COHEN and WOLF P.C.
ATTORNEYS AT LAW

RACHEL A. SCHWARTZMAN

Please Reply To: Bridgeport
Writer's Direct Dial: (203) 337-4110
E-Mail: rschwartzman@cohenandwolf.com

September 22, 2014

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

Re: Notice of Exempt Modification
Town of Wethersfield/T-Mobile co-location
Site ID CTHA014A
23 Kelleher Court, Wethersfield, CT

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, the Town of Wethersfield owns the existing monopole telecommunications tower and related facility at 23 Kelleher Court in Wethersfield (41.715275/-72.690275). T-Mobile intends to add three (3) antennas and related equipment at this existing telecommunications facility in Wethersfield ("Wethersfield 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 Mayor Paul Montinieri, and the property owner, the Town of Wethersfield.

The existing Wethersfield Facility consists of a 180-foot monopole tower.[1] T-Mobile plans to add three (3) antennas, installed on existing empty pipe masts and mounted on existing t-arm mounts, at a centerline of 151 feet. T-Mobile will also install three remote radio units (RRUs) behind the proposed antennas. (See the plans revised to August 8, 2014, attached hereto as **Exhibit A**). The existing Wethersfield Facility is structurally capable of supporting T-Mobile's proposed modifications, as indicated in the structural analysis dated August 12, 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 a notices of intent captioned TS-AT&T–159-020823, EM-VER-159-021220, TS-SPRINT-159-030630, EM-VER-077-089-094-155-159-163-164-040129, TS-NEXTEL-159-050503, EM-CING-155-159-060616, TS-T-MOBILE-159-060817, EM-POCKET-159-081112, EM-T-MOBILE-159-090123, EM-CLEARWIRE-159-100507, EM-VER-159-100812, EM-VER-159-110907, EM-AT&T-159-120427, EM-SPRINT-159-121203, EM-METROPCS-159-130104MA, EM-VER-159-130909

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The planned modifications to the Wethersfield 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 existing antennas are at a centerline of 151 feet; the additional antennas will be installed at the same 151 foot level. 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 on the site boundaries or lease area, as depicted on Sheet 1 of Exhibit A. T-Mobile's 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 additional antennas and equipment 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 August 22, 2014, T-Mobile's operations would add 1.88% 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 70.92% 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 Wethersfield Facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Upon acknowledgement of this exempt modification, T-Mobile shall commence construction approximately sixty days from the receipt of the Council's decision.

Sincerely,

Rachel A. Schwartzman, Esq.

cc: Mayor Paul Montinieri, Town of Wethersfield
Town of Wethersfield
Jamie Ford, EBI Consulting

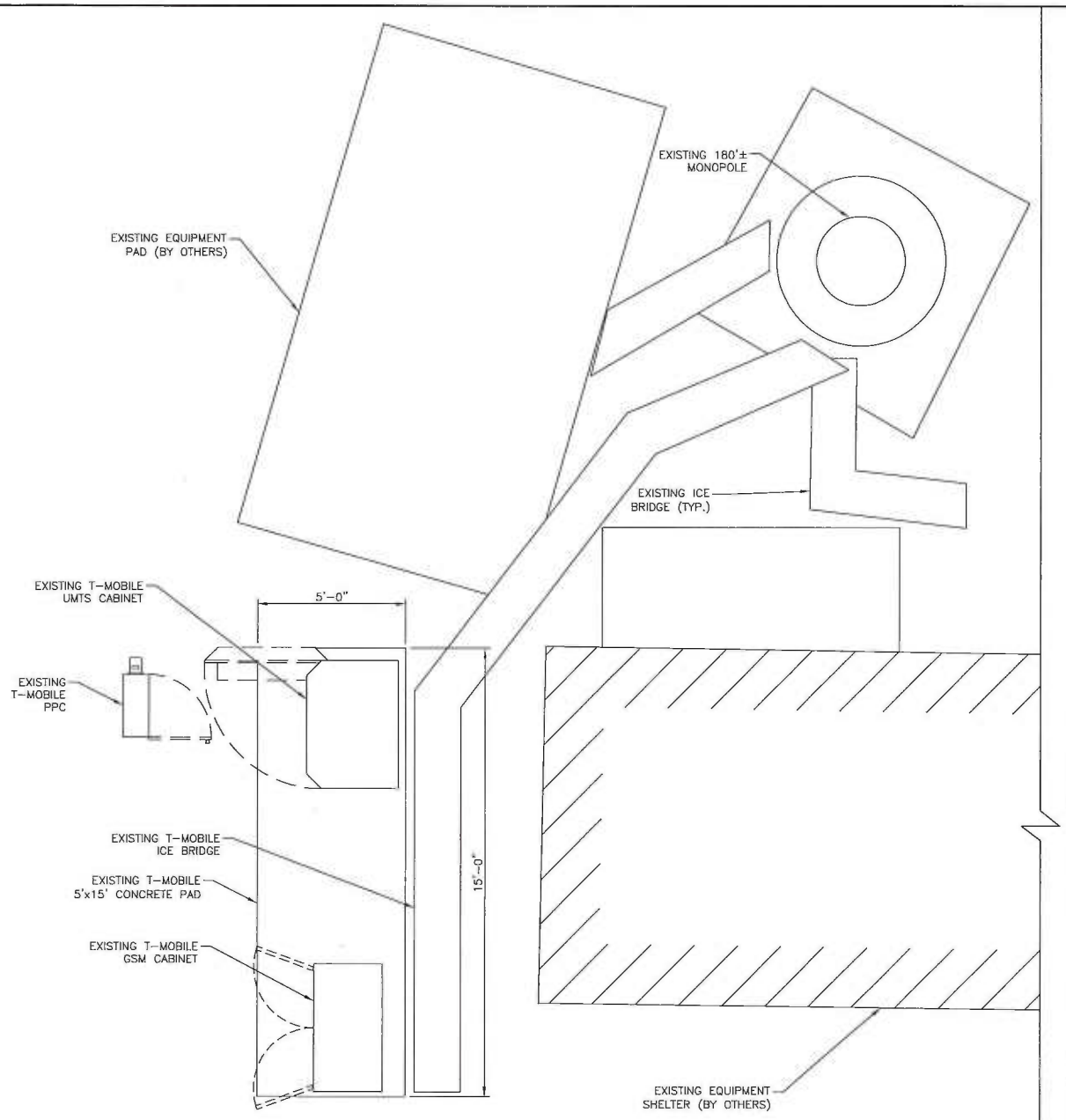
1115 Broad Street
P.O. Box 1821
Bridgeport, CT 06601-1821
Tel: (203) 368-0211
Fax: (203) 394-9901

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

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: 3/16" = 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.: 81140824

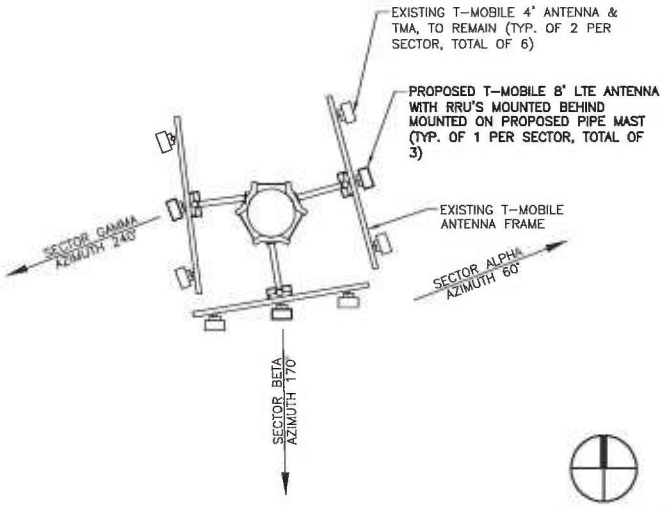
CLIENT:
T-Mobile Northeast, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860.692.7100

SITE INFO:
CTHA014A
HA014/ T OF WETHERSFIELD_MP
23 KELLEHER COURT
WETHERSFIELD, CT 06109

SUBMITTALS			
NO.	DATE	DESCRIPTION	BY
A	08/08/14	FOR REVIEW	JT

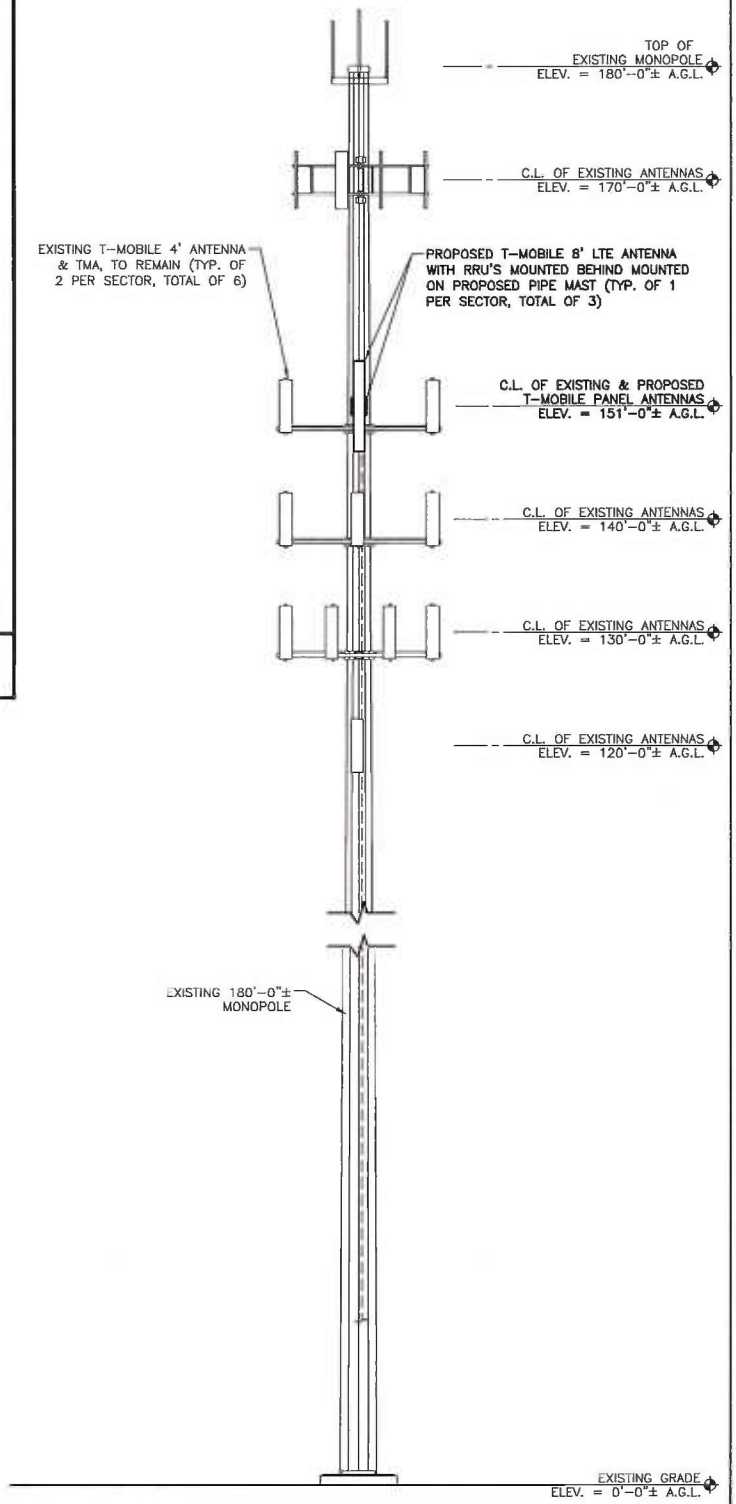
DRAWN BY: JT
CHECKED BY: PM
DATE: 08/08/14

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: 1/16" =1'-0"

PREPARED BY:
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21 B Street | Burlington, MA 01803
Tel: (781) 273-2500 | Fax: (781) 273-3311
www.ebiconsulting.com
EBI JOB NO.: 81140824

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

SITE INFO:
CTHA014A
HA014/ T OF WETHERSFIELD_MP
23 KELLEHER COURT
WETHERSFIELD, CT 06109

SUBMITTALS			
NO.	DATE	DESCRIPTION	BY
A	08/08/14	FOR REVIEW	JT

DRAWN BY: JT
CHECKED BY: PM
DATE: 08/08/14

SHEET NO: LE-2

EXHIBIT B

EBI Consulting
environmental | engineering | due diligence

21 B Street
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STRUCTURAL ANALYSIS REPORT

August 12, 2014

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

Subject: 700MHz Upgrade Project
Site #: CT HA 014 A
EBI Reference #: 81140824
Site Name: TOF Wethersfield_MP
Address: 23 Kelleher Court, Wetherfield, CT 06109

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 assess 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:

- International Building Code, 2003 with CT 2005, 2009, 2011, and 2013 amendments
- ASCE 7-05
- AISC Steel Construction Manual, 13th Edition
- ANSI/TIA-222-F

The following sources of information were considered in preparing this analysis:

- Lease Exhibit drawings prepared by EBI consulting, dated August 4, 2014
- Photographs taken by EBI personnel on a site visit on July 24, 2014
- Structural analysis report prepared by Atlantis Group, dated December 23, 2013

The monopole was analyzed for a wind speed of 80 mph without ice and with 1/2" radial ice at a reduced wind speed of 69 mph.

Three Commscope SBNHH-1d65C (96"x11.9x7.1 at 75 lbs) antennas are proposed to be installed on existing empty mast pipes, mounted to three existing T-Arm antenna mounts at a centerline elevation of approximately 151'-0". Additionally, three RRUS11 B12 remote radio units are proposed to be installed behind the proposed antennas on the same existing mast pipes.

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Existing Antenna and Cable Information:

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
179.0	184.0	1	-	10' Dipole AF	3 4 1	1-5/8" 1-1/4" 7/8"
		2	-	2.5" Dia. 10' Whip		
	179.0	1	-	T-Arm Mount [TA 702-3]		
177.0	177.0	1	-	4' x 3" Pipe Mount		
		1	Micro-Wave Dishes	Gabriel Electronics 2' Dish	1	1/2"
174.0	175.0	2	-	APXVSPP18-C-A20 w/ mast pipe	6	1-5/8"
		1	-	P40-16-XLPP-RR w/ mast pipe	3	Hybriflex 1-1/4"
	174.0	1	-	T-Arm Mount [TA 602-3]		
172.0	172.0	3	-	1900 MHz RRH w/ mast pipe		
		3	-	800 MHz RRH w/ mast pipe		
163.0	163.0	1	-	4' x 3" Pipe Mount		
		1	Micro-Wave Dishes	Gabriel Electronics 2' Dish		
151.0	152.0	3	Ericsson	AIR21 B2A/B4P w/ mast pipe	18	1-5/8"
		3	Ericsson	AIR21 B4A/B2P w/ mast pipe	1	Hybrid 1-5/8"
		3	-	dd B4 TMA		
	151	1	-	T-Arm Mount [TA 602-3]		

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Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
140.0	141.0	6	-	RRUS 11 incl sunshield	12	1-5/8"
	140.0	2	Commscope	SBNH-1D6565C w/ mast pipe		
		3	-	Junction box w/ mast pipe		
		1	KMW	AM-X-CD-16-65-OOT w/ mast pipe		
		6	-	P65-17-XLH-RR w/ mast pipe		
		1	-	Surge Supressor		
		1	-	T-Arm Mount [TA 602-3]		
135.0	135.0	1	-	RayCap OVP Box		
130.0	131.0	3	Antel	BXA 70063/6CF_4 w/ mast pipe	18	1-5/8"
		3	Antel	BXA-171063/12CF w/ mast pipe		
		3	Antel	BXA-70063/4CF w/ mast pipe		
		3	Kaveri	MGD3-800TX w/ mast pipe		
	130.0	3	-	ALU AWS RRH		
		1	-	PIROD 13' Low Profile Platform		
128.0	128.0	1	-	4' x 3" Pipe Mount		

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Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		1	Micro-Wave Dishes	Gabriel Electronics 2' Dish		
120.0	120.0	3	-	APXV18-206517S_C w/ mast pipe	6	1-5/8"

Local Antenna Mounting System:

The generic *T-Arms* antenna mounting system has the following assumed characteristics:

- T-shaped in plan with a nominal face width between 10'-0" and 12'-0".
- Horizontal standoff members, spanning from the tower connection point to the center point of the horizontal face member, are made of hollow structural steel sections, HSS4x4x1/4" minimum, with a length of no more than 3'-0".
- Horizontal face members are made from 3-1/2" minimum O.D. Sch. 40 steel pipe.
- Supported by a robust collar mount with (2) 3/4" minimum diameter high-strength threaded rods at each connection.

By engineering analysis and/or comparison, the existing antenna mounting system is capable of supporting the final configuration of proposed equipment without causing an overstress condition on the mounting system.

Summary of Results: (Refer to attached TNX Tower Analysis for detailed analysis results)

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	179 - 141.25	Pole	TP33.249x23.1x0.25	1	-6965.02	1313242.22	21.7	Pass
L2	141.25 - 92.58	Pole	TP45.833x31.5849x0.375	2	-21231.10	2714347.80	49.9	Pass
L3	92.58 - 45.5	Pole	TP57.742x43.4915x0.375	3	-34807.30	3424943.41	66.7	Pass
L4	45.5 - 0	Pole	TP69.225x54.9754x0.375	4	-53769.00	3850223.71	82.9	Pass
							Summary	
						Pole (L4)	82.9	Pass
						Bolt Check	98.6	Pass
						Base Plate	88.2	Pass
						RATING =	**98.6**	**Pass**

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The maximum stress under the proposed conditions and configurations is **98.6%** of the monopole capacity, governed by the bolts, and is considered adequate.

Foundation:

Reactions:

Maximum reactions at base:	08-12-2014 EBI Consulting Analysis	12-23-2013 Atlantis Group Analysis	URS Analysis
Base Shear (Kips)	38.5	35.6	36
Base Compression (Kips)	64.7	65.2	65
Base Moment (Kip-ft)	4,455	4.228	4,179

Based on the stress level of the monopole shaft, which is at **82.9%**, and assuming the foundation system was designed to have at least the capacity of the superstructure, the monopole foundation system is considered to have adequate structural strength

Limitations and Assumptions:

The report is based on the following:

1. Tower is properly installed and maintained.
2. All members are as specified in the original design documents and are in good condition.
3. All required members are in place.
4. All bolts are in place and are tightly fastened.
5. Tower is in plumb condition.
6. All member protective coatings are in good condition.
7. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
8. Modifications listed in the previous report have been installed.

EBI is not responsible for any modifications completed prior to or hereafter in which EBI is not or was not directly involved. Modifications include but are not limited to:

A. Adding antennas
B. Removing / replacing antennas
C. Adding coaxial cables

EBI hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from the original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact EBI. EBI disclaims all liability for representation, recommendation, or conclusion not expressly stated herein.

THE CONCLUSION OF THE MONOPOLE STRUCTURAL ANALYSIS IS THAT THE MONOPOLE IS AT 98.6% CAPACITY FOR THE PROPOSED AND EXISTING LOADING AND IS CONSIDERED ADEQUATE.

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

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environmental | engineering | due diligence

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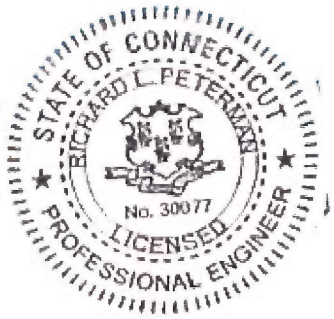
Sincerely yours,
EBI Consulting
August 12, 2014

Brandon Kelsey, E.I.T.

Richard L. Peterman, P.E.
Professional Engineer



Attachment: Photograph Log, Calculations

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PHOTOGRAPH LOG

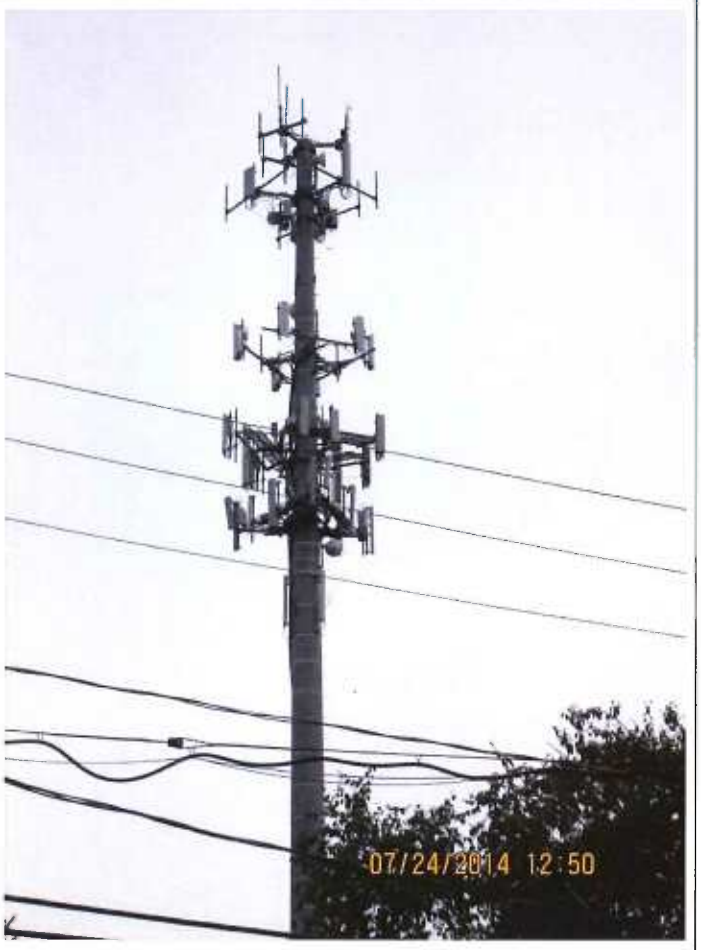
Photo 1: Existing monopole.	
Photo 2: T-Mobile existing antenna support system.	

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Photo 3: T-Mobile existing antenna support system, close-up view at connection to monopole.	
Photo 4: Existing monopole base.	

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STRUCTURAL DESIGN PARAMETERS

BUILDING CODE:	2003 IBC WITH CT 2005, 2009, 2011, 2013 AMENDMENTS ASCE7-05 TIA- 222-F
OCCUPANCY CATEGORY:	II
LIVE LOADS:	
Roof:	20 PSF
SNOW LOADS:	
GROUND SNOW LOAD, Pg:	30 PSF
EQUATION 7-1 FLAT ROOF CONVERSION FACTOR:	0.7
SNOW EXPOSURE FACTOR, Ce:	1.0
THERMAL FACTOR, Ct:	0.9
SNOW LOAD IMPORTANCE FACTOR, I_S:	1.0
TANK FLAT ROOF SNOW LOAD, Pf:	20 PSF
WIND LOADS:	
BASIC WIND SPEED (fastest mile), V:	80 MPH
IMPORTANCE FACTOR, I:	1.0
EXPOSURE CATEGORY:	C
INTERNAL PRESSURE COEFFICIENT:	±0.18
ICE LOADS:	
ICE THICKNESS	0.5 INCH
BASIC WIND SPEED WITH ICE, Vi	69 MPH
SEISMIC LOADS:	
COMPONENT IMPORTANCE FACTOR, Ip:	1.5
SPECTRAL ACCELERATION SHORT PERIOD, $S_S \leq$	0.24
SPECTRAL ACCELERATION 1-SECOND PERIOD, $S_1 \leq$	0.064
SITE CLASS:	D
SPECTRAL RESPONSE COEFFICIENT, S_{DS}:	0.256
SPECTRAL RESPONSE COEFFICIENT, S_{D1}:	0.102
SEISMIC DESIGN CATEGORY, SDC:	B

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APPENDIX A

Mount Calculations

EBI Consulting
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EnviroBusiness, Inc.
21 B Street
Burlington, MA 01803
800.786.2346

Carrier: T-Mobile
Site ID: CTHA014A

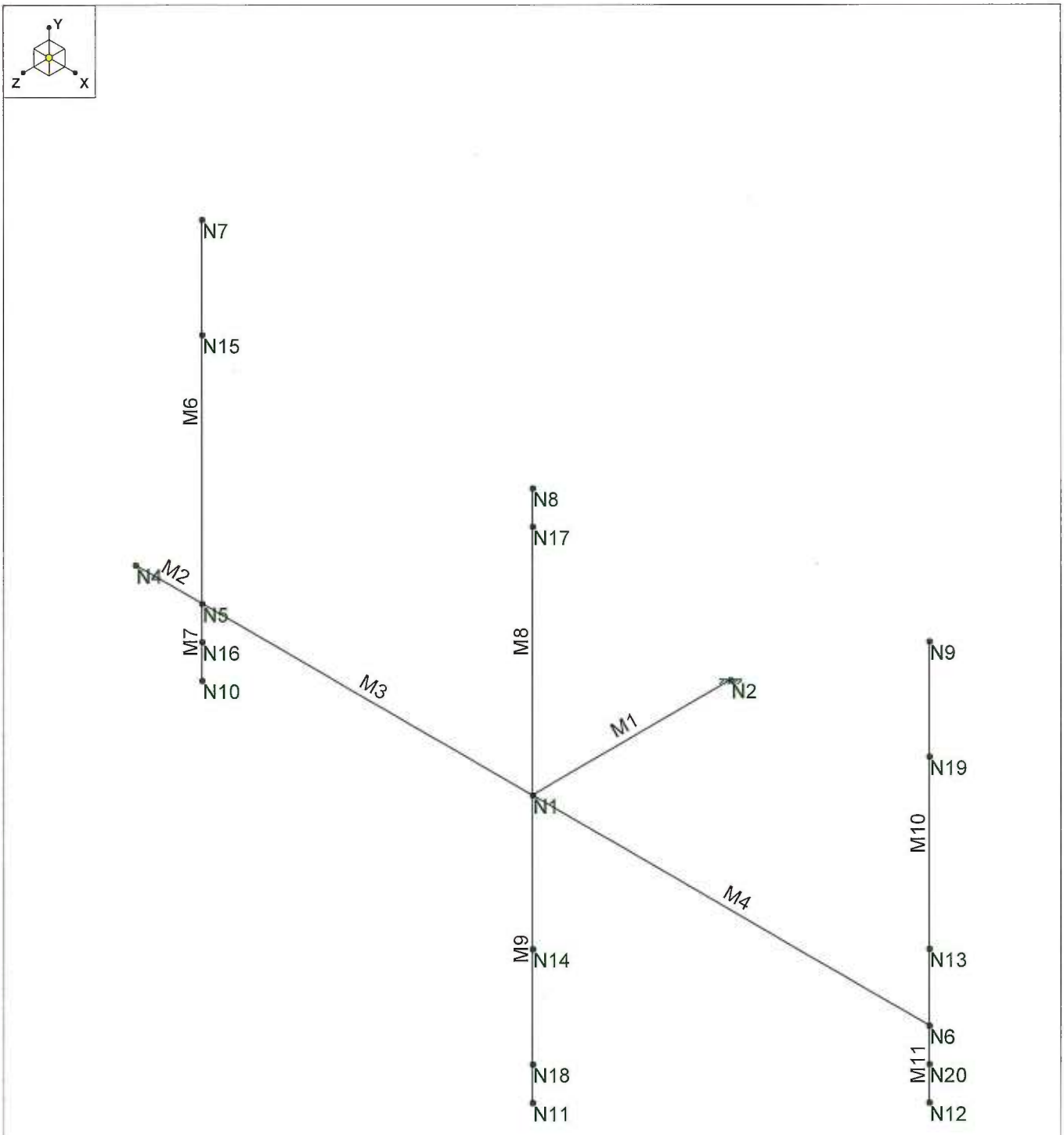
This spreadsheet calculates the wind and ice forces on proposed equipment. Shaded fields indicated user data entry.

Determine the wind loads on new equipment using TIA222 - Rev F design code:

sustained V=	80	mph (for appurtenances only, per TIA-222-F county listings)
Height above grade =	151	ft, center of antennas
Kz=	1.54	
Wind importance factor, I =	1.00	
qz=	25.3	psf, formula is ,*0.00256*Kz*V^2
Gh for lattice structure formula	1.13	see table below for occurrence - use value only when not at a cantilever or on a monopole
Wind with ice / Wind ratio	0.75	
Ice thickness	0.50	
Ice density	56	pcf

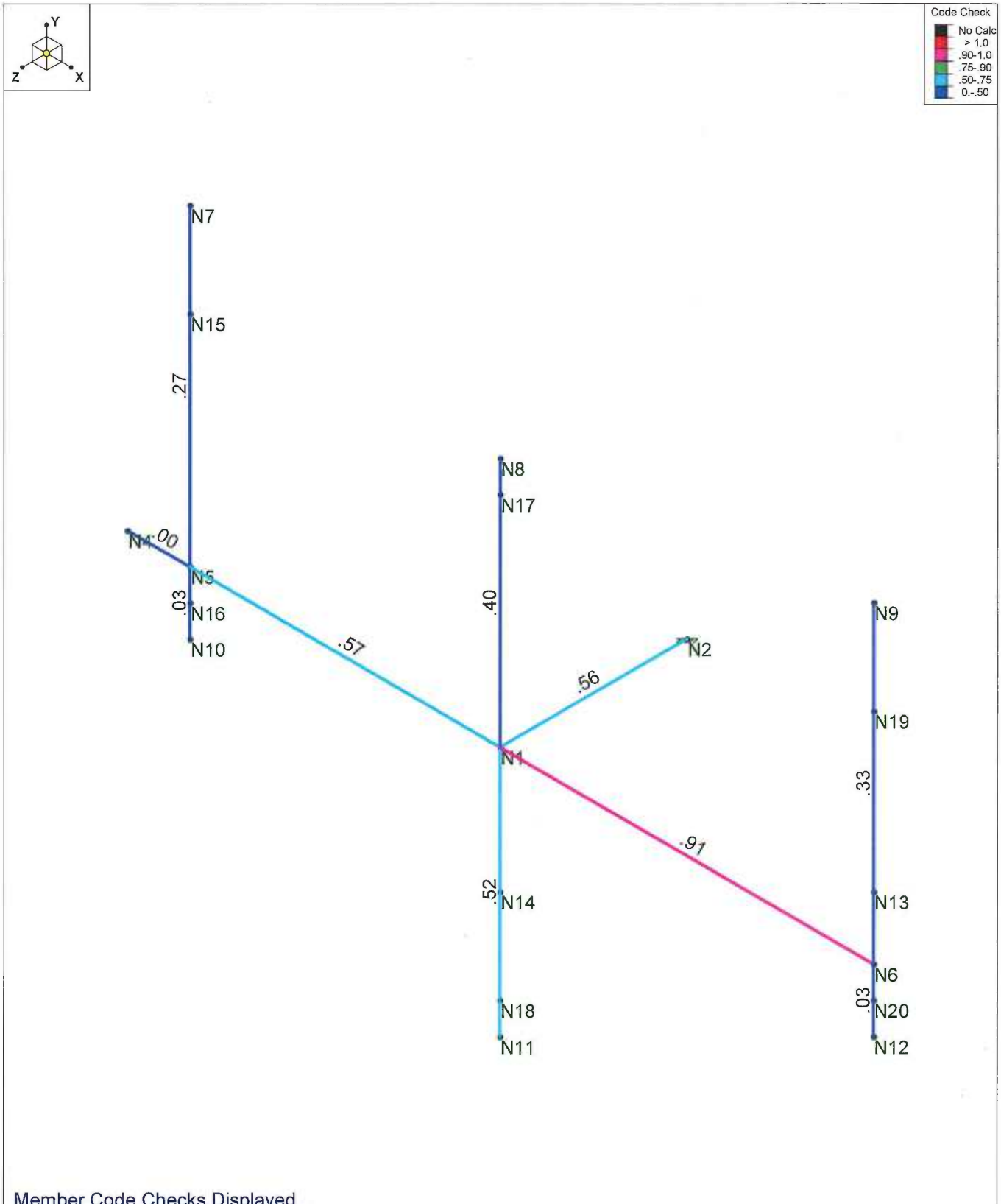
Calculate wind at face of proposed equipment using the TIA-222-F code revision:

Description	Weight (lbs)	Height (in)	Width (in)	Depth (in)	Front Aspect ratio	Front C_a (TIA222F Table 3)	Side Aspect ratio	Side C_a (TIA222F Table 3)	Cant-ilever or mono-pole?	Gh	Wind force on face, no ice (lb)	Wind at face, with ice (lb)	Wind force on side, no ice (lb)	Wind at side, with ice (lb or plf)	Ice Load (lb or plf)
Flat Appurtenances															
Ex. AIR21 B4A/B2P	108	56	12	8	4.67	1.40	7.00	1.40	Y	1.69	**279**	220.2	**186.2**	149.7	42.5
Ex. AIR21 B2A/B4P	108	56	12	8	4.67	1.40	7.00	1.40	Y	1.69	**279**	220.2	**186.2**	149.7	42.5
Pr. Commscope sbnhh-1d65c	75	96	11.9	7.1	8.07	1.44	13.52	1.62	Y	1.69	**487**	382.5	**327.3**	234.5	70.1
Pr. RRUS11 B12	76	20	17	7	1.18	1.40	2.86	1.40	Y	1.69	**141**	111.8	**58.2**	47.9	19.2
Ex. TMA	30	24	15	10	1.60	1.40	2.40	1.40	Y	1.69	**150**	118.4	**99.8**	80.2	22.6
Ex. HSS 4x4x1/4 (1 LF)	12	12	4	4	3.00	1.40	3.00	1.40	Y	1.69	**20**	17.5	**20.0**	17.5	3.8
Round Appurtenances															
Ex. 2-7/8" O.D. pipe (per lf)	6	12.0	2.9	2.9	-	1.20	4.17	1.20	Y	1.69	**12**	11.3	**12.3**	11.3	2.8
Ex. 3-1/2" O.D. pipe (per lf)	8	12.0	3.5	3.5	-	1.20	3.43	1.20	Y	1.69	**15**	13.4	**15.0**	13.4	3.3



Solution: Envelope

EBI Consulting		SK - 1
B. Kelsey	Antenna Mount Analysis	Aug 12, 2014 at 4:15 PM
81140824	Member and Node Labels	T-Arm Mount 3 (TIA222-F, ASD).r3d



Member Code Checks Displayed
Solution: Envelope

EBI Consulting		SK - 2
B. Kelsey	Antenna Mount Analysis	Aug 12, 2014 at 4:17 PM
81140824	Bending Unity Check	T-Arm Mount 3 (TIA222-F, ASD).r3d

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	58	1.2
3	A992	29000	11154	.3	.65	.49	50	1.1	58	1.2
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.2	58	1.1
6	A53 Gr. B	29000	11154	.3	.65	.49	35	1.5	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	mast pipe	PIPE_2.5	Column	Wide Flange	A53 Gr. B	Typical	1.61	1.45	1.45	2.89
2	HSS Tube	HSS4x4x4	Beam	Tube	A500 Gr.42	Typical	3.37	7.8	7.8	12.8
3	H Pipe	PIPE_3.0	Beam	Pipe	A53 Gr. B	Typical	2.07	2.85	2.85	5.69

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torq...	Kyy	Kzz	Cb	Function
1	M1	HSS Tube	3									Lateral
2	M2	H Pipe	1									Lateral
3	M3	H Pipe	5									Lateral
4	M4	H Pipe	6									Lateral
5	M6	mast pipe	5									Lateral
6	M7	mast pipe	1									Lateral
7	M8	mast pipe	4									Lateral
8	M9	mast pipe	4									Lateral
9	M10	mast pipe	5									Lateral
10	M11	mast pipe	1									Lateral

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	0	-3	0	
3	N4	-6	0	0	0	
4	N5	-5	0	0	0	
5	N6	6	0	0	0	
6	N7	-5	5	0	0	
7	N8	0	4	0	0	
8	N9	6	5	0	0	
9	N10	-5	-1	0	0	
10	N11	0	-4	0	0	
11	N12	6	-1	0	0	
12	N13	6	1	0	0	
13	N14	0	-2	0	0	
14	N15	-5	3.5	0	0	
15	N16	-5	-.5	0	0	
16	N17	0	3.5	0	0	
17	N18	0	-3.5	0	0	
18	N19	6	3.5	0	0	
19	N20	6	-.5	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]	Footing
1	N2	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction	

Joint Loads and Enforced Displacements (BLC 1 : dead)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	N15	L	Y	-.054
2	N16	L	Y	-.054
3	N19	L	Y	-.054
4	N20	L	Y	-.054
5	N17	L	Y	-.038
6	N18	L	Y	-.038
7	N14	L	Y	-.076
8	N13	L	Y	-.03

Joint Loads and Enforced Displacements (BLC 2 : ice)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	N15	L	Y	-.022
2	N16	L	Y	-.022
3	N19	L	Y	-.022
4	N20	L	Y	-.022
5	N17	L	Y	-.035
6	N18	L	Y	-.035
7	N14	L	Y	-.019
8	N13	L	Y	-.023

Joint Loads and Enforced Displacements (BLC 3 : Wind Front (Z) NO ICE)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	N15	L	Z	-.14
2	N16	L	Z	-.14
3	N19	L	Z	-.14
4	N20	L	Z	-.14
5	N17	L	Z	-.244
6	N18	L	Z	-.244
7	N14	L	Z	-.141
8	N13	L	Z	-.15

Joint Loads and Enforced Displacements (BLC 4 : Wind Front (Z) WITH ICE)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	N15	L	Z	-.11
2	N16	L	Z	-.11
3	N19	L	Z	-.11
4	N20	L	Z	-.11
5	N17	L	Z	-.192
6	N18	L	Z	-.192
7	N14	L	Z	-.112
8	N13	L	Z	-.118

Joint Loads and Enforced Displacements (BLC 5 : Wind Side (X) NO ICE)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	N15	L	X	-.093
2	N16	L	X	-.093
3	N19	L	X	-.093
4	N20	L	X	-.093
5	N17	L	X	-.164

Joint Loads and Enforced Displacements (BLC 5 : Wind Side (X) NO ICE) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
6	N18	L	X	-.164
7	N14	L	X	-.058
8	N13	L	X	-.1

Joint Loads and Enforced Displacements (BLC 6 : Wind SIde (X) WITH ICE)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	N15	L	X	-.075
2	N16	L	X	-.075
3	N19	L	X	-.075
4	N20	L	X	-.075
5	N17	L	X	-.123
6	N18	L	X	-.123
7	N14	L	X	-.048
8	N13	L	X	-.08

Member Distributed Loads (BLC 2 : ice)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.004	-.004	0	0
2	M2	Y	-.003	-.003	0	0
3	M3	Y	-.003	-.003	0	0
4	M4	Y	-.003	-.003	0	0
5	M6	Y	-.003	-.003	0	0
6	M7	Y	-.003	-.003	0	0
7	M8	Y	-.003	-.003	0	0
8	M9	Y	-.003	-.003	0	0
9	M10	Y	-.003	-.003	0	0
10	M11	Y	-.003	-.003	0	0

Member Distributed Loads (BLC 3 : Wind Front (Z) NO ICE)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M6	Z	-.012	-.012	0	0
2	M7	Z	-.012	-.012	0	0
3	M3	Z	-.015	-.015	0	0
4	M2	Z	-.015	-.015	0	0
5	M4	Z	-.015	-.015	0	0
6	M8	Z	-.012	-.012	0	0
7	M9	Z	-.012	-.012	0	0
8	M10	Z	-.012	-.012	0	0
9	M11	Z	-.012	-.012	0	0

Member Distributed Loads (BLC 4 : Wind Front (Z) WITH ICE)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M6	Z	-.011	-.011	0	0
2	M7	Z	-.011	-.011	0	0
3	M2	Z	-.013	-.013	0	0
4	M3	Z	-.013	-.013	0	0
5	M8	Z	-.011	-.011	0	0
6	M9	Z	-.011	-.011	0	0
7	M4	Z	-.013	-.013	0	0
8	M10	Z	-.011	-.011	0	0
9	M11	Z	-.011	-.011	0	0

Member Distributed Loads (BLC 5 : Wind Side (X) NO ICE)

Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]

Member Distributed Loads (BLC 5 : Wind Side (X) NO ICE) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	-.02	-.02	0	0
2	M6	X	-.012	-.012	0	0
3	M7	X	-.012	-.012	0	0
4	M8	X	-.012	-.012	0	0
5	M9	X	-.012	-.012	0	0
6	M10	X	-.012	-.012	0	0
7	M11	X	-.012	-.012	0	0

Member Distributed Loads (BLC 6 : Wind Side (X) WITH ICE)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	-.018	-.018	0	0
2	M6	X	-.011	-.011	0	0
3	M7	X	-.011	-.011	0	0
4	M8	X	-.011	-.011	0	0
5	M9	X	-.011	-.011	0	0
6	M10	X	-.011	-.011	0	0
7	M11	X	-.011	-.011	0	0

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(M...	Surface...
1	dead	DL		-1		8				
2	ice	SL				8		10		
3	Wind Front (Z) NO ICE	WLZ				8		9		
4	Wind Front (Z) WITH ICE	OL1				8		9		
5	Wind Side (X) NO ICE	WLX				8		7		
6	Wind Side (X) WITH ICE	OL2				8		7		

Load Combinations

	Description	Sol...	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..
1	1.0DL + 1.0WLZ	Yes	Y		1	1	3	1												
2	1.0DL + 1.0WLX	Yes	Y		1	1	5	1												
3	1.0DL + 1.0Di + 1.0WLZi	Yes	Y		1	1	2	1	4	1										
4	1.0DL + 1.0Di + 1.0WLXi	Yes	Y		1	1	2	1	6	1										

Envelope AISC 13th(360-05): ASD Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
1	M1	HSS4x4x4	.560	0	4	.123	0	z	2	81.889	84.754	9.829	9.829	1...	H1-1b
2	M2	PIPE_3.0	.002	1	1	.001	1		1	43.152	43.383	3.825	3.825	2...	H1-1b
3	M3	PIPE_3.0	.574	5	1	.203	5		1	37.949	43.383	3.825	3.825	1...	H1-1b
4	M4	PIPE_3.0	.910	0	1	.260	0		1	35.779	43.383	3.825	3.825	1...	H1-1b
5	M6	PIPE_2.5	.271	5	1	.020	5		1	27.5	33.743	2.393	2.393	2...	H1-1b
6	M7	PIPE_2.5	.033	0	1	.015	0		1	33.468	33.743	2.393	2.393	3	H1-1b
7	M8	PIPE_2.5	.399	4	1	.029	4		1	29.601	33.743	2.393	2.393	1...	H1-1b
8	M9	PIPE_2.5	.516	0	1	.043	0		1	29.601	33.743	2.393	2.393	2...	H1-1b
9	M10	PIPE_2.5	.335	5	1	.035	5		1	27.5	33.743	2.393	2.393	2...	H1-1b
10	M11	PIPE_2.5	.033	0	1	.015	0		1	33.468	33.743	2.393	2.393	3	H1-1b

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N2	max	1.158	2	.934	3	1.759	1	-.821	1	3.39	2	.526	3
2		min	0	3	.626	2	0	2	-2.737	4	-1.265	1	-.504	2

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
3	Totals:	max	1.158	2	.934	3	1.759	1						
4		min	0	3	.626	2	0	2						

EBI Consulting
environmental | engineering | due diligence

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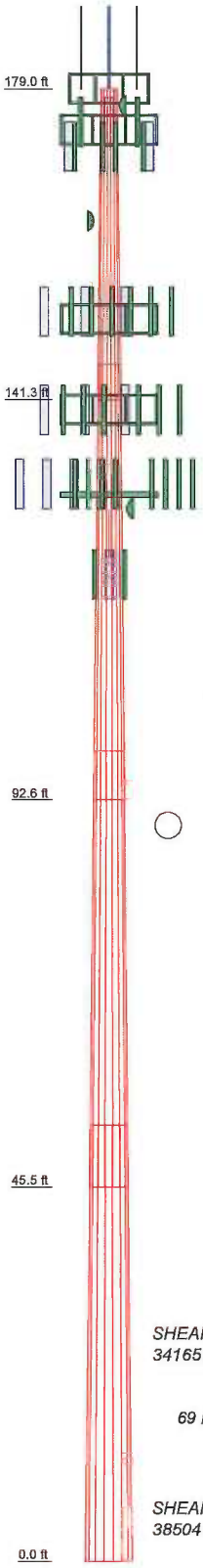
APPENDIX B

TNX Tower Results

Section	4	3	2	1	
Length (ft)	53.00	53.00	53.00	37.75	
Number of Sides	18	18	18	18	
Thickness (in)	0.3750	0.3750	0.3750	0.2500	
Socket Length (ft)		7.50	5.92	4.33	
Top Dia (in)	54.9754	43.4915	31.5849	23.1000	
Bot Dia (in)	69.2250	57.7420	45.8330	33.2490	
Grade	A572-65				
Weight (lb)	13249.9	10784.9	8228.7	2846.3	35109.8



AXIAL
64739 lb

SHEAR
34165 lb

MOMENT
3974903 lb-ft

TORQUE 1186 lb-ft
69 mph WIND - 0.5000 in ICE

AXIAL
53790 lb

SHEAR
38504 lb

MOMENT
4454991 lb-ft

TORQUE 1256 lb-ft
REACTIONS - 80 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
T-Arm Mount [TA 702-3]	179	RRUS 11 incl sunshield	140
2.5" Dia. 10' Whip	179	Commscope SBNH-1D6565C w/ mast pipe	140
10' Dipole AF	179	Commscope SBNH-1D6565C w/ mast pipe	140
2.5" Dia. 10' Whip	179	KMW AM-X-CD-16-65-OOT w/ mast pipe	140
4' x 3" Pipe Mount	177	Surge Supressor	140
Gabriel Electronics 2' Dish	177	Junction box w/ mast pipe	140
P40-16-XLPP-RR w/ mast pipe	174	Junction box w/ mast pipe	140
APXVSPP18-C-A20 w/ mast pipe	174	Junction box w/ mast pipe	140
APXVSPP18-C-A20 w/ mast pipe	174	P65-17-XLH-RR w/ mast pipe	140
T-Arm Mount [TA 602-3]	174	P65-17-XLH-RR w/ mast pipe	140
800 MHz RRH w/ mast pipe	172	P65-17-XLH-RR w/ mast pipe	140
800 MHz RRH w/ mast pipe	172	RRUS 11 incl sunshield	140
1900 MHz RRH w/ mast pipe	172	RRUS 11 incl sunshield	140
1900 MHz RRH w/ mast pipe	172	RRUS 11 incl sunshield	140
1900 MHz RRH w/ mast pipe	172	T-Arm Mount [TA 602-3]	140
800 MHz RRH w/ mast pipe	172	P65-17-XLH-RR w/ mast pipe	140
4' x 3" Pipe Mount	163	RayCap OVP Box	135
Gabriel Electronics 2' Dish	163	Antel BXA-171063/12CF w/ mast pipe	130
AIR21 B2A/B4P w/ mast pipe	151	Antel BXA-171063/12CF w/ mast pipe	130
AIR21 B2A/B4P w/ mast pipe	151	ALU AWS RRH	130
AIR21 B4A/B2P w/ mast pipe	151	ALU AWS RRH	130
AIR21 B4A/B2P w/ mast pipe	151	ALU AWS RRH	130
AIR21 B4A/B2P w/ mast pipe	151	Kaveri MGD3-800TX w/ mast pipe	130
dd B4 TMA	151	Kaveri MGD3-800TX w/ mast pipe	130
dd B4 TMA	151	Kaveri MGD3-800TX w/ mast pipe	130
dd B4 TMA	151	BXA-70063/4CF w/ mast pipe	130
Commscope SBNHH-1D65C w/ mast pipe	151	BXA-70063/4CF w/ mast pipe	130
Commscope SBNHH-1D65C w/ mast pipe	151	BXA-70063/4CF w/ mast pipe	130
Commscope SBNHH-1D65C w/ mast pipe	151	Antel BXA 70063/6CF_4 w/ mast pipe	130
RRUS11_B12	151	Antel BXA 70063/6CF_4 w/ mast pipe	130
RRUS11_B12	151	Antel BXA 70063/6CF_4 w/ mast pipe	130
RRUS11_B12	151	Antel BXA-171063/12CF w/ mast pipe	130
T-Arm Mount [TA 602-3]	151	PIROD 13' Low Profile Platform	130
AIR21 B2A/B4P w/ mast pipe	151	4' x 3" Pipe Mount	128
P65-17-XLH-RR w/ mast pipe	140	Gabriel Electronics 2' Dish	128
P65-17-XLH-RR w/ mast pipe	140	APXV18-206517S_C w/ mast pipe	120
RRUS 11 incl sunshield	140	APXV18-206517S_C w/ mast pipe	120
RRUS 11 incl sunshield	140	APXV18-206517S_C w/ mast pipe	120

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 98.6%

EBI Consulting
21 B St
Burlington, MA 01803
Phone: (781) 273 - 2500
FAX: (781) 273 - 3311

Job: CTHA014A			
Project: 81140824			
Client: T-Mobile	Drawn by: Brandon Kelsey		App'd:
Code: TIA/EIA-222-F	Date: 08/13/14		Scale: NTS
Path: C:\Users\bkelsey\Desktop\Job Notes\08.11 CTHA014A (81140824)\calcs\tnxtower\CTHA014A tower.eri			Dwg No. E-1

tnxTower	Job	Page
	CTHA014A	1 of 21
EBI Consulting 21 B St Burlington, MA 01803 Phone: (781) 273 - 2500 FAX: (781) 273 - 3311	Project 81140824	Date 10:53:35 08/13/14
	Client T-Mobile	Designed by Brandon Kelsey

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 Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 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.

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 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	179.00-141.25	37.75	4.33	18	23.1000	33.2490	0.2500	1.0000	A572-65 (65 ksi)
L2	141.25-92.58	53.00	5.92	18	31.5849	45.8330	0.3750	1.5000	A572-65 (65 ksi)
L3	92.58-45.50	53.00	7.50	18	43.4915	57.7420	0.3750	1.5000	A572-65 (65 ksi)
L4	45.50-0.00	53.00		18	54.9754	69.2250	0.3750	1.5000	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	23.4564	18.1315	1196.0325	8.1118	11.7348	101.9219	2393.6388	9.0675	3.6256	14.502
	33.7619	26.1847	3602.3567	11.7146	16.8905	213.2772	7209.4536	13.0948	5.4118	21.647
L2	33.2541	37.1476	4571.4330	11.0795	16.0451	284.9110	9148.8811	18.5773	4.8989	13.064
	46.5400	54.1064	14125.5905	16.1376	23.2832	606.6869	28269.7679	27.0583	7.4066	19.751
L3	45.7787	51.3194	12053.3157	15.3064	22.0937	545.5547	24122.4915	25.6646	6.9945	18.652
	58.6328	68.2811	28389.7820	20.3653	29.3329	967.8466	56816.9200	34.1470	9.5026	25.34
L4	57.8711	64.9882	24477.3072	19.3831	27.9275	876.4585	48986.8223	32.5003	9.0157	24.042
	70.2929	81.9487	49078.0698	24.4417	35.1663	1395.5995	98220.7178	40.9821	11.5236	30.73

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 179.00-141.25				1	1	1		
L2 141.25-92.58				1	1	1		
L3 92.58-45.50				1	1	1		
L4 45.50-0.00				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	16
Embedment length	51.5000 in
f'_c	4 ksi
Grout space	2.0000 in
Base plate grade	A572-60
Base plate thickness	2.2500 in
Bolt circle diameter	76.0000 in
Outer diameter	79.5000 in
Inner diameter	60.0000 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_AA_A ft^2/ft	Weight plf
LDF7-50A (1-5/8 FOAM)	A	No	Inside Pole	10.00 - 179.00	3	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF1-50A (1/4 FOAM)	A	No	Inside Pole	10.00 - 179.00	4	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
LDF5-50A (7/8 FOAM)	A	No	Inside Pole	10.00 - 179.00	1	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF4RN-50A (1/2 FOAM)	A	No	Inside Pole	10.00 - 179.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
LDF7-50A (1-5/8 FOAM)	A	No	Inside Pole	5.00 - 174.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF6-50A (1-1/4 FOAM)	A	No	Inside Pole	5.00 - 174.00	3	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
LDF7-50A (1-5/8 FOAM)	B	No	Inside Pole	5.00 - 151.00	16	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF7-50A (1-5/8 FOAM)	B	No	CaAa (Out Of Face)	5.00 - 151.00	2	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
LDF6-50A (1-1/4 FOAM)	C	No	CaAa (Out Of Face)	5.00 - 151.00	1	No Ice	0.16	1.61
						1/2" Ice	0.26	2.89
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	5.00 - 140.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
2.5" Rigid Conduit	C	No	Inside Pole	5.00 - 140.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	5.00 - 130.00	17	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF7-50A (1-5/8 FOAM)	C	No	CaAa (Out Of Face)	5.00 - 130.00	1	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
LDF1-50A (1/4 FOAM)	C	No	Inside Pole	5.00 - 130.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	5.00 - 120.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
Climbing Ladder	A	No	CaAa (Out Of Face)	0.00 - 179.00	1	No Ice	0.29	7.90
						1/2" Ice	0.55	10.60
Safety Line 5/16	A	No	CaAa (Out Of Face)	0.00 - 179.00	1	No Ice	0.03	0.26
						1/2" Ice	0.13	0.76

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	179.00-141.25	A	0.000	0.000	0.000	12.129	716.94
		B	0.000	0.000	0.000	3.861	143.91
		C	0.000	0.000	0.000	1.560	15.70
L2	141.25-92.58	A	0.000	0.000	0.000	15.638	981.19
		B	0.000	0.000	0.000	19.273	718.37
		C	0.000	0.000	0.000	15.196	1268.58
L3	92.58-45.50	A	0.000	0.000	0.000	15.127	949.13
		B	0.000	0.000	0.000	18.644	694.90
		C	0.000	0.000	0.000	16.854	1502.32
L4	45.50-0.00	A	0.000	0.000	0.000	14.619	841.38
		B	0.000	0.000	0.000	16.038	597.78
		C	0.000	0.000	0.000	14.499	1292.36

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	179.00-141.25	A	0.500	0.000	0.000	0.000	25.719	837.74
		B		0.000	0.000	0.000	5.811	173.45
		C		0.000	0.000	0.000	2.535	28.18

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
L2	141.25-92.58	A	0.500	0.000	0.000	0.000	33.159	1136.93
		B		0.000	0.000	0.000	29.007	865.83
		C		0.000	0.000	0.000	23.805	1387.57
L3	92.58-45.50	A	0.500	0.000	0.000	0.000	32.076	1099.79
		B		0.000	0.000	0.000	28.059	837.55
		C		0.000	0.000	0.000	26.271	1633.91
L4	45.50-0.00	A	0.500	0.000	0.000	0.000	30.999	986.98
		B		0.000	0.000	0.000	24.138	720.49
		C		0.000	0.000	0.000	22.599	1405.55

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	179.00-141.25	0.0749	-0.3004	0.0900	-0.5874
L2	141.25-92.58	0.0770	0.0408	0.0814	-0.1288
L3	92.58-45.50	0.0395	0.0668	0.0341	-0.1081
L4	45.50-0.00	0.0366	0.0135	0.0324	-0.1938

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
T-Arm Mount [TA 702-3]	A	None		0.0000	179.00	No Ice	5.64	5.64	339.00
						1/2" Ice	6.55	6.55	429.00
2.5" Dia. 10' Whip	A	From Leg	3.00 0.00 5.00	0.0000	179.00	No Ice 1/2" Ice	2.50 3.53	2.50 3.53	30.00 48.64
10' Dipole AF	B	From Leg	3.00 0.00 5.00	0.0000	179.00	No Ice 1/2" Ice	2.00 3.02	2.00 3.02	20.00 35.50
2.5" Dia. 10' Whip	C	From Leg	3.00 0.00 5.00	0.0000	179.00	No Ice 1/2" Ice	2.50 3.53	2.50 3.53	30.00 48.64
4' x 3" Pipe Mount	B	From Leg	0.25 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice	1.00 1.25	1.00 1.25	29.00 37.96
T-Arm Mount [TA 602-3]	A	None		0.0000	174.00	No Ice	11.59	11.59	774.30
						1/2" Ice	15.44	15.44	990.35
P40-16-XLPP-RR w/ mast pipe	A	From Leg	3.00 0.00 1.00	0.0000	174.00	No Ice 1/2" Ice	9.57 10.12	5.24 5.95	98.74 165.52
APXVSPP18-C-A20 w/ mast pipe	B	From Leg	3.00 0.00 1.00	0.0000	174.00	No Ice 1/2" Ice	8.72 9.29	7.58 8.42	110.48 185.30
APXVSPP18-C-A20 w/ mast	C	From Leg	3.00	0.0000	174.00	No Ice	8.72	7.58	110.48

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
pipe			0.00 1.00			1/2" Ice	9.29	8.42	185.30
800 MHz RRH w/ mast pipe	A	From Leg	1.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice	3.67 4.15	3.98 4.55	98.74 139.59
800 MHz RRH w/ mast pipe	B	From Leg	1.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice	3.67 4.15	3.98 4.55	98.74 139.59
800 MHz RRH w/ mast pipe	C	From Leg	1.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice	3.67 4.15	3.98 4.55	98.74 139.59
1900 MHz RRH w/ mast pipe	A	From Leg	1.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice	3.42 3.89	3.20 3.75	80.74 115.70
1900 MHz RRH w/ mast pipe	B	From Leg	1.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice	3.42 3.89	3.20 3.75	80.74 115.70
1900 MHz RRH w/ mast pipe	C	From Leg	1.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice	3.42 3.89	3.20 3.75	80.74 115.70
4' x 3" Pipe Mount	C	From Leg	0.25 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	1.00 1.25	1.00 1.25	29.00 37.96
T-Arm Mount [TA 602-3]	A	None		0.0000	151.00	No Ice 1/2" Ice	11.59 15.44	11.59 15.44	774.30 990.35
AIR21 B2A/B4P w/ mast pipe	A	From Leg	3.00 -3.00 1.00	0.0000	151.00	No Ice 1/2" Ice	6.87 7.38	6.29 7.05	134.62 203.81
AIR21 B2A/B4P w/ mast pipe	B	From Leg	3.00 -3.00 1.00	0.0000	151.00	No Ice 1/2" Ice	6.87 7.38	6.29 7.05	134.62 203.81
AIR21 B2A/B4P w/ mast pipe	C	From Leg	3.00 -3.00 1.00	0.0000	151.00	No Ice 1/2" Ice	6.87 7.38	6.29 7.05	134.62 203.81
AIR21 B4A/B2P w/ mast pipe	A	From Leg	3.00 3.00 1.00	0.0000	151.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	126.90 182.26
AIR21 B4A/B2P w/ mast pipe	B	From Leg	3.00 3.00 1.00	0.0000	151.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	126.90 182.26
AIR21 B4A/B2P w/ mast pipe	C	From Leg	3.00 3.00 1.00	0.0000	151.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	126.90 182.26
dd B4 TMA	A	From Leg	3.00 3.00 1.00	0.0000	151.00	No Ice 1/2" Ice	0.64 0.82	0.52 0.71	22.43 31.59
dd B4 TMA	B	From Leg	3.00 3.00 1.00	0.0000	151.00	No Ice 1/2" Ice	0.64 0.82	0.52 0.71	22.43 31.59
dd B4 TMA	C	From Leg	3.00 3.00 1.00	0.0000	151.00	No Ice 1/2" Ice	0.64 0.82	0.52 0.71	22.43 31.59
Commscope SBNHH-1D65C w/ mast pipe	A	From Leg	3.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice	11.39 12.01	9.96 11.38	121.32 211.80
Commscope SBNHH-1D65C w/ mast pipe	B	From Leg	3.00 0.00	0.0000	151.00	No Ice 1/2" Ice	11.39 12.01	9.96 11.38	121.32 211.80

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 SBNHH-1D65C w/ mast pipe	C	From Leg	3.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice	11.39 12.01	9.96 11.38	121.32 211.80
RRUS11_B12	A	From Leg	3.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice	3.31 3.55	1.36 1.54	51.00 71.87
RRUS11_B12	B	From Leg	3.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice	3.31 3.55	1.36 1.54	51.00 71.87
RRUS11_B12	C	From Leg	3.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice	3.31 3.55	1.36 1.54	51.00 71.87
T-Arm Mount [TA 602-3]	A	None		0.0000	140.00	No Ice 1/2" Ice	11.59 15.44	11.59 15.44	774.30 990.35
P65-17-XLH-RR w/ mast pipe	A	From Leg	4.00 -3.00 0.00	0.0000	140.00	No Ice 1/2" Ice	11.70 12.42	8.94 10.45	102.85 184.99
P65-17-XLH-RR w/ mast pipe	B	From Leg	4.00 -3.00 0.00	0.0000	140.00	No Ice 1/2" Ice	11.70 12.42	8.94 10.45	102.85 184.99
P65-17-XLH-RR w/ mast pipe	C	From Leg	4.00 -3.00 0.00	0.0000	140.00	No Ice 1/2" Ice	11.70 12.42	8.94 10.45	102.85 184.99
RRUS 11 incl sunshield	A	From Leg	4.00 -3.00 1.00	0.0000	140.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
RRUS 11 incl sunshield	B	From Leg	4.00 -3.00 1.00	0.0000	140.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
RRUS 11 incl sunshield	C	From Leg	4.00 -3.00 1.00	0.0000	140.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
Commscope SBNH-1D6565C w/ mast pipe	A	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	11.67 12.39	9.83 11.35	112.85 198.80
Commscope SBNH-1D6565C w/ mast pipe	B	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	11.67 12.39	9.83 11.35	112.85 198.80
KMW AM-X-CD-16-65-OOT w/ mast pipe	C	From Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	6.89 7.39	5.65 6.39	84.85 141.76
Surge Supressor	B	From Leg	2.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	1.33 1.53	1.33 1.53	33.00 48.91
Junction box w/ mast pipe	A	From Leg	1.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	6.09 6.53	3.77 4.26	63.16 115.06
Junction box w/ mast pipe	B	From Leg	1.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	6.09 6.53	3.77 4.26	63.16 115.06
Junction box w/ mast pipe	C	From Leg	1.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	6.09 6.53	3.77 4.26	63.16 115.06
P65-17-XLH-RR w/ mast pipe	A	From Leg	4.00 3.00 0.00	0.0000	140.00	No Ice 1/2" Ice	11.70 12.42	8.94 10.45	102.85 184.99

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
P65-17-XLH-RR w/ mast pipe	B	From Leg	4.00 3.00 0.00	0.0000	140.00	No Ice 1/2" Ice	11.70 12.42	8.94 10.45	102.85 184.99
P65-17-XLH-RR w/ mast pipe	C	From Leg	4.00 3.00 0.00	0.0000	140.00	No Ice 1/2" Ice	11.70 12.42	8.94 10.45	102.85 184.99
RRUS 11 incl sunshield	A	From Leg	4.00 3.00 1.00	0.0000	140.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
RRUS 11 incl sunshield	B	From Leg	4.00 3.00 1.00	0.0000	140.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
RRUS 11 incl sunshield	C	From Leg	4.00 3.00 1.00	0.0000	140.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
RayCap OVP Box	A	From Leg	0.50 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice	4.08 4.37	2.72 2.97	30.00 59.30
PIROD 13' Low Profile Platform	A	None		0.0000	130.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
Antel BXA-171063/12CF w/ mast pipe	A	From Leg	4.00 -6.00 1.00	0.0000	130.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	15.00 42.45
Antel BXA-171063/12CF w/ mast pipe	B	From Leg	4.00 -6.00 1.00	0.0000	130.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	15.00 42.45
Antel BXA-171063/12CF w/ mast pipe	C	From Leg	4.00 -6.00 1.00	0.0000	130.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	15.00 42.45
ALU AWS RRH	A	From Leg	4.00 -6.00 0.00	0.0000	130.00	No Ice 1/2" Ice	2.34 2.54	2.34 2.54	57.30 82.20
ALU AWS RRH	B	From Leg	4.00 -6.00 0.00	0.0000	130.00	No Ice 1/2" Ice	2.34 2.54	2.34 2.54	57.30 82.20
ALU AWS RRH	C	From Leg	4.00 -6.00 0.00	0.0000	130.00	No Ice 1/2" Ice	2.34 2.54	2.34 2.54	57.30 82.20
Kaveri MGD3-800TX w/ mast pipe	A	From Leg	4.00 -2.00 1.00	0.0000	130.00	No Ice 1/2" Ice	3.46 3.87	3.65 4.36	54.77 86.97
Kaveri MGD3-800TX w/ mast pipe	B	From Leg	4.00 -2.00 1.00	0.0000	130.00	No Ice 1/2" Ice	3.46 3.87	3.65 4.36	54.77 86.97
Kaveri MGD3-800TX w/ mast pipe	C	From Leg	4.00 -2.00 1.00	0.0000	130.00	No Ice 1/2" Ice	3.46 3.87	3.65 4.36	54.77 86.97
BXA-70063/4CF w/ mast pipe	A	From Leg	4.00 2.00 1.00	0.0000	130.00	No Ice 1/2" Ice	5.49 5.93	4.05 4.66	54.99 107.68
BXA-70063/4CF w/ mast pipe	B	From Leg	4.00 2.00 1.00	0.0000	130.00	No Ice 1/2" Ice	5.49 5.93	4.05 4.66	54.99 107.68
BXA-70063/4CF w/ mast pipe	C	From Leg	4.00 2.00 1.00	0.0000	130.00	No Ice 1/2" Ice	5.49 5.93	4.05 4.66	54.99 107.68
Antel BXA 70063/6CF_4 w/	A	From Leg	4.00	0.0000	130.00	No Ice	7.93	6.84	66.27

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
mast pipe			6.00 1.00			1/2" Ice	8.50	7.67	136.03
Antel BXA 70063/6CF_4 w/ mast pipe	B	From Leg	4.00 6.00 1.00	0.0000	130.00	No Ice 1/2" Ice	7.93 8.50	6.84 7.67	66.27 136.03
Antel BXA 70063/6CF_4 w/ mast pipe	C	From Leg	4.00 6.00 1.00	0.0000	130.00	No Ice 1/2" Ice	7.93 8.50	6.84 7.67	66.27 136.03
4' x 3" Pipe Mount	B	From Leg	0.25 0.00 0.00	0.0000	128.00	No Ice 1/2" Ice	1.00 1.25	1.00 1.25	29.00 37.96
APXV18-206517S_C w/ mast pipe	A	From Leg	0.50 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	60.55 102.82
APXV18-206517S_C w/ mast pipe	B	From Leg	0.50 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	60.55 102.82
APXV18-206517S_C w/ mast pipe	C	From Leg	0.50 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	60.55 102.82

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
Gabriel Electronics 2' Dish	B	Paraboloid w/o Radome	From Leg	0.50 0.00 0.00	0.0000		177.00	2.42	No Ice 1/2" Ice	4.59 4.91	65.00 115.00
Gabriel Electronics 2' Dish	C	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	0.0000		163.00	2.42	No Ice 1/2" Ice	4.59 4.91	65.00 115.00
Gabriel Electronics 2' Dish	B	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	0.0000		128.00	2.42	No Ice 1/2" Ice	4.59 4.91	65.00 115.00

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	159.15	1.568	26	88.632	A	0.000	88.632	88.632	100.00	0.000	12.129

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
179.00-141.25					B	0.000	88.632		100.00	0.000	3.861
					C	0.000	88.632		100.00	0.000	1.560
L2	115.93	1.432	23	159.358	A	0.000	159.358	159.358	100.00	0.000	15.638
141.25-92.58					B	0.000	159.358		100.00	0.000	19.273
					C	0.000	159.358		100.00	0.000	15.196
L3 92.58-45.50	68.65	1.233	20	201.709	A	0.000	201.709	201.709	100.00	0.000	15.127
					B	0.000	201.709		100.00	0.000	18.644
					C	0.000	201.709		100.00	0.000	16.854
L4 45.50-0.00	22.06	1	16	239.286	A	0.000	239.286	239.286	100.00	0.000	14.619
					B	0.000	239.286		100.00	0.000	16.038
					C	0.000	239.286		100.00	0.000	14.499

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	159.15	1.568	19	0.5000	91.778	A	0.000	91.778	91.778	100.00	0.000	25.719
179.00-141.25						B	0.000	91.778		100.00	0.000	5.811
						C	0.000	91.778		100.00	0.000	2.535
L2 141.25-92.58	115.93	1.432	18	0.5000	163.413	A	0.000	163.413	163.413	100.00	0.000	33.159
						B	0.000	163.413		100.00	0.000	29.007
						C	0.000	163.413		100.00	0.000	23.805
L3 92.58-45.50	68.65	1.233	15	0.5000	205.632	A	0.000	205.632	205.632	100.00	0.000	32.076
						B	0.000	205.632		100.00	0.000	28.059
						C	0.000	205.632		100.00	0.000	26.271
L4 45.50-0.00	22.06	1	12	0.5000	243.078	A	0.000	243.078	243.078	100.00	0.000	30.999
						B	0.000	243.078		100.00	0.000	24.138
						C	0.000	243.078		100.00	0.000	22.599

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	159.15	1.568	10	88.632	A	0.000	88.632	88.632	100.00	0.000	12.129
179.00-141.25					B	0.000	88.632		100.00	0.000	3.861
					C	0.000	88.632		100.00	0.000	1.560
L2	115.93	1.432	9	159.358	A	0.000	159.358	159.358	100.00	0.000	15.638
141.25-92.58					B	0.000	159.358		100.00	0.000	19.273
					C	0.000	159.358		100.00	0.000	15.196
L3 92.58-45.50	68.65	1.233	8	201.709	A	0.000	201.709	201.709	100.00	0.000	15.127
					B	0.000	201.709		100.00	0.000	18.644
					C	0.000	201.709		100.00	0.000	16.854
L4 45.50-0.00	22.06	1	6	239.286	A	0.000	239.286	239.286	100.00	0.000	14.619
					B	0.000	239.286		100.00	0.000	16.038

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	239.286		100.00	0.000	14.499

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	876.55	2846.33	A	1	0.65	1	1	1	88.632	3260.24	86.36	C
179.00-141.25			B	1	0.65	1	1	1	88.632			
			C	1	0.65	1	1	1	88.632			
L2	2968.14	8228.73	A	1	0.65	1	1	1	159.358	6081.15	124.95	C
141.25-92.58			B	1	0.65	1	1	1	159.358			
			C	1	0.65	1	1	1	159.358			
L3	3146.36	10784.85	A	1	0.65	1	1	1	201.709	6169.89	131.05	C
92.58-45.50			B	1	0.65	1	1	1	201.709			
			C	1	0.65	1	1	1	201.709			
L4 45.50-0.00	2731.51	13249.88	A	1	0.65	1	1	1	239.286	5578.08	122.60	C
			B	1	0.65	1	1	1	239.286			
			C	1	0.65	1	1	1	239.286			
Sum Weight:	9722.56	35109.80						OTM	1770456.08 lb-ft	21089.36		

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	876.55	2846.33	A	1	0.65	1	1	1	88.632	3260.24	86.36	C
179.00-141.25			B	1	0.65	1	1	1	88.632			
			C	1	0.65	1	1	1	88.632			
L2	2968.14	8228.73	A	1	0.65	1	1	1	159.358	6081.15	124.95	C
141.25-92.58			B	1	0.65	1	1	1	159.358			
			C	1	0.65	1	1	1	159.358			
L3	3146.36	10784.85	A	1	0.65	1	1	1	201.709	6169.89	131.05	C
92.58-45.50			B	1	0.65	1	1	1	201.709			
			C	1	0.65	1	1	1	201.709			
L4 45.50-0.00	2731.51	13249.88	A	1	0.65	1	1	1	239.286	5578.08	122.60	C
			B	1	0.65	1	1	1	239.286			
			C	1	0.65	1	1	1	239.286			
Sum Weight:	9722.56	35109.80						OTM	1770456.08 lb-ft	21089.36		

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	876.55	2846.33	A	1	0.65	1	1	1	88.632	3260.24	86.36	C
179.00-141.25			B	1	0.65	1	1	1	88.632			
			C	1	0.65	1	1	1	88.632			
L2	2968.14	8228.73	A	1	0.65	1	1	1	159.358	6081.15	124.95	C
141.25-92.58			B	1	0.65	1	1	1	159.358			
			C	1	0.65	1	1	1	159.358			
L3	3146.36	10784.85	A	1	0.65	1	1	1	201.709	6169.89	131.05	C
92.58-45.50			B	1	0.65	1	1	1	201.709			
			C	1	0.65	1	1	1	201.709			
L4 45.50-0.00	2731.51	13249.88	A	1	0.65	1	1	1	239.286	5578.08	122.60	C
			B	1	0.65	1	1	1	239.286			
			C	1	0.65	1	1	1	239.286			
Sum Weight:	9722.56	35109.80						OTM	1770456.08 lb-ft	21089.36		

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	1039.37	3514.39	A	1	0.65	1	1	1	91.778	3048.97	80.77	C
179.00-141.25			B	1	0.65	1	1	1	91.778			
			C	1	0.65	1	1	1	91.778			
L2	3390.34	9423.95	A	1	0.65	1	1	1	163.413	5703.38	117.18	C
141.25-92.58			B	1	0.65	1	1	1	163.413			
			C	1	0.65	1	1	1	163.413			
L3	3571.25	12293.24	A	1	0.65	1	1	1	205.632	5603.40	119.02	C
92.58-45.50			B	1	0.65	1	1	1	205.632			
			C	1	0.65	1	1	1	205.632			
L4 45.50-0.00	3113.02	15036.08	A	1	0.65	1	1	1	243.078	4914.07	108.00	C
			B	1	0.65	1	1	1	243.078			
			C	1	0.65	1	1	1	243.078			
Sum Weight:	11113.97	40267.66						OTM	1639499.92 lb-ft	19269.82		

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	1039.37	3514.39	A	1	0.65	1	1	1	91.778	3048.97	80.77	C
179.00-141.25			B	1	0.65	1	1	1	91.778			
			C	1	0.65	1	1	1	91.778			
L2	3390.34	9423.95	A	1	0.65	1	1	1	163.413	5703.38	117.18	C
141.25-92.58			B	1	0.65	1	1	1	163.413			
			C	1	0.65	1	1	1	163.413			
L3	3571.25	12293.24	A	1	0.65	1	1	1	205.632	5603.40	119.02	C
92.58-45.50			B	1	0.65	1	1	1	205.632			
			C	1	0.65	1	1	1	205.632			

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
L4 45.50-0.00	3113.02	15036.08	A	1	0.65	1	1	1	243.078	4914.07	108.00	C
			B	1	0.65	1	1	1	243.078			
			C	1	0.65	1	1	1	243.078			
Sum Weight:	11113.97	40267.66						OTM	1639499.92 lb-ft	19269.82		

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	1039.37	3514.39	A	1	0.65	1	1	1	91.778	3048.97	80.77	C
179.00-141.25			B	1	0.65	1	1	1	91.778			
			C	1	0.65	1	1	1	91.778			
L2	3390.34	9423.95	A	1	0.65	1	1	1	163.413	5703.38	117.18	C
141.25-92.58			B	1	0.65	1	1	1	163.413			
			C	1	0.65	1	1	1	163.413			
L3	3571.25	12293.24	A	1	0.65	1	1	1	205.632	5603.40	119.02	C
92.58-45.50			B	1	0.65	1	1	1	205.632			
			C	1	0.65	1	1	1	205.632			
L4 45.50-0.00	3113.02	15036.08	A	1	0.65	1	1	1	243.078	4914.07	108.00	C
			B	1	0.65	1	1	1	243.078			
			C	1	0.65	1	1	1	243.078			
Sum Weight:	11113.97	40267.66						OTM	1639499.92 lb-ft	19269.82		

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	876.55	2846.33	A	1	0.65	1	1	1	88.632	1273.53	33.74	C
179.00-141.25			B	1	0.65	1	1	1	88.632			
			C	1	0.65	1	1	1	88.632			
L2	2968.14	8228.73	A	1	0.65	1	1	1	159.358	2375.45	48.81	C
141.25-92.58			B	1	0.65	1	1	1	159.358			
			C	1	0.65	1	1	1	159.358			
L3	3146.36	10784.85	A	1	0.65	1	1	1	201.709	2410.11	51.19	C
92.58-45.50			B	1	0.65	1	1	1	201.709			
			C	1	0.65	1	1	1	201.709			
L4 45.50-0.00	2731.51	13249.88	A	1	0.65	1	1	1	239.286	2178.94	47.89	C
			B	1	0.65	1	1	1	239.286			
			C	1	0.65	1	1	1	239.286			
Sum Weight:	9722.56	35109.80						OTM	691584.41 lb-ft	8238.03		

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	876.55	2846.33	A	1	0.65	1	1	1	88.632	1273.53	33.74	C
179.00-141.25			B	1	0.65	1	1	1	88.632			
			C	1	0.65	1	1	1	88.632			
L2	2968.14	8228.73	A	1	0.65	1	1	1	159.358	2375.45	48.81	C
141.25-92.58			B	1	0.65	1	1	1	159.358			
			C	1	0.65	1	1	1	159.358			
L3	3146.36	10784.85	A	1	0.65	1	1	1	201.709	2410.11	51.19	C
92.58-45.50			B	1	0.65	1	1	1	201.709			
			C	1	0.65	1	1	1	201.709			
L4 45.50-0.00	2731.51	13249.88	A	1	0.65	1	1	1	239.286	2178.94	47.89	C
			B	1	0.65	1	1	1	239.286			
			C	1	0.65	1	1	1	239.286			
Sum Weight:	9722.56	35109.80						OTM	691584.41 lb-ft	8238.03		

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	876.55	2846.33	A	1	0.65	1	1	1	88.632	1273.53	33.74	C
179.00-141.25			B	1	0.65	1	1	1	88.632			
			C	1	0.65	1	1	1	88.632			
L2	2968.14	8228.73	A	1	0.65	1	1	1	159.358	2375.45	48.81	C
141.25-92.58			B	1	0.65	1	1	1	159.358			
			C	1	0.65	1	1	1	159.358			
L3	3146.36	10784.85	A	1	0.65	1	1	1	201.709	2410.11	51.19	C
92.58-45.50			B	1	0.65	1	1	1	201.709			
			C	1	0.65	1	1	1	201.709			
L4 45.50-0.00	2731.51	13249.88	A	1	0.65	1	1	1	239.286	2178.94	47.89	C
			B	1	0.65	1	1	1	239.286			
			C	1	0.65	1	1	1	239.286			
Sum Weight:	9722.56	35109.80						OTM	691584.41 lb-ft	8238.03		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	35109.80					
Bracing Weight	0.00					
Total Member Self-Weight	35109.80			-2001.80	-153.63	
Total Weight	53789.98			-2001.80	-153.63	
Wind 0 deg - No Ice		-261.70	-38502.94	-4334825.54	37448.96	1097.70
Wind 30 deg - No Ice		19174.73	-33073.02	-3712425.58	-2155587.97	1264.52

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 60 deg - No Ice		33139.99	-19156.61	-2154453.68	-3720414.48	889.62
Wind 90 deg - No Ice		38285.53	-131.47	-23860.22	-4298325.05	224.59
Wind 120 deg - No Ice		33305.60	19038.00	2129358.66	-3746095.58	-593.25
Wind 150 deg - No Ice		19067.61	33164.33	3721463.51	-2136619.01	-1181.61
Wind 180 deg - No Ice		42.99	38259.96	4292721.42	-6295.40	-1278.88
Wind 210 deg - No Ice		-18988.74	33072.55	3708302.51	2125037.86	-1010.08
Wind 240 deg - No Ice		-33416.69	18799.95	2095189.58	3761810.93	-504.45
Wind 270 deg - No Ice		-38374.92	-316.95	-50456.33	4310877.20	-8.66
Wind 300 deg - No Ice		-33288.84	-19292.19	-2173883.46	3741477.05	389.26
Wind 330 deg - No Ice		-19420.10	-33171.90	-3726608.09	2190504.14	711.24
Member Ice	5157.86					
Total Weight Ice	64738.88			-2164.39	-516.40	
Wind 0 deg - Ice		-201.78	-34164.86	-3836707.65	28506.70	985.16
Wind 30 deg - Ice		17035.43	-29373.90	-3289923.58	-1911078.66	928.18
Wind 60 deg - Ice		29440.60	-17013.41	-1909227.66	-3298083.73	459.72
Wind 90 deg - Ice		34005.41	-113.66	-20846.07	-3809470.95	-173.45
Wind 120 deg - Ice		29565.28	16904.08	1885994.40	-3317542.38	-834.45
Wind 150 deg - Ice		16935.33	29438.98	3294912.89	-1893876.99	-1215.29
Wind 180 deg - Ice		26.31	33969.92	3801811.33	-4298.91	-1130.52
Wind 210 deg - Ice		-16886.21	29373.52	3285498.95	1885782.40	-724.05
Wind 240 deg - Ice		-29662.59	16727.27	1860564.12	3330509.25	-150.71
Wind 270 deg - Ice		-34077.13	-246.10	-39893.87	3818755.08	346.69
Wind 300 deg - Ice		-29551.84	-17108.01	-1922832.80	3313050.70	670.80
Wind 330 deg - Ice		-17218.13	-29445.06	-3300157.06	1936322.02	837.93
Total Weight	53789.98			-2001.80	-153.63	
Wind 0 deg - Service		-102.23	-15040.21	-1692296.31	14351.03	428.79
Wind 30 deg - Service		7490.13	-12919.15	-1449171.33	-842304.03	493.95
Wind 60 deg - Service		12945.31	-7483.05	-840588.55	-1453564.38	347.51
Wind 90 deg - Service		14955.28	-51.36	-8325.48	-1679310.69	87.73
Wind 120 deg - Service		13010.00	7436.72	832775.64	-1463596.06	-231.74
Wind 150 deg - Service		7448.29	12954.82	1454691.60	-834894.27	-461.56
Wind 180 deg - Service		16.79	14945.30	1677839.22	-2736.61	-499.56
Wind 210 deg - Service		-7417.47	12918.96	1449550.58	829815.44	-394.56
Wind 240 deg - Service		-13053.39	7343.73	819428.35	1469179.92	-197.05
Wind 270 deg - Service		-14990.20	-123.81	-18714.59	1683658.93	-3.38
Wind 300 deg - Service		-13003.45	-7536.01	-848178.31	1461237.00	152.05
Wind 330 deg - Service		-7585.98	-12957.77	-1454711.37	855388.21	277.83

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

Comb. No.	Description
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	179 - 141.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-10221.28	97.96	90.42
			Max. Mx	11	-6977.30	179051.94	5292.00
			Max. My	2	-6965.02	4007.40	181996.71
			Max. Vy	11	-10738.43	179051.94	5292.00
			Max. Vx	2	-10856.32	4007.40	181996.71
			Max. Torque	12			648.49
L2	141.25 - 92.58	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-29075.67	-616.24	615.34
			Max. Mx	11	-21245.12	1190626.81	18454.35
			Max. My	2	-21231.08	12000.42	1200988.40
			Max. Vy	11	-26804.75	1190626.81	18454.35
			Max. Vx	2	-26939.18	12000.42	1200988.40
			Max. Torque	8			1216.03
L3	92.58 - 45.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-44043.98	-574.77	1223.48
			Max. Mx	11	-34815.18	2545000.92	34035.12
			Max. My	2	-34807.31	24374.04	2561980.61
			Max. Vy	11	-32626.29	2545000.92	34035.12
			Max. Vx	2	-32759.39	24374.04	2561980.61
			Max. Torque	8			1236.51
L4	45.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-64738.88	-516.40	2164.39
			Max. Mx	11	-53769.23	4430121.24	52031.33
			Max. My	2	-53769.04	38574.66	4454823.67
			Max. Vy	11	-38404.00	4430121.24	52031.33
			Max. Vx	2	-38532.18	38574.66	4454823.67
			Max. Torque	8			1256.06

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	15	64738.88	201.78	34164.87
	Max. H_x	11	53789.98	38374.93	316.95
	Max. H_z	2	53789.98	261.70	38502.95
	Max. M_x	2	4454823.67	261.70	38502.95
	Max. M_z	5	4417221.99	-38285.53	131.47
	Max. Torsion	8	1256.06	-42.99	-38259.96
	Min. Vert	1	53789.98	0.00	0.00
	Min. H_x	5	53789.98	-38285.53	131.47
	Min. H_z	8	53789.98	-42.99	-38259.96
	Min. M_x	8	-4411462.37	-42.99	-38259.96
	Min. M_z	11	-4430121.24	38374.93	316.95
	Min. Torsion	3	-1241.70	-19174.73	33073.02

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	53789.98	0.00	0.00	-2001.80	-153.63	0.00
Dead+Wind 0 deg - No Ice	53789.98	-261.70	-38502.95	-4454823.67	38574.84	1077.49
Dead+Wind 30 deg - No Ice	53789.98	19174.73	-33073.02	-3815097.66	-2215270.51	1241.70
Dead+Wind 60 deg - No Ice	53789.98	33139.99	-19156.61	-2214088.08	-3823327.09	877.63
Dead+Wind 90 deg - No Ice	53789.98	38285.53	-131.47	-24636.57	-4417221.99	228.57
Dead+Wind 120 deg - No Ice	53789.98	33305.60	19038.00	2188154.23	-3849807.75	-574.52
Dead+Wind 150 deg - No Ice	53789.98	19067.61	33164.33	3824417.69	-2195659.88	-1159.62
Dead+Wind 180 deg - No Ice	53789.98	42.99	38259.96	4411462.37	-6485.72	-1256.06
Dead+Wind 210 deg - No Ice	53789.98	-18988.74	33072.55	3810879.00	2183738.31	-993.06
Dead+Wind 240 deg - No Ice	53789.98	-33416.69	18799.95	2152955.24	3865992.07	-503.61
Dead+Wind 270 deg - No Ice	53789.98	-38374.93	-316.95	-52031.34	4430121.24	-15.25
Dead+Wind 300 deg - No Ice	53789.98	-33288.84	-19292.19	-2234076.62	3844977.23	378.22
Dead+Wind 330 deg - No Ice	53789.98	-19420.10	-33171.90	-3829664.64	2251208.63	697.19
Dead+Ice+Temp	64738.88	0.00	0.00	-2164.39	-516.40	0.00
Dead+Wind 0 deg+Ice+Temp	64738.88	-201.78	-34164.87	-3974793.06	29616.97	957.65
Dead+Wind 30 deg+Ice+Temp	64738.88	17035.44	-29373.91	-3408194.04	-1979870.83	902.96
Dead+Wind 60 deg+Ice+Temp	64738.88	29440.60	-17013.41	-1977919.65	-3416690.35	448.81
Dead+Wind 90 deg+Ice+Temp	64738.88	34005.42	-113.66	-21723.67	-3946467.08	-165.75
Dead+Wind 120 deg+Ice+Temp	64738.88	29565.29	16904.08	1953695.31	-3436950.44	-810.35
Dead+Wind 150 deg+Ice+Temp	64738.88	16935.33	29438.99	3413396.61	-1961919.02	-1186.12
Dead+Wind 180 deg+Ice+Temp	64738.88	26.31	33969.93	3938511.87	-4480.15	-1101.24
Dead+Wind 210 deg+Ice+Temp	64738.88	-16886.22	29373.53	3403620.80	1953486.74	-702.90
Dead+Wind 240 deg+Ice+Temp	64738.88	-29662.60	16727.27	1927260.64	3450398.68	-148.17
Dead+Wind 270 deg+Ice+Temp	64738.88	-34077.14	-246.10	-41520.87	3956072.75	336.89
Dead+Wind 300 deg+Ice+Temp	64738.88	-29551.85	-17108.02	-1992044.59	3432195.43	652.14
Dead+Wind 330 deg+Ice+Temp	64738.88	-17218.13	-29445.06	-3418804.39	2006068.42	814.26
Dead+Wind 0 deg - Service	53789.98	-102.23	-15040.22	-1742400.85	14975.71	422.18
Dead+Wind 30 deg - Service	53789.98	7490.13	-12919.15	-1492343.58	-865917.67	487.90
Dead+Wind 60 deg - Service	53789.98	12945.31	-7483.05	-866608.84	-1494410.52	344.62
Dead+Wind 90 deg - Service	53789.98	14955.29	-51.36	-10885.56	-1726528.88	89.06
Dead+Wind 120 deg - Service	53789.98	13010.00	7436.72	853963.34	-1504765.91	-226.60
Dead+Wind 150 deg - Service	53789.98	7448.29	12954.82	1493475.57	-858250.54	-454.99
Dead+Wind 180 deg - Service	53789.98	16.79	14945.30	1722918.94	-2637.63	-492.67

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 210 deg - Service	53789.98	-7417.48	12918.97	1488177.36	853382.05	-389.27
Dead+Wind 240 deg - Service	53789.98	-13053.40	7343.73	840205.07	1510887.35	-195.82
Dead+Wind 270 deg - Service	53789.98	-14990.21	-123.81	-21593.72	1731374.29	-5.13
Dead+Wind 300 deg - Service	53789.98	-13003.45	-7536.01	-874429.76	1502681.52	147.96
Dead+Wind 330 deg - Service	53789.98	-7585.98	-12957.78	-1498051.05	879768.05	272.24

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	-53789.98	0.00	0.00	53789.98	0.00	0.000%
2	-261.70	-53789.98	-38502.94	261.70	53789.98	38502.95	0.000%
3	19174.73	-53789.98	-33073.02	-19174.73	53789.98	33073.02	0.000%
4	33139.99	-53789.98	-19156.61	-33139.99	53789.98	19156.61	0.000%
5	38285.53	-53789.98	-131.47	-38285.53	53789.98	131.47	0.000%
6	33305.60	-53789.98	19038.00	-33305.60	53789.98	-19038.00	0.000%
7	19067.61	-53789.98	33164.33	-19067.61	53789.98	-33164.33	0.000%
8	42.99	-53789.98	38259.96	-42.99	53789.98	-38259.96	0.000%
9	-18988.74	-53789.98	33072.55	18988.74	53789.98	-33072.55	0.000%
10	-33416.69	-53789.98	18799.95	33416.69	53789.98	-18799.95	0.000%
11	-38374.92	-53789.98	-316.95	38374.93	53789.98	316.95	0.000%
12	-33288.84	-53789.98	-19292.19	33288.84	53789.98	19292.19	0.000%
13	-19420.10	-53789.98	-33171.90	19420.10	53789.98	33171.90	0.000%
14	0.00	-64738.88	0.00	0.00	64738.88	0.00	0.000%
15	-201.78	-64738.88	-34164.86	201.78	64738.88	34164.87	0.000%
16	17035.43	-64738.88	-29373.90	-17035.44	64738.88	29373.91	0.000%
17	29440.60	-64738.88	-17013.41	-29440.60	64738.88	17013.41	0.000%
18	34005.41	-64738.88	-113.66	-34005.42	64738.88	113.66	0.000%
19	29565.28	-64738.88	16904.08	-29565.29	64738.88	-16904.08	0.000%
20	16935.33	-64738.88	29438.98	-16935.33	64738.88	-29438.99	0.000%
21	26.31	-64738.88	33969.92	-26.31	64738.88	-33969.93	0.000%
22	-16886.21	-64738.88	29373.52	16886.22	64738.88	-29373.53	0.000%
23	-29662.59	-64738.88	16727.27	29662.60	64738.88	-16727.27	0.000%
24	-34077.13	-64738.88	-246.10	34077.14	64738.88	246.10	0.000%
25	-29551.84	-64738.88	-17108.01	29551.85	64738.88	17108.02	0.000%
26	-17218.13	-64738.88	-29445.06	17218.13	64738.88	29445.06	0.000%
27	-102.23	-53789.98	-15040.21	102.23	53789.98	15040.22	0.000%
28	7490.13	-53789.98	-12919.15	-7490.13	53789.98	12919.15	0.000%
29	12945.31	-53789.98	-7483.05	-12945.31	53789.98	7483.05	0.000%
30	14955.28	-53789.98	-51.36	-14955.29	53789.98	51.36	0.000%
31	13010.00	-53789.98	7436.72	-13010.00	53789.98	-7436.72	0.000%
32	7448.29	-53789.98	12954.82	-7448.29	53789.98	-12954.82	0.000%
33	16.79	-53789.98	14945.30	-16.79	53789.98	-14945.30	0.000%
34	-7417.47	-53789.98	12918.96	7417.48	53789.98	-12918.97	0.000%
35	-13053.39	-53789.98	7343.73	13053.40	53789.98	-7343.73	0.000%
36	-14990.20	-53789.98	-123.81	14990.21	53789.98	123.81	0.000%
37	-13003.45	-53789.98	-7536.01	13003.45	53789.98	7536.01	0.000%
38	-7585.98	-53789.98	-12957.77	7585.98	53789.98	12957.78	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	4	0.00000001	0.00009247
3	Yes	5	0.00000001	0.00016264
4	Yes	5	0.00000001	0.00015698
5	Yes	4	0.00000001	0.00008688
6	Yes	5	0.00000001	0.00015751
7	Yes	5	0.00000001	0.00016091
8	Yes	4	0.00000001	0.00021477
9	Yes	5	0.00000001	0.00015351
10	Yes	5	0.00000001	0.00015862
11	Yes	4	0.00000001	0.00015767
12	Yes	5	0.00000001	0.00016294
13	Yes	5	0.00000001	0.00016120
14	Yes	4	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00011673
16	Yes	5	0.00000001	0.00032758
17	Yes	5	0.00000001	0.00032269
18	Yes	5	0.00000001	0.00011606
19	Yes	5	0.00000001	0.00032059
20	Yes	5	0.00000001	0.00032512
21	Yes	5	0.00000001	0.00011627
22	Yes	5	0.00000001	0.00031626
23	Yes	5	0.00000001	0.00032078
24	Yes	5	0.00000001	0.00011653
25	Yes	5	0.00000001	0.00033012
26	Yes	5	0.00000001	0.00032732
27	Yes	4	0.00000001	0.00004528
28	Yes	4	0.00000001	0.00043628
29	Yes	4	0.00000001	0.00040460
30	Yes	4	0.00000001	0.00003879
31	Yes	4	0.00000001	0.00040720
32	Yes	4	0.00000001	0.00042835
33	Yes	4	0.00000001	0.00005423
34	Yes	4	0.00000001	0.00039163
35	Yes	4	0.00000001	0.00041729
36	Yes	4	0.00000001	0.00004000
37	Yes	4	0.00000001	0.00043017
38	Yes	4	0.00000001	0.00041948

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	179 - 141.25	32.968	27	1.4888	0.0021
L2	145.58 - 92.58	22.777	27	1.3883	0.0015
L3	98.5 - 45.5	10.630	27	1.0170	0.0007
L4	53 - 0	3.098	27	0.5339	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.00	T-Arm Mount [TA 702-3]	27	32.968	1.4888	0.0021	69267
177.00	Gabriel Electronics 2' Dish	27	32.345	1.4846	0.0021	69267
174.00	T-Arm Mount [TA 602-3]	27	31.412	1.4782	0.0020	69267
172.00	800 MHz RRH w/ mast pipe	27	30.790	1.4739	0.0020	49477
163.00	Gabriel Electronics 2' Dish	27	28.009	1.4521	0.0018	21646
151.00	T-Arm Mount [TA 602-3]	27	24.376	1.4123	0.0016	12368
140.00	T-Arm Mount [TA 602-3]	27	21.166	1.3586	0.0014	9528
135.00	RayCap OVP Box	27	19.756	1.3280	0.0013	8886
130.00	PIROD 13' Low Profile Platform	27	18.380	1.2939	0.0012	8326
128.00	Gabriel Electronics 2' Dish	27	17.839	1.2793	0.0012	8121
120.00	APXV18-206517S_C w/ mast pipe	27	15.737	1.2163	0.0011	7393

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	179 - 141.25	84.221	2	3.8041	0.0054
L2	145.58 - 92.58	58.197	2	3.5474	0.0037
L3	98.5 - 45.5	27.168	2	2.5992	0.0017
L4	53 - 0	7.920	2	1.3649	0.0006

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.00	T-Arm Mount [TA 702-3]	2	84.221	3.8041	0.0054	27328
177.00	Gabriel Electronics 2' Dish	2	82.631	3.7935	0.0053	27328
174.00	T-Arm Mount [TA 602-3]	2	80.247	3.7773	0.0052	27328
172.00	800 MHz RRH w/ mast pipe	2	78.660	3.7662	0.0051	19520
163.00	Gabriel Electronics 2' Dish	2	71.559	3.7104	0.0046	8539
151.00	T-Arm Mount [TA 602-3]	2	62.280	3.6088	0.0040	4877
140.00	T-Arm Mount [TA 602-3]	2	54.083	3.4718	0.0035	3755
135.00	RayCap OVP Box	2	50.481	3.3936	0.0033	3501
130.00	PIROD 13' Low Profile Platform	2	46.965	3.3065	0.0031	3279
128.00	Gabriel Electronics 2' Dish	2	45.585	3.2693	0.0031	3198
120.00	APXV18-206517S_C w/ mast pipe	2	40.216	3.1082	0.0027	2909

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
2.2500	16	2.2500	172494.33	179215.46	52.936		Bolt T	1.31

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		
			131210.58 1.31	217809.56 0.82	45.000 1.18			✔

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	lb	lb	
L1	179 - 141.25 (1)	TP33.249x23.1x0.25	37.75	0.00	0.0	39.000	25.2610	-6965.02	985178.00	0.007
L2	141.25 - 92.58 (2)	TP45.833x31.5849x0.375	53.00	0.00	0.0	39.000	52.2121	-21231.10	2036270.00	0.010
L3	92.58 - 45.5 (3)	TP57.742x43.4915x0.375	53.00	0.00	0.0	39.000	65.8808	-34807.30	2569350.00	0.014
L4	45.5 - 0 (4)	TP69.225x54.9754x0.375	53.00	0.00	0.0	35.246	81.9487	-53769.00	2888390.00	0.019

Pole Bending Design Data

Section No.	Elevation	Size	Actual M_x	Actual f_{bx}	Allow. F_{bx}	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y	Actual f_{by}	Allow. F_{by}	Ratio $\frac{f_{by}}{F_{by}}$
	ft		lb-ft	ksi	ksi		lb-ft	ksi	ksi	
L1	179 - 141.25 (1)	TP33.249x23.1x0.25	182040.83	-11.008	39.000	0.282	0.00	0.000	39.000	0.000
L2	141.25 - 92.58 (2)	TP45.833x31.5849x0.375	1201050.00	-25.519	39.000	0.654	0.00	0.000	39.000	0.000
L3	92.58 - 45.5 (3)	TP57.742x43.4915x0.375	2562100.00	-34.132	39.000	0.875	0.00	0.000	39.000	0.000
L4	45.5 - 0 (4)	TP69.225x54.9754x0.375	4454991.67	-38.306	35.246	1.087	0.00	0.000	35.246	0.000

Pole Interaction Design Data

Section No.	Elevation	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
	ft							
L1	179 - 141.25 (1)	TP33.249x23.1x0.25	0.007	0.282	0.000	0.289 ✔	1.333	H1-3 ✔
L2	141.25 - 92.58 (2)	TP45.833x31.5849x0.375	0.010	0.654	0.000	0.665 ✔	1.333	H1-3 ✔
L3	92.58 - 45.5 (3)	TP57.742x43.4915x0.375	0.014	0.875	0.000	0.889 ✔	1.333	H1-3 ✔

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
L4	45.5 - 0 (4)	TP69.225x54.9754x0.375	0.019	1.087	0.000	1.105 ✔	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	179 - 141.25	Pole	TP33.249x23.1x0.25	1	-6965.02	1313242.22	21.7	Pass
L2	141.25 - 92.58	Pole	TP45.833x31.5849x0.375	2	-21231.10	2714347.80	49.9	Pass
L3	92.58 - 45.5	Pole	TP57.742x43.4915x0.375	3	-34807.30	3424943.41	66.7	Pass
L4	45.5 - 0	Pole	TP69.225x54.9754x0.375	4	-53769.00	3850223.71	82.9	Pass
							Summary	
						Pole (L4)	82.9	Pass
						Base Plate	98.6	Pass
						RATING =	**98.6**	**Pass**

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: CTHA014A

Town of Wethersfield Monopole
23 Kelleher Court
Wethersfield, CT 06109

August 22, 2014

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general public allowable limit:	**70.92 %**

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

EBI Consulting
environmental | engineering | due diligence

August 22, 2014

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

Emissions Analysis for Site: **CTHA014A – Town of Wethersfield Monopole**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **23 Kelleher Court, Wethersfield, 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 μW/cm2 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 (μW/cm2). The general population exposure limit for the 700 MHz Band is 567 μW/cm2, and the general population exposure limit for the PCS and AWS bands is 1000 μW/cm2. 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 **23 Kelleher Court, Wethersfield, 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-A1M** 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 **15.6 dBd** at its main lobe. The **Commscope LNX-6515DS-A1M** has a maximum gain of **15.5 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 **151 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.

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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:	15.6 dBd	Gain:	15.6 dBd	Gain:	15.6 dBd
Height (AGL):	151	Height (AGL):	151	Height (AGL):	151
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:	60	Total TX Power:	60	# AWS Channels:	60
ERP (W):	1,888.44	ERP (W):	1,888.44	ERP (W):	1,888.44
Antenna A1 MPE%	0.74	Antenna B1 MPE%	0.74	Antenna C1 MPE%	0.74
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:	15.6 dBd	Gain:	15.6 dBd	Gain:	15.6 dBd
Height (AGL):	151	Height (AGL):	151	Height (AGL):	151
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:	60	Total TX Power:	60	Total TX Power:	60
ERP (W):	1,888.44	ERP (W):	1,888.44	ERP (W):	1,888.44
Antenna A2 MPE%	0.74	Antenna B2 MPE%	0.74	Antenna C2 MPE%	0.74
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M	Make / Model:	Commscope LNX-6515DS-A1M
Gain:	15.5 dBd	Gain:	15.5 dBd	Gain:	15.5 dBd
Height (AGL):	151	Height (AGL):	151	Height (AGL):	151
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):	470.23	ERP (W):	470.23	ERP (W):	470.23
Antenna A3 MPE%	0.39	Antenna B3 MPE%	0.39	Antenna C3 MPE%	0.39

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**5.64**
Town	2.25 %
Clearwire	0.67 %
AT&T	17.54 %
Verizon Wireless	26.26 %
Sprint	4.67 %
Nextel	13.89 %
Site Total MPE %:	**70.92 %**

T-Mobile Sector 1 Total:	1.88 %
T-Mobile Sector 2 Total:	1.88 %
T-Mobile Sector 3 Total:	1.88 %
Site Total:	70.92 %

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Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector 1:	1.88 %
Sector 2:	1.88 %
Sector 3 :	1.88 %
T-Mobile Total:	5.64 %
Site Total:	70.92 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **70.92%** 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.

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