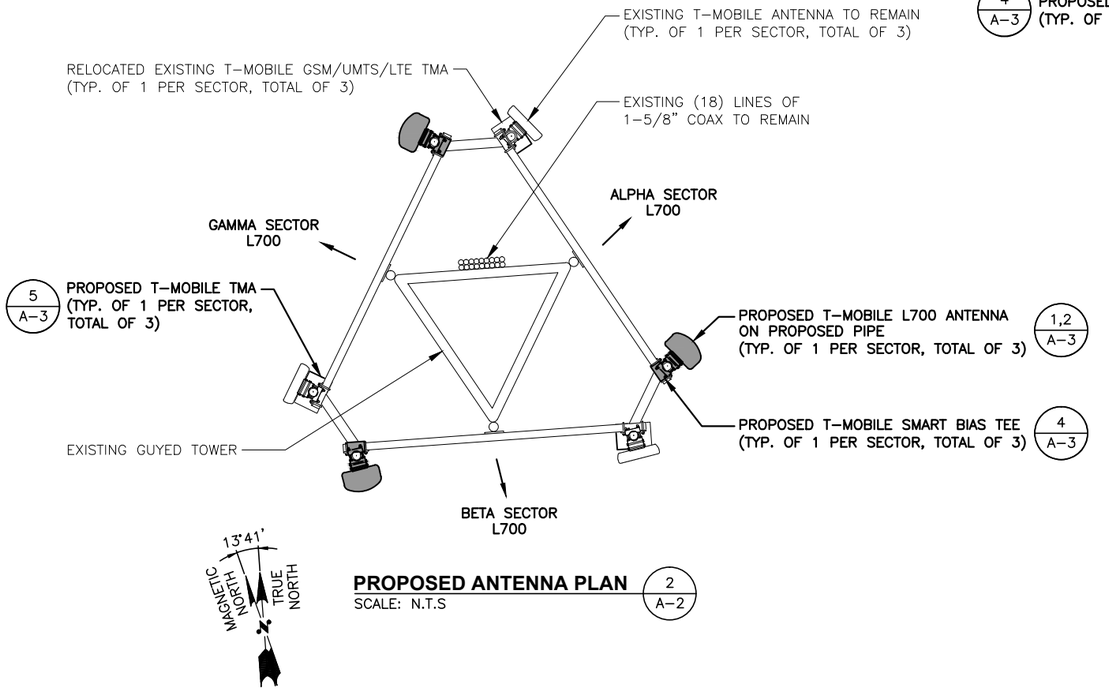
ANTENNA INSTALLATION SPECIAL WORK NOTE:
ANTENNA INSTALLATION WORKING POINT IS THE STRUCTURAL FACE FRAME VERTICAL CENTERLINE OF THE EXISTING ANTENNA SUPPORT ASSEMBLY. UNLESS NOTED OTHERWISE, VERTICALLY CENTER ALL PIPE MASTS AND ANTENNAS ON THIS WORKING POINT.



SOURCE: HDG 07–01–2015

PROPOSED ANTENNA PHOTO DETAIL (3 / A–2)
SCALE: N.T.S



PROPOSED ANTENNA PLAN (2 / A–2)
SCALE: N.T.S

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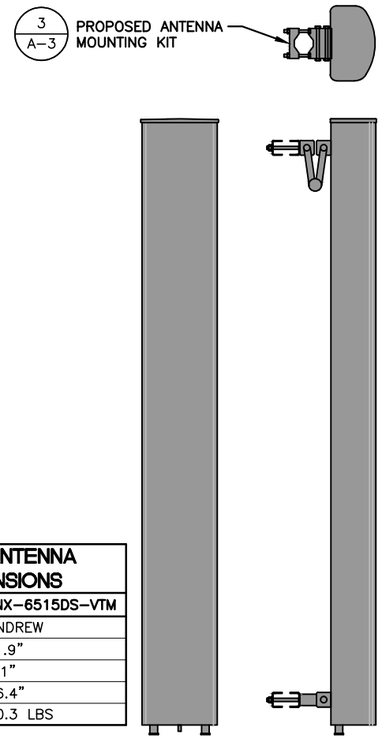
WATERBURY, CT 06704
NEW HAVEN COUNTY

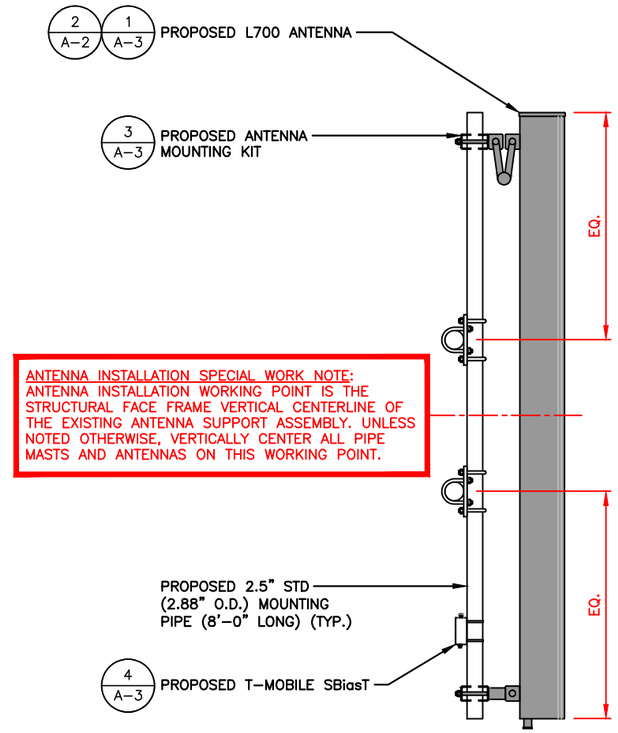
SHEET TITLE
EXISTING & PROPOSED ANTENNA PLANS

SHEET NUMBER
A-2



L700 ANTENNA DIMENSIONS	
MODEL #	LNX-6515DS-VTM
MANUF.	ANDREW
WIDTH	11.9"
DEPTH	7.1"
HEIGHT	96.4"
WEIGHT	50.3 LBS

L700 ANTENNA DETAIL 1 A-3
SCALE: N.T.S



ANTENNA INSTALLATION SPECIAL WORK NOTE:
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PROPOSED L700 ANTENNA AND SBiasT MOUNTING DETAIL 2 A-3
SCALE: N.T.S

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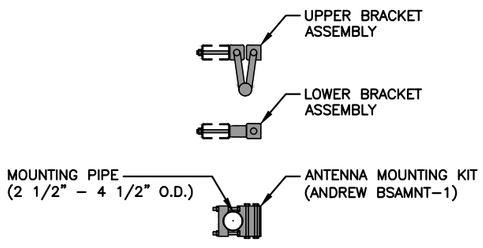


ANTENNA MOUNTING BRACKET 3 A-3
SCALE: N.T.S

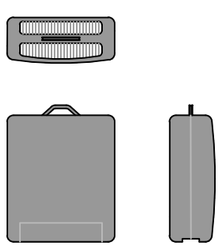
TMA DIMENSIONS	
MODEL #	KRY 112 489/2
MANUF.	ERICSSON
LENGTH	11"
WIDTH	6.1"
DEPTH	3.9"
WEIGHT	15.4 LBS

TWIN TMA 5 A-3
SCALE: N.T.S

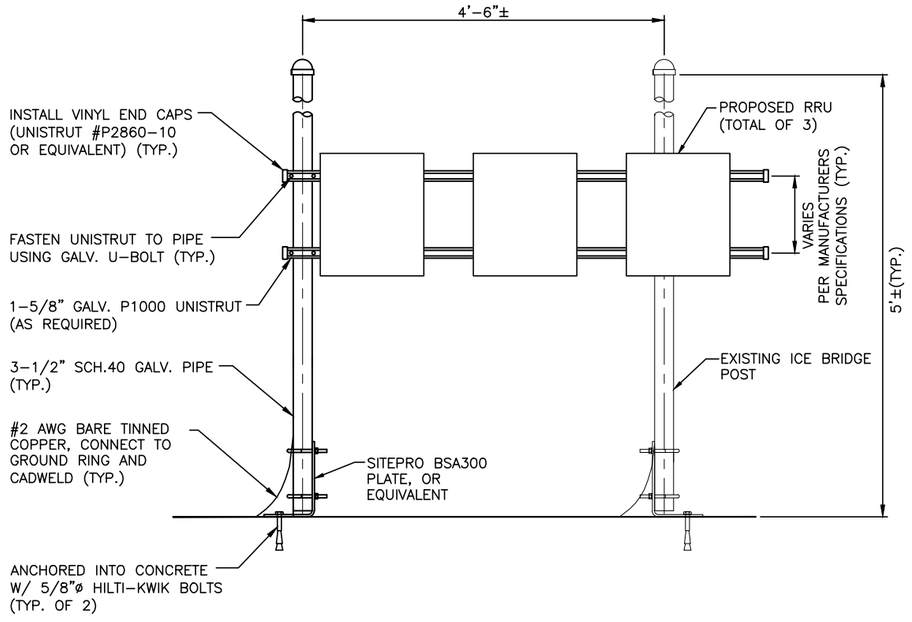
SBIAST DIMENSIONS	
MODEL #	75211054
MANUF.	KATHREIN
LENGTH	5.5"
WIDTH	3.2"
DEPTH	1.8"

SMART BIAS TEE (SBiasT) 4 A-3
SCALE: N.T.S

RRU DIMENSIONS	
MODEL #	RRU11 B12
MANUF.	ERICSSON
WIDTH	17"
DEPTH	7"
HEIGHT	20"
WEIGHT	50.6 LBS



PROPOSED RRU DETAIL 6 A-3
SCALE: N.T.S



PROPOSED RRU MOUNTING DETAIL ON H-FRAME 7 A-3
SCALE: N.T.S

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SITE ADDRESS:
181 GARDEN CIRCLE
WATERBURY, CT 06704
NEW HAVEN COUNTY

SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
A-3