

RACHEL A. SCHWARTZMAN

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September 8, 2014

Attorney Melanie Bachman
Acting Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06501

**Re: Notice of Exempt Modification
Town of Orange/T-Mobile co-location
Site ID CT11720A
26 South Orange Center Road, Orange CT**

Dear Ms. Bachman:

This office represents T-Mobile Northeast LLC ("T-Mobile") and MetroPCS Massachusetts, LLC, a Delaware limited liability company ("MetroPCS"), and has been retained to file exempt modification filings with the Connecticut Siting Council on its behalf.

In this case, the Town of Orange owns the existing monopole telecommunications tower and related facility at 26 South Orange Center Road, Orange Connecticut (latitude 41.25572, longitude -73.0182). T-Mobile intends to install three (3) antennas, remove three (3) existing MetroPCS antennas, and install related equipment at this existing facility in Orange ("Orange 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 being sent to the First Selectman, James Zeoli and property owner, the Town of Orange.

The existing Orange Facility consists of a 180-foot monopole tower.¹ T-Mobile plans to install three (3) antennas on low-profile platforms at a centerline of 150 feet and remove three existing (3) MetroPCS antennas at a centerline of 170 feet. T-Mobile will also install telecommunications poles, install three (3) remote radio units at the 150-foot centerline, and install an equipment cabinet on an H-frame near the base of the tower (See the plans dated September 8, 2014 attached hereto as **Exhibit A**). The existing tower is structurally capable of supporting T-Mobile' proposed use, as indicated in the structural analysis dated September 3, 2014 and attached hereto as **Exhibit B**.

¹ While the online docket for the Connecticut Siting Council does not provide a docket or petition number for approval of this structure, it does reference this structure in connection with notices of intent captioned EM-T-MOBILE-107-120614B and EM-T-MOBILE-107-081218.

September 8, 2014
CT11720A
Page 2

The planned modifications to the Orange Facility fall squarely within those activities 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 replacement antennas will be installed at the 150 foot level. The enclosed tower drawing confirms that the proposed modification will not increase the height of the tower.

2 . The installation of the T-Mobile replacement equipment in the existing compound, as reflected on the attached site plan, will not require an extension of the site boundaries. T-Mobile's proposed equipment will be located entirely within the existing compound area.

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

4 . The operation of the replacement 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 RF Exposure Analysis prepared by EBI dated September 4, 2014 T-Mobile's operations would add 5.82% 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 53.65% 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 replacement antennas and equipment at the Orange Facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,



Rachel A. Schwartzman, Esq.

cc: First Selectman James Zeoli, Town of Orange
Sheldon J. Freinle, Northeast Site Solutions

EXHIBIT A



KEY PLAN
N.T.S.

1
LE1

CONFIGURATION

702CU

SUBMITTALS

LE REV A	07.31.14
LE REV 0	08.01.14
LE REV 1	09.08.14

ATLANTIS GROUP
1340 Centre Street
Suite 212
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

LEASE EXHIBIT

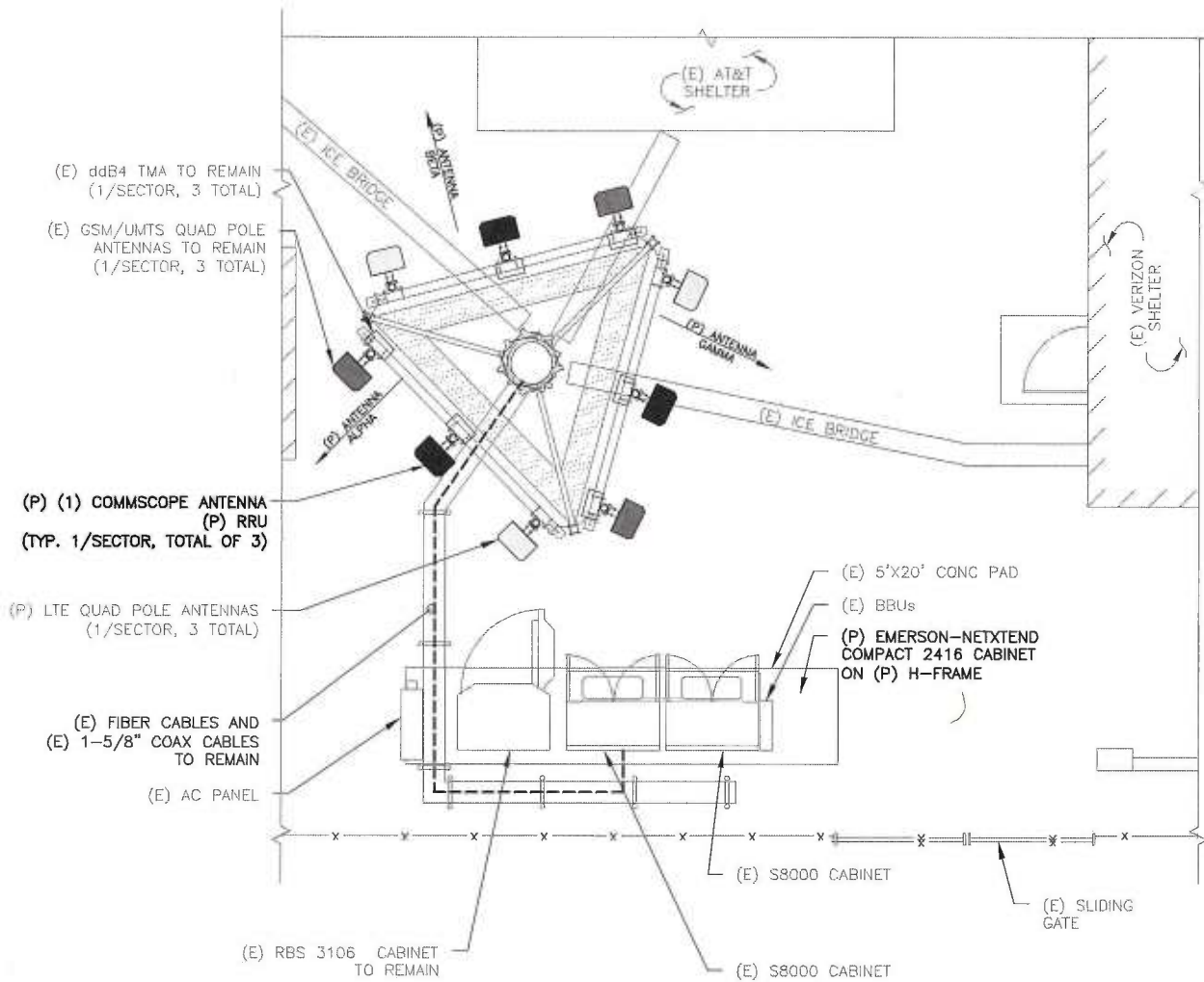
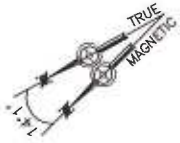
SITE NUMBER:
CT11720A
SITE NAME:
CT720/TOWN OF ORANGE_MP
SITE ADDRESS:
26 SO. ORANGE CENTER ROAD
ORANGE, CT 06477

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237
FOR
T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX: (860) 692-7159

DRAWN BY: MB

CHECKED BY: SM

PAGE 1 OF 4



ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE'S STRUCTURAL & RF ENGINEERS. LOCATIONS OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITY COMPANIES.

COMPOUND PLAN

N.T.S.

1
LE-2

CONFIGURATION

702CU

SUBMITTALS

LE REV A	07.31.14
LE REV 0	08.01.14
LE REV 1	09.08.14

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LEASE EXHIBIT

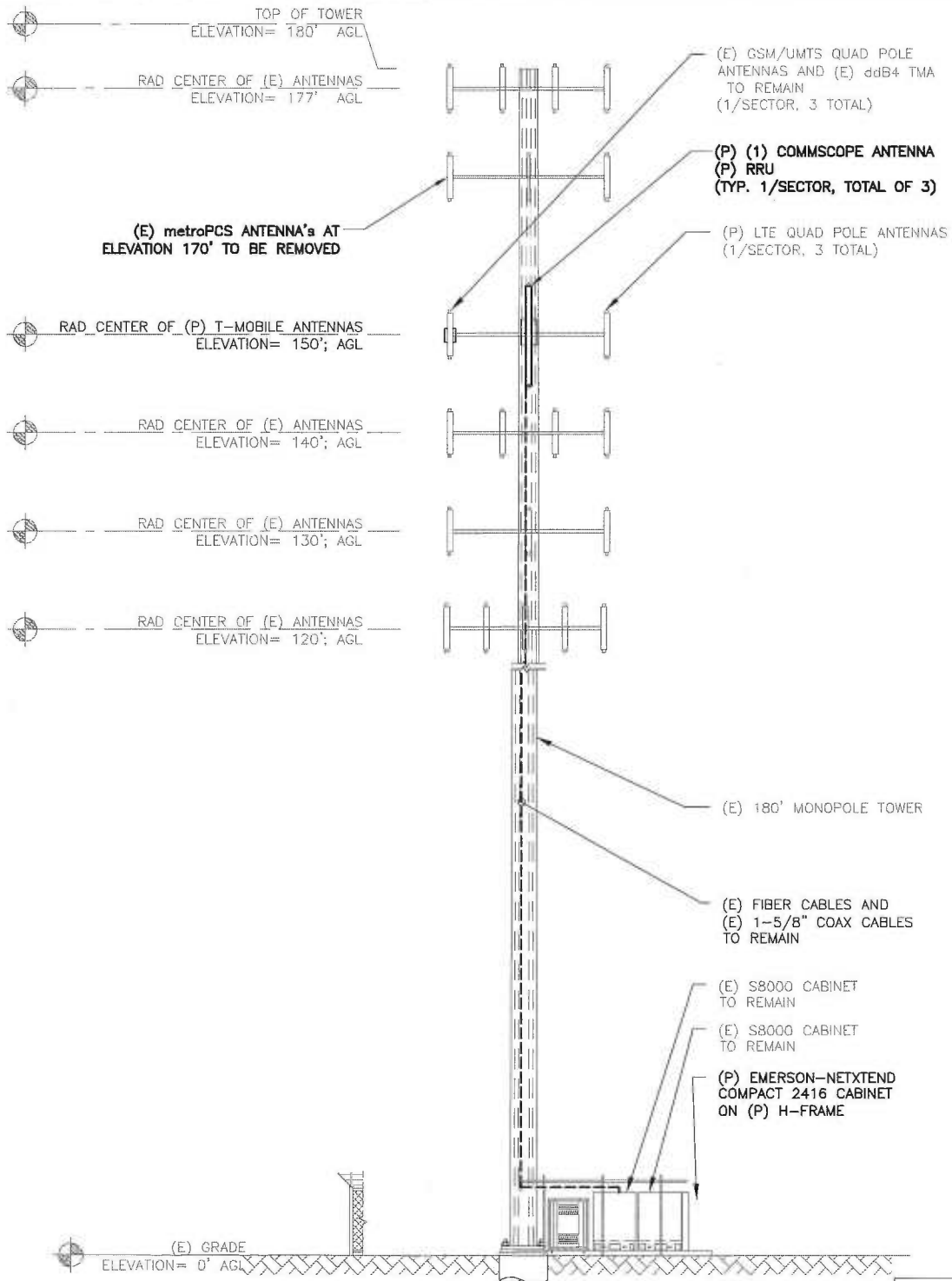
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EAST ELEVATION
N.T.S

1
LE-3

CONFIGURATION

702CU

SUBMITTALS

LE REV A	07.31.14
LE REV 0	08.01.14
LE REV 1	09.08.14

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PAGE 3 OF 3

EXHIBIT B

STRUCTURAL ANALYSIS REPORT – REVISION 2
MONOPOLE



Prepared For:

T-Mobile
35 Griffin Road South
Bloomfield, CT 06002



Monopole Rating

Monopole: Pass (99.3 %)

Foundation: Pass

Sincerely,
Atlantis Group, Inc.
9-3-2014



Ahmet Colakoglu, PE
CT Professional Engineer
License No: 27057

T-Mobile Site ID: CT11720A
T-Mobile Site Name: CT720/Town of Orange_MP
26 South Orange Center Road,
Orange, CT 06477

September 3, 2014

Prepared By:

Atlantis Group, Inc.

1340 Centre Street, Suite 212

Newton, Massachusetts 02459

Phone: 617-965-0789, Fax: 617-213-5056

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1.0 SUBJECT AND REFERENCES

The purpose of this analysis is to evaluate the structural capacity of the existing 180 feet high monopole located at 26 South Orange Center Road, Orange, CT 06477, for the addition and alteration of wireless telecommunication appurtenances proposed by T-Mobile.

The structural analysis is based on the following documentation:

- Lease Exhibit for Site Number CT11720A prepared by the Atlantis Group, dated August 1, 2014.
- Structural Analysis Report prepared by the Atlantis Group for T-Mobile Site ID CT11720A dated April 18, 2014.
- Monopole Structural Analysis Report prepared by Bay State Design, Inc., dated 12/12/2008, which includes a prior analysis by PJF.
- Antenna information provided by T-Mobile.

1.1 STRUCTURE

The monopole is formed by the following sections:

Section Length (ft)	Lap Splice (in)	Shaft Thickness (in)	Top Dia/Bottom Dia (in/in)	Steel Yield Strength (ksi)
12.84	41	0.1875	24.0000/26.2500	65
52.75	57	0.2500	25.2757/36.5250	65
54.00	72	0.3125	35.0120/46.3570	65
54.56	79	0.3750	44.4714/55.7650	65
26.58		0.4375	53.6571/64.7500	65

- The pole is 18-sided and connected to the foundation with anchor bolts and a base plate.

2.0 EXISTING AND PROPOSED APPURTENANCES

The analysis is based on the following existing and proposed appurtenances:

Existing Configuration of T-MOBILE Appurtenances:

Rad Center (ft)	Antenna & TMA		Mount	Coax
150	GSM/UMTS LTE QUAD POLE LTE QUAD POLE TMA	(3) AIR21 B2A/B4P (3) AIR21 B4A/B2P (3) dd B4	Low Profile Platform	(12) 1 5/8" (1) 1 5/8" Fiber Lines Inside Shaft

Proposed Configuration of T-MOBILE Appurtenances:

Rad Center (ft)	Antenna & TMA		Mount	Coax
150	GSM/UMTS LTE QUAD POLE LTE QUAD POLE LTE DUAL POLE TMA RRU	(3) AIR21 B2A/B4P (3) AIR21 B4A/B2P (3) LNX-6515DS-VTM (3) dd B4 (3) RRUS11_B12	Low Profile Platform	(12) 1 5/8" (1) 1 5/8" Fiber Lines Inside Shaft

Existing Appurtenances by Others

CARRIER	RAD CENTER (FT)	ANTENNA & TMA	COAX	MOUNT
AT&T	180	(6) EMSRR90-17-02DP (3) 776QNB120EXM	(24) 1 5/8" (3) 1 1/2" Inside Shaft	Low Profile Platform
Metro PCS	170	*(3) Panel Antennas	*(6) 1 5/8" Inside Shaft	*(3) Flush Mounts
Nextel	139	(12) DB844H80-XY	(12) 1 5/8" Inside Shaft	Low Profile Platform
Sprint	130	(12) DB983H65A-M	(12) 1 5/8" Inside Shaft	Low Profile Platform
Verizon	119	(12) DB846H90-SX	(12) 1 5/8" Inside Shaft	Low Profile Platform

*To be removed.

3.0 CODES AND LOADING

The monopole was analyzed per ANSI/TIA/EIA-222-F-1996 as referenced by 2005 Connecticut Building Code (based on IBC 2003). The following wind loading was used in compliance with the standard for New Haven County.

- Basic wind speed 85 mph (W) without ice.
- Basic wind speed 74 mph (W_i) with 1/2" radial ice.

The following load combinations were used with wind blowing at 0° , 60° and 90° , measured from a line normal to the face of the tower.

- $D + W$
- $D + W_i + I$

D: Dead Load W: Wind Load, without ice
W_i: Wind Load with ice I: Ice Gravity Load

4.0 STANDARD CONDITIONS FOR ENGINEERING SERVICES ON EXISTING STRUCTURES

The analysis is based on the information provided to Atlantis Group and is assumed to be current and correct. Unless otherwise noted, the structure is assumed to be in good condition, free of defects and can achieve theoretical strength.

It is assumed that the structure has been maintained and shall be maintained during its service. The superstructure and the foundation system are assumed to be designed with proper engineering practice and fabricated, constructed and erected in accordance with the design documents. Atlantis Group will accept no liability which may arise due to any existing deficiency in design, material, fabrication, erection, construction, etc. or lack of maintenance.

The analysis does not include a qualification of the mounts attached on the structure or their connections. The analysis is performed to verify the capacity of the main structural members, which is the current practice in the tower industry.

The analysis results presented in this report are only applicable for the previously mentioned existing and proposed appurtenances. Any deviation of the appurtenances and appurtenance placement will require Atlantis Group to generate an additional structural analysis. Additionally, the proposed linear appurtenances should be placed per recommendations of this report.

5.0 ANALYSIS and ASSUMPTIONS

The tower was analyzed by utilizing Risa-Tower, a non-linear 3-Dimensional finite element software, a product of Tower Numerics, Inc. Software output for this analysis is provided in Appendix-A of this report.

6.0 RESULTS AND CONCLUSION

The existing monopole is found to have **adequate** structural capacity for the proposed changes by T-Mobile. For the aforementioned load combinations, the second shaft from the ground level is stressed to **99.3%** of capacity as a maximum. Anchor bolts and base plate are stressed to maximum **86.9%** usage of capacity. Monopole foundation (caisson) is also found to have adequate structural capacity using Brom's method.

Therefore, the proposed additions and alterations by T-Mobile can be implemented as intended and with the conditions outlined in this report.

Reactions Comparison

Reactions	Analysis Reactions	Previous Atlantis Analysis Reactions	PJF Analysis Reactions
Base Shear (kips)	38.0	38.2	33
Base Moment (kip-ft)	4637	4596	3888

Should you need any clarifications or have any questions about this letter, please contact me at (617) 965-0789.

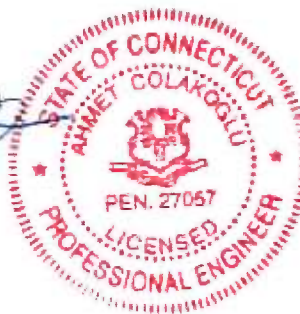
Sincerely,

Atlantis Group

9-3-2014



Ahmet Colakoglu, PE
Connecticut Professional Engineer
License No: 27057



APPENDIX A

SOFTWARE OUTPUT

tnxTower Atlantis Group, Inc. 1340 Centre Street, Suite 212 Newton, Massachusetts 02459 Phone: (617) 695-0789 FAX: (617) 213-5056	Job	010170080 - 028	Page	1 of 12
	Project	CT11720A	Date	09:26:46 09/03/14
	Client	T-Mobile	Designed by	Ahmet Colakoglu

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 New Haven 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 50 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.

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	180.00-167.16	12.84	3.42	18	24.0000	26.2500	0.1875	0.7500	A572-65 (65 ksi)
L2	167.16-117.83	52.75	4.75	18	25.2757	36.5250	0.2500	1.0000	A572-65 (65 ksi)
L3	117.83-68.58	54.00	6.00	18	35.0120	46.3570	0.3125	1.2500	A572-65 (65 ksi)
L4	68.58-20.02	54.56	6.56	18	44.4714	55.7650	0.3750	1.5000	A572-65 (65 ksi)
L5	20.02-0.00	26.58		18	53.6571	64.7500	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	24.3702	14.1714	1015.2211	8.4534	12.1920	83.2694	2031.7780	7.0871	3.8940	20.768
	26.6549	15.5104	1331.0484	9.2522	13.3350	99.8162	2663.8483	7.7567	4.2900	22.88
L2	26.4062	19.8579	1571.2422	8.8841	12.8401	122.3704	3144.5519	9.9308	4.0085	16.034
	37.0885	28.7842	4785.2722	12.8776	18.5547	257.9008	9576.8409	14.3948	5.9884	23.954
L3	36.5655	34.4176	5235.5845	12.3183	17.7861	294.3636	10478.0581	17.2121	5.6121	17.959
	47.0721	45.6704	12232.8508	16.3458	23.5494	519.4559	24481.7979	22.8395	7.6088	24.348
L4	46.4186	52.4858	12893.9643	15.6542	22.5915	570.7442	25804.8949	26.2479	7.1670	19.112
	56.6253	65.9279	25554.6382	19.6635	28.3286	902.0785	51142.9018	32.9702	9.1546	24.412
L5	57.2649	73.9021	26444.6507	18.8930	27.2578	970.1675	52924.0980	36.9581	8.6737	19.825
	65.7489	89.3059	46666.8628	22.8309	32.8930	1418.7475	93395.1311	44.6615	10.6260	24.288

tnxTower Atlantis Group, Inc. 1340 Centre Street, Suite 212 Newton, Massachusetts 02459 Phone: (617) 695-0789 FAX: (617) 213-5056	Job	010170080 - 028	Page	2 of 12
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	Client	T-Mobile	Designed by	Ahmet Colakoglu

Tower Elevation	Gusset Area (per face)	Gusset Thickness	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
ft	ft ²	in						
L1 180.00-167.16				1	1	1		
L2 167.16-117.83				1	1	1		
L3 117.83-68.58				1	1	1		
L4 68.58-20.02				1	1	1		
L5 20.02-0.00				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	20
Embedment length	80.0000 in
f_c	3 ksi
Grout space	1.5000 in
Base plate grade	A633-60
Base plate thickness	2.7500 in
Bolt circle diameter	72.0000 in
Outer diameter	77.2500 in
Inner diameter	50.0000 in
Base plate type	Plain Plate

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		$C_A A_A$ ft ² /ft	Weight plf
AVA7-50 (1-5/8 LOW DENSI. FOAM) (AT&T)	A	No	Inside Pole	177.50 - 0.00	24	No Ice 1/2" Ice	0.00 0.00	0.72 0.72
LDF4RN-50A (1/2 FOAM) (AT&T)	A	No	Inside Pole	177.50 - 0.00	3	No Ice 1/2" Ice	0.00 0.00	0.15 0.15
AVA7-50 (1-5/8 LOW DENSI. FOAM) (T-Mobile)	A	No	Inside Pole	148.00 - 0.00	12	No Ice 1/2" Ice	0.00 0.00	0.72 0.72
AVA7-50 (1-5/8 LOW DENSI. FOAM) (Nextel)	A	No	Inside Pole	137.00 - 0.00	12	No Ice 1/2" Ice	0.00 0.00	0.72 0.72
AVA7-50 (1-5/8 LOW DENSI. FOAM) (Sprint)	A	No	Inside Pole	128.00 - 0.00	12	No Ice 1/2" Ice	0.00 0.00	0.72 0.72
AVA7-50 (1-5/8 LOW DENSI. FOAM) (Verizon)	A	No	Inside Pole	117.00 - 0.00	12	No Ice 1/2" Ice	0.00 0.00	0.72 0.72
Fiber Bundle	C	No	Inside Pole	150.00 - 0.00	1	No Ice 1/2" Ice	0.00 0.00	0.62 0.62

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Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight lb
L1	180.00-167.16	A	0.000	0.000	0.000	0.000	183.33
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	167.16-117.83	A	0.000	0.000	0.000	0.000	1388.79
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	19.95
L3	117.83-68.58	A	0.000	0.000	0.000	0.000	2568.11
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	30.54
L4	68.58-20.02	A	0.000	0.000	0.000	0.000	2539.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	30.11
L5	20.02-0.00	A	0.000	0.000	0.000	0.000	1046.85
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	12.41

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	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight lb
L1	180.00-167.16	A	0.500	0.000	0.000	0.000	0.000	183.33
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	167.16-117.83	A	0.500	0.000	0.000	0.000	0.000	1388.79
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	19.95
L3	117.83-68.58	A	0.500	0.000	0.000	0.000	0.000	2568.11
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	30.54
L4	68.58-20.02	A	0.500	0.000	0.000	0.000	0.000	2539.20
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	30.11
L5	20.02-0.00	A	0.500	0.000	0.000	0.000	0.000	1046.85
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	12.41

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	180.00-167.16	0.0000	0.0000	0.0000	0.0000
L2	167.16-117.83	0.0000	0.0000	0.0000	0.0000
L3	117.83-68.58	0.0000	0.0000	0.0000	0.0000
L4	68.58-20.02	0.0000	0.0000	0.0000	0.0000
L5	20.02-0.00	0.0000	0.0000	0.0000	0.0000

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Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight lb
(3) RR90-17-02DP w/Mount Pipe (AT&T)	A	From Leg	3.00 0.00 0.00	0.0000	180.00 - 177.75	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	43.55 84.46
(3) RR90-17-02DP w/Mount Pipe (AT&T)	B	From Leg	3.00 0.00 0.00	0.0000	180.00 - 177.75	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	43.55 84.46
(3) 776QNB120EXM w/Mount Pipe (AT&T)	C	From Leg	3.00 0.00 0.00	0.0000	180.00 - 177.75	No Ice 1/2" Ice	16.90 18.00	7.24 8.42	135.55 267.07
(4) DB844H80-XY w/Mount Pipe (Nextel)	A	From Leg	3.00 0.00 0.00	0.0000	139.00 - 137.00	No Ice 1/2" Ice	3.58 4.20	5.63 6.73	35.55 80.31
(4) DB844H80-XY w/Mount Pipe (Nextel)	B	From Leg	3.00 0.00 0.00	0.0000	139.00 - 137.00	No Ice 1/2" Ice	3.58 4.20	5.63 6.73	35.55 80.31
(4) DB844H80-XY w/Mount Pipe (Nextel)	C	From Leg	3.00 0.00 0.00	0.0000	139.00 - 137.00	No Ice 1/2" Ice	3.58 4.20	5.63 6.73	35.55 80.31
(4) DB983H65A-M w/Mount Pipe (Sprint)	A	From Leg	3.00 0.00 0.00	0.0000	130.00 - 128.00	No Ice 1/2" Ice	5.43 5.96	4.72 6.08	37.55 82.18
(4) DB983H65A-M w/Mount Pipe (Sprint)	B	From Leg	3.00 0.00 0.00	0.0000	130.00 - 128.00	No Ice 1/2" Ice	5.43 5.96	4.72 6.08	37.55 82.18
(4) DB983H65A-M w/Mount Pipe (Sprint)	C	From Leg	3.00 0.00 0.00	0.0000	130.00 - 128.00	No Ice 1/2" Ice	5.43 5.96	4.72 6.08	37.55 82.18
(4) DB846H90E-SX w/Mount Pipe (Verizon)	A	From Leg	3.00 0.00 0.00	0.0000	119.00 - 117.00	No Ice 1/2" Ice	5.23 5.78	7.53 8.72	40.55 97.40
(4) DB846H90E-SX w/Mount Pipe (Verizon)	B	From Leg	3.00 0.00 0.00	0.0000	119.00 - 117.00	No Ice 1/2" Ice	5.23 5.78	7.53 8.72	40.55 97.40
(4) DB846H90E-SX w/Mount Pipe (Verizon)	C	From Leg	3.00 0.00 0.00	0.0000	119.00 - 117.00	No Ice 1/2" Ice	5.23 5.78	7.53 8.72	40.55 97.40
PiROD 13' Low Profile Platform (ATT)	C	None		0.0000	177.75	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
PiROD 13' Low Profile Platform (Nextel)	C	None		0.0000	137.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
PiROD 13' Low Profile Platform (Sprint)	C	None		0.0000	128.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
PiROD 13' Low Profile Platform (Verizon)	C	None		0.0000	117.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00

AIR21 B4A/B2P with pipe (T-Mobile)	A	From Leg	3.00 4.00	0.0000	150.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	126.90 184.69

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight lb
AIR21 B4A/B2P with pipe (T-Mobile)	B	From Leg	0.00 3.00 4.00 0.00	0.0000	150.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	126.90 184.69
AIR21 B4A/B2P with pipe (T-Mobile)	C	From Leg	0.00 3.00 4.00 0.00	0.0000	150.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	126.90 184.69
AIR21 B2A/B4P with pipe (T-Mobile)	A	From Leg	0.00 3.00 -4.00 0.00	0.0000	150.00	No Ice 1/2" Ice	6.87 7.38	6.29 7.05	134.62 201.01
AIR21 B2A/B4P with pipe (T-Mobile)	B	From Leg	0.00 3.00 -4.00 0.00	0.0000	150.00	No Ice 1/2" Ice	6.87 7.38	6.29 7.05	134.62 201.01
AIR21 B2A/B4P with pipe (T-Mobile)	C	From Leg	0.00 3.00 -4.00 0.00	0.0000	150.00	No Ice 1/2" Ice	6.87 7.38	6.29 7.05	134.62 201.01
TMA (T-Mobile)	A	From Leg	0.00 3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	0.56 0.66	0.00 0.00	11.00 15.18
TMA (T-Mobile)	B	From Leg	0.00 3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	0.56 0.66	0.00 0.00	11.00 15.18
TMA (T-Mobile)	C	From Leg	0.00 3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	0.56 0.66	0.00 0.00	11.00 15.18
LNx-6515DS-VTM w/ Mount Pipe (T-Mobile)	A	From Leg	0.00 3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	11.68 12.40	9.84 11.37	83.27 172.93
LNx-6515DS-VTM w/ Mount Pipe (T-Mobile)	B	From Leg	0.00 3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	11.68 12.40	9.84 11.37	83.27 172.93
LNx-6515DS-VTM w/ Mount Pipe (T-Mobile)	C	From Leg	0.00 3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	11.68 12.40	9.84 11.37	83.27 172.93
RRUS 11 B12 (T-Mobile)	A	From Leg	0.00 3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	3.31 3.55	0.00 0.00	50.70 71.57
RRUS 11 B12 (T-Mobile)	B	From Leg	0.00 3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	3.31 3.55	0.00 0.00	50.70 71.57
RRUS 11 B12 (T-Mobile)	C	From Leg	0.00 3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	3.31 3.55	0.00 0.00	50.70 71.57
PIROD 13' Low Profile Platform (T-Mobile)	C	None	0.00	0.0000	150.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00

Load Combinations

Comb. No.	Description
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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
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 lb-ft	Minor Axis Moment lb-ft
L1	180 - 167.16	Pole	Max Tension	5	0.04	0.44	-1.26
			Max. Compression	14	-3824.70	1908.60	-1101.93
			Max. Mx	11	-2063.65	39844.12	-5095.13
			Max. My	8	-2148.99	5435.19	-34115.05
			Max. Vy	11	-5116.71	39844.12	-5095.13
			Max. Vx	2	-4472.92	-3853.37	32996.82
			Max. Torque	13			2188.50
			Max Tension	1	0.00	0.00	0.00
L2	167.16 - 117.83	Pole	Max. Compression	14	-19328.73	1957.58	-1130.21
			Max. Mx	11	-12250.60	585984.09	-32680.76
			Max. My	8	-12365.82	33067.47	-548652.48
			Max. Vy	11	-21076.46	585984.09	-32680.76
			Max. Vx	8	20403.87	33067.47	-548652.48
			Max. Torque	13			2188.37

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L3	117.83 - 68.58	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-33463.97	1930.32	-1114.47
			Max. Mx	11	-23832.30	1978504.16	-60980.65
			Max. My	8	-23909.44	61412.93	-1908721.54
			Max. Vy	11	-31773.39	1978504.16	-60980.65
			Max. Vx	8	31101.45	61412.93	-1908721.54
			Max. Torque	13			2185.04
			Max Tension	1	0.00	0.00	0.00
L4	68.58 - 20.02	Pole	Max. Compression	14	-47942.72	1899.74	-1096.81
			Max. Mx	11	-37859.35	3600552.03	-88638.86
			Max. My	8	-37881.76	89084.49	-3498893.33
			Max. Vy	11	-35597.52	3600552.03	-88638.86
			Max. Vx	8	34945.61	89084.49	-3498893.33
			Max. Torque	13			2177.72
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-59163.11	1882.41	-1086.81
L5	20.02 - 0	Pole	Max. Mx	11	-48590.33	4574261.11	-103491.77
			Max. My	8	-48590.75	103936.73	-4455451.81
			Max. Vy	11	-37723.74	4574261.11	-103491.77
			Max. Vx	8	37085.95	103936.73	-4455451.81
			Max. Torque	13			2173.68
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-59163.11	1882.41	-1086.81
			Max. Mx	11	-48590.33	4574261.11	-103491.77

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	14	59163.11	-0.60	0.35
	Max. H _x	11	48600.07	37711.19	-552.06
	Max. H _z	2	48599.98	-552.00	37072.09
	Max. M _x	2	4454014.55	-552.00	37072.09
	Max. M _z	5	4571957.75	-37709.50	552.01
	Max. Torsion	13	2173.40	18378.11	31831.81
	Min. Vert	5	48599.96	-37709.50	552.01
	Min. H _x	5	48599.96	-37709.50	552.01
	Min. H _z	8	48600.08	552.06	-37073.72
	Min. M _x	8	-4455451.82	552.06	-37073.72
	Min. M _z	11	-4574261.12	37711.19	-552.06
	Min. Torsion	7	-2173.36	-18378.11	-31831.81

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x lb-ft	Overturning Moment, M _z lb-ft	Torque lb-ft
Dead Only	48600.17	0.09	-0.05	551.04	954.42	0.00
Dead+Wind 0 deg - No Ice	48599.98	552.00	-37072.09	-4454014.55	-101910.45	-1881.54

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Load Combination	Vertical lb	Shear _x lb	Shear _y lb	Overturning Moment, M _x lb-ft	Overturning Moment, M _y lb-ft	Torque lb-ft
Dead+Wind 30 deg - No Ice	48600.16	19334.36	-32383.91	-3908673.55	-2374839.70	-1084.74
Dead+Wind 60 deg - No Ice	48600.16	32936.00	-19015.61	-2315726.33	-4010954.78	-0.03
Dead+Wind 90 deg - No Ice	48599.96	37709.50	-552.01	-102320.43	-4571957.75	1084.76
Dead+Wind 120 deg - No Ice	48600.16	32383.90	18059.36	2138967.35	-3908649.20	1881.53
Dead+Wind 150 deg - No Ice	48600.16	18378.11	31831.81	3807502.97	-2196917.67	2173.36
Dead+Wind 180 deg - No Ice	48600.08	-552.06	37073.72	4455451.82	103936.59	1880.78
Dead+Wind 210 deg - No Ice	48600.16	-19334.36	32383.91	3909854.16	2376863.89	1084.86
Dead+Wind 240 deg - No Ice	48600.16	-32936.00	19015.61	2316900.09	4012987.78	-0.03
Dead+Wind 270 deg - No Ice	48600.07	-37711.19	552.06	103491.68	4574261.12	-1084.89
Dead+Wind 300 deg - No Ice	48600.16	-32383.90	-18059.36	-2137808.87	3910676.45	-1880.69
Dead+Wind 330 deg - No Ice	48600.16	-18378.11	-31831.81	-3806337.64	2198936.08	-2173.40
Dead+Ice+Temp	59163.11	0.60	-0.35	1086.81	1882.41	0.00
Dead+Wind 0 deg+Ice+Temp	59163.07	429.91	-30805.38	-3808326.46	-79367.47	-1465.45
Dead+Wind 30 deg+Ice+Temp	59163.10	16023.44	-26893.56	-3338522.84	-2020149.83	-845.57
Dead+Wind 60 deg+Ice+Temp	59163.10	27323.49	-15775.22	-1973936.75	-3418957.89	-0.02
Dead+Wind 90 deg+Ice+Temp	59163.06	31301.79	-429.91	-80236.29	-3901208.01	845.59
Dead+Wind 120 deg+Ice+Temp	59163.10	26893.56	15030.58	1835481.32	-3337887.13	1465.47
Dead+Wind 150 deg+Ice+Temp	59163.10	15278.79	26463.64	3259834.07	-1879297.17	1691.77
Dead+Wind 180 deg+Ice+Temp	59163.07	-429.91	30805.37	3810729.49	83519.78	1463.69
Dead+Wind 210 deg+Ice+Temp	59163.10	-16023.44	26893.56	3340926.91	2024303.54	844.24
Dead+Wind 240 deg+Ice+Temp	59163.10	-27323.49	15775.22	1976336.82	3423114.94	-0.02
Dead+Wind 270 deg+Ice+Temp	59163.06	-31301.79	429.91	82631.57	3905366.59	-844.24
Dead+Wind 300 deg+Ice+Temp	59163.10	-26893.56	-15030.58	-1833087.03	3342044.43	-1463.65
Dead+Wind 330 deg+Ice+Temp	59163.10	-15278.79	-26463.64	-3257435.78	1883451.14	-1691.81
Dead+Wind 0 deg - Service	48600.14	191.00	-12827.66	-1542612.95	-34649.58	-658.25
Dead+Wind 30 deg - Service	48600.14	6689.52	-11204.59	-1353684.41	-822060.89	-380.17
Dead+Wind 60 deg - Service	48600.14	11395.59	-6579.25	-801892.39	-1388917.65	-0.01
Dead+Wind 90 deg - Service	48600.14	13048.21	-191.00	-35083.13	-1583354.92	380.18
Dead+Wind 120 deg - Service	48600.14	11204.58	6248.42	741299.61	-1353267.04	658.26
Dead+Wind 150 deg - Service	48600.14	6358.70	11013.58	1319219.15	-760282.04	759.60
Dead+Wind 180 deg - Service	48600.14	-191.00	12827.66	1543800.40	36704.14	657.33
Dead+Wind 210 deg - Service	48600.14	-6689.52	11204.58	1354872.29	824116.19	379.27
Dead+Wind 240 deg - Service	48600.14	-11395.59	6579.25	803079.54	1390973.84	-0.01
Dead+Wind 270 deg - Service	48600.14	-13048.21	191.00	36269.13	1585411.30	-379.26
Dead+Wind 300 deg - Service	48600.14	-11204.58	-6248.42	-740114.04	1355322.68	-657.32
Dead+Wind 330 deg - Service	48600.14	-6358.69	-11013.58	-1318032.85	762336.77	-759.61

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-48600.17	0.00	-0.09	48600.17	0.05	0.000%
2	552.10	-48600.17	-37075.07	-552.00	48599.98	37072.09	0.005%
3	19334.42	-48600.17	-32384.00	-19334.36	48600.16	32383.91	0.000%
4	32936.10	-48600.17	-19015.67	-32936.00	48600.16	19015.61	0.000%
5	37712.58	-48600.17	-552.10	-37709.50	48599.96	552.01	0.005%
6	32384.00	-48600.17	18059.41	-32383.90	48600.16	-18059.36	0.000%
7	18378.16	-48600.17	31831.91	-18378.11	48600.16	-31831.81	0.000%
8	-552.10	-48600.17	37075.07	552.06	48600.08	-37073.72	0.002%
9	-19334.42	-48600.17	32384.00	19334.36	48600.16	-32383.91	0.000%
10	-32936.10	-48600.17	19015.67	32936.00	48600.16	-19015.61	0.000%
11	-37712.58	-48600.17	552.10	37711.19	48600.07	-552.06	0.002%
12	-32384.00	-48600.17	-18059.41	32383.90	48600.16	18059.36	0.000%
13	-18378.16	-48600.17	-31831.91	18378.11	48600.16	31831.81	0.000%
14	0.00	-59163.11	0.00	-0.60	59163.11	0.35	0.001%
15	429.92	-59163.11	-30805.90	-429.91	59163.07	30805.38	0.001%
16	16023.49	-59163.11	-26893.65	-16023.44	59163.10	26893.56	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
17	27323.58	-59163.11	-15775.27	-27323.49	59163.10	15775.22	0.000%
18	31302.33	-59163.11	-429.92	-31301.79	59163.06	429.91	0.001%
19	26893.65	-59163.11	15030.62	-26893.56	59163.10	-15030.58	0.000%
20	15278.84	-59163.11	26463.73	-15278.79	59163.10	-26463.64	0.000%
21	-429.92	-59163.11	30805.90	429.91	59163.07	-30805.37	0.001%
22	-16023.49	-59163.11	26893.65	16023.44	59163.10	-26893.56	0.000%
23	-27323.58	-59163.11	15775.27	27323.49	59163.10	-15775.22	0.000%
24	-31302.33	-59163.11	429.92	31301.79	59163.06	-429.91	0.001%
25	-26893.65	-59163.11	-15030.62	26893.56	59163.10	15030.58	0.000%
26	-15278.84	-59163.11	-26463.73	15278.79	59163.10	26463.64	0.000%
27	191.04	-48600.17	-12828.74	-191.00	48600.14	12827.66	0.002%
28	6690.11	-48600.17	-11205.54	-6689.52	48600.14	11204.59	0.002%
29	11396.57	-48600.17	-6579.82	-11395.59	48600.14	6579.25	0.002%
30	13049.34	-48600.17	-191.04	-13048.21	48600.14	191.00	0.002%
31	11205.54	-48600.17	6248.93	-11204.58	48600.14	-6248.42	0.002%
32	6359.22	-48600.17	11014.50	-6358.70	48600.14	-11013.58	0.002%
33	-191.04	-48600.17	12828.74	191.00	48600.14	-12827.66	0.002%
34	-6690.11	-48600.17	11205.54	6689.52	48600.14	-11204.58	0.002%
35	-11396.57	-48600.17	6579.82	11395.59	48600.14	-6579.25	0.002%
36	-13049.34	-48600.17	191.04	13048.21	48600.14	-191.00	0.002%
37	-11205.54	-48600.17	-6248.93	11204.58	48600.14	6248.42	0.002%
38	-6359.22	-48600.17	-11014.50	6358.69	48600.14	11013.58	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00006782	0.00007479
3	Yes	19	0.00000001	0.00009285
4	Yes	19	0.00000001	0.00009655
5	Yes	15	0.00006747	0.00008404
6	Yes	19	0.00000001	0.00008440
7	Yes	19	0.00000001	0.00007483
8	Yes	16	0.00003103	0.00013109
9	Yes	19	0.00000001	0.00009693
10	Yes	19	0.00000001	0.00009714
11	Yes	16	0.00003085	0.00010872
12	Yes	19	0.00000001	0.00007676
13	Yes	19	0.00000001	0.00008277
14	Yes	6	0.00000001	0.00001479
15	Yes	17	0.00002268	0.00008277
16	Yes	19	0.00000001	0.00010111
17	Yes	19	0.00000001	0.00010432
18	Yes	17	0.00002260	0.00008451
19	Yes	19	0.00000001	0.00009220
20	Yes	19	0.00000001	0.00008411
21	Yes	17	0.00002267	0.00009924
22	Yes	19	0.00000001	0.00010556
23	Yes	19	0.00000001	0.00010570
24	Yes	17	0.00002259	0.00009536
25	Yes	19	0.00000001	0.00008590
26	Yes	19	0.00000001	0.00009108
27	Yes	15	0.00007122	0.00003531
28	Yes	15	0.00007092	0.00009979
29	Yes	15	0.00007091	0.00010857

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30	Yes	15	0.00007119	0.00003289
31	Yes	15	0.00007101	0.00010305
32	Yes	15	0.00007101	0.00007474
33	Yes	15	0.00007121	0.00004313
34	Yes	15	0.00007091	0.00011405
35	Yes	15	0.00007090	0.00011082
36	Yes	15	0.00007118	0.00003860
37	Yes	15	0.00007100	0.00007736
38	Yes	15	0.00007101	0.00010117

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 167.16	44.237	35	2.0793	0.0093
L2	170.58 - 117.83	40.146	35	2.0629	0.0073
L3	122.58 - 68.58	20.870	35	1.6838	0.0025
L4	74.58 - 20.02	7.171	35	0.9685	0.0009
L5	26.58 - 0	0.781	35	0.2670	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	(3) RR90-17-02DP w/Mount Pipe	35	44.237	2.0793	0.0093	37912
178.88	(3) RR90-17-02DP w/Mount Pipe	35	43.747	2.0778	0.0090	37912
177.75	(3) RR90-17-02DP w/Mount Pipe	35	43.258	2.0762	0.0088	37912
150.00	AIR21 B4A/B2P with pipe	35	31.437	1.9593	0.0044	8133
139.00	(4) DB844H80-XY w/Mount Pipe	35	27.015	1.8656	0.0034	6168
138.00	(4) DB844H80-XY w/Mount Pipe	35	26.624	1.8559	0.0034	6036
137.00	(4) DB844H80-XY w/Mount Pipe	35	26.235	1.8460	0.0033	5909
130.00	(4) DB983H65A-M w/Mount Pipe	35	23.570	1.7717	0.0029	5150
129.00	(4) DB983H65A-M w/Mount Pipe	35	23.198	1.7604	0.0028	5057
128.00	(4) DB983H65A-M w/Mount Pipe	35	22.829	1.7489	0.0028	4967
119.00	(4) DB846H90E-SX w/Mount Pipe	35	19.619	1.6384	0.0024	4449
118.00	(4) DB846H90E-SX w/Mount Pipe	35	19.275	1.6253	0.0023	4426
117.00	(4) DB846H90E-SX w/Mount Pipe	35	18.935	1.6121	0.0023	4403

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 167.16	127.127	10	5.9718	0.0294
L2	170.58 - 117.83	115.408	10	5.9292	0.0241
L3	122.58 - 68.58	60.084	10	4.8488	0.0078
L4	74.58 - 20.02	20.669	10	2.7917	0.0026
L5	26.58 - 0	2.252	10	0.7702	0.0005

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Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
180.00	(3) RR90-17-02DP w/Mount Pipe	10	127.127	5.9718	0.0294	14197
178.88	(3) RR90-17-02DP w/Mount Pipe	10	125.725	5.9680	0.0287	14197
177.75	(3) RR90-17-02DP w/Mount Pipe	10	124.323	5.9641	0.0281	14197
150.00	AIR21 B4A/B2P with pipe	10	90.432	5.6374	0.0151	2920
139.00	(4) DB844H80-XY w/Mount Pipe	10	77.738	5.3699	0.0117	2198
138.00	(4) DB844H80-XY w/Mount Pipe	10	76.614	5.3421	0.0114	2149
137.00	(4) DB844H80-XY w/Mount Pipe	10	75.497	5.3138	0.0111	2103
130.00	(4) DB983H65A-M w/Mount Pipe	10	67.842	5.1009	0.0094	1827
129.00	(4) DB983H65A-M w/Mount Pipe	10	66.774	5.0685	0.0091	1793
128.00	(4) DB983H65A-M w/Mount Pipe	10	65.713	5.0356	0.0089	1761
119.00	(4) DB846H90E-SX w/Mount Pipe	10	56.487	4.7182	0.0071	1572
118.00	(4) DB846H90E-SX w/Mount Pipe	10	55.499	4.6807	0.0070	1563
117.00	(4) DB846H90E-SX w/Mount Pipe	10	54.520	4.6429	0.0068	1554

Base Plate Design Data

Plate Thickness	Number of Anchor Bolts	Anchor Bolt Size	Actual Allowable Ratio Bolt Tension	Actual Allowable Ratio Bolt Compression	Actual Allowable Ratio Plate Stress	Actual Allowable Ratio Stiffener Stress	Controlling Condition	Ratio
in		in	lb	lb	ksi	ksi		
2.7500	20	2.2500	152030.47	156889.49	44.364		Bolt T	1.16
			131210.58	217809.56	45.000			✓
			1.16	0.72	0.99			

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L _u	KI/r	F _a	A	Actual P	Allow. P _a	Ratio P
	ft		ft	ft		ksi	in ²	lb	lb	P _a
L1	180 - 167.16 (1)	TP26.25x24x0.1875	12.84	0.00	0.0	39.000	15.1538	-2021.02	590998.00	0.003
L2	167.16 - 117.83 (2)	TP36.525x25.2757x0.25	52.75	0.00	0.0	39.000	27.9804	-12192.90	1091240.00	0.011
L3	117.83 - 68.58 (3)	TP46.357x35.012x0.3125	54.00	0.00	0.0	39.000	44.4201	-23793.60	1732380.00	0.014
L4	68.58 - 20.02 (4)	TP55.765x44.4714x0.375	54.56	0.00	0.0	39.000	64.3117	-37848.20	2508160.00	0.015
L5	20.02 - 0 (5)	TP64.75x53.6571x0.4375	26.58	0.00	0.0	39.000	77.7038	-41460.90	3030450.00	0.014

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Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	180 - 167.16 (1)	TP26.25x24x0.1875	42656.4 2	-5.373	39.000	0.138	0.00	0.000	39.000	0.000
L2	167.16 - 117.83 (2)	TP36.525x25.2757x0.25	604628. 33	-29.779	39.000	0.764	0.00	0.000	39.000	0.000
L3	117.83 - 68.58 (3)	TP46.357x35.012x0.3125	2013433 33	-49.177	39.000	1.261	0.00	0.000	39.000	0.000
L4	68.58 - 20.02 (4)	TP55.765x44.4714x0.375	3651483 33	-51.055	39.000	1.309	0.00	0.000	39.000	0.000
L5	20.02 - 0 (5)	TP64.75x53.6571x0.4375	3888750 .00	-43.491	39.000	1.115	0.00	0.000	39.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio P P_a	Ratio f_{bx} F_{bx}	Ratio f_{by} F_{by}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	180 - 167.16 (1)	TP26.25x24x0.1875	0.003	0.138	0.000	0.141	1.333	HI-3 ✓
L2	167.16 - 117.83 (2)	TP36.525x25.2757x0.25	0.011	0.764	0.000	0.775	1.333	HI-3 ✓
L3	117.83 - 68.58 (3)	TP46.357x35.012x0.3125	0.014	1.261	0.000	1.275	1.333	HI-3 ✓
L4	68.58 - 20.02 (4)	TP55.765x44.4714x0.375	0.015	1.309	0.000	1.324	1.333	HI-3 ✓
L5	20.02 - 0 (5)	TP64.75x53.6571x0.4375	0.014	1.115	0.000	1.129	1.333	HI-3 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF* P_{allow} lb	% Capacity	Pass Fail
L1	180 - 167.16	Pole	TP26.25x24x0.1875	1	-2021.02	787800.30	10.6	Pass
L2	167.16 - 117.83	Pole	TP36.525x25.2757x0.25	2	-12192.90	1454622.86	58.1	Pass
L3	117.83 - 68.58	Pole	TP46.357x35.012x0.3125	3	-23793.60	2309262.44	95.6	Pass
L4	68.58 - 20.02	Pole	TP55.765x44.4714x0.375	4	-37848.20	3343377.14	99.3	Pass
L5	20.02 - 0	Pole	TP64.75x53.6571x0.4375	5	-41460.90	4039589.68	84.7	Pass
Summary								
Pole (L4)							99.3	Pass
Base Plate							86.9	Pass
RATING =							99.3	Pass

EXHIBIT C

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

T-Mobile Existing Facility

Site ID: CT11720A

Town of Orange Monopole
26 South Orange Center Road
Orange, CT 06477

September 4, 2014

EBI Project Number: 62144534

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	53.65 %

September 4, 2014

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

Emissions Analysis for Site: **CT11720A – Town of Orange Monopole**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **26 South Orange Center Road, Orange, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **26 South Orange Center Road, Orange, 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** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 B4A/B2P** has a maximum gain of **15.9 dBd** at its main lobe. 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 **150 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):	150	Height (AGL):	150	Height (AGL):	150
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):	1,906.06	ERP (W):	1,906.06	ERP (W):	1,906.06
Antenna A1 MPE%	0.81	Antenna B1 MPE%	0.81	Antenna C1 MPE%	0.81
Antenna #:	2	Antenna #:	2	Antenna #:	2
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):	150	Height (AGL):	150	Height (AGL):	150
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):	1,906.06	ERP (W):	1,906.06	ERP (W):	1,906.06
Antenna A2 MPE%	0.81	Antenna B2 MPE%	0.81	Antenna C2 MPE%	0.81
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):	150	Height (AGL):	150	Height (AGL):	150
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):	445.37	ERP (W):	445.37	ERP (W):	445.37
Antenna A3 MPE%	0.32	Antenna B3 MPE%	0.32	Antenna C3 MPE%	0.32

Site Composite MPE%	
Carrier	MPE%
T-Mobile	5.82
Sprint	7.67 %
Clearwire	1.15 %
AT&T	4.91 %
Verizon Wireless	30.05 %
Nextel	4.05 %
Site Total MPE %:	53.65 %

T-Mobile Sector 1 Total:	1.94 %
T-Mobile Sector 2 Total:	1.94 %
T-Mobile Sector 3 Total:	1.94 %
Site Total:	53.65 %

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:	1.94 %
Sector 2:	1.94 %
Sector 3 :	1.94 %
T-Mobile Total:	5.82 %
Site Total:	53.65 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **53.65%** 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

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