



Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

October 16, 2015

Melanie A. Bachman
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

**RE: T-Mobile - Exempt Modification - Crown Site BU: 881536
T-Mobile Site ID: CTNH037A
Located at: 120 Universal Drive, North Haven, CT 06473**

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of T-Mobile. T-Mobile is making modifications to certain existing sites in its Connecticut system in order to implement their 700MHz technology. Please accept this letter and exhibits as notification, pursuant to § 16-50j-73 of the Regulations of Connecticut State Agencies (“R.C.S.A.”), of construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In compliance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Michael J. Freda, First Selectman, Town of North Haven and Mr. William Berluti, 120 Universal Drive Associates, LLC, Property Owner.

T-Mobile plans to modify the existing wireless communications facility owned by Crown Castle and located at **120 Universal Drive, North Haven, CT**. Attached are a compound plan and elevation depicting the planned changes (Exhibit-1), and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration (Exhibit-2). Also included is a power density table report reflecting the modification to T-Mobile’s operations at the site (Exhibit-3).

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes (“C.G.S.”) § 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in the R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. T-Mobile’s additional antennas will be located at the same elevation on the existing tower.
2. There will be no proposed modifications to the ground and no extension of boundaries.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

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4. A Structural Modification Report confirming that the tower and foundation can support T-Mobile's proposed modifications is included as Exhibit-2.
5. The operation of the additional antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table report for T-Mobile's modified facility is included as Exhibit-3.

For the foregoing reasons, T-Mobile respectfully submits the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: Kimberly Myl.

Sincerely,



Kimberly Myl
Real Estate Specialist

Enclosures

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes

Tab 2: Exhibit-2: Structural Modification Report

Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: Mr. Michael J. Freda - First Selectman of North Haven
Town of North Haven
18 Church Street
North Haven, CT 06473

Mr. William Berluti
120 Universal Drive Associates, LLC
120 Universal Drive
North Haven, CT 06473

Date: **September 22, 2015**

Sean Dempsey
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277



Black & Veatch Corp.
10950 Grandview Drive
Overland Park, KS 66210
(913) 458-7245

Subject: **Structural Analysis Report**

Carrier Designation: **T-Mobile Co-Locate**
Carrier Site Number: CTNH037A
Carrier Site Name: CTNH037/Candid N. Haven

Crown Castle Designation: **Crown Castle BU Number:** 881536
Crown Castle Site Name: NORTH HAVEN TOWER
Crown Castle JDE Job Number: 347088
Crown Castle Work Order Number: 1120523
Crown Castle Application Number: 309462 Rev. 0

Engineering Firm Designation: **Black & Veatch Corp. Project Number:** 182896

Site Data: **120 Universal Drive, North Haven, New Haven County, CT**
Latitude 41° 20' 40.01", Longitude -72° 52' 14.92"
120 Foot - Monopole Tower

Dear Sean Dempsey,

Black & Veatch Corp. is pleased to submit this "**Structural Analysis Report**" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 827034, in accordance with application 309462, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Existing + Proposed Equipment

Sufficient Capacity

Note: See Table I and Table II for the proposed and existing loading, respectively.

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 85 mph fastest mile.

We at *Black & Veatch Corp.* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Jumpon Uea-areevorakul/Sheetal Ajaonkar

Respectfully submitted by:

Ping Jiang, P.E.
Professional Engineer

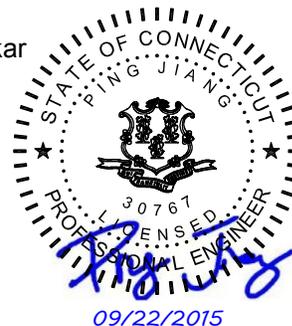


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1) INTRODUCTION

This tower is a 120 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in February of 2001. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed 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)	Note
83.0	84.0	3	commscope	LNX-6515DS-A1M w/ Mount Pipe	-	-	-
		3	ericsson	RRUS 11 B12			

Table 2 - 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)	Note
118.0	120.0	3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe	12 2 1	1-5/8 3/4 3/8	1
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		12	powerwave technologies	LGP2140X			
	118.0	1	cci tower mounts	Platform Mount [LP 712-1]			
116.0	117.0	6	ericsson	RRUS 11	-	-	1
	116.0	1	cci tower mounts	Side Arm Mount [SO 102-3]			
108.0	110.0	12	decibel	844G65VTZASX w/ Mount Pipe	12	1-1/4	1
	108.0	1	cci tower mounts	Platform Mount [LP 303-1]			
100.0	100.0	3	alcatel lucent	TME 1900MHz RRH (65MHz)	-	-	1
		1	cci tower mounts	Side Arm Mount [SO 102-3]			
	99.0	3	alcatel lucent	TME 800MHZ RRH			
97.0	98.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	1 3	1-1/4 1/2	1
		3	alcatel lucent	TD-RRH8x20-25			
		2	powerwave technologies	P40-16-XLPP-RR-A w/ Mount Pipe			
		9	rfs celwave	ACU-A20-N			
		1	rfs celwave	APXVSP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
	97.0	1	cci tower mounts	Platform Mount [LP 601-1]			
83.0	84.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	12 1	1-5/8 1-1/4	1
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	rfs celwave	ATMAA1412D-1A20			
	83.0	1	cci tower mounts	Platform Mount [LP 303-1]			
51.0	51.0	1	cci tower mounts	Side Arm Mount [SO 701-1]	1	1/2	1
		1	lucent	KS24019-L112A			

Notes:

- Existing Equipment

Table 3 - Design 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)
118.0	118.0	12	allgon	7120.16	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E., P.C.	1405753	CCSITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineering Endeavors, Inc.	1405795	CCSITES
4-TOWER MANUFACTURER DRAWINGS	Engineering Endeavors, Inc.	1405788	CCSITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Crown Castle	4125102	CCSITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- Tower and structures were built in accordance with the manufacturer's specifications.
- The tower and structures have been maintained in accordance with the manufacturer's specification.
- The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
- The existing base plate grout was not considered in this analysis.
- This analysis was performed under the assumption that all information provided to Black & Veatch is current and correct. This is to include site data, existing/proposed appurtenance

loading, tower/foundation details, and geotechnical data. The existing/proposed loading on the structure is based on CAD level drawings and carrier applications provided by the owner. If any of this information is not current and correct, this report should be considered obsolete and further analysis will be required.

This analysis may be affected if any assumptions are not valid or have been made in error. Black & Veatch Corp. should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	120 - 84.7161	Pole	TP32.5458x24.09x0.375	1	-10.19	1922.92	26.2	Pass
L2	84.7161 - 41.6224	Pole	TP42.0347x30.7011x0.4375	2	-21.62	2904.13	51.8	Pass
L3	41.6224 - 0	Pole	TP51x39.7912x0.5	3	-36.00	4166.42	57.4	Pass
							Summary	
						Pole (L3)	57.4	Pass
						RATING =	57.4	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	39.3	Pass
	Base Plate		47.7	Pass
1	Base Foundation	0	50.9	Pass
	Base Foundation Soil Interaction		17.8	Pass

Structure Rating (max from all components) =	57.4%
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Notes:

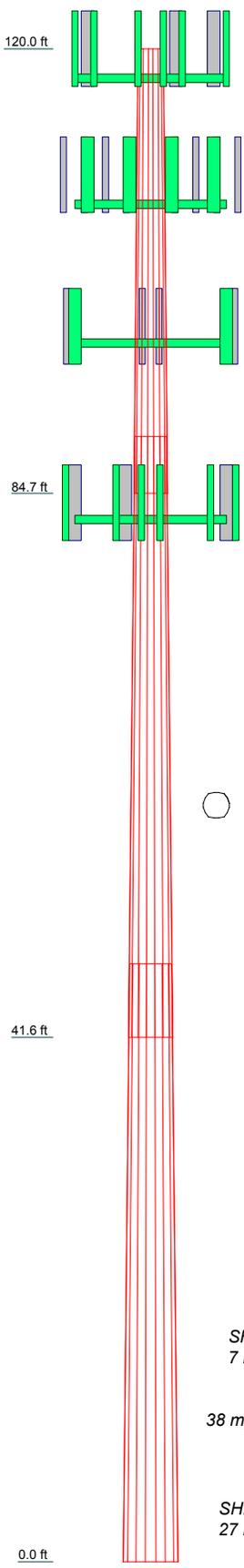
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

APPENDIX A
TNXTOWER OUTPUT

Section	1	2	3
Length (ft)	35.28	47.66	47.38
Number of Sides	18	18	18
Thickness (in)	0.3750	0.4375	0.5000
Socket Length (ft)	4.57	5.76	39.7912
Top Dia (in)	24.0900	30.7011	39.7912
Bot Dia (in)	32.5458	42.0347	51.0000
Grade	A572-65	A572-65	A572-65
Weight (K)	4.0	8.1	11.5



DESIGNED APPURTENANCE LOADING

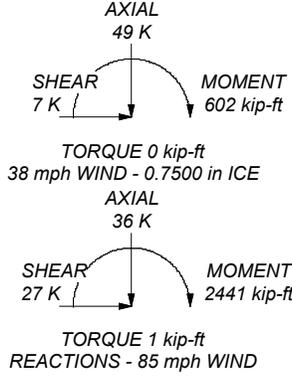
TYPE	ELEVATION	TYPE	ELEVATION
(2) 7770.00 w/ Mount Pipe	118	P40-16-XLPP-RR-A w/ Mount Pipe	97
(2) 7770.00 w/ Mount Pipe	118	APXVTM14-C-120 w/ Mount Pipe	97
(2) 7770.00 w/ Mount Pipe	118	APXVSP18-C-A20 w/ Mount Pipe	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	118	APXVTM14-C-120 w/ Mount Pipe	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	118	P40-16-XLPP-RR-A w/ Mount Pipe	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	118	APXVTM14-C-120 w/ Mount Pipe	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	118	(3) ACU-A20-N	97
AM-X-CD-16-65-00T-RET w/ Mount Pipe	118	(3) ACU-A20-N	97
(4) LGP2140X	118	(3) ACU-A20-N	97
(4) LGP2140X	118	800 EXTERNAL NOTCH FILTER	97
(4) LGP2140X	118	800 EXTERNAL NOTCH FILTER	97
8'x2" Antenna Mount Pipe	118	800 EXTERNAL NOTCH FILTER	97
8'x2" Antenna Mount Pipe	118	TD-RRH8x20-25	97
8'x2" Antenna Mount Pipe	118	TD-RRH8x20-25	97
Transition Ladder	118	TD-RRH8x20-25	97
Platform Mount [LP 712-1]	118	Transition Ladder	97
RRUS 11	116	Platform Mount [LP 601-1]	97
RRUS 11	116	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	83
RRUS 11	116	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	83
RRUS 11	116	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	83
RRUS 11	116	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	83
RRUS 11	116	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	83
RRUS 11	116	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	83
4' x 2" Pipe Mount	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
4' x 2" Pipe Mount	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
4' x 2" Pipe Mount	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
4' x 2" Pipe Mount	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
4' x 2" Pipe Mount	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
4' x 2" Pipe Mount	116	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	83
4' x 2" Pipe Mount	116	ATMAA1412D-1A20	83
Side Arm Mount [SO 102-3]	116	ATMAA1412D-1A20	83
(4) 844G65VTZASX w/ Mount Pipe	108	ATMAA1412D-1A20	83
(4) 844G65VTZASX w/ Mount Pipe	108	LNX-6515DS-A1M w/ Mount Pipe	83
(4) 844G65VTZASX w/ Mount Pipe	108	LNX-6515DS-A1M w/ Mount Pipe	83
(4) 844G65VTZASX w/ Mount Pipe	108	LNX-6515DS-A1M w/ Mount Pipe	83
Platform Mount [LP 303-1]	108	LNX-6515DS-A1M w/ Mount Pipe	83
TME 1900MHz RRH (65MHz)	100	RRUS 11 B12	83
TME 1900MHz RRH (65MHz)	100	RRUS 11 B12	83
TME 1900MHz RRH (65MHz)	100	RRUS 11 B12	83
TME 800MHZ RRH	100	8'x2" Antenna Mount Pipe	83
TME 800MHZ RRH	100	8'x2" Antenna Mount Pipe	83
TME 800MHZ RRH	100	8'x2" Antenna Mount Pipe	83
4' x 2" Pipe Mount	100	Platform Mount [LP 303-1]	83
4' x 2" Pipe Mount	100	KS24019-L112A	51
4' x 2" Pipe Mount	100	Side Arm Mount [SO 701-1]	51
Side Arm Mount [SO 102-3]	100		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 57.4%



<p>BLACK & VEATCH Building a world of difference.[®]</p> <p>C:\Program Files (x86)\TNTX\tower\BV\Logow.BMP</p>	<p>Black & Veatch Corp. 10950 Grandview Drive Overland Park, KS 66210</p> <p>Phone: (913) 458-7245 FAX: (913) 458-8136</p>	<p>Job: NORTH HAVEN TOWER (BU# 881536)</p> <p>Project: 182896 (881536.1120523)</p> <p>Client: Crown Castle Drawn by: Sheetal Ajaonkar App'd:</p> <p>Code: TIA/EIA-222-F Date: 09/22/15 Scale: NTS</p> <p>Path: C:\Users\jag4202\Desktop\CGITower_S&C\Verification\881536\1120523\Structural Analysis.dwg</p>
	<p>Dwg No. E-1</p>	

Tower Input Data

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

- 1) Tower is located in New Haven County, Connecticut.
- 2) Basic wind speed of 85 mph.
- 3) Nominal ice thickness of 0.7500 in.
- 4) Ice thickness is considered to increase with height.
- 5) Ice density of 56 pcf.
- 6) A wind speed of 38 mph is used in combination with ice.
- 7) Temperature drop of 50 °F.
- 8) Deflections calculated using a wind speed of 50 mph.
- 9) A non-linear (P-delta) analysis was used.
- 10) Pressures are calculated at each section.
- 11) Stress ratio used in pole design is 1.333.
- 12) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys ✓ Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas SR Members Have Cut Ends Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Use TIA-222-G Tension Splice Capacity Exemption	Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feedline Torque Include Angle Block Shear Check <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
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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	120.00-84.72	35.28	4.57	18	24.0900	32.5458	0.3750	1.5000	A572-65 (65 ksi)
L2	84.72-41.62	47.66	5.76	18	30.7011	42.0347	0.4375	1.7500	A572-65 (65 ksi)
L3	41.62-0.00	47.38		18	39.7912	51.0000	0.5000	2.0000	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	24.4616 33.0479	28.2268 38.2913	2005.6033 5006.8113	8.4188 11.4206	12.2377 16.5333	163.8870 302.8326	4013.8455 10020.210	14.1161 19.1493	3.5798 5.0681	9.546 13.515

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
L2	32.2777	42.0249	4862.7974	10.7436	15.5962	311.7941	9731.9934	21.0164	4.6334	10.591
	42.6832	57.7629	12627.422	14.7670	21.3536	591.3479	25271.461	28.8869	6.6281	15.15
L3	41.7876	62.3551	12161.823	13.9484	20.2139	601.6563	24339.649	31.1835	6.1232	12.246
	51.7868	80.1435	25821.918	17.9275	25.9080	996.6774	51677.814	40.0794	8.0960	16.192

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
L1 120.00-84.72				1	1	1		
L2 84.72-41.62				1	1	1		
L3 41.62-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number		C _A A _A	Weight
				ft			ft ² /ft	plf
Safety Line 3/8	B	No	CaAa (Out Of Face)	120.00 - 11.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46
LDF7-50A(1-5/8")	B	No	Inside Pole	118.00 - 3.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
2" innerduct conduit	B	No	Inside Pole	118.00 - 3.00	1	No Ice	0.00	0.20
						1/2" Ice	0.00	0.20
						1" Ice	0.00	0.20
						2" Ice	0.00	0.20
						4" Ice	0.00	0.20
FB-L98B-002-75000(3/8")	B	No	Inside Pole	118.00 - 3.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	B	No	Inside Pole	118.00 - 3.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
						2" Ice	0.00	0.58
						4" Ice	0.00	0.58

LDF6-50A(1-1/4")	A	No	Inside Pole	108.00 - 10.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
HB114-13U3M12-XXXF(1-1/4")	A	No	CaAa (Out Of Face)	97.00 - 10.00	1	No Ice	0.15	0.99
						1/2" Ice	0.25	2.24
						1" Ice	0.35	4.10
						2" Ice	0.55	9.64
						4" Ice	0.95	28.07
HYBRIFLEX RRH 1-SECTOR(1/2")	A	No	CaAa (Out Of Face)	97.00 - 10.00	3	No Ice	0.00	0.15
						1/2" Ice	0.00	0.83
						1" Ice	0.00	2.13
						2" Ice	0.00	6.55
						4" Ice	0.00	22.73

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
MLE Hybrid 3Power/6Fiber RL 2 10AWG(1-1/4")	C	No	Inside Pole	83.00 - 10.00	1	No Ice	0.00	0.46
						1/2" Ice	0.00	0.46
						1" Ice	0.00	0.46
						2" Ice	0.00	0.46
						4" Ice	0.00	0.46
HCC 158-50J(1-5/8")	C	No	Inside Pole	83.00 - 10.00	12	No Ice	0.00	0.86
						1/2" Ice	0.00	0.86
						1" Ice	0.00	0.86
						2" Ice	0.00	0.86
						4" Ice	0.00	0.86
LDF4-50A(1/2")	A	No	CaAa (Out Of Face)	51.00 - 10.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.84
						1" Ice	0.00	2.14
						2" Ice	0.00	6.58
						4" Ice	0.00	22.78

Feed Line/Linear Appurtenances Section Areas

Tower Section n	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 K
L1	120.00-84.72	A	0.000	0.000	0.000	1.892	0.20
		B	0.000	0.000	0.000	1.323	0.38
		C	0.000	0.000	0.000	0.000	0.00
L2	84.72-41.62	A	0.000	0.000	0.000	6.636	0.40
		B	0.000	0.000	0.000	1.616	0.50
		C	0.000	0.000	0.000	0.000	0.45
L3	41.62-0.00	A	0.000	0.000	0.000	4.870	0.30
		B	0.000	0.000	0.000	1.148	0.44
		C	0.000	0.000	0.000	0.000	0.34

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	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 K
L1	120.00-84.72	A	0.858	0.000	0.000	0.000	4.001	0.29
		B		0.000	0.000	0.000	7.381	0.41
		C		0.000	0.000	0.000	0.000	0.00
L2	84.72-41.62	A	0.810	0.000	0.000	0.000	14.035	0.74
		B		0.000	0.000	0.000	9.015	0.53
		C		0.000	0.000	0.000	0.000	0.45
L3	41.62-0.00	A	0.750	0.000	0.000	0.000	9.993	0.57
		B		0.000	0.000	0.000	6.110	0.47
		C		0.000	0.000	0.000	0.000	0.34

Feed Line Center of Pressure

Section	Elevation ft	CP _x in	CP _z in	CP _x Ice in	CP _z Ice in
L1	120.00-84.72	0.0469	-0.0579	0.2270	-0.0248
L2	84.72-41.62	0.0459	-0.1910	0.2227	-0.2717
L3	41.62-0.00	0.0336	-0.1454	0.1631	-0.2147

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K

(2) 7770.00 w/ Mount Pipe	A	From Leg	3.00 0.00 2.00	-20.0000	118.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						Ice	7.13	5.71	0.16
						1" Ice	8.16	7.16	0.29
						2" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe	B	From Leg	3.00 0.00 2.00	-20.0000	118.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						Ice	7.13	5.71	0.16
						1" Ice	8.16	7.16	0.29
						2" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe	C	From Leg	3.00 0.00 2.00	-20.0000	118.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						Ice	7.13	5.71	0.16
						1" Ice	8.16	7.16	0.29
						2" Ice	10.36	10.41	0.66
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	3.00 2.00 2.00	-20.0000	118.00	No Ice	8.50	6.30	0.07
						1/2" Ice	9.15	7.48	0.14
						Ice	9.77	8.37	0.21
						1" Ice	11.03	10.18	0.38
						2" Ice	13.68	14.02	0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	3.00 2.00 2.00	-20.0000	118.00	No Ice	8.50	6.30	0.07
						1/2" Ice	9.15	7.48	0.14
						Ice	9.77	8.37	0.21
						1" Ice	11.03	10.18	0.38
						2" Ice	13.68	14.02	0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	3.00 2.00 2.00	-20.0000	118.00	No Ice	8.50	6.30	0.07
						1/2" Ice	9.15	7.48	0.14
						Ice	9.77	8.37	0.21
						1" Ice	11.03	10.18	0.38
						2" Ice	13.68	14.02	0.87
(4) LGP2140X	A	From Leg	3.00 0.00 2.00	-20.0000	118.00	No Ice	1.26	0.38	0.01
						1/2" Ice	1.42	0.49	0.02
						Ice	1.58	0.62	0.03
						1" Ice	1.94	0.89	0.05
						2" Ice	2.75	1.54	0.13
(4) LGP2140X	B	From Leg	3.00 0.00 2.00	-20.0000	118.00	No Ice	1.26	0.38	0.01
						1/2" Ice	1.42	0.49	0.02
						Ice	1.58	0.62	0.03
						1" Ice	1.94	0.89	0.05
						2" Ice	2.75	1.54	0.13
(4) LGP2140X	C	From Leg	3.00 0.00 2.00	-20.0000	118.00	No Ice	1.26	0.38	0.01
						1/2" Ice	1.42	0.49	0.02
						Ice	1.58	0.62	0.03
						1" Ice	1.94	0.89	0.05
						2" Ice	2.75	1.54	0.13
8'x2" Antenna Mount Pipe	A	From Leg	3.00 -2.00 0.00	0.0000	118.00	No Ice	1.90	1.90	0.03
						1/2" Ice	2.73	2.73	0.04
						Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice	6.50	6.50	0.30
8'x2" Antenna Mount Pipe	B	From Leg	3.00	0.0000	118.00	No Ice	1.90	1.90	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
			-2.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice	6.50	6.50	0.30
						4" Ice			
8'x2" Antenna Mount Pipe	C	From Leg	3.00	0.0000	118.00	No Ice	1.90	1.90	0.03
			-2.00			1/2"	2.73	2.73	0.04
			0.00			Ice	3.40	3.40	0.06
						1" Ice	4.40	4.40	0.12
						2" Ice	6.50	6.50	0.30
						4" Ice			
Transition Ladder	B	From Leg	3.00	0.0000	118.00	No Ice	6.00	6.00	0.16
			2.00			1/2"	8.00	8.00	0.24
			-6.00			Ice	10.00	10.00	0.32
						1" Ice	14.00	14.00	0.48
						2" Ice	22.00	22.00	0.80
						4" Ice			
Platform Mount [LP 712-1]	A	None		0.0000	118.00	No Ice	24.53	24.53	1.34
						1/2"	29.94	29.94	1.65
						Ice	35.35	35.35	1.96
						1" Ice	46.17	46.17	2.58
						2" Ice	67.81	67.81	3.82
						4" Ice			

RRUS 11	A	From Leg	1.00	-20.0000	116.00	No Ice	3.25	1.37	0.05
			-1.00			1/2"	3.49	1.55	0.07
			1.00			Ice	3.74	1.74	0.10
						1" Ice	4.27	2.14	0.15
						2" Ice	5.43	3.04	0.31
						4" Ice			
RRUS 11	A	From Leg	1.00	-20.0000	116.00	No Ice	3.25	1.37	0.05
			1.00			1/2"	3.49	1.55	0.07
			1.00			Ice	3.74	1.74	0.10
						1" Ice	4.27	2.14	0.15
						2" Ice	5.43	3.04	0.31
						4" Ice			
RRUS 11	B	From Leg	1.00	-20.0000	116.00	No Ice	3.25	1.37	0.05
			-1.00			1/2"	3.49	1.55	0.07
			1.00			Ice	3.74	1.74	0.10
						1" Ice	4.27	2.14	0.15
						2" Ice	5.43	3.04	0.31
						4" Ice			
RRUS 11	B	From Leg	1.00	-20.0000	116.00	No Ice	3.25	1.37	0.05
			1.00			1/2"	3.49	1.55	0.07
			1.00			Ice	3.74	1.74	0.10
						1" Ice	4.27	2.14	0.15
						2" Ice	5.43	3.04	0.31
						4" Ice			
RRUS 11	C	From Leg	1.00	-20.0000	116.00	No Ice	3.25	1.37	0.05
			-1.00			1/2"	3.49	1.55	0.07
			1.00			Ice	3.74	1.74	0.10
						1" Ice	4.27	2.14	0.15
						2" Ice	5.43	3.04	0.31
						4" Ice			
RRUS 11	C	From Leg	1.00	-20.0000	116.00	No Ice	3.25	1.37	0.05
			1.00			1/2"	3.49	1.55	0.07
			1.00			Ice	3.74	1.74	0.10
						1" Ice	4.27	2.14	0.15
						2" Ice	5.43	3.04	0.31
						4" Ice			
4' x 2" Pipe Mount	A	From Leg	1.00	0.0000	116.00	No Ice	0.79	0.79	0.03
			-1.00			1/2"	1.03	1.03	0.04
			0.00			Ice	1.28	1.28	0.04
						1" Ice	1.81	1.81	0.07
						2" Ice	3.11	3.11	0.17

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _{AA} _{Front}	C _{AA} _{Side}	Weight	
			Horz	Lateral	Vert						ft
			ft	ft	ft	°	ft	ft ²	ft ²	K	
4' x 2" Pipe Mount	A	From Leg	1.00			0.0000	116.00	4" Ice			
			1.00					No Ice	0.79	0.79	0.03
			0.00					1/2"	1.03	1.03	0.04
								Ice	1.28	1.28	0.04
								1" Ice	1.81	1.81	0.07
4' x 2" Pipe Mount	B	From Leg	1.00			0.0000	116.00	2" Ice	3.11	3.11	0.17
			-1.00					4" Ice			
			0.00					No Ice	0.79	0.79	0.03
								1/2"	1.03	1.03	0.04
								Ice	1.28	1.28	0.04
4' x 2" Pipe Mount	B	From Leg	1.00			0.0000	116.00	1" Ice	1.81	1.81	0.07
			1.00					2" Ice	3.11	3.11	0.17
			0.00					4" Ice			
								No Ice	0.79	0.79	0.03
								1/2"	1.03	1.03	0.04
4' x 2" Pipe Mount	C	From Leg	1.00			0.0000	116.00	Ice	1.28	1.28	0.04
			-1.00					1" Ice	1.81	1.81	0.07
			0.00					2" Ice	3.11	3.11	0.17
								4" Ice			
								No Ice	0.79	0.79	0.03
Side Arm Mount [SO 102-3]	A	None				0.0000	116.00	1/2"	1.03	1.03	0.04
								Ice	1.28	1.28	0.04
								1" Ice	1.81	1.81	0.07
								2" Ice	3.11	3.11	0.17
								4" Ice			
*** (4) 844G65VTZASX w/ Mount Pipe	A	From Face	4.00			20.0000	108.00	No Ice	6.13	5.21	0.03
			0.00					1/2"	6.59	5.89	0.09
			2.00					Ice	7.06	6.59	0.14
								1" Ice	8.04	8.04	0.28
								2" Ice	10.12	11.19	0.67
(4) 844G65VTZASX w/ Mount Pipe	B	From Face	4.00			20.0000	108.00	4" Ice			
			0.00					No Ice	6.13	5.21	0.03
			2.00					1/2"	6.59	5.89	0.09
								Ice	7.06	6.59	0.14
								1" Ice	8.04	8.04	0.28
(4) 844G65VTZASX w/ Mount Pipe	C	From Face	4.00			20.0000	108.00	2" Ice	10.12	11.19	0.67
			0.00					4" Ice			
			2.00					No Ice	6.13	5.21	0.03
								1/2"	6.59	5.89	0.09
								Ice	7.06	6.59	0.14
Platform Mount [LP 303-1]	A	None				0.0000	108.00	1" Ice	8.04	8.04	0.28
								2" Ice	10.12	11.19	0.67
								4" Ice			
								No Ice	14.66	14.66	1.25
								1/2"	18.87	18.87	1.48
*** TME 1900MHz RRH (65MHz)	A	From Face	1.00			10.0000	100.00	Ice	23.08	23.08	1.71
			0.00					1" Ice	31.50	31.50	2.18
							2" Ice	48.34	48.34	3.10	
							4" Ice				
							No Ice	2.71	2.61	0.06	
							1/2"	2.95	2.84	0.08	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral						Vert
			ft	ft	°	ft	ft ²	ft ²	K	
			0.00				Ice	3.20	3.09	0.11
							1" Ice	3.72	3.61	0.17
							2" Ice	4.86	4.74	0.35
							4" Ice			
TME 1900MHz RRH (65MHz)	B	From Face	1.00	-20.0000		100.00	No Ice	2.71	2.61	0.06
			0.00				1/2"	2.95	2.84	0.08
			0.00				Ice	3.20	3.09	0.11
							1" Ice	3.72	3.61	0.17
							2" Ice	4.86	4.74	0.35
							4" Ice			
TME 1900MHz RRH (65MHz)	C	From Leg	1.00	10.0000		100.00	No Ice	2.71	2.61	0.06
			0.00				1/2"	2.95	2.84	0.08
			0.00				Ice	3.20	3.09	0.11
							1" Ice	3.72	3.61	0.17
							2" Ice	4.86	4.74	0.35
							4" Ice			
TME 800MHZ RRH	A	From Face	1.00	10.0000		100.00	No Ice	2.49	2.07	0.05
			0.00				1/2"	2.71	2.27	0.07
			-1.00				Ice	2.93	2.48	0.10
							1" Ice	3.41	2.93	0.16
							2" Ice	4.46	3.93	0.32
							4" Ice			
TME 800MHZ RRH	B	From Face	1.00	-20.0000		100.00	No Ice	2.49	2.07	0.05
			0.00				1/2"	2.71	2.27	0.07
			-1.00				Ice	2.93	2.48	0.10
							1" Ice	3.41	2.93	0.16
							2" Ice	4.46	3.93	0.32
							4" Ice			
TME 800MHZ RRH	C	From Leg	1.00	10.0000		100.00	No Ice	2.49	2.07	0.05
			0.00				1/2"	2.71	2.27	0.07
			-1.00				Ice	2.93	2.48	0.10
							1" Ice	3.41	2.93	0.16
							2" Ice	4.46	3.93	0.32
							4" Ice			
4' x 2" Pipe Mount	A	From Face	1.00	0.0000		100.00	No Ice	0.79	0.79	0.03
			0.00				1/2"	1.03	1.03	0.04
			0.00				Ice	1.28	1.28	0.04
							1" Ice	1.81	1.81	0.07
							2" Ice	3.11	3.11	0.17
							4" Ice			
4' x 2" Pipe Mount	B	From Face	1.00	0.0000		100.00	No Ice	0.79	0.79	0.03
			0.00				1/2"	1.03	1.03	0.04
			0.00				Ice	1.28	1.28	0.04
							1" Ice	1.81	1.81	0.07
							2" Ice	3.11	3.11	0.17
							4" Ice			
4' x 2" Pipe Mount	C	From Leg	1.00	0.0000		100.00	No Ice	0.79	0.79	0.03
			0.00				1/2"	1.03	1.03	0.04
			0.00				Ice	1.28	1.28	0.04
							1" Ice	1.81	1.81	0.07
							2" Ice	3.11	3.11	0.17
							4" Ice			
Side Arm Mount [SO 102-3]	A	None			0.0000	100.00	No Ice	3.00	3.00	0.08
							1/2"	3.48	3.48	0.11
							Ice	3.96	3.96	0.14
							1" Ice	4.92	4.92	0.20
							2" Ice	6.84	6.84	0.32
							4" Ice			

P40-16-XLPP-RR-A w/ Mount Pipe	A	From Face	3.00	10.0000		97.00	No Ice	9.37	4.83	0.07
			-6.00				1/2"	9.91	5.57	0.14
			1.00				Ice	10.45	6.27	0.21
							1" Ice	11.56	7.80	0.37
							2" Ice	13.89	11.11	0.82
							4" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
APXVTM14-C-120 w/ Mount Pipe	A	From Face	3.00	10.0000	97.00	No Ice	7.13	4.96	0.08
			6.00			1/2"	7.66	5.75	0.13
			1.00			Ice	8.18	6.47	0.19
						1" Ice	9.26	8.01	0.34
						2" Ice	11.53	11.41	0.75
APXVSP18-C-A20 w/ Mount Pipe	B	From Face	3.00	-20.0000	97.00	No Ice	8.50	6.95	0.08
			-6.00			1/2"	9.15	8.13	0.15
			1.00			Ice	9.77	9.02	0.23
						1" Ice	11.03	10.84	0.41
						2" Ice	13.68	14.85	0.91
APXVTM14-C-120 w/ Mount Pipe	B	From Face	3.00	-20.0000	97.00	No Ice	7.13	4.96	0.08
			6.00			1/2"	7.66	5.75	0.13
			1.00			Ice	8.18	6.47	0.19
						1" Ice	9.26	8.01	0.34
						2" Ice	11.53	11.41	0.75
P40-16-XLPP-RR-A w/ Mount Pipe	C	From Face	3.00	-50.0000	97.00	No Ice	9.37	4.83	0.07
			-6.00			1/2"	9.91	5.57	0.14
			1.00			Ice	10.45	6.27	0.21
						1" Ice	11.56	7.80	0.37
						2" Ice	13.89	11.11	0.82
APXVTM14-C-120 w/ Mount Pipe	C	From Face	3.00	-50.0000	97.00	No Ice	7.13	4.96	0.08
			6.00			1/2"	7.66	5.75	0.13
			1.00			Ice	8.18	6.47	0.19
						1" Ice	9.26	8.01	0.34
						2" Ice	11.53	11.41	0.75
(3) ACU-A20-N	A	From Face	3.00	10.0000	97.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			1.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
(3) ACU-A20-N	B	From Face	3.00	-20.0000	97.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			1.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
(3) ACU-A20-N	C	From Face	3.00	-50.0000	97.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			1.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
800 EXTERNAL NOTCH FILTER	A	From Face	3.00	10.0000	97.00	No Ice	0.77	0.37	0.01
			-6.00			1/2"	0.89	0.46	0.02
			1.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11
800 EXTERNAL NOTCH FILTER	B	From Face	3.00	-20.0000	97.00	No Ice	0.77	0.37	0.01
			-6.00			1/2"	0.89	0.46	0.02
			1.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11
800 EXTERNAL NOTCH FILTER	C	From Face	3.00	-50.0000	97.00	No Ice	0.77	0.37	0.01
			-6.00			1/2"	0.89	0.46	0.02
			1.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11

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 K	
TD-RRH8x20-25	A	From Face	3.00 6.00 1.00	10.0000	97.00	4" Ice			
						No Ice	4.72	1.70	0.07
						1/2"	5.01	1.92	0.10
						Ice	5.32	2.15	0.13
						1" Ice	5.95	2.62	0.20
						2" Ice	7.31	3.68	0.40
TD-RRH8x20-25	B	From Face	3.00 6.00 1.00	-20.0000	97.00	4" Ice			
						No Ice	4.72	1.70	0.07
						1/2"	5.01	1.92	0.10
						Ice	5.32	2.15	0.13
						1" Ice	5.95	2.62	0.20
						2" Ice	7.31	3.68	0.40
TD-RRH8x20-25	C	From Face	3.00 6.00 1.00	-50.0000	97.00	4" Ice			
						No Ice	4.72	1.70	0.07
						1/2"	5.01	1.92	0.10
						Ice	5.32	2.15	0.13
						1" Ice	5.95	2.62	0.20
						2" Ice	7.31	3.68	0.40
Transition Ladder	A	From Face	3.00 2.00 -6.00	0.0000	97.00	4" Ice			
						No Ice	6.00	6.00	0.16
						1/2"	8.00	8.00	0.24
						Ice	10.00	10.00	0.32
						1" Ice	14.00	14.00	0.48
						2" Ice	22.00	22.00	0.80
Platform Mount [LP 601-1]	A	None		0.0000	97.00	4" Ice			
						No Ice	28.47	28.47	1.12
						1/2"	33.59	33.59	1.51
						Ice	38.71	38.71	1.91
						1" Ice	48.95	48.95	2.69
						2" Ice	69.43	69.43	4.26
*** ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	3.00 -6.00 1.00	-20.0000	83.00	4" Ice			
						No Ice	6.83	5.64	0.11
						1/2"	7.35	6.48	0.17
						Ice	7.86	7.26	0.23
						1" Ice	8.93	8.86	0.38
						2" Ice	11.18	12.29	0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	3.00 -6.00 1.00	-30.0000	83.00	4" Ice			
						No Ice	6.83	5.64	0.11
						1/2"	7.35	6.48	0.17
						Ice	7.86	7.26	0.23
						1" Ice	8.93	8.86	0.38
						2" Ice	11.18	12.29	0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	3.00 -6.00 1.00	-30.0000	83.00	4" Ice			
						No Ice	6.83	5.64	0.11
						1/2"	7.35	6.48	0.17
						Ice	7.86	7.26	0.23
						1" Ice	8.93	8.86	0.38
						2" Ice	11.18	12.29	0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	3.00 6.00 1.00	-20.0000	83.00	4" Ice			
						No Ice	6.81	5.63	0.11
						1/2"	7.33	6.47	0.17
						Ice	7.85	7.24	0.23
						1" Ice	8.91	8.85	0.38
						2" Ice	11.16	12.27	0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	3.00 6.00 1.00	-30.0000	83.00	4" Ice			
						No Ice	6.81	5.63	0.11
						1/2"	7.33	6.47	0.17
						Ice	7.85	7.24	0.23
						1" Ice	8.91	8.85	0.38
						2" Ice	11.16	12.27	0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	3.00 6.00 1.00	-30.0000	83.00	4" Ice			
						No Ice	6.81	5.63	0.11
						1/2"	7.33	6.47	0.17
						Ice	7.85	7.24	0.23

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} _{Front}	C _{AA} _{Side}	Weight	
			Horz	Lateral						Vert
			ft	ft	°	ft	ft ²	ft ²	K	
ATMAA1412D-1A20	A	From Leg	3.00	-6.00	-20.0000	83.00	1" Ice	8.91	8.85	0.38
							2" Ice	11.16	12.27	0.81
							4" Ice			
							No Ice	1.17	0.47	0.01
							1/2" Ice	1.31	0.57	0.02
							1" Ice	1.47	0.69	0.03
							2" Ice	1.81	0.95	0.06
ATMAA1412D-1A20	B	From Leg	3.00	-6.00	-30.0000	83.00	2" Ice	2.58	1.57	0.14
							4" Ice			
							No Ice	1.17	0.47	0.01
							1/2" Ice	1.31	0.57	0.02
							1" Ice	1.47	0.69	0.03
							1" Ice	1.81	0.95	0.06
							2" Ice	2.58	1.57	0.14
ATMAA1412D-1A20	C	From Leg	3.00	-6.00	-30.0000	83.00	4" Ice			
							No Ice	1.17	0.47	0.01
							1/2" Ice	1.31	0.57	0.02
							1" Ice	1.47	0.69	0.03
							1" Ice	1.81	0.95	0.06
							2" Ice	2.58	1.57	0.14
							4" Ice			
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	3.00	-2.00	-20.0000	83.00	No Ice	11.68	9.84	0.08
							1/2" Ice	12.40	11.37	0.17
							1" Ice	13.14	12.91	0.27
							1" Ice	14.60	15.27	0.51
							2" Ice	17.87	20.14	1.15
							4" Ice			
							No Ice	11.68	9.84	0.08
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	3.00	-2.00	-30.0000	83.00	No Ice	11.68	9.84	0.08
							1/2" Ice	12.40	11.37	0.17
							1" Ice	13.14	12.91	0.27
							1" Ice	14.60	15.27	0.51
							2" Ice	17.87	20.14	1.15
							4" Ice			
							No Ice	11.68	9.84	0.08
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	3.00	-2.00	-30.0000	83.00	No Ice	11.68	9.84	0.08
							1/2" Ice	12.40	11.37	0.17
							1" Ice	13.14	12.91	0.27
							1" Ice	14.60	15.27	0.51
							2" Ice	17.87	20.14	1.15
							4" Ice			
							No Ice	11.68	9.84	0.08
RRUS 11 B12	A	From Leg	3.00	-2.00	-20.0000	83.00	No Ice	3.31	1.36	0.05
							1/2" Ice	3.55	1.54	0.07
							1" Ice	3.80	1.73	0.10
							1" Ice	4.33	2.13	0.15
							2" Ice	5.50	3.04	0.31
							4" Ice			
							No Ice	3.31	1.36	0.05
RRUS 11 B12	B	From Leg	3.00	-2.00	-30.0000	83.00	No Ice	3.31	1.36	0.05
							1/2" Ice	3.55	1.54	0.07
							1" Ice	3.80	1.73	0.10
							1" Ice	4.33	2.13	0.15
							2" Ice	5.50	3.04	0.31
							4" Ice			
							No Ice	3.31	1.36	0.05
RRUS 11 B12	C	From Leg	3.00	-2.00	-30.0000	83.00	No Ice	3.31	1.36	0.05
							1/2" Ice	3.55	1.54	0.07
							1" Ice	3.80	1.73	0.10
							1" Ice	4.33	2.13	0.15
							2" Ice	5.50	3.04	0.31
							4" Ice			
							No Ice	3.31	1.36	0.05
8'x2" Antenna Mount Pipe	A	From Leg	3.00	2.00	0.0000	83.00	No Ice	1.90	1.90	0.03
							1/2" Ice	2.73	2.73	0.04
							1" Ice	3.40	3.40	0.06
							1" Ice	4.40	4.40	0.12
							2" Ice	6.50	6.50	0.30
							4" Ice			
							No Ice	1.90	1.90	0.03
8'x2" Antenna Mount Pipe	B	From Leg	3.00	2.00	0.0000	83.00	No Ice	1.90	1.90	0.03
							1/2" Ice	2.73	2.73	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _A A _{Front} ft ²	C _A A _{Side} ft ²	Weight K
			0.00			Ice 3.40	3.40	0.06
						1" Ice 4.40	4.40	0.12
						2" Ice 6.50	6.50	0.30
						4" Ice		
8'x2" Antenna Mount Pipe	C	From Leg	3.00	0.0000	83.00	No Ice 1.90	1.90	0.03
			2.00			1/2" 2.73	2.73	0.04
			0.00			Ice 3.40	3.40	0.06
						1" Ice 4.40	4.40	0.12
						2" Ice 6.50	6.50	0.30
						4" Ice		
Platform Mount [LP 303-1]	A	None		0.0000	83.00	No Ice 14.66	14.66	1.25
						1/2" 18.87	18.87	1.48
						Ice 23.08	23.08	1.71
						1" Ice 31.50	31.50	2.18
						2" Ice 48.34	48.34	3.10
						4" Ice		

KS24019-L112A	B	From Face	2.00	0.0000	51.00	No Ice 0.16	0.16	0.01
			0.00			1/2" 0.22	0.22	0.01
			0.00			Ice 0.30	0.30	0.01
						1" Ice 0.48	0.48	0.02
						2" Ice 0.95	0.95	0.06
						4" Ice		
Side Arm Mount [SO 701-1]	B	From Face	0.00	0.0000	51.00	No Ice 0.85	1.67	0.07
			0.00			1/2" 1.14	2.34	0.08
			0.00			Ice 1.43	3.01	0.09
						1" Ice 2.01	4.35	0.12
						2" Ice 3.17	7.03	0.18
						4" Ice		

Load Combinations

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

Comb. No.	Description
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 K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 84.7161	Pole	Max Tension	24	0.00	-0.00	0.00
			Max. Compression	14	-17.70	0.45	0.52
			Max. Mx	11	-10.21	311.66	2.67
			Max. My	2	-10.21	2.65	310.62
			Max. Vy	11	-16.25	311.66	2.67
			Max. Vx	2	-16.14	2.65	310.62
			Max. Torque	12			1.29
L2	84.7161 - 41.6224	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-32.81	0.23	1.13
			Max. Mx	11	-21.63	1212.78	13.03
			Max. My	2	-21.63	12.78	1209.99
			Max. Vy	11	-23.76	1212.78	13.03
			Max. Vx	2	-23.73	12.78	1209.99
			Max. Torque	12			1.47
L3	41.6224 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-49.29	0.17	1.76
			Max. Mx	11	-36.00	2420.70	24.95
			Max. My	2	-36.00	24.59	2416.85
			Max. Vy	11	-27.22	2420.70	24.95
			Max. Vx	2	-27.19	24.59	2416.85
			Max. Torque	12			1.32

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	49.29	3.32	5.69
	Max. H _x	11	36.01	27.20	0.25
	Max. H _z	2	36.01	0.25	27.18
	Max. M _x	2	2416.85	0.25	27.18
	Max. M _z	5	2420.39	-27.20	-0.25
	Max. Torsion	12	1.27	23.68	13.80
	Min. Vert	1	36.01	0.00	0.00
	Min. H _x	5	36.01	-27.20	-0.25
	Min. H _z	8	36.01	-0.25	-27.18
	Min. M _x	8	-2415.82	-0.25	-27.18
	Min. M _z	11	-2420.70	27.20	0.25
	Min. Torsion	6	-1.27	-23.68	-13.80

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	36.01	0.00	0.00	-0.50	0.15	0.00
Dead+Wind 0 deg - No Ice	36.01	-0.25	-27.18	-2416.85	24.59	-0.59
Dead+Wind 30 deg - No Ice	36.01	13.39	-23.41	-2080.92	-1188.97	0.06
Dead+Wind 60 deg - No Ice	36.01	23.43	-13.37	-1187.53	-2083.89	0.68
Dead+Wind 90 deg - No Ice	36.01	27.20	0.25	23.91	-2420.39	1.13
Dead+Wind 120 deg - No Ice	36.01	23.68	13.80	1228.80	-2108.30	1.27
Dead+Wind 150 deg - No Ice	36.01	13.81	23.66	2104.29	-1231.27	1.08
Dead+Wind 180 deg - No Ice	36.01	0.25	27.18	2415.82	-24.28	0.59
Dead+Wind 210 deg - No Ice	36.01	-13.39	23.41	2079.89	1189.28	-0.06
Dead+Wind 240 deg - No Ice	36.01	-23.43	13.37	1186.50	2084.20	-0.69
Dead+Wind 270 deg - No Ice	36.01	-27.20	-0.25	-24.95	2420.70	-1.13
Dead+Wind 300 deg - No Ice	36.01	-23.68	-13.80	-1229.84	2108.61	-1.27
Dead+Wind 330 deg - No Ice	36.01	-13.81	-23.66	-2105.33	1231.58	-1.07
Dead+Ice+Temp	49.29	0.00	0.00	-1.76	0.17	0.00
Dead+Wind 0 deg+Ice+Temp	49.29	-0.05	-6.54	-597.18	5.19	-0.06
Dead+Wind 30 deg+Ice+Temp	49.29	3.23	-5.64	-514.91	-293.72	0.02
Dead+Wind 60 deg+Ice+Temp	49.29	5.65	-3.23	-295.16	-513.87	0.10
Dead+Wind 90 deg+Ice+Temp	49.29	6.55	0.05	3.19	-596.29	0.14
Dead+Wind 120 deg+Ice+Temp	49.29	5.70	3.32	300.20	-518.88	0.15
Dead+Wind 150 deg+Ice+Temp	49.29	3.32	5.69	516.28	-302.39	0.12
Dead+Wind 180 deg+Ice+Temp	49.29	0.05	6.54	593.54	-4.82	0.06
Dead+Wind 210 deg+Ice+Temp	49.29	-3.23	5.64	511.27	294.09	-0.02
Dead+Wind 240 deg+Ice+Temp	49.29	-5.65	3.23	291.52	514.24	-0.10
Dead+Wind 270 deg+Ice+Temp	49.29	-6.55	-0.05	-6.83	596.66	-0.14
Dead+Wind 300 deg+Ice+Temp	49.29	-5.70	-3.32	-303.83	519.25	-0.15
Dead+Wind 330 deg+Ice+Temp	49.29	-3.32	-5.69	-519.92	302.76	-0.12
Dead+Wind 0 deg - Service	36.01	-0.09	-9.40	-836.88	8.61	-0.20
Dead+Wind 30 deg - Service	36.01	4.63	-8.10	-720.60	-411.43	0.02
Dead+Wind 60 deg - Service	36.01	8.11	-4.63	-411.37	-721.19	0.24
Dead+Wind 90 deg - Service	36.01	9.41	0.09	7.94	-837.66	0.39
Dead+Wind 120 deg - Service	36.01	8.19	4.78	424.99	-729.65	0.44
Dead+Wind 150 deg - Service	36.01	4.78	8.19	728.02	-426.08	0.37
Dead+Wind 180 deg - Service	36.01	0.09	9.40	835.85	-8.30	0.20
Dead+Wind 210 deg - Service	36.01	-4.63	8.10	719.57	411.74	-0.02
Dead+Wind 240 deg - Service	36.01	-8.11	4.63	410.34	721.50	-0.24
Dead+Wind 270 deg - Service	36.01	-9.41	-0.09	-8.97	837.98	-0.39
Dead+Wind 300 deg - Service	36.01	-8.19	-4.78	-426.02	729.96	-0.44
Dead+Wind 330 deg - Service	36.01	-4.78	-8.19	-729.06	426.39	-0.37

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-36.01	0.00	0.00	36.01	0.00	0.000%
2	-0.25	-36.01	-27.18	0.25	36.01	27.18	0.000%
3	13.39	-36.01	-23.41	-13.39	36.01	23.41	0.000%
4	23.43	-36.01	-13.37	-23.43	36.01	13.37	0.000%
5	27.20	-36.01	0.25	-27.20	36.01	-0.25	0.000%
6	23.68	-36.01	13.80	-23.68	36.01	-13.80	0.000%
7	13.81	-36.01	23.66	-13.81	36.01	-23.66	0.000%
8	0.25	-36.01	27.18	-0.25	36.01	-27.18	0.000%
9	-13.39	-36.01	23.41	13.39	36.01	-23.41	0.000%
10	-23.43	-36.01	13.37	23.43	36.01	-13.37	0.000%
11	-27.20	-36.01	-0.25	27.20	36.01	0.25	0.000%
12	-23.68	-36.01	-13.80	23.68	36.01	13.80	0.000%
13	-13.81	-36.01	-23.66	13.81	36.01	23.66	0.000%
14	0.00	-49.29	0.00	0.00	49.29	0.00	0.000%
15	-0.05	-49.29	-6.54	0.05	49.29	6.54	0.000%
16	3.23	-49.29	-5.64	-3.23	49.29	5.64	0.000%
17	5.65	-49.29	-3.23	-5.65	49.29	3.23	0.000%
18	6.55	-49.29	0.05	-6.55	49.29	-0.05	0.000%
19	5.70	-49.29	3.32	-5.70	49.29	-3.32	0.000%
20	3.32	-49.29	5.69	-3.32	49.29	-5.69	0.000%
21	0.05	-49.29	6.54	-0.05	49.29	-6.54	0.000%
22	-3.23	-49.29	5.64	3.23	49.29	-5.64	0.000%
23	-5.65	-49.29	3.23	5.65	49.29	-3.23	0.000%
24	-6.55	-49.29	-0.05	6.55	49.29	0.05	0.000%
25	-5.70	-49.29	-3.32	5.70	49.29	3.32	0.000%
26	-3.32	-49.29	-5.69	3.32	49.29	5.69	0.000%
27	-0.09	-36.01	-9.40	0.09	36.01	9.40	0.000%
28	4.63	-36.01	-8.10	-4.63	36.01	8.10	0.000%
29	8.11	-36.01	-4.63	-8.11	36.01	4.63	0.000%
30	9.41	-36.01	0.09	-9.41	36.01	-0.09	0.000%
31	8.19	-36.01	4.78	-8.19	36.01	-4.78	0.000%
32	4.78	-36.01	8.19	-4.78	36.01	-8.19	0.000%
33	0.09	-36.01	9.40	-0.09	36.01	-9.40	0.000%
34	-4.63	-36.01	8.10	4.63	36.01	-8.10	0.000%
35	-8.11	-36.01	4.63	8.11	36.01	-4.63	0.000%
36	-9.41	-36.01	-0.09	9.41	36.01	0.09	0.000%
37	-8.19	-36.01	-4.78	8.19	36.01	4.78	0.000%
38	-4.78	-36.01	-8.19	4.78	36.01	8.19	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	0.00007919
3	Yes	5	0.00000001	0.00002554
4	Yes	5	0.00000001	0.00002442
5	Yes	4	0.00000001	0.00015080
6	Yes	5	0.00000001	0.00002817
7	Yes	5	0.00000001	0.00002544
8	Yes	4	0.00000001	0.00002857
9	Yes	5	0.00000001	0.00002507
10	Yes	5	0.00000001	0.00002633
11	Yes	4	0.00000001	0.00009482
12	Yes	5	0.00000001	0.00002524
13	Yes	5	0.00000001	0.00002782
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00040541
16	Yes	4	0.00000001	0.00043604
17	Yes	4	0.00000001	0.00043560
18	Yes	4	0.00000001	0.00040472
19	Yes	4	0.00000001	0.00044222
20	Yes	4	0.00000001	0.00044052
21	Yes	4	0.00000001	0.00040262
22	Yes	4	0.00000001	0.00043358

23	Yes	4	0.00000001	0.00043503
24	Yes	4	0.00000001	0.00040545
25	Yes	4	0.00000001	0.00044398
26	Yes	4	0.00000001	0.00044469
27	Yes	4	0.00000001	0.00001248
28	Yes	4	0.00000001	0.00007360
29	Yes	4	0.00000001	0.00006686
30	Yes	4	0.00000001	0.00002316
31	Yes	4	0.00000001	0.00008828
32	Yes	4	0.00000001	0.00006999
33	Yes	4	0.00000001	0.00001016
34	Yes	4	0.00000001	0.00007053
35	Yes	4	0.00000001	0.00007933
36	Yes	4	0.00000001	0.00002014
37	Yes	4	0.00000001	0.00006939
38	Yes	4	0.00000001	0.00008568

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 84.7161	13.465	37	0.9013	0.0024
L2	89.2839 - 41.6224	7.869	37	0.8021	0.0014
L3	47.3776 - 0	2.254	37	0.4350	0.0004

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
118.00	(2) 7770.00 w/ Mount Pipe	37	13.088	0.8971	0.0023	59520
116.00	RRUS 11	37	12.712	0.8929	0.0022	59520
108.00	(4) 844G65VTZASX w/ Mount Pipe	37	11.214	0.8748	0.0019	24800
100.00	TME 1900MHz RRH (65MHz)	37	9.748	0.8507	0.0016	14880
97.00	P40-16-XLPP-RR-A w/ Mount Pipe	37	9.211	0.8393	0.0016	12939
83.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	37	6.829	0.7618	0.0012	8311
51.00	KS24019-L112A	37	2.592	0.4709	0.0005	4814

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 84.7161	38.864	12	2.6028	0.0070
L2	89.2839 - 41.6224	22.714	12	2.3151	0.0039
L3	47.3776 - 0	6.508	12	1.2561	0.0012

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
118.00	(2) 7770.00 w/ Mount Pipe	12	37.776	2.5910	0.0067	20709
116.00	RRUS 11	12	36.689	2.5790	0.0065	20709
108.00	(4) 844G65VTZASX w/ Mount Pipe	12	32.369	2.5261	0.0055	8628
100.00	TME 1900MHz RRH (65MHz)	12	28.138	2.4561	0.0048	5176
97.00	P40-16-XLPP-RR-A w/ Mount Pipe	12	26.586	2.4231	0.0045	4500
83.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	12	19.714	2.1989	0.0035	2888
51.00	KS24019-L112A	12	7.485	1.3597	0.0014	1670

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio $\frac{P}{P_a}$
L1	120 - 84.7161 (1)	TP32.5458x24.09x0.375	35.28	0.00	0.0	39.000	36.9884	-10.19	1442.55	0.007
L2	84.7161 - 41.6224 (2)	TP42.0347x30.7011x0.437 5	47.66	0.00	0.0	39.000	55.8625	-21.62	2178.64	0.010
L3	41.6224 - 0 (3)	TP51x39.7912x0.5	47.38	0.00	0.0	39.000	80.1435	-36.00	3125.60	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	120 - 84.7161 (1)	TP32.5458x24.09x0.375	313.55	13.321	39.000	0.342	0.00	0.000	39.000	0.000
L2	84.7161 - 41.6224 (2)	TP42.0347x30.7011x0.43 75	1223.1 3	26.547	39.000	0.681	0.00	0.000	39.000	0.000
L3	41.6224 - 0 (3)	TP51x39.7912x0.5	2441.0 5	29.390	39.000	0.754	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f _v ksi	Allow. F _v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f _{vt} ksi	Allow. F _{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	120 - 84.7161 (1)	TP32.5458x24.09x0.375	16.45	0.445	26.000	0.034	1.28	0.027	26.000	0.001
L2	84.7161 - 41.6224 (2)	TP42.0347x30.7011x0.43 75	23.97	0.429	26.000	0.033	1.33	0.014	26.000	0.001
L3	41.6224 - 0 (3)	TP51x39.7912x0.5	27.43	0.342	26.000	0.026	1.28	0.007	26.000	0.000

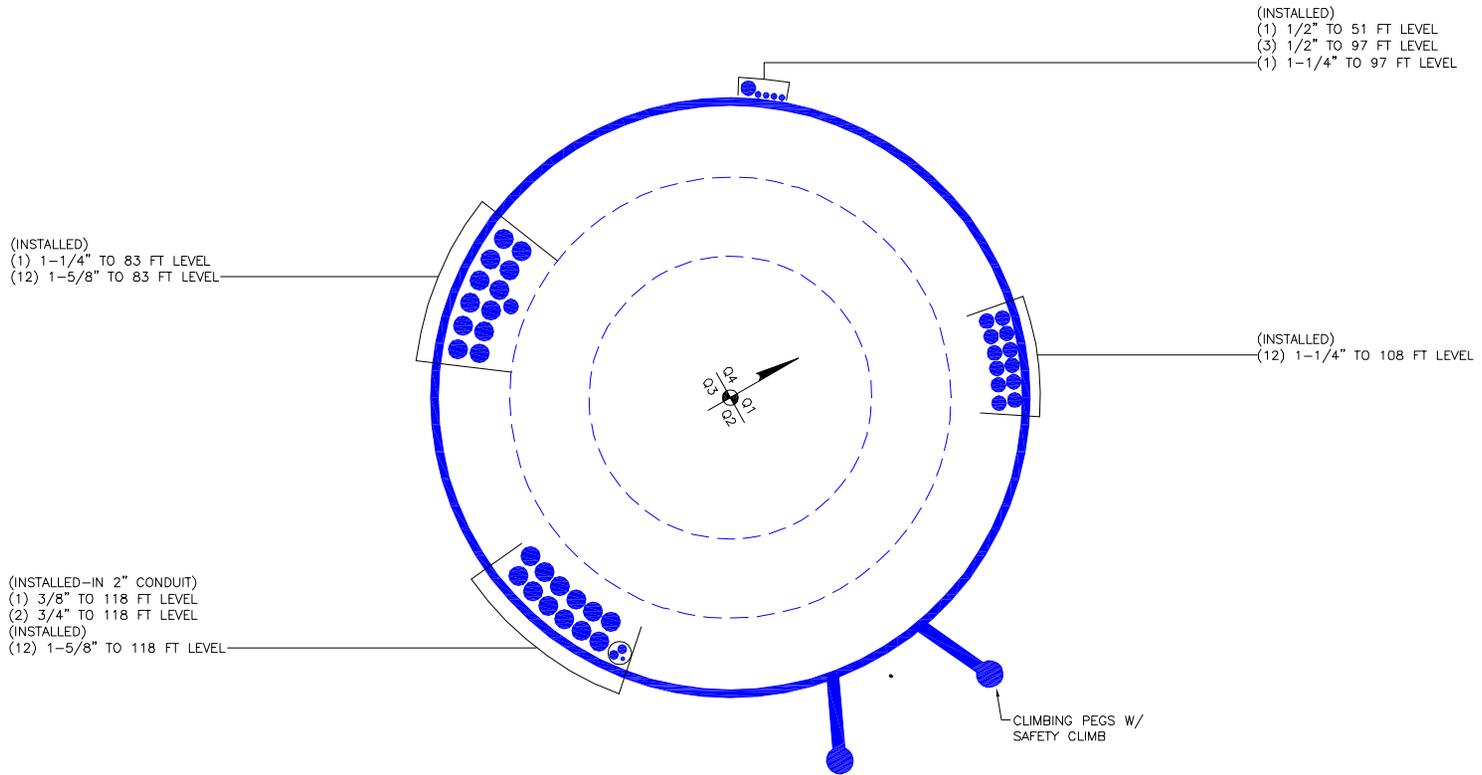
Pole Interaction Design Data

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		P	f_{bx}	f_{by}	f_v	f_{vt}			
		P_a	F_{bx}	F_{by}	F_v	F_{vt}			
L1	120 - 84.7161 (1)	0.007	0.342	0.000	0.034	0.001	0.349 ✓	1.333	H1-3+VT ✓
L2	84.7161 - 41.6224 (2)	0.010	0.681	0.000	0.033	0.001	0.691 ✓	1.333	H1-3+VT ✓
L3	41.6224 - 0 (3)	0.012	0.754	0.000	0.026	0.000	0.765 ✓	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF * P_{allow}$ K	% Capacity	Pass Fail	
L1	120 - 84.7161	Pole	TP32.5458x24.09x0.375	1	-10.19	1922.92	26.2	Pass	
L2	84.7161 - 41.6224	Pole	TP42.0347x30.7011x0.4375	2	-21.62	2904.13	51.8	Pass	
L3	41.6224 - 0	Pole	TP51x39.7912x0.5	3	-36.00	4166.42	57.4	Pass	
							Summary		
							Pole (L3)	57.4	Pass
							RATING =	57.4	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

Stiffened or Unstiffened, UngROUTed, Circular Base Plate - Any Rod Material

TIA Rev G Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: 881536

Site Name: NORTH HAVEN TOWER

App #: 309462 Rev. 0

Pole Manufacturer: *Other*

Anchor Rod Data

Qty: 20

Diam: 2.25 in

Rod Material: A615-J

Strength (Fu): 100 ksi

Yield (Fy): 75 ksi

Bolt Circle: 60 in

Plate Data

Diam: 66 in

Thick: 2.25 in

Grade: 60 ksi

Single-Rod B-eff: 8.09 in

Stiffener Data (Welding at both sides)

Config: 0 *

Weld Type:

Groove Depth: <-- Disregard

Groove Angle: <-- Disregard

Fillet H. Weld: in

Fillet V. Weld: in

Width: in

Height: in

Thick: in

Notch: in

Grade: ksi

Weld str.: ksi

Pole Data

Diam: 51 in

Thick: 0.5 in

Grade: 65 ksi

of Sides: 18 "0" IF Round

Fu 80 ksi

Reinf. Fillet Weld 0 "0" if None

Reactions

Mu: 2441 ft-kips

Axial, Pu: 36 kips

Shear, Vu: 27 kips

Eta Factor, η 0.5 TIA G (Fig. 4-4)

If No stiffeners, Criteria: AISC LRFD <-Only Applicable to Unstiffened Cases

Anchor Rod Results

Max Rod (Cu+ Vu/η): 102.2 Kips

Allowable Axial, Φ*Fu*Anet: 260.0 Kips

Anchor Rod Stress Ratio: 39.3% **Pass**

Rigid

AISC LRFD

φ*Tn

Base Plate Results

Flexural Check

Base Plate Stress: 25.7 ksi

Allowable Plate Stress: 54.0 ksi

Base Plate Stress Ratio: 47.7% **Pass**

Rigid

AISC LRFD

φ*Fy

Y.L. Length:

31.61

n/a

Stiffener Results

Horizontal Weld : n/a

Vertical Weld: n/a

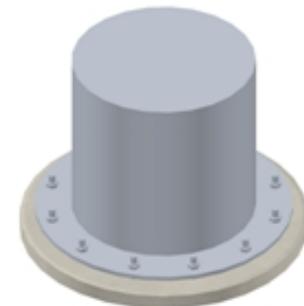
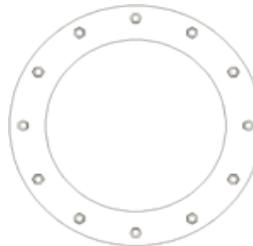
Plate Flex+Shear, fb/Fb+(fv/Fv)^2: n/a

Plate Tension+Shear, ft/Ft+(fv/Fv)^2: n/a

Plate Comp. (AISC Bracket): n/a

Pole Results

Pole Punching Shear Check: n/a



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

BU:	881536
Site Name:	NORTH HAVEN TOWER
App Number:	309462 Rev. 0
Work Order:	1120523

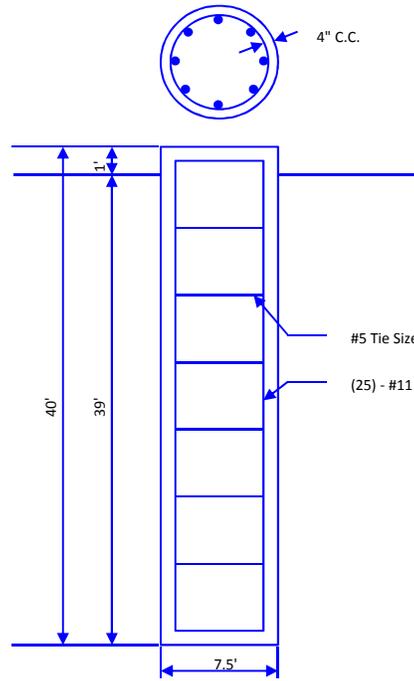


Monopole Drilled Pier

Input

Criteria	
TIA Revision:	F
ACI 318 Revision:	2005
Seismic Category:	B
Forces	
Compression	36 kips
Shear	27 kips
Moment	2441 k-ft
Swelling Force	0 kips
Foundation Dimensions	
Pier Diameter:	7.5 ft
Ext. above grade:	1 ft
Depth below grade:	39 ft
Material Properties	
Number of Rebar:	25
Rebar Size:	11
Tie Size	5
Rebar tensile strength:	60 ksi
Concrete Strength:	4000 psi
Ultimate Concrete Strain	0.003 in/in
Clear Cover to Ties:	4 in

Soil Profile: 881536 Soil Profile



Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3.75	0	3.75	120		28				
2	1.25	3.75	5	120		32				
3	2	5	7	120		32	1.4	1.4		
4	32	7	39	60		32	1.4	1.4	16	

Analysis Results

Soil Lateral Capacity	
Depth to Zero Shear:	8.50 ft
Max Moment, Mu:	2638.08 k-ft
Soil Safety Factor:	11.21
Safety Factor Req'd:	2
RATING:	17.8%

Soil Axial Capacity	
Skin Friction (k):	566.84 kips
End Bearing (k):	353.43 kips
Comp. Capacity (k), φCn:	920.27 kips
Comp. (k), Cu:	46.80 kips
RATING:	5.1%

Concrete/Steel Check	
Mu (from soil analysis)	3429.50 k-ft
φMn	6736.97 k-ft
RATING:	50.9%

rho provided	0.61
rho required	0.33 OK

Rebar Spacing	8.56
Spacing required	22.56 OK

Dev. Length required	30.17
Dev. Length provided	53.51 OK

Overall Foundation Rating: 50.9%

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

T-Mobile Existing Facility

Site ID: CTNH037A

Candid N. Haven
120 Universal Drive
North Haven, CT 06473

October 2, 2015

EBI Project Number: 6215004936

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	13.35 %

October 2, 2015

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

Emissions Analysis for Site: **CTNH037A – Candid N. Haven**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **120 Universal Drive, North Haven, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The general population exposure limit for the 700 MHz Band is approximately 467 $\mu\text{W}/\text{cm}^2$, and the general population exposure limit for the 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 **120 Universal Drive, North Haven, 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 / UMTS channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel
- 2) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 3) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 4) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.
- 5) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

- 6) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 7) The antennas used in this modeling are the **Ericsson AIR21 B4A/B2P & B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 B4A/B2P & B2A/B4P** have a maximum gain of **15.9 dBd** at their 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 **84 feet** above ground level (AGL).
- 9) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculations were done with respect to uncontrolled / general public threshold limits.

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson 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):	84	Height (AGL):	84	Height (AGL):	84
Frequency Bands	2100 MHz (AWS)	Frequency Bands	2100 MHz (AWS)	Frequency Bands	2100 MHz (AWS)
Channel Count	2	Channel Count	2	# PCS Channels:	2
Total TX Power:	120	Total TX Power:	120	# AWS Channels:	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A1 MPE%	2.76	Antenna B1 MPE%	2.76	Antenna C1 MPE%	2.76
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	84	Height (AGL):	84	Height (AGL):	84
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power:	120	Total TX Power:	120	Total TX Power:	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A2 MPE%	2.76	Antenna B2 MPE%	2.76	Antenna C2 MPE%	2.76
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):	84	Height (AGL):	84	Height (AGL):	84
Frequency Bands	700 MHz	Frequency Bands	700 MHz	Frequency Bands	700 MHz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power:	30	Total TX Power:	30	Total TX Power:	30
ERP (W):	865.21	ERP (W):	865.21	ERP (W):	865.21
Antenna A3 MPE%	1.09	Antenna B3 MPE%	1.09	Antenna C3 MPE%	1.09

Site Composite MPE%	
Carrier	MPE%
T-Mobile (Per Sector Max)	6.61 %
MetroPCS	2.42 %
Sprint	1.30 %
AT&T	2.39 %
Nextel	0.63 %
Site Total MPE %:	13.35 %

T-Mobile Sector 1 Total:	6.61 %
T-Mobile Sector 2 Total:	6.61 %
T-Mobile Sector 3 Total:	6.61 %
Site Total:	13.35 %

T-Mobile _per sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu\text{W}/\text{cm}^2$)	Frequency (MHz)	Allowable MPE ($\mu\text{W}/\text{cm}^2$)	Calculated % MPE
T-Mobile 2100 MHz (AWS) LTE	2	2334.27	84	27.56	2100	1000	2.76 %
T-Mobile 700 MHz LTE	1	865.21	84	5.11	700	467	1.09 %
T-Mobile 1900 MHz (PCS) GSM/UMTS	2	1167.14	84	13.79	1900	1000	1.38 %
T-Mobile 2100 MHz (AWS) UMTS	2	1167.14	84	13.79	2100	1000	1.38 %
						Total:	6.61%

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:	6.61 %
Sector 2:	6.61 %
Sector 3 :	6.61 %
T-Mobile Per Sector Maximum:	6.61 %
Site Total:	13.35 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **13.35%** 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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