COHEN and WOLF P.C.
ATTORNEYS AT LAW

JULIE D. KOHLER

PLEASE REPLY TO: Bridgeport
WRITER'S DIRECT DIAL: (203) 337-4157
E-Mail Address: jkohler@cohenandwolf.com

March 17, 2015

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

Re: Notice of Exempt Modification
Eastern Connecticut State University/T-Mobile equipment upgrade
Site ID CT11506A
83 Windham Street, Willimantic

Dear Attorney Bachman:

This office represents T-Mobile Northeast LLC ("T-Mobile") and has been retained to file exempt modification filings with the Connecticut Siting Council on its behalf.

In this case, Eastern Connecticut State University owns the existing monopole telecommunications tower and related facility located at 83 Windham Street, Willimantic, Connecticut (Latitude: 41.720498, Longitude: -72.21835). T-Mobile intends to add three (3) antennas and related equipment at this existing telecommunications facility in Willimantic ("Willimantic Facility"). Please accept this letter as notification, pursuant to R.C.S.A. § 16-50j-73, of construction which 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 also being sent to the Mayor, Earnest Eldridge, and the property owner, which is also Eastern Connecticut State University.

The existing Willimantic Facility consists of a 175 foot tall monopole tower.[1] T-Mobile plans to add three (3) antennas and three (3) RRUs (remote radio units) on proposed pipe masts at a centerline of 117 feet. (See the plans revised to March 5, 2015 attached hereto as Exhibit A). T-Mobile will also reuse spare fiber cable for the new antenna. The existing Willimantic Facility is structurally capable of supporting T-Mobile's proposed modifications, as indicated in the structural analysis dated February 17, 2015 attached hereto as Exhibit B.

The planned modifications to the Willimantic Facility fall squarely within those activities

[1] While the online docket for the Connecticut Siting Council does not provide a docket or petition number for the approval of this structure, it does reference this structure in connection with notices of intent captioned EM-T-MOBILE-163-110526 and EM-T-MOBILE-163-140318.

1115 Broad Street
P.O. Box 1821
Bridgeport, CT 06601-1821
Tel: (203) 368-0211
Fax: (203) 394-9901

158 Deer Hill Avenue
Danbury, CT 06810
Tel: (203) 792-2771
Fax: (203) 791-8149

320 Post Road West
Westport, CT 06880
Tel: (203) 222-1034
Fax: (203) 227-1373

657 Orange Center Road
Orange, CT 06477
Tel: (203) 298-4066
Fax: (203) 298-4068

explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modification will not increase the height of the tower. T-Mobile's additional antennas and equipment will be installed at a centerline of 117 feet merely modifying the array located at the same 117 foot elevation. The enclosed tower drawing confirms that the proposed modification will not increase the height of the tower.

2. The proposed modifications will not require an extension of the site boundaries. T-Mobile's proposes no changes to the equipment compound as shown on Sheet LE-1 of Exhibit A.

3. The proposed modification to the Willimantic Facility will not increase the noise levels at the existing facility by six decibels or more.

4. The operation of the additional antennas will not increase the total radio frequency (RF) power density, measured at the base of the tower, to a level at or above the applicable standard. According to a Radio Frequency Emissions Analysis Report prepared by EBI dated March 9, 2015, T-Mobile's operations would add 9.79% of the FCC Standard. Therefore, the calculated "worst case" power density for the planned combined operation at the site including all of the proposed antennas would be 94.11% of the FCC Standard as calculated for a mixed frequency site as evidenced by the engineering exhibit attached hereto as Exhibit C.

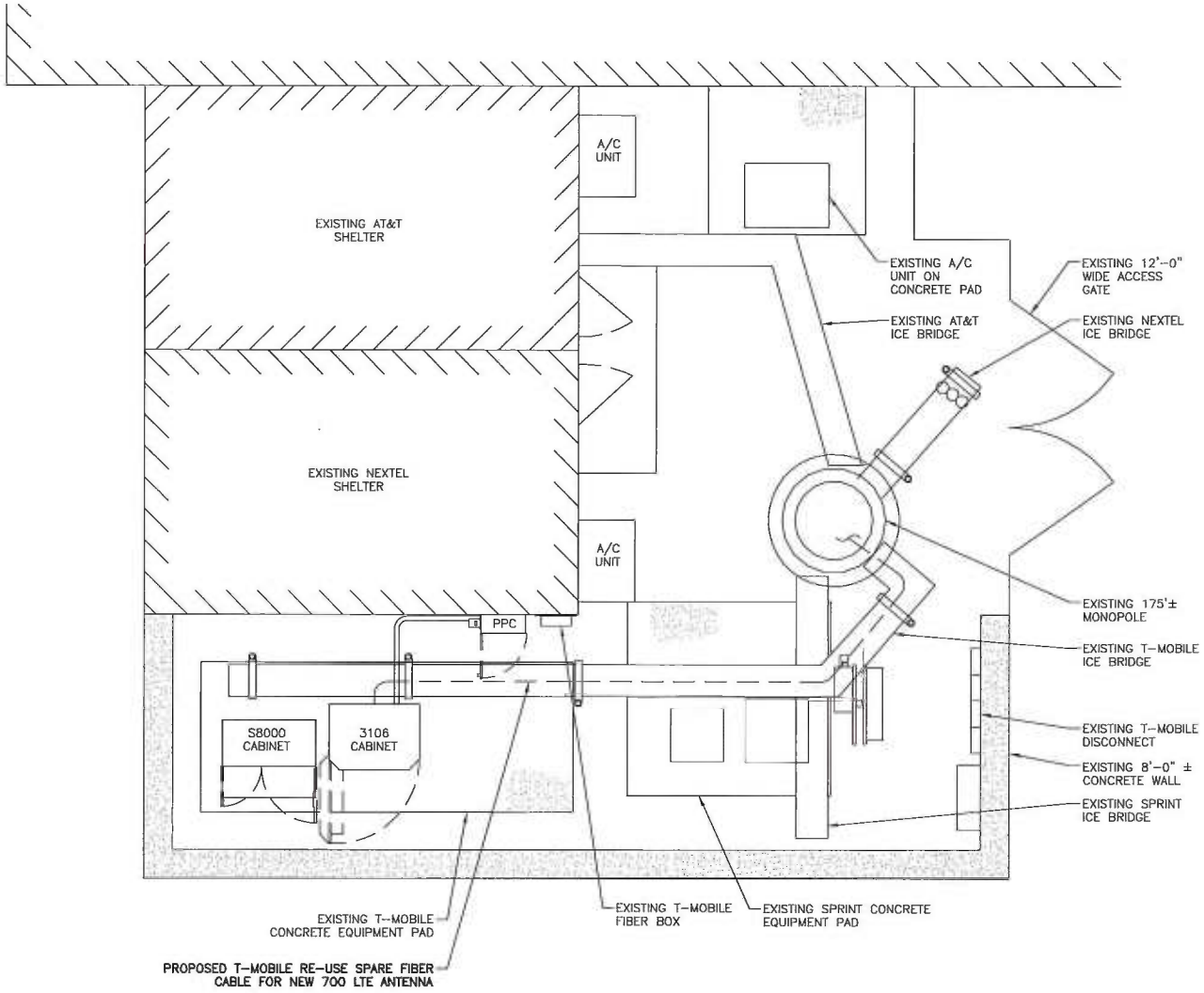
For the foregoing reasons, T-Mobile respectfully submits that the proposed additional antennas and equipment at the Willimantic Facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Upon acknowledgement by the Council of this proposed exempt modification, T-Mobile shall commence construction approximately sixty days from the date of the Council's notice of acknowledgement.

Sincerely,

Julie D. Kohler, Esq.

cc: Town of Willimantic, Mayor Ernest Eldridge
Eastern Connecticut State University
Jamie Ford, EBI Consulting

EXHIBIT A



CONFIGURATION

702CU

APPROX. NORTH

NOTE:
ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE STRUCTURAL AND RF ENGINEERS.

SITE PLAN

SCALE: 1/8" = 1'-0"

PREPARED BY:
EBI Consulting
environmental | engineering | due diligence
21 B Street | Burlington, MA 01803
Tel: (781) 273-2500 | Fax: (781) 273-3311
www.ebiconsulting.com
EBI JOB NO.: 8115000121

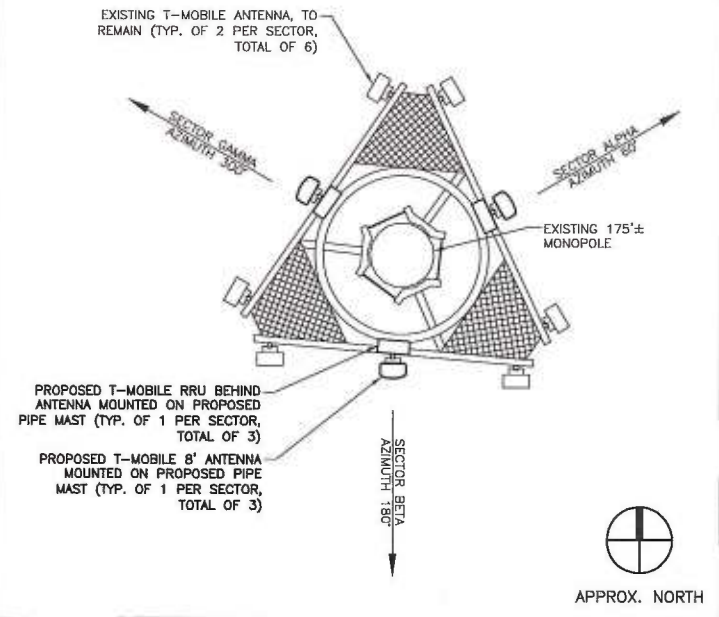
CLIENT:
T-Mobile Northeast, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860.692.7100

SITE INFO:
CT11506A
CT506/WILLIMATIC
ECSU
83 WINDHAM STREET
WILLMANTIC, CT 06226

SUBMITTALS			
NO.	DATE	DESCRIPTION	BY
A	03/05/15	FOR REVIEW	SH

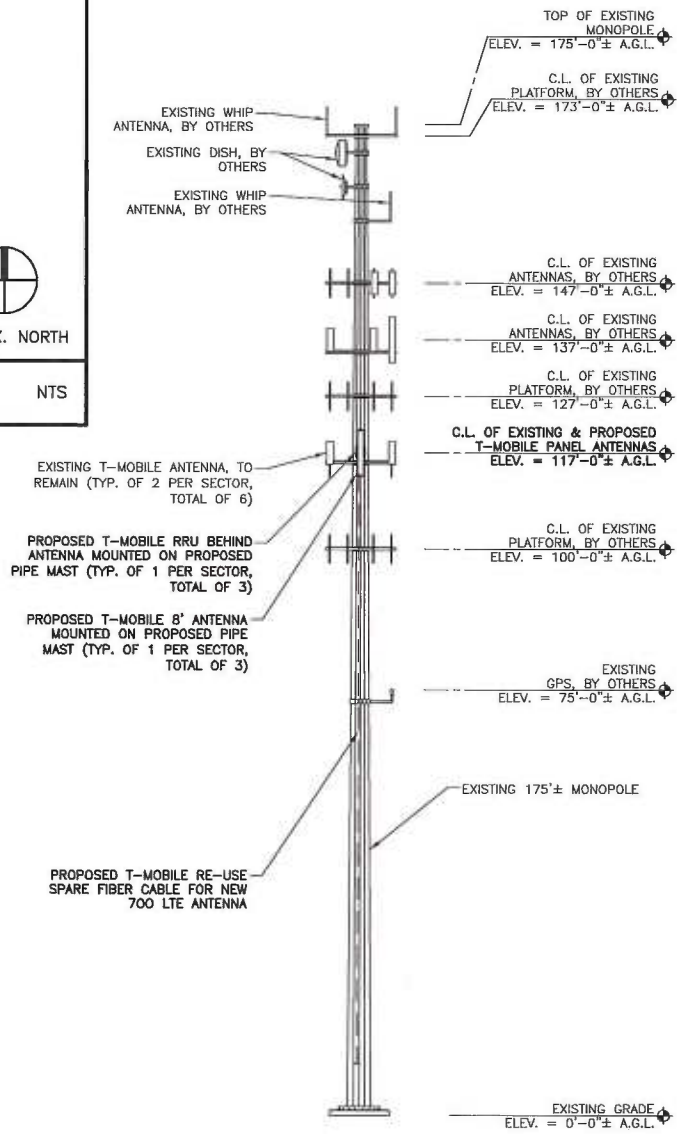
DRAWN BY: SH
CHECKED BY: BB
DATE: 02/25/15

SHEET NO: LE-1



ANTENNA CONFIGURATION

NTS



CONFIGURATION

702CU

NOTE:
ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE STRUCTURAL AND RF ENGINEERS.

TOWER ELEVATION

SCALE: 1/32" = 1'-0"

PREPARED BY:
EBI Consulting
environmental | engineering | due diligence
21 B Street | Burlington, MA 01803
Tel: (781) 273-2500 | Fax: (781) 273-3311
www.ebiconsulting.com
EBI JOB NO.: 8115000121

CLIENT:
T-Mobile Northeast, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860.692.7100

SITE INFO:
CT11506A
CT506/WILLIMATIC
ECSU
83 WINDHAM STREET
WILLMANTIC, CT 06226

SUBMITTALS			
NO.	DATE	DESCRIPTION	BY
A	03/05/15	FOR REVIEW	SH

DRAWN BY: SH
CHECKED BY: BB
DATE: 02/25/15

SHEET NO: LE-2

EXHIBIT B

EBI Consulting
environmental | engineering | due diligence

21 B Street
Burlington, MA 01803
Tel: (781) 273-2500
Fax: (781) 273-3311
www.ebiconsulting.com

STRUCTURAL ANALYSIS REPORT

February 17, 2015

T-Mobile, USA
35 Griffin Road South
Bloomfield, CT 06002
Attention: Mark Richard

Subject: 700 MHz Upgrade Project
Site #: CT11506A
EBI Reference #: 81150121
Site Name: CT506/ Willimantic ECSU
Address: 83 Windham Street, Willimantic, CT 06226

Dear Mr. Richard:

In accordance with your request, EBI Consulting's structural engineers have reviewed the available documentation for the above site in order to determine its capability for supporting the structural loads from the proposed antennas, remote radio units, coaxial cables, and related equipment. This analysis is in accordance with the following design codes governing this project:

- State Building Code – 2005 CT Supplement (with 2009, 2011, and 2013 Amendments)
- International Building Code, 2003
- AISC Steel Construction Manual, 13th Edition
- ANSI/TIA-222-F

EBI Consulting has reviewed the following sources in preparing this analysis:

- Site visit photos dated January 19, 2015
- Drawing, "Issued for Use," by Atlantis Group, dated March 06, 2014
- Drawings, "Issued for Review," by Hudson Design Group, dated January 14, 2013
- Constructions Drawing, "Issued for Construction," by Hudson Design Group, dated September 24. 2012
- Structural Analysis by URS Group, dated March 04, 2014
- Structural Analysis by Malouf Engineering, dated June 03, 2008

At a centerline elevation of approximately 117'-0" above ground level, proposed new equipment to be installed includes: three (one per sector) Commscope LNX-6515DS-VTM antennas (96.0"T x 11.9"W x 7.1"D) and three (one per sector) remote radio units RRUS11 (20"H, x 17"W x 7"D). Please refer to EBI Consulting's Construction Drawings for additional information.

Based on the information available to us, the existing monopole **has sufficient capacity** to support the structural loads imposed by the proposed antennas, and RRUs listed herein. From the TNX report, the monopole has an overall rating of 79.4%.

EBI Consulting
environmental | engineering | due diligence

21 B Street
Burlington, MA 01803
Tel: (781) 273-2500
Fax: (781) 273-3311
www.ebiconsulting.com

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*Pallow lb	% Capacity	Pass Fail
L1	175 - 128.66	Pole	TP35.29x23x0.25	1	-13526.80	1320085.84	52.4	Pass
L2	128.66 - 85.09	Pole	TP42.47x31.7505x0.3125	2	-31172.90	2107166.32	65.3	Pass
L3	85.09 - 42.03	Pole	TP51.41x40.552x0.375	3	-42003.20	3062527.35	73.4	Pass
L4	42.03 - 0	Pole	TP60x49.1184x0.4375	4	-55733.50	4299844.59	72.0	Pass
							Summary	
						Pole (L3)	73.4	Pass
						Base Plate	79.4	Pass
						RATING =	79.4	Pass

By comparing existing structural analysis reactions, the foundation has sufficient capacity:

Reactions	EBI Analysis	URS Group Analysis	Malouf Engineering
Shear	32 K	31 K	33 K
Axial	59 K	59 K	49 K
Moment	3721 Kip-ft	3654 Kip-ft	3823 Kip-ft

Our analysis relies upon the condition that the structures were properly designed, analyzed, and constructed to building code requirements, that the structures have not been adversely modified, and that the structures remain in sound structural condition. EBI Consulting shall be notified immediately should any of these conditions be found not to exist. All proposed equipment shall be installed in accordance with the manufacturer's requirements. No structural qualification is made or implied by this report for existing structural members not supporting the proposed installation.

Please feel free to contact our office should you have any questions.

Sincerely yours,
EBI Consulting
February 17, 2015

Rita Apted, P.E.
Professional Engineer

STATE OF CONNECTICUT
RICHARD L. PETERMAN
No. 30077
LICENSED
PROFESSIONAL ENGINEER

2/17/15

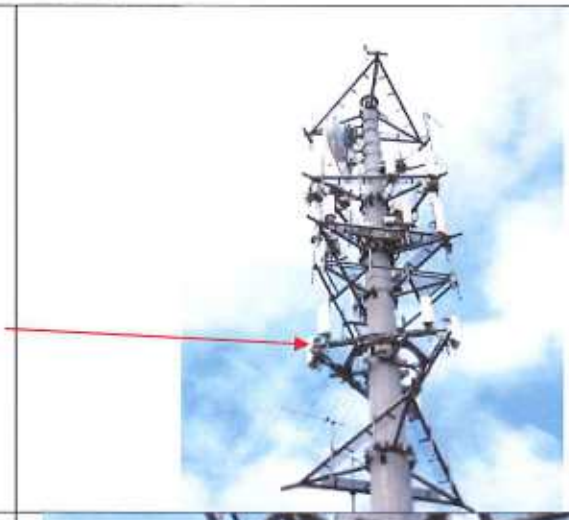
Richard L. Peterman, P.E.
Professional Engineer

Attachments: Photograph log, analysis calculations

EBI Consulting
environmental | engineering | due diligence

21 B Street
Burlington, MA 01803
Tel: (781) 273-2500
Fax: (781) 273-3311
www.ebiconsulting.com

PHOTOGRAPH LOG

Photo 1: Platform at EL= 173 ft. Platform at EL = 147 ft. Platform at EL= 137 ft. Platform at EL = 127 ft. Elevation of proposed antennas =117 ft. Platform at EL= 100 ft.	
Photo 2: Enlarged view of Platform at EL = 127 ft. with existing equipment.	
Photo 3: Base plate with stiffeners.	

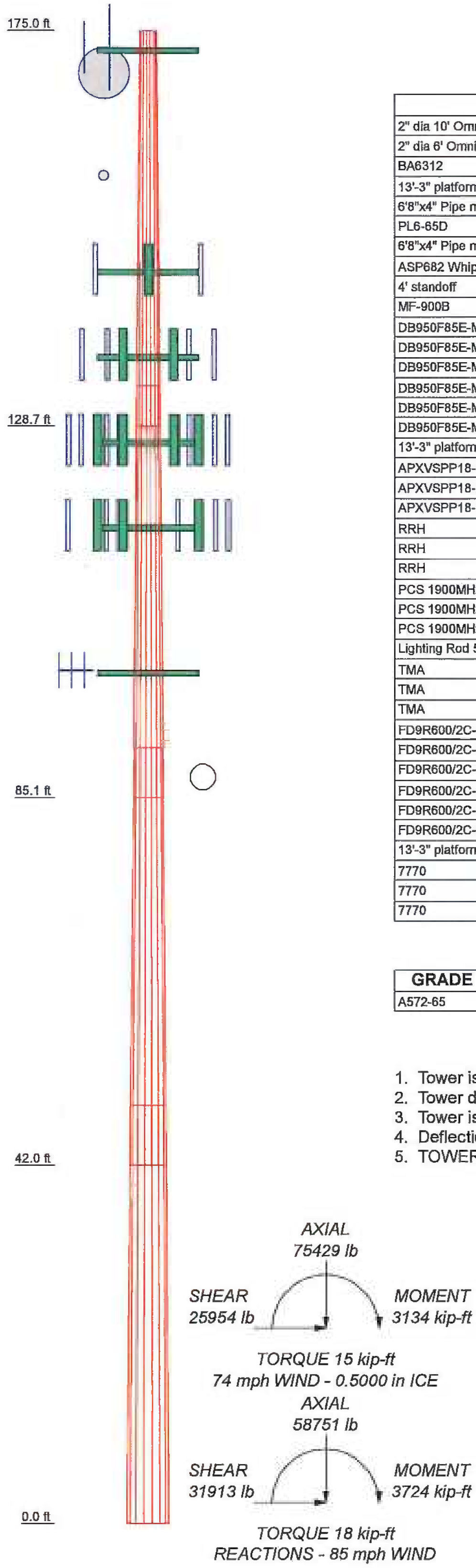
EBI Consulting
environmental | engineering | due diligence

21 B Street
Burlington, MA 01803
Tel: (781) 273-2500
Fax: (781) 273-3311
www.ebiconsulting.com

STRUCTURAL DESIGN PARAMETERS

BUILDING CODE:	2003 IBC with CT 2005, 2009, 2011, and 2013 AMENDMENTS ASCE7-05 TIA-222-F
OCCUPANCY CATEGORY:	II
WIND LOADS:	85 MPH (TIA-222 Rev F)
IMPORTANCE FACTOR, I:	1.0
ICE LOADS:	
ICE THICKNESS:	0.5 INCH
BASIC WIND SPEED WITH ICE, Vi:	73.6 MPH

Section	1	2	3	4	
Length (ft)	46.34	48.25	48.88	48.97	
Number of Sides	18	18	18	18	
Thickness (in)	0.2500	0.3125	0.3750	0.4375	
Socket Length (ft)	4.68	5.82	6.94		
Top Dia (in)	23.0000	31.7508	40.5520	49.1184	
Bot Dia (in)	33.2900	42.4700	51.4100	60.0000	
Grade	A572-65				
Weight (lb)	3490.3	5992.6	9028.7	12523.4	31035.0



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
2" dia 10' Omni	173	7770	137
2" dia 6' Omni	173	7700	137
BA6312	173	7700	137
13'-3" platform	173	TMA	137
6'8"x4" Pipe mount	170	TMA	137
PL6-65D	170	TMA	137
6'8"x4" Pipe mount	163	DB844H90	127
ASP682 Whip	158	13'-3" platform	127
4' standoff	158	DB844H90	127
MF-900B	158	DB844H90	127
DB950F85E-M	147	DB844H90	127
DB950F85E-M	147	DB844H90	127
DB950F85E-M	147	DB844H90	127
DB950F85E-M	147	DB844H90	127
DB950F85E-M	147	DB844H90	127
DB950F85E-M	147	DB844H90	127
13'-3" platform	147	DB844H90	127
APXVSPP18-C-A20	147	DB844H90	127
APXVSPP18-C-A20	147	DB844H90	127
APXVSPP18-C-A20	147	AIR B2A/B4P	117
RRH	147	AIR B2A/B4P	117
RRH	147	AIR B2A/B4P	117
RRH	147	AIR B2A/B4P	117
PCS 1900MHz 4x45W-65MHz	147	AIR B2A/B4P	117
PCS 1900MHz 4x45W-65MHz	147	AIR B2A/B4P	117
PCS 1900MHz 4x45W-65MHz	147	Twin TMAs	117
Lighting Rod 5/8"x4'	147	Twin TMAs	117
TMA	137	Twin TMAs	117
TMA	137	Commscope LNX-6515DS-VTM	117
TMA	137	Commscope LNX-6515DS-VTM	117
FD9R600/2C-3L Diplexer	137	Commscope LNX-6515DS-VTM	117
FD9R600/2C-3L Diplexer	137	RRUS11 B12	117
FD9R600/2C-3L Diplexer	137	RRUS11 B12	117
FD9R600/2C-3L Diplexer	137	RRUS11 B12	117
FD9R600/2C-3L Diplexer	137	13'-3" platform	117
FD9R600/2C-3L Diplexer	137	13'-3" platform	100
13'-3" platform	137	yagi antenna	100
7770	137	4 ft standoff	75
7770	137	GPS	75
7770	137		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Windham 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 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 60 mph wind.
5. TOWER RATING: 79.4%

EBI Consulting 21 B Street Burlington, MA Phone: 781.273.2500 FAX: 781.273.3311	Job: **175 ft MONOPOLE**		
	Project: **CT11506A_CT506 Willimantic ECSU**		
	Client: T-Mobile	Drawn by:	App'd:
	Code: TIA/EIA-222-F	Date: 02/17/15	Scale: NTS
	Path:		Dwg No. E-1

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Windham County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Treat Feedline Bundles As Cylinder
	Consider Moments - Horizontals		Assume Legs Pinned		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Calculate Redundant Bracing Forces
	Use Moment Magnification		Use Clear Spans For Wind Area		Ignore Redundant Members in FEA
√	Use Code Stress Ratios		Use Clear Spans For KL/r		SR Leg Bolts Resist Compression
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		All Leg Panels Have Same Allowable
	Escalate Ice	√	Bypass Mast Stability Checks		Offset Girt At Foundation
	Always Use Max Kz		Use Azimuth Dish Coefficients	√	Consider Feedline Torque
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Include Angle Block Shear Check
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Poles
	Leg Bolts Are At Top Of Section		SR Members Have Cut Ends		Include Shear-Torsion Interaction
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Always Use Sub-Critical Flow
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Use Top Mounted Sockets
	Add IBC .6D+W Combination		Use TIA-222-G Tension Splice Capacity Exemption		

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	175.00-128.66	46.34	4.68	18	23.0000	33.2900	0.2500	1.0000	A572-65 (65 ksi)
L2	128.66-85.09	48.25	5.82	18	31.7508	42.4700	0.3125	1.2500	A572-65 (65 ksi)
L3	85.09-42.03	48.88	6.94	18	40.5520	51.4100	0.3750	1.5000	A572-65 (65 ksi)
L4	42.03-0.00	48.97		18	49.1184	60.0000	0.4375	1.7500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	23.3548	18.0521	1180.3983	8.0762	11.6840	101.0269	2362.3498	9.0278	3.6080	14.432
	33.8036	26.2172	3615.8008	11.7292	16.9113	213.8095	7236.3594	13.1111	5.4190	21.676
L2	33.2963	31.1828	3893.7759	11.1606	16.1294	241.4086	7792.6754	15.5944	5.0381	16.122
	43.1252	41.8150	9388.9914	14.9659	21.5748	435.1840	18790.3370	20.9115	6.9247	22.159
L3	42.4904	47.8207	9752.3462	14.2628	20.6004	473.4050	19517.5248	23.9149	6.4772	17.272
	52.2031	60.7444	19988.4905	18.1174	26.1163	765.3651	40003.2823	30.3780	8.3882	22.368
L4	51.4420	67.5995	20239.4045	17.2817	24.9521	811.1291	40505.4405	33.8062	7.8748	18
	60.9256	82.7100	37071.5875	21.1447	30.4800	1216.2594	74191.9547	41.3628	9.7900	22.377

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 175.00-128.66				1	1	1		
L2 128.66-85.09				1	1	1		
L3 85.09-42.03				1	1	1		
L4 42.03-0.00				1	1	1		

Monopole Base Plate Data

Base Plate Data	
Base plate is square	
Base plate is grouted	
Anchor bolt grade	A615-75
Anchor bolt size	2.2500 in
Number of bolts	18
Embedment length	63.0000 in
f'_c	3.0 ksi
Grout space	3.5000 in
Base plate grade	A572-60
Base plate thickness	2.0000 in
Bolt circle diameter	69.0000 in
Outer diameter	75.5000 in
Inner diameter	60.0000 in
Base plate type	Stiffened Plate
Bolts per stiffener	1
Stiffener thickness	0.5000 in
Stiffener height	8.0000 in

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF5-50A (7/8 FOAM)	A	No	Inside Pole	100.00 - 0.00	1	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
LDF7-50A (1-5/8	A	No	Inside Pole	117.00 - 0.00	12	No Ice	0.00	0.82

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
FOAM)						1/2" Ice	0.00	0.82
LDF7-50A (1-5/8	A	No	Inside Pole	127.00 - 0.00	12	No Ice	0.00	0.82
FOAM)						1/2" Ice	0.00	0.82
LDF7-50A (1-5/8	A	No	Inside Pole	137.00 - 0.00	12	No Ice	0.00	0.82
FOAM)						1/2" Ice	0.00	0.82
LDF7-50A (1-5/8	A	No	Inside Pole	147.00 - 0.00	12	No Ice	0.00	0.82
FOAM)						1/2" Ice	0.00	0.82
LDF5-50A (7/8 FOAM)	A	No	Inside Pole	158.00 - 0.00	2	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
LDF7-50A (1-5/8	A	No	Inside Pole	163.00 - 0.00	1	No Ice	0.00	0.82
FOAM)						1/2" Ice	0.00	0.82
EW52	A	No	Inside Pole	170.00 - 0.00	1	No Ice	0.00	0.59
						1/2" Ice	0.00	0.59
LDF5-50A (7/8 FOAM)	A	No	Inside Pole	173.00 - 0.00	1	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
Hybriflex fiber optic	A	No	Inside Pole	147.00 - 0.00	3	No Ice	0.00	0.37
cable						1/2" Ice	0.00	0.37
1-5/8" hybriflex	A	No	Inside Pole	117.00 - 0.00	1	No Ice	0.00	0.21
(T-Mobile)						1/2" Ice	0.00	0.21

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	175.00-128.66	A	0.000	0.000	0.000	0.000	369.43
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	128.66-85.09	A	0.000	0.000	0.000	0.000	1748.40
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L3	85.09-42.03	A	0.000	0.000	0.000	0.000	1869.23
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L4	42.03-0.00	A	0.000	0.000	0.000	0.000	1824.52
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	175.00-128.66	A	0.500	0.000	0.000	0.000	0.000	369.43
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	128.66-85.09	A	0.500	0.000	0.000	0.000	0.000	1748.40
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L3	85.09-42.03	A	0.500	0.000	0.000	0.000	0.000	1869.23
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L4	42.03-0.00	A	0.500	0.000	0.000	0.000	0.000	1824.52
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	175.00-128.66	0.0000	0.0000	0.0000	0.0000
L2	128.66-85.09	0.0000	0.0000	0.0000	0.0000
L3	85.09-42.03	0.0000	0.0000	0.0000	0.0000
L4	42.03-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
GPS	A	None		0.0000	75.00	No Ice	1.00	1.00	10.00
						1/2" Ice	1.50	1.50	15.00
4 ft standoff	A	None		0.0000	75.00	No Ice	3.42	3.42	111.16
						1/2" Ice	3.67	3.67	147.20
13'-3" platform	A	None		0.0000	100.00	No Ice	13.92	13.92	3200.00
						1/2" Ice	17.41	17.41	4900.00
yagi antenna	A	From Face	6.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.95 3.38	2.95 3.38	15.00 31.85
13'-3" platform	A	None		0.0000	117.00	No Ice	13.92	13.92	3200.00
						1/2" Ice	17.41	17.41	4900.00
DB844H90	A	From Face	6.00 6.00 0.00	0.0000	127.00	No Ice 1/2" Ice	3.06 3.39	3.73 4.10	20.00 46.30
DB844H90	A	From Face	6.00 3.00 0.00	0.0000	127.00	No Ice 1/2" Ice	3.06 3.39	3.73 4.10	20.00 46.30
DB844H90	A	From Face	6.00 -3.00 0.00	0.0000	127.00	No Ice 1/2" Ice	3.06 3.39	3.73 4.10	20.00 46.30
DB844H90	A	From Face	6.00 -6.00 0.00	0.0000	127.00	No Ice 1/2" Ice	3.06 3.39	3.73 4.10	20.00 46.30
DB844H90	B	From Face	6.00 6.00 0.00	0.0000	127.00	No Ice 1/2" Ice	3.06 3.39	3.73 4.10	20.00 46.30
DB844H90	B	From Face	6.00 3.00 0.00	0.0000	127.00	No Ice 1/2" Ice	3.06 3.39	3.73 4.10	20.00 46.30
DB844H90	B	From Face	6.00 -3.00 0.00	0.0000	127.00	No Ice 1/2" Ice	3.06 3.39	3.73 4.10	20.00 46.30
DB844H90	B	From Face	6.00 -6.00 0.00	0.0000	127.00	No Ice 1/2" Ice	3.06 3.39	3.73 4.10	20.00 46.30
DB844H90	C	From Face	6.00	0.0000	127.00	No Ice	3.06	3.73	20.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			6.00			1/2" Ice	3.39	4.10	46.30
			0.00						
DB844H90	C	From Face	6.00	0.0000	127.00	No Ice	3.06	3.73	20.00
			3.00			1/2" Ice	3.39	4.10	46.30
			0.00						
DB844H90	C	From Face	6.00	0.0000	127.00	No Ice	3.06	3.73	20.00
			-3.00			1/2" Ice	3.39	4.10	46.30
			0.00						
DB844H90	C	From Face	6.00	0.0000	127.00	No Ice	3.06	3.73	20.00
			-6.00			1/2" Ice	3.39	4.10	46.30
			0.00						
13'-3" platform	A	None		0.0000	127.00	No Ice	13.92	13.92	3200.00
						1/2" Ice	17.41	17.41	4900.00
7770	A	From Face	6.00	0.0000	137.00	No Ice	5.88	2.93	39.00
			3.00			1/2" Ice	6.31	3.27	71.63
			0.00						
7770	A	From Face	6.00	0.0000	137.00	No Ice	5.88	2.93	39.00
			-3.00			1/2" Ice	6.31	3.27	71.63
			0.00						
7770	B	From Face	6.00	0.0000	137.00	No Ice	5.88	2.93	39.00
			3.00			1/2" Ice	6.31	3.27	71.63
			0.00						
7770	B	From Face	6.00	0.0000	137.00	No Ice	5.88	2.93	39.00
			-3.00			1/2" Ice	6.31	3.27	71.63
			0.00						
7700	C	From Face	6.00	0.0000	137.00	No Ice	5.88	2.93	39.00
			3.00			1/2" Ice	6.31	3.27	71.63
			0.00						
7700	C	From Face	6.00	0.0000	137.00	No Ice	5.81	2.93	39.00
			-3.00			1/2" Ice	6.31	3.27	71.63
			0.00						
TMA	A	From Face	6.00	0.0000	137.00	No Ice	1.06	0.45	20.00
			3.00			1/2" Ice	1.21	0.57	26.53
			0.00						
TMA	A	From Face	6.00	0.0000	137.00	No Ice	1.06	0.45	20.00
			-3.00			1/2" Ice	1.21	0.57	26.53
			0.00						
TMA	B	From Face	6.00	0.0000	137.00	No Ice	1.06	0.45	20.00
			3.00			1/2" Ice	1.21	0.57	26.53
			0.00						
TMA	B	From Face	6.00	0.0000	137.00	No Ice	1.06	0.45	20.00
			-3.00			1/2" Ice	1.21	0.57	26.53
			0.00						
TMA	C	From Face	6.00	0.0000	137.00	No Ice	1.06	0.45	20.00
			3.00			1/2" Ice	1.21	0.57	26.53
			0.00						
TMA	C	From Face	6.00	0.0000	137.00	No Ice	1.06	0.45	20.00
			-3.00			1/2" Ice	1.21	0.57	26.53
			0.00						
FD9R600/2C-3L Diplexer	A	From Face	6.00	0.0000	137.00	No Ice	0.36	0.08	0.00
			3.00			1/2" Ice	0.45	0.13	2.28
			0.00						
FD9R600/2C-3L Diplexer	A	From Face	6.00	0.0000	137.00	No Ice	0.36	0.08	0.00
			-3.00			1/2" Ice	0.45	0.13	2.28
			0.00						
FD9R600/2C-3L Diplexer	B	From Face	6.00	0.0000	137.00	No Ice	0.36	0.08	0.00
			3.00			1/2" Ice	0.45	0.13	2.28

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00						
FD9R600/2C-3L Diplexer	B	From Face	6.00 -3.00 0.00	0.0000	137.00	No Ice 1/2" Ice	0.36 0.45	0.08 0.13	0.00 2.28
FD9R600/2C-3L Diplexer	C	From Face	6.00 3.00 0.00	0.0000	137.00	No Ice 1/2" Ice	0.36 0.45	0.08 0.13	0.00 2.28
FD9R600/2C-3L Diplexer	C	From Face	6.00 -3.00 0.00	0.0000	137.00	No Ice 1/2" Ice	0.36 0.45	0.08 0.13	0.00 2.28
13'-3" platform	A	None		0.0000	137.00	No Ice 1/2" Ice	13.92 17.41	13.92 17.41	3200.00 4900.00
DB950F85E-M	A	From Face	6.00 3.00 0.00	0.0000	147.00	No Ice 1/2" Ice	2.53 2.90	4.24 4.62	11.50 35.03
DB950F85E-M	A	From Face	6.00 -3.00 0.00	0.0000	147.00	No Ice 1/2" Ice	2.53 2.90	4.24 4.62	11.50 35.03
DB950F85E-M	B	From Face	6.00 3.00 0.00	0.0000	147.00	No Ice 1/2" Ice	2.53 2.90	4.24 4.62	11.50 35.03
DB950F85E-M	B	From Face	6.00 -3.00 0.00	0.0000	147.00	No Ice 1/2" Ice	2.53 2.90	4.24 4.62	11.50 35.03
DB950F85E-M	C	From Face	6.00 3.00 0.00	0.0000	147.00	No Ice 1/2" Ice	2.53 2.90	4.24 4.62	11.50 35.03
DB950F85E-M	C	From Face	6.00 -3.00 0.00	0.0000	147.00	No Ice 1/2" Ice	2.53 2.90	4.24 4.62	11.50 35.03
13'-3" platform	A	None		0.0000	147.00	No Ice 1/2" Ice	13.92 17.41	13.92 17.41	3200.00 4900.00
ASP682 Whip	A	From Face	5.00 0.00 0.00	0.0000	158.00	No Ice 1/2" Ice	3.25 4.90	3.25 4.90	10.00 35.05
4' standoff	A	None		0.0000	158.00	No Ice 1/2" Ice	3.42 3.67	3.42 3.67	111.16 147.20
6'8"x4" Pipe mount	A	None		0.0000	163.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	72.00 93.13
6'8"x4" Pipe mount	A	None		0.0000	170.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	72.00 93.13
2" dia 10' Omni	A	From Face	6.00 3.00 0.00	0.0000	173.00	No Ice 1/2" Ice	2.00 3.02	2.00 3.02	25.00 40.50
2" dia 6' Omni	A	From Face	6.00 -3.00 0.00	0.0000	173.00	No Ice 1/2" Ice	1.20 1.80	1.20 1.80	5.00 14.39
BA6312	A	From Face	6.00 0.00 0.00	0.0000	173.00	No Ice 1/2" Ice	0.45 1.09	0.45 1.09	3.00 7.00
13'-3" platform	A	None		0.0000	173.00	No Ice 1/2" Ice	13.92 17.41	13.92 17.41	3200.00 4900.00
APXVSPP18-C-A20	A	From Face	6.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice	8.40 8.92	5.28 5.74	57.00 107.04
APXVSPP18-C-A20	B	From Face	6.00 0.00	0.0000	147.00	No Ice 1/2" Ice	8.40 8.92	5.28 5.74	57.00 107.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00						
APXVSPP18-C-A20	C	From Face	6.00	0.0000	147.00	No Ice	8.40	5.28	57.00
			0.00			1/2" Ice	8.92	5.74	107.04
			0.00						
RRH	A	From Face	6.00	0.0000	147.00	No Ice	2.25	1.23	50.00
			0.00			1/2" Ice	2.45	1.39	66.85
			0.00						
RRH	B	From Face	6.00	0.0000	147.00	No Ice	2.25	1.23	50.00
			0.00			1/2" Ice	2.45	1.39	66.85
			0.00						
RRH	C	From Face	6.00	0.0000	147.00	No Ice	2.25	1.23	50.00
			0.00			1/2" Ice	2.45	1.39	66.85
			0.00						
PCS 1900MHz 4x45W-65MHz	A	From Leg	6.00	0.0000	147.00	No Ice	2.73	2.61	60.00
			0.00			1/2" Ice	2.95	2.83	88.16
			0.00						
PCS 1900MHz 4x45W-65MHz	B	From Leg	6.00	0.0000	147.00	No Ice	2.73	2.61	60.00
			0.00			1/2" Ice	2.95	2.83	88.16
			0.00						
PCS 1900MHz 4x45W-65MHz	C	From Leg	6.00	0.0000	147.00	No Ice	2.73	2.61	60.00
			0.00			1/2" Ice	2.95	2.83	88.16
			0.00						
Lighting Rod 5/8"x4'	C	From Face	0.00	0.0000	147.00	No Ice	0.25	0.25	31.00
			0.00			1/2" Ice	0.66	0.66	33.82
			0.00						
AIR B2A/B4P	A	From Face	6.00	0.0000	117.00	No Ice	6.42	4.22	83.00
			6.00			1/2" Ice	6.86	4.64	124.00
			0.00						
AIR B2A/B4P	B	From Face	6.00	0.0000	117.00	No Ice	6.42	4.22	83.00
			6.00			1/2" Ice	6.86	4.64	124.00
			0.00						
AIR B2A/B4P	C	From Face	6.00	0.0000	117.00	No Ice	6.42	4.22	83.00
			6.00			1/2" Ice	6.86	4.64	124.00
			0.00						
AIR B2A/B4P	A	From Face	6.00	0.0000	117.00	No Ice	6.42	4.22	83.00
			-6.00			1/2" Ice	6.86	4.64	124.00
			0.00						
AIR B2A/B4P	B	From Face	6.00	0.0000	117.00	No Ice	6.42	4.22	83.00
			-6.00			1/2" Ice	6.86	4.64	124.00
			0.00						
AIR B2A/B4P	C	From Face	6.00	0.0000	117.00	No Ice	6.42	4.22	83.00
			-6.00			1/2" Ice	6.86	4.64	124.00
			0.00						
Twin TMAs	A	From Leg	5.00	0.0000	117.00	No Ice	0.68	0.45	13.20
			6.00			1/2" Ice	0.80	0.56	18.38
			0.00						
Twin TMAs	B	From Leg	5.00	0.0000	117.00	No Ice	0.68	0.45	13.20
			6.00			1/2" Ice	0.80	0.56	18.38
			0.00						
Twin TMAs	C	From Leg	5.00	0.0000	117.00	No Ice	0.68	0.45	13.20
			6.00			1/2" Ice	0.80	0.56	18.38
			0.00						
Commscope LNX-6515DS-VTM	A	From Face	6.00	0.0000	117.00	No Ice	11.63	9.79	76.55
			3.00			1/2" Ice	12.35	11.31	165.86
			0.00						
Commscope LNX-6515DS-VTM	B	From Face	6.00	0.0000	117.00	No Ice	11.63	9.79	76.55
			3.00			1/2" Ice	12.35	11.31	165.86

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00						
Commscope	C	From Face	6.00	0.0000	117.00	No Ice	11.63	9.79	76.55
LNX-6515DS-VTM			3.00			1/2" Ice	12.35	11.31	165.86
			0.00						
RRUS11 B12	A	From Face	6.00	0.0000	117.00	No Ice	3.31	1.36	50.70
			3.00			1/2" Ice	3.55	1.54	71.57
			0.00						
RRUS11 B12	B	From Face	6.00	0.0000	117.00	No Ice	3.31	1.36	50.70
			3.00			1/2" Ice	3.55	1.54	71.57
			0.00						
RRUS11 B12	C	From Face	6.00	0.0000	117.00	No Ice	3.31	1.36	50.70
			3.00			1/2" Ice	3.55	1.54	71.57
			0.00						

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
MF-900B	A	Grid	From Face	5.00	Worst		158.00	1.33	No Ice	2.66	13.00
				0.00					1/2" Ice	1.58	21.09
				0.00							
PL6-65D	A	Paraboloid w/o Radome	From Face	5.00	Worst		170.00	6.00	No Ice	28.27	143.00
				0.00					1/2" Ice	29.05	292.13
				0.00							

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	150.67	1.543	29	108.687	A	0.000	108.687	108.687	100.00	0.000	0.000
175.00-128.66					B	0.000	108.687		100.00	0.000	0.000
					C	0.000	108.687		100.00	0.000	0.000
L2	106.26	1.397	26	136.629	A	0.000	136.629	136.629	100.00	0.000	0.000
128.66-85.09					B	0.000	136.629		100.00	0.000	0.000
					C	0.000	136.629		100.00	0.000	0.000
L3 85.09-42.03	63.35	1.205	22	167.315	A	0.000	167.315	167.315	100.00	0.000	0.000
					B	0.000	167.315		100.00	0.000	0.000
					C	0.000	167.315		100.00	0.000	0.000
L4 42.03-0.00	20.42	1	18	193.794	A	0.000	193.794	193.794	100.00	0.000	0.000
					B	0.000	193.794		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	193.794		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	150.67	1.543	21	0.5000	112.548	A	0.000	112.548	112.548	100.00	0.000	0.000
175.00-128.66						B	0.000	112.548		100.00	0.000	0.000
						C	0.000	112.548		100.00	0.000	0.000
L2 128.66-85.09	106.26	1.397	19	0.5000	140.260	A	0.000	140.260	140.260	100.00	0.000	0.000
						B	0.000	140.260		100.00	0.000	0.000
						C	0.000	140.260		100.00	0.000	0.000
L3 85.09-42.03	63.35	1.205	17	0.5000	170.903	A	0.000	170.903	170.903	100.00	0.000	0.000
						B	0.000	170.903		100.00	0.000	0.000
						C	0.000	170.903		100.00	0.000	0.000
L4 42.03-0.00	20.42	1	14	0.5000	197.297	A	0.000	197.297	197.297	100.00	0.000	0.000
						B	0.000	197.297		100.00	0.000	0.000
						C	0.000	197.297		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	150.67	1.543	14	108.687	A	0.000	108.687	108.687	100.00	0.000	0.000
175.00-128.66					B	0.000	108.687		100.00	0.000	0.000
					C	0.000	108.687		100.00	0.000	0.000
L2	106.26	1.397	13	136.629	A	0.000	136.629	136.629	100.00	0.000	0.000
128.66-85.09					B	0.000	136.629		100.00	0.000	0.000
					C	0.000	136.629		100.00	0.000	0.000
L3 85.09-42.03	63.35	1.205	11	167.315	A	0.000	167.315	167.315	100.00	0.000	0.000
					B	0.000	167.315		100.00	0.000	0.000
					C	0.000	167.315		100.00	0.000	0.000
L4 42.03-0.00	20.42	1	9	193.794	A	0.000	193.794	193.794	100.00	0.000	0.000
					B	0.000	193.794		100.00	0.000	0.000
					C	0.000	193.794		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	369.43	3490.32	A	1	0.65	1	1	1	108.687	3404.24	73.46	C
175.00-128.66			B	1	0.65	1	1	1	108.687			
			C	1	0.65	1	1	1	108.687			
L2	1748.40	5992.56	A	1	0.65	1	1	1	136.629	3869.78	88.82	C
128.66-85.09			B	1	0.65	1	1	1	136.629			
			C	1	0.65	1	1	1	136.629			
L3	1869.23	9028.74	A	1	0.65	1	1	1	167.315	4073.82	94.61	C
85.09-42.03			B	1	0.65	1	1	1	167.315			
			C	1	0.65	1	1	1	167.315			
L4 42.03-0.00	1824.52	12523.39	A	1	0.65	1	1	1	193.794	3937.48	93.68	C
			B	1	0.65	1	1	1	193.794			
			C	1	0.65	1	1	1	193.794			
Sum Weight:	5811.59	31035.00						OTM	1263 kip-ft	15285.33		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	369.43	3490.32	A	1	0.65	1	1	1	108.687	3404.24	73.46	C
175.00-128.66			B	1	0.65	1	1	1	108.687			
			C	1	0.65	1	1	1	108.687			
L2	1748.40	5992.56	A	1	0.65	1	1	1	136.629	3869.78	88.82	C
128.66-85.09			B	1	0.65	1	1	1	136.629			
			C	1	0.65	1	1	1	136.629			
L3	1869.23	9028.74	A	1	0.65	1	1	1	167.315	4073.82	94.61	C
85.09-42.03			B	1	0.65	1	1	1	167.315			
			C	1	0.65	1	1	1	167.315			
L4 42.03-0.00	1824.52	12523.39	A	1	0.65	1	1	1	193.794	3937.48	93.68	C
			B	1	0.65	1	1	1	193.794			
			C	1	0.65	1	1	1	193.794			
Sum Weight:	5811.59	31035.00						OTM	1263 kip-ft	15285.33		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	369.43	3490.32	A	1	0.65	1	1	1	108.687	3404.24	73.46	C
175.00-128.66			B	1	0.65	1	1	1	108.687			
			C	1	0.65	1	1	1	108.687			
L2	1748.40	5992.56	A	1	0.65	1	1	1	136.629	3869.78	88.82	C
128.66-85.09			B	1	0.65	1	1	1	136.629			
			C	1	0.65	1	1	1	136.629			
L3	1869.23	9028.74	A	1	0.65	1	1	1	167.315	4073.82	94.61	C
85.09-42.03			B	1	0.65	1	1	1	167.315			
			C	1	0.65	1	1	1	167.315			
L4 42.03-0.00	1824.52	12523.39	A	1	0.65	1	1	1	193.794	3937.48	93.68	C
			B	1	0.65	1	1	1	193.794			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	1	0.65	1	1	1	193.794			
Sum Weight:	5811.59	31035.00						OTM	1263 kip-ft	15285.33		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	369.43	4309.55	A	1	0.65	1	1	1	112.548	2643.90	57.05	C
175.00-128.66			B	1	0.65	1	1	1	112.548			
			C	1	0.65	1	1	1	112.548			
L2	1748.40	7017.88	A	1	0.65	1	1	1	140.260	2979.46	68.38	C
128.66-85.09			B	1	0.65	1	1	1	140.260			
			C	1	0.65	1	1	1	140.260			
L3	1869.23	10281.16	A	1	0.65	1	1	1	170.903	3120.90	72.48	C
85.09-42.03			B	1	0.65	1	1	1	170.903			
			C	1	0.65	1	1	1	170.903			
L4 42.03-0.00	1824.52	13971.60	A	1	0.65	1	1	1	197.297	3006.49	71.53	C
			B	1	0.65	1	1	1	197.297			
			C	1	0.65	1	1	1	197.297			
Sum Weight:	5811.59	35580.19						OTM	974 kip-ft	11750.75		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	369.43	4309.55	A	1	0.65	1	1	1	112.548	2643.90	57.05	C
175.00-128.66			B	1	0.65	1	1	1	112.548			
			C	1	0.65	1	1	1	112.548			
L2	1748.40	7017.88	A	1	0.65	1	1	1	140.260	2979.46	68.38	C
128.66-85.09			B	1	0.65	1	1	1	140.260			
			C	1	0.65	1	1	1	140.260			
L3	1869.23	10281.16	A	1	0.65	1	1	1	170.903	3120.90	72.48	C
85.09-42.03			B	1	0.65	1	1	1	170.903			
			C	1	0.65	1	1	1	170.903			
L4 42.03-0.00	1824.52	13971.60	A	1	0.65	1	1	1	197.297	3006.49	71.53	C
			B	1	0.65	1	1	1	197.297			
			C	1	0.65	1	1	1	197.297			
Sum Weight:	5811.59	35580.19						OTM	974 kip-ft	11750.75		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	369.43	4309.55	A	1	0.65	1	1	1	112.548	2643.90	57.05	C
175.00-128.66			B	1	0.65	1	1	1	112.548			
			C	1	0.65	1	1	1	112.548			
L2	1748.40	7017.88	A	1	0.65	1	1	1	140.260	2979.46	68.38	C
128.66-85.09			B	1	0.65	1	1	1	140.260			
			C	1	0.65	1	1	1	140.260			
L3	1869.23	10281.16	A	1	0.65	1	1	1	170.903	3120.90	72.48	C
85.09-42.03			B	1	0.65	1	1	1	170.903			
			C	1	0.65	1	1	1	170.903			
L4 42.03-0.00	1824.52	13971.60	A	1	0.65	1	1	1	197.297	3006.49	71.53	C
			B	1	0.65	1	1	1	197.297			
			C	1	0.65	1	1	1	197.297			
Sum Weight:	5811.59	35580.19						OTM	974 kip-ft	11750.75		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	369.43	3490.32	A	1	0.65	1	1	1	108.687	1696.23	36.60	C
175.00-128.66			B	1	0.65	1	1	1	108.687			
			C	1	0.65	1	1	1	108.687			
L2	1748.40	5992.56	A	1	0.65	1	1	1	136.629	1928.19	44.26	C
128.66-85.09			B	1	0.65	1	1	1	136.629			
			C	1	0.65	1	1	1	136.629			
L3	1869.23	9028.74	A	1	0.65	1	1	1	167.315	2029.86	47.14	C
85.09-42.03			B	1	0.65	1	1	1	167.315			
			C	1	0.65	1	1	1	167.315			
L4 42.03-0.00	1824.52	12523.39	A	1	0.65	1	1	1	193.794	1961.93	46.68	C
			B	1	0.65	1	1	1	193.794			
			C	1	0.65	1	1	1	193.794			
Sum Weight:	5811.59	31035.00						OTM	629 kip-ft	7616.22		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	369.43	3490.32	A	1	0.65	1	1	1	108.687	1696.23	36.60	C
175.00-128.66			B	1	0.65	1	1	1	108.687			
			C	1	0.65	1	1	1	108.687			
L2	1748.40	5992.56	A	1	0.65	1	1	1	136.629	1928.19	44.26	C
128.66-85.09			B	1	0.65	1	1	1	136.629			
			C	1	0.65	1	1	1	136.629			
L3	1869.23	9028.74	A	1	0.65	1	1	1	167.315	2029.86	47.14	C
85.09-42.03			B	1	0.65	1	1	1	167.315			
			C	1	0.65	1	1	1	167.315			
L4 42.03-0.00	1824.52	12523.39	A	1	0.65	1	1	1	193.794	1961.93	46.68	C
			B	1	0.65	1	1	1	193.794			

tnxTower	Job	Page
	175 ft MONOPOLE	13 of 21
EBI Consulting 21 B Street Burlington, MA Phone: 781.273.2500 FAX: 781.273.3311	**Project** CT11506A_CT506 Willimantic ECSU	**Date** 14:32:14 02/17/15
	Client T-Mobile	**Designed by**

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
Sum Weight:	5811.59	31035.00	C	1	0.65	1	1	1 OTM	193.794 629 kip-ft	7616.22		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	369.43	3490.32	A	1	0.65	1	1	1	108.687	1696.23	36.60	C
175.00-128.66			B	1	0.65	1	1	1	108.687			
			C	1	0.65	1	1	1	108.687			
L2	1748.40	5992.56	A	1	0.65	1	1	1	136.629	1928.19	44.26	C
128.66-85.09			B	1	0.65	1	1	1	136.629			
			C	1	0.65	1	1	1	136.629			
L3	1869.23	9028.74	A	1	0.65	1	1	1	167.315	2029.86	47.14	C
85.09-42.03			B	1	0.65	1	1	1	167.315			
			C	1	0.65	1	1	1	167.315			
L4 42.03-0.00	1824.52	12523.39	A	1	0.65	1	1	1	193.794	1961.93	46.68	C
			B	1	0.65	1	1	1	193.794			
			C	1	0.65	1	1	1	193.794			
Sum Weight:	5811.59	31035.00						OTM	629 kip-ft	7616.22		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	31035.00					
Bracing Weight	0.00					
Total Member Self-Weight	31035.00			-1	1	
Total Weight	58751.26			-1	1	
Wind 0 deg - No Ice		0.00	-31909.99	-3558	1	-15
Wind 30 deg - No Ice		15956.64	-27634.86	-3082	-1778	-18
Wind 60 deg - No Ice		27637.71	-15955.00	-1780	-3080	-15
Wind 90 deg - No Ice		31913.28	0.00	-1	-3557	-9
Wind 120 deg - No Ice		27637.71	15955.00	1778	-3080	0
Wind 150 deg - No Ice		15956.64	27634.86	3080	-1778	9
Wind 180 deg - No Ice		0.00	31909.99	3557	1	15
Wind 210 deg - No Ice		-15956.64	27634.86	3080	1780	18
Wind 240 deg - No Ice		-27637.71	15955.00	1778	3083	15
Wind 270 deg - No Ice		-31913.28	0.00	-1	3559	9
Wind 300 deg - No Ice		-27637.71	-15955.00	-1780	3083	0
Wind 330 deg - No Ice		-15956.64	-27634.86	-3082	1780	-9
Member Ice	4545.18					
Total Weight Ice	75429.28			-1	2	
Wind 0 deg - Ice		0.00	-25953.42	-2934	2	-13
Wind 30 deg - Ice		12976.71	-22476.32	-2541	-1464	-15
Wind 60 deg - Ice		22476.32	-12976.71	-1468	-2538	-13
Wind 90 deg - Ice		25953.42	0.00	-1	-2931	-8

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 120 deg - Ice		22476.32	12976.71	1465	-2538	0
Wind 150 deg - Ice		12976.71	22476.32	2539	-1464	7
Wind 180 deg - Ice		0.00	25953.42	2932	2	13
Wind 210 deg - Ice		-12976.71	22476.32	2539	1469	15
Wind 240 deg - Ice		-22476.32	12976.71	1465	2542	13
Wind 270 deg - Ice		-25953.42	0.00	-1	2935	8
Wind 300 deg - Ice		-22476.32	-12976.71	-1468	2542	0
Wind 330 deg - Ice		-12976.71	-22476.32	-2541	1469	-7
Total Weight	58751.26			-1	1	
Wind 0 deg - Service		0.00	-15899.79	-1773	1	-8
Wind 30 deg - Service		7950.71	-13769.62	-1536	-885	-9
Wind 60 deg - Service		13771.04	-7949.89	-887	-1534	-8
Wind 90 deg - Service		15901.43	0.00	-1	-1772	-4
Wind 120 deg - Service		13771.04	7949.89	886	-1534	0
Wind 150 deg - Service		7950.71	13769.62	1535	-885	4
Wind 180 deg - Service		0.00	15899.79	1772	1	8
Wind 210 deg - Service		-7950.71	13769.62	1535	888	9
Wind 240 deg - Service		-13771.04	7949.89	886	1537	8
Wind 270 deg - Service		-15901.43	0.00	-1	1774	4
Wind 300 deg - Service		-13771.04	-7949.89	-887	1537	0
Wind 330 deg - Service		-7950.71	-13769.62	-1536	888	-4

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service

Comb. No.	Description
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	175 - 128.66	Pole	Max Tension	18	0.00	0	0
			Max. Compression	14	-21211.04	2	1
			Max. Mx	11	-13526.88	273	0
			Max. My	2	-13527.58	0	272
			Max. Vy	11	-13316.69	273	0
			Max. Vx	2	-13312.97	0	272
			Max. Torque	9			-17
L2	128.66 - 85.09	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-46119.58	3	2
			Max. Mx	11	-31172.91	1130	1
			Max. My	2	-31173.50	1	1130
			Max. Vy	11	-24713.97	1130	1
			Max. Vx	2	-24710.16	1	1130
			Max. Torque	3			18
L3	85.09 - 42.03	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-57700.02	3	2
			Max. Mx	11	-42003.24	2246	1
			Max. My	2	-42003.53	1	2245
			Max. Vy	11	-28347.18	2246	1
			Max. Vx	2	-28343.60	1	2245
			Max. Torque	3			18
L4	42.03 - 0	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-75429.28	3	2
			Max. Mx	11	-58733.54	3724	1
			Max. My	2	-58733.55	1	3723
			Max. Vy	11	-31945.88	3724	1
			Max. Vx	2	-31942.59	1	3723
			Max. Torque	3			18

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	24	75429.28	25953.52	-0.00
	Max. H_x	11	58751.26	31913.28	0.00
	Max. H_z	2	58751.26	0.00	31909.99
	Max. M_x	2	3723	0.00	31909.99
	Max. M_z	5	3721	-31913.28	0.00
	Max. Torsion	3	18	-15956.64	27634.87
	Min. Vert	1	58751.26	0.00	0.00

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
	Min. H_x	5	58751.26	-31913.28	0.00
	Min. H_z	8	58751.26	0.00	-31909.99
	Min. M_x	8	-3721	0.00	-31909.99
	Min. M_z	11	-3724	31913.28	0.00
	Min. Torsion	9	-18	15956.64	-27634.86

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	58751.26	-0.00	-0.00	-1	1	0
Dead+Wind 0 deg - No Ice	58751.26	-0.00	-31909.99	-3723	1	-15
Dead+Wind 30 deg - No Ice	58751.26	15956.64	-27634.87	-3224	-1860	-18
Dead+Wind 60 deg - No Ice	58751.26	27637.71	-15955.00	-1862	-3223	-15
Dead+Wind 90 deg - No Ice	58751.26	31913.28	-0.00	-1	-3721	-9
Dead+Wind 120 deg - No Ice	58751.26	27637.71	15955.00	1860	-3222	0
Dead+Wind 150 deg - No Ice	58751.26	15956.64	27634.87	3222	-1860	9
Dead+Wind 180 deg - No Ice	58751.26	-0.00	31909.99	3721	1	15
Dead+Wind 210 deg - No Ice	58751.26	-15956.64	27634.86	3223	1862	18
Dead+Wind 240 deg - No Ice	58751.26	-27637.71	15955.00	1860	3225	15
Dead+Wind 270 deg - No Ice	58751.26	-31913.28	-0.00	-1	3724	9
Dead+Wind 300 deg - No Ice	58751.26	-27637.71	-15955.00	-1862	3225	0
Dead+Wind 330 deg - No Ice	58751.26	-15956.64	-27634.87	-3224	1862	-9
Dead+Ice+Temp	75429.28	-0.00	-0.00	-2	3	0
Dead+Wind 0 deg+Ice+Temp	75429.28	0.00	-25953.52	-3133	3	-13
Dead+Wind 30 deg+Ice+Temp	75429.28	12976.72	-22476.33	-2713	-1563	-15
Dead+Wind 60 deg+Ice+Temp	75429.28	22476.33	-12976.71	-1567	-2709	-13
Dead+Wind 90 deg+Ice+Temp	75429.28	25953.52	0.00	-2	-3129	-8
Dead+Wind 120 deg+Ice+Temp	75429.28	22476.33	12976.72	1564	-2709	0
Dead+Wind 150 deg+Ice+Temp	75429.28	12976.72	22476.33	2710	-1563	7
Dead+Wind 180 deg+Ice+Temp	75429.28	0.00	25953.52	3130	3	13
Dead+Wind 210 deg+Ice+Temp	75429.28	-12976.71	22476.33	2710	1568	15
Dead+Wind 240 deg+Ice+Temp	75429.28	-22476.33	12976.72	1564	2714	13
Dead+Wind 270 deg+Ice+Temp	75429.28	-25953.52	0.00	-2	3134	8
Dead+Wind 300 deg+Ice+Temp	75429.28	-22476.33	-12976.72	-1567	2714	0
Dead+Wind 330 deg+Ice+Temp	75429.28	-12976.71	-22476.33	-2713	1568	-7
Dead+Wind 0 deg - Service	58751.26	-0.00	-15899.79	-1856	1	-8
Dead+Wind 30 deg - Service	58751.26	7950.71	-13769.62	-1608	-927	-9
Dead+Wind 60 deg - Service	58751.26	13771.04	-7949.89	-929	-1606	-8
Dead+Wind 90 deg - Service	58751.26	15901.43	-0.00	-1	-1855	-4
Dead+Wind 120 deg - Service	58751.26	13771.04	7949.89	927	-1606	0
Dead+Wind 150 deg - Service	58751.26	7950.71	13769.62	1606	-927	4
Dead+Wind 180 deg - Service	58751.26	-0.00	15899.79	1855	1	8
Dead+Wind 210 deg - Service	58751.26	-7950.71	13769.62	1606	929	9
Dead+Wind 240 deg - Service	58751.26	-13771.04	7949.89	927	1609	8
Dead+Wind 270 deg - Service	58751.26	-15901.43	-0.00	-1	1857	4
Dead+Wind 300 deg - Service	58751.26	-13771.04	-7949.89	-929	1609	0
Dead+Wind 330 deg - Service	58751.26	-7950.71	-13769.62	-1608	929	-4

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-58751.26	0.00	0.00	58751.26	0.00	0.000%
2	0.00	-58751.26	-31909.99	0.00	58751.26	31909.99	0.000%
3	15956.64	-58751.26	-27634.86	-15956.64	58751.26	27634.87	0.000%
4	27637.71	-58751.26	-15955.00	-27637.71	58751.26	15955.00	0.000%
5	31913.28	-58751.26	0.00	-31913.28	58751.26	0.00	0.000%
6	27637.71	-58751.26	15955.00	-27637.71	58751.26	-15955.00	0.000%
7	15956.64	-58751.26	27634.86	-15956.64	58751.26	-27634.87	0.000%
8	0.00	-58751.26	31909.99	0.00	58751.26	-31909.99	0.000%
9	-15956.64	-58751.26	27634.86	15956.64	58751.26	-27634.86	0.000%
10	-27637.71	-58751.26	15955.00	27637.71	58751.26	-15955.00	0.000%
11	-31913.28	-58751.26	0.00	31913.28	58751.26	0.00	0.000%
12	-27637.71	-58751.26	-15955.00	27637.71	58751.26	15955.00	0.000%
13	-15956.64	-58751.26	-27634.86	15956.64	58751.26	27634.87	0.000%
14	0.00	-75429.28	0.00	0.00	75429.28	0.00	0.000%
15	0.00	-75429.28	-25953.42	-0.00	75429.28	25953.52	0.000%
16	12976.71	-75429.28	-22476.32	-12976.72	75429.28	22476.33	0.000%
17	22476.32	-75429.28	-12976.71	-22476.33	75429.28	12976.71	0.000%
18	25953.42	-75429.28	0.00	-25953.52	75429.28	-0.00	0.000%
19	22476.32	-75429.28	12976.71	-22476.33	75429.28	-12976.72	0.000%
20	12976.71	-75429.28	22476.32	-12976.72	75429.28	-22476.33	0.000%
21	0.00	-75429.28	25953.42	-0.00	75429.28	-25953.52	0.000%
22	-12976.71	-75429.28	22476.32	12976.71	75429.28	-22476.33	0.000%
23	-22476.32	-75429.28	12976.71	22476.33	75429.28	-12976.72	0.000%
24	-25953.42	-75429.28	0.00	25953.52	75429.28	-0.00	0.000%
25	-22476.32	-75429.28	-12976.71	22476.33	75429.28	12976.72	0.000%
26	-12976.71	-75429.28	-22476.32	12976.71	75429.28	22476.33	0.000%
27	0.00	-58751.26	-15899.79	0.00	58751.26	15899.79	0.000%
28	7950.71	-58751.26	-13769.62	-7950.71	58751.26	13769.62	0.000%
29	13771.04	-58751.26	-7949.89	-13771.04	58751.26	7949.89	0.000%
30	15901.43	-58751.26	0.00	-15901.43	58751.26	0.00	0.000%
31	13771.04	-58751.26	7949.89	-13771.04	58751.26	-7949.89	0.000%
32	7950.71	-58751.26	13769.62	-7950.71	58751.26	-13769.62	0.000%
33	0.00	-58751.26	15899.79	0.00	58751.26	-15899.79	0.000%
34	-7950.71	-58751.26	13769.62	7950.71	58751.26	-13769.62	0.000%
35	-13771.04	-58751.26	7949.89	13771.04	58751.26	-7949.89	0.000%
36	-15901.43	-58751.26	0.00	15901.43	58751.26	0.00	0.000%
37	-13771.04	-58751.26	-7949.89	13771.04	58751.26	7949.89	0.000%
38	-7950.71	-58751.26	-13769.62	7950.71	58751.26	13769.62	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00047527
3	Yes	5	0.00000001	0.00075324
4	Yes	6	0.00000001	0.00006658
5	Yes	5	0.00000001	0.00027843
6	Yes	5	0.00000001	0.00082247
7	Yes	5	0.00000001	0.00073302
8	Yes	5	0.00000001	0.00047501
9	Yes	6	0.00000001	0.00007019
10	Yes	5	0.00000001	0.00073777
11	Yes	5	0.00000001	0.00027868
12	Yes	5	0.00000001	0.00082995
13	Yes	5	0.00000001	0.00099828

14	Yes	4	0.00000001	0.00001035
15	Yes	5	0.00000001	0.00097987
16	Yes	6	0.00000001	0.00013467
17	Yes	6	0.00000001	0.00017748
18	Yes	5	0.00000001	0.00072651
19	Yes	6	0.00000001	0.00013843
20	Yes	6	0.00000001	0.00013014
21	Yes	5	0.00000001	0.00097796
22	Yes	6	0.00000001	0.00018530
23	Yes	6	0.00000001	0.00013268
24	Yes	5	0.00000001	0.00072890
25	Yes	6	0.00000001	0.00014032
26	Yes	6	0.00000001	0.00015903
27	Yes	5	0.00000001	0.00014477
28	Yes	5	0.00000001	0.00015959
29	Yes	5	0.00000001	0.00023969
30	Yes	5	0.00000001	0.00008490
31	Yes	5	0.00000001	0.00013193
32	Yes	5	0.00000001	0.00011939
33	Yes	5	0.00000001	0.00014452
34	Yes	5	0.00000001	0.00025960
35	Yes	5	0.00000001	0.00014574
36	Yes	5	0.00000001	0.00008514
37	Yes	5	0.00000001	0.00013437
38	Yes	5	0.00000001	0.00018812

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	175 - 128.66	46.810	37	2.2108	0.0885
L2	133.34 - 85.09	28.167	37	1.9802	0.0362
L3	90.91 - 42.03	12.916	37	1.3684	0.0148
L4	48.97 - 0	3.688	37	0.6871	0.0053

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
173.00	2" dia 10' Omni	37	45.884	2.2041	0.0857	43843
170.00	PL6-65D	37	44.494	2.1939	0.0813	43843
163.00	6'8"x4" Pipe mount	37	41.266	2.1685	0.0714	18268
158.00	MF-900B	37	38.978	2.1478	0.0646	12894
147.00	DB950F85E-M	37	34.037	2.0895	0.0505	7828
137.00	7770	37	29.704	2.0145	0.0396	5768
127.00	DB844H90	37	25.579	1.9113	0.0310	4905
117.00	13'-3" platform	37	21.698	1.7812	0.0247	4433
100.00	13'-3" platform	37	15.737	1.5192	0.0175	3809
75.00	GPS	37	8.656	1.1034	0.0106	3317

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	175 - 128.66	93.687	11	4.4205	0.1772
L2	133.34 - 85.09	56.413	11	3.9648	0.0723
L3	90.91 - 42.03	25.879	11	2.7417	0.0295
L4	48.97 - 0	7.392	11	1.3772	0.0107

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
173.00	2" dia 10' Omni	11	91.834	4.4074	0.1714	22244
170.00	PL6-65D	11	89.058	4.3876	0.1628	22244
163.00	6'8"x4" Pipe mount	11	82.603	4.3379	0.1429	9267
158.00	MF-900B	11	78.030	4.2971	0.1292	6541
147.00	DB950F85E-M	11	68.151	4.1820	0.1011	3969
137.00	7770	11	59.486	4.0331	0.0791	2923
127.00	DB844H90	11	51.233	3.8273	0.0619	2480
117.00	13'-3" platform	11	43.466	3.5676	0.0492	2235
100.00	13'-3" platform	11	31.531	3.0435	0.0350	1912
75.00	GPS	11	17.345	2.2110	0.0212	1660

Base Plate Design Data

Plate Thickness in	Number of Anchor Bolts	Anchor Bolt Size in	Actual Allowable Ratio Bolt Tension lb	Actual Allowable Ratio Bolt Compression lb	Actual Allowable Ratio Plate Stress ksi	Actual Allowable Ratio Stiffener Stress ksi	Controlling Condition	Ratio
2.0000	18	2.2500	138462.55 131210.58 1.06	144988.50 217809.56 0.67	37.4 45.0 0.83	47.6 45.0 1.06	Stiff	1.06 ✔

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L1	175 - 128.66 (1)	TP33.29x23x0.25	46.34	0.00	0.0	39.0	25.3926	-13526.80	990312.00	0.014
L2	128.66 - 85.09 (2)	TP42.47x31.7508x0.3125	48.25	0.00	0.0	39.0	40.5325	-31172.90	1580770.00	0.020

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L3	85.09 - 42.03 (3)	TP51.41x40.552x0.375	48.88	0.00	0.0	39.0	58.9095	-42003.20	2297470.00	0.018
L4	42.03 - 0 (4)	TP60x49.1184x0.4375	48.97	0.00	0.0	39.0	82.7100	-58733.50	3225690.00	0.018

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	175 - 128.66 (1)	TP33.29x23x0.25	273	-16.3	39.0	0.418	0	0.0	39.0	0.000
L2	128.66 - 85.09 (2)	TP42.47x31.7508x0.3125	1130	-33.2	39.0	0.851	0	0.0	39.0	0.000
L3	85.09 - 42.03 (3)	TP51.41x40.552x0.375	2246	-37.4	39.0	0.960	0	0.0	39.0	0.000
L4	42.03 - 0 (4)	TP60x49.1184x0.4375	3724	-36.7	39.0	0.942	0	0.0	39.0	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	175 - 128.66 (1)	TP33.29x23x0.25	0.014	0.418	0.000	0.432 ✔	1.333	H1-3 ✔
L2	128.66 - 85.09 (2)	TP42.47x31.7508x0.3125	0.020	0.851	0.000	0.871 ✔	1.333	H1-3 ✔
L3	85.09 - 42.03 (3)	TP51.41x40.552x0.375	0.018	0.960	0.000	0.979 ✔	1.333	H1-3 ✔
L4	42.03 - 0 (4)	TP60x49.1184x0.4375	0.018	0.942	0.000	0.960 ✔	1.333	H1-3 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	175 - 128.66	Pole	TP33.29x23x0.25	1	-13526.80	1320085.84	32.4	Pass
L2	128.66 - 85.09	Pole	TP42.47x31.7508x0.3125	2	-31172.90	2107166.32	65.3	Pass
L3	85.09 - 42.03	Pole	TP51.41x40.552x0.375	3	-42003.20	3062527.38	73.4	Pass
L4	42.03 - 0	Pole	TP60x49.1184x0.4375	4	-58733.50	4299844.59	72.0	Pass
							Summary	
						Pole (L3)	73.4	Pass
						Base Plate	79.4	Pass
						RATING =	**79.4**	**Pass**

tnxTower	Job	Page
EBI Consulting 21 B Street Burlington, MA Phone: 781.273.2500 FAX: 781.273.3311	175 ft MONOPOLE	21 of 21
	Project CT11506A_CT506 Willimantic ECSU	Date 14:32:14 02/17/15
Program Version 6.1.4.1 - 12/17/2013 File:C:/Users/rapted/Desktop/1_Jobs/9_81150121_CT11506A_Monopole/2_TNX/CT11506A_CT506 Willimantic ECSU.eri	Client T-Mobile	Designed by

EXHIBIT C

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CT11506A

CT506 / Willimantic ECSU
83 Windham Street
Willimantic, CT 06226

March 9, 2015

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	94.11 %

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

EBI Consulting
environmental | engineering | due diligence

March 9, 2015

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

Emissions Analysis for Site: **CT11506A – CT506 / Willimantic ECSU**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **83 Windham Street, Willimantic, 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 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 **83 Windham Street, Willimantic, 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 GSM 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 AIR21 (B4A/B2P & 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 & B2A/B4P)** have a maximum gain of **15.9 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 **117 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.

EBI Consulting
environmental | engineering | due diligence

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):	117	Height (AGL):	117	Height (AGL):	117
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	# PCS Channels:	2
Total TX Power:	120	Total TX Power:	120	# AWS Channels:	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A1 MPE%	1.36	Antenna B1 MPE%	1.36	Antenna C1 MPE%	1.36
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):	117	Height (AGL):	117	Height (AGL):	117
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	4	Channel Count	4	Channel Count	4
Total TX Power:	120	Total TX Power:	120	Total TX Power:	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A2 MPE%	1.36	Antenna B2 MPE%	1.36	Antenna C2 MPE%	1.36
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):	117	Height (AGL):	117	Height (AGL):	117
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 A3 MPE%	0.54	Antenna B3 MPE%	0.54	Antenna C3 MPE%	0.54

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**9.79**
ECSU	Receive Only
FM Broadcast	52.80 %
UHP Whip	0.17 %
Parabolic dish	0.06 %
VHF Whip	0.45 %
CPTV Microwave	0.90 %
Sprint	6.91 %
AT&T	18.31 %
Nextel	4.72 %
Site Total MPE %:	**94.11 %**

T-Mobile Sector 1 Total:	3.26 %
T-Mobile Sector 2 Total:	3.26 %
T-Mobile Sector 3 Total:	3.26 %
Site Total:	94.11 %

EBI Consulting
environmental | engineering | due diligence

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:	3.26 %
Sector 2:	3.26 %
Sector 3 :	3.26 %
T-Mobile Total:	9.79 %
Site Total:	94.11 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **94.11%** 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