COHEN and WOLF P.C.
ATTORNEYS AT LAW

JULIE D. KOHLER

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

March 17, 2014

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

Re: Notice of Exempt Modification
Cellco Partnership, d/b/a Verizon Wireless/T-Mobile co-location
Site ID CTNH411A
20 Antolini Road, New Hartford, 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, Cellco Partnership, d/b/a Verizon Wireless owns the existing monopole telecommunications tower and related facility located at 20 Antolini Road, New Hartford, Connecticut (Latitude: 41° 49' 39.38" Longitude: -73° 00' 48.38"). T-Mobile intends to replace six antennas and related equipment at this existing telecommunications facility in New Hartford ("New Hartford Facility"). Please accept this letter as notification, pursuant to R.C.S.A. § 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is also being sent to the First Selectman, Daniel V. Jerram, and the property owner, South End Fire District.

The existing New Hartford Facility consists of a 145 foot tall monopole tower, approved by the Council in Docket Nos. 184 and 184A.[1] T-Mobile plans to replace three antennas and six TMAs with six antennas and three TMAs at a centerline of 125 feet. (See the plans revised to February 27, 2014 attached hereto as Exhibit A). T-Mobile will also install fiber cable and reuse existing coax cable. The existing New Hartford Facility is structurally capable of supporting T-Mobile's proposed modifications, as indicated in the structural analysis dated March 5, 2014 and attached hereto as Exhibit B.

The planned modifications to the New Hartford Facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

[1] The Decision and Order in these dockets (dated June 25, 1998 and May 7, 2002 respectively) contain no relevant requirements or limitations on the configuration of T-Mobile's co-location on the New Hartford Facility.

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

1. The proposed modification will not increase the height of the tower. T-Mobile's replacement antennas will be installed at a centerline of 125 feet, merely replacing existing antennas located at the same 125 foot elevation. The enclosed tower drawing confirms that the proposed modification will not increase the height of the tower.

2. The proposed modifications will not require an extension of the site boundaries. T-Mobile's equipment will be located entirely within the existing compound and leased area as shown on Page 1 of Exhibit A.

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

4. The operation of the replacement antennas will not increase the total radio frequency (RF) power density, measured at the base of the tower, to a level at or above the applicable standard. According to a Radio Frequency Emissions Analysis Report prepared by EBI dated March 17, 2014, T-Mobile's operations would add 0.736% 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 88.616% of the FCC Standard as calculated for a mixed frequency site as evidenced by the engineering exhibit attached hereto as Exhibit C.

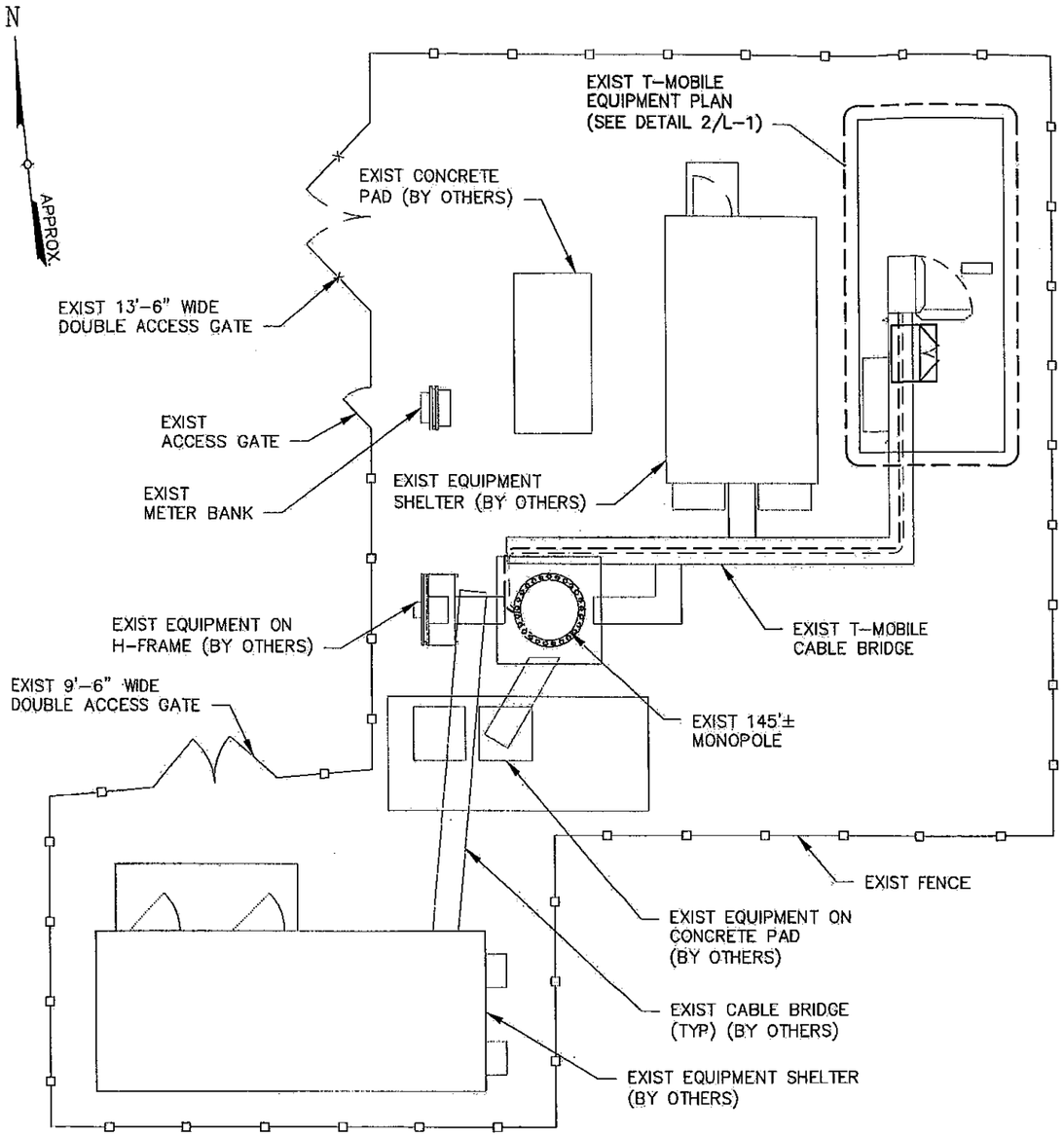
For the foregoing reasons, T-Mobile respectfully submits that the proposed replacement antennas and equipment at the New Hartford Facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Upon acknowledgement by the Council of this proposed exempt modification, T-Mobile shall commence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

Sincerely,

Julie D. Kohler, Esq.

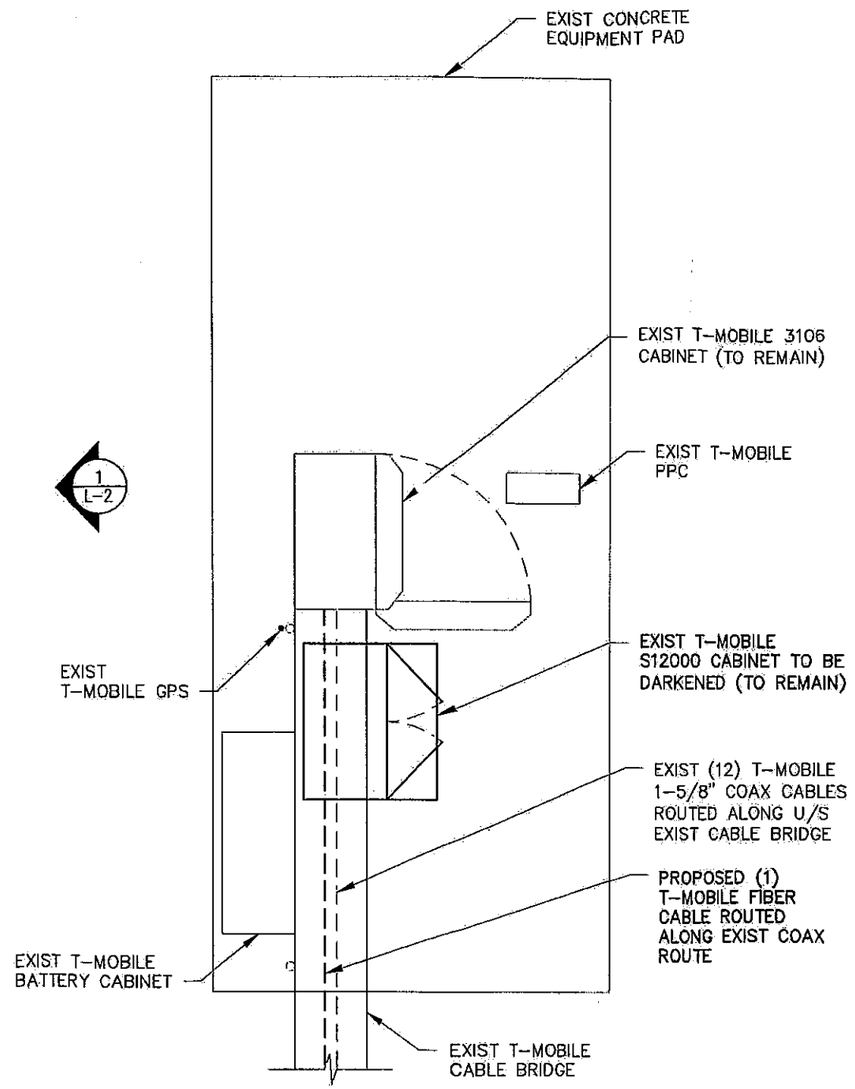
cc: Town of New Hartford, First Selectman Daniel V. Jerram
Cellco Partnership, d/b/a Verizon Wireless
South End Fire District
HPC Wireless Solutions, Halene Fujimoto

EXHIBIT A



1 / L-1 SITE PLAN

SCALE: 3/32" = 1'-0"



2 / L-1 EQUIPMENT PLAN

SCALE: 1/4" = 1'-0"

STRUCTURAL NOTE:
EXIST MOUNTS AND MONOPOLE TO BE VERIFIED FOR STRUCTURAL SUITABILITY BY A STATE LICENSED P.E.

CONFIGURATION
2C

0 1 2 3
ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • SURVEYING
• ENGINEERING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-5555
Fax: (845) 567-8703

T-Mobile
NORTHEAST LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS
T-MOBILE
LANDLORD
RF
CONSTRUCTION

PROJECT NUMBER	DESIGNED BY
6844.CTNH411A	JQ

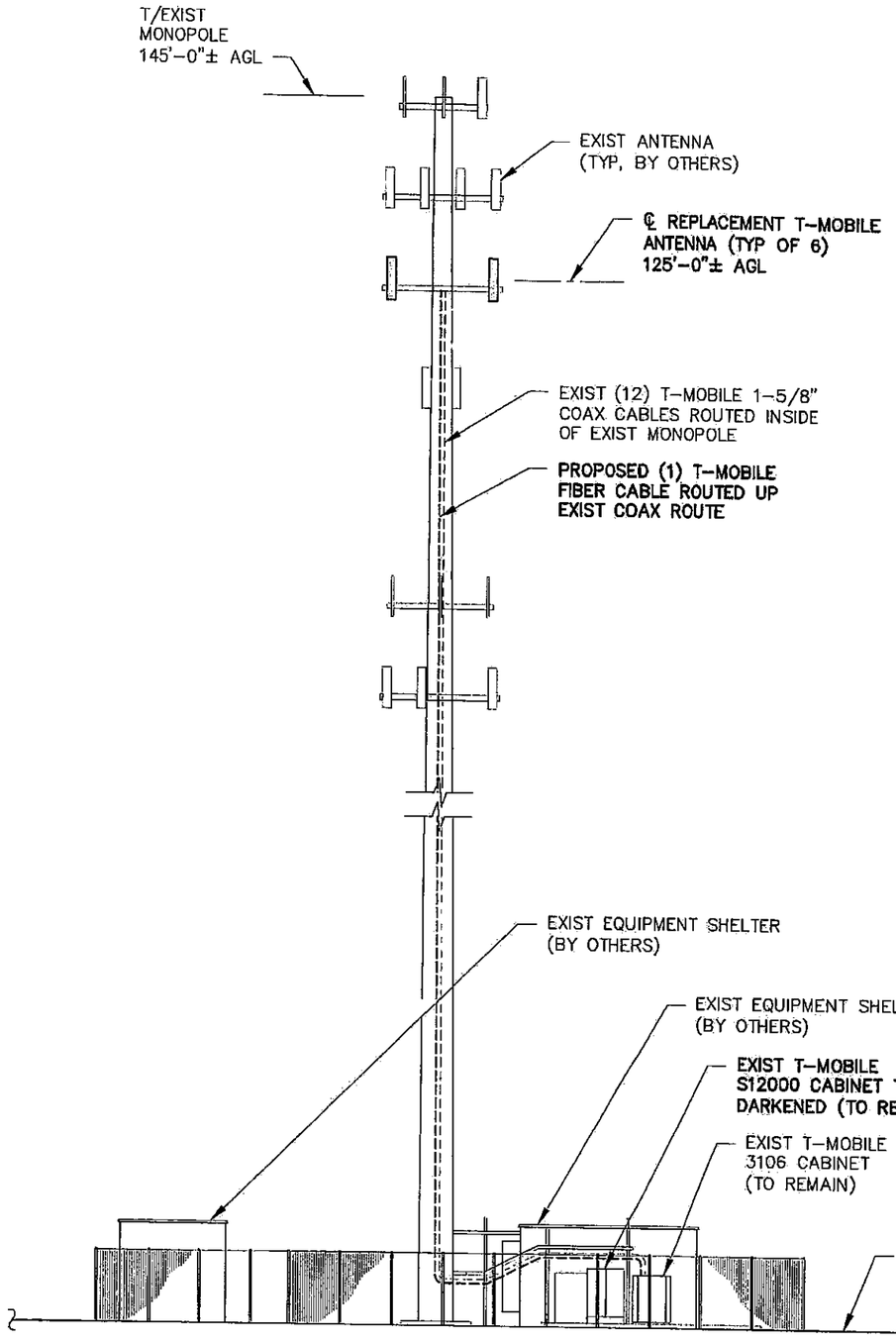
REV	DATE	REVISION	DRAWN BY
0	02/27/14	FOR COMMENT	SF

ISSUED BY	DATE

SITE INFORMATION
CTNH411A
ANTOLINI-VERIZON COLO
20 ANTOLINI ROAD
NEW HARTFORD,
CT 06057

SHEET TITLE
SITE PLAN AND EQUIPMENT PLAN

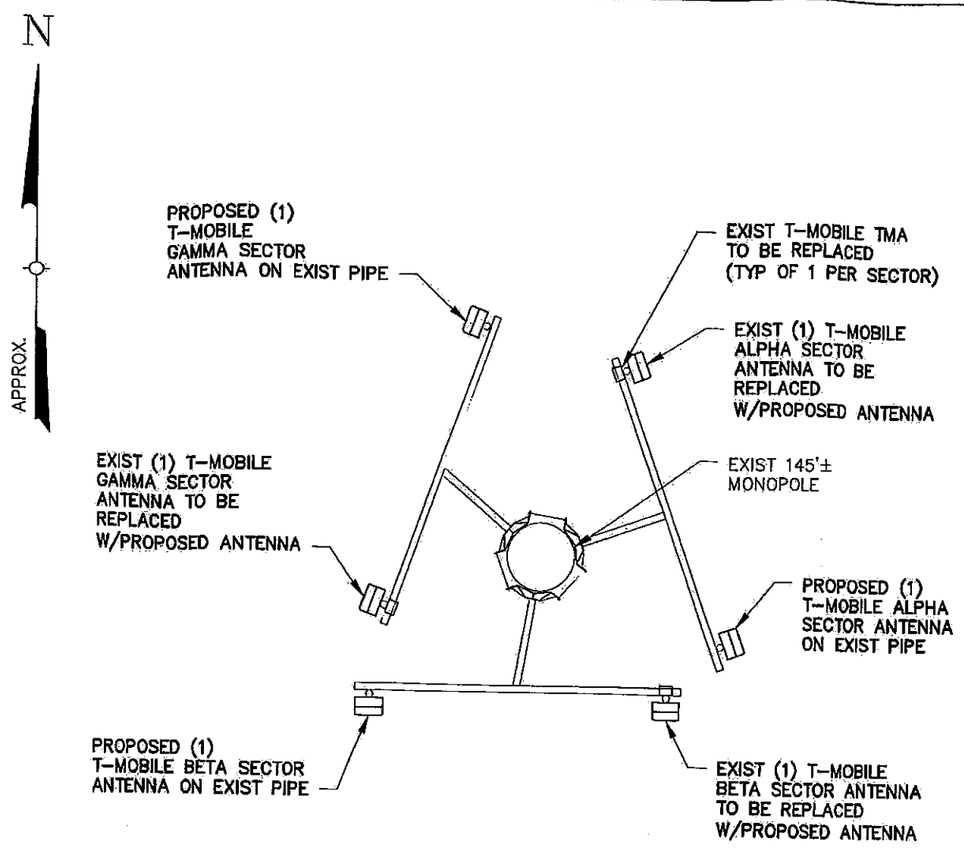
SHEET NUMBER
L-1



NOTE: SOME EXISTING SITE FEATURES BY OTHERS NOT SHOWN FOR CLARITY.

1/L-2 ELEVATION

SCALE: 1/16" = 1'-0"



2/L-2 ANTENNA PLAN

SCALE: 3/16" = 1'-0"

STRUCTURAL NOTE:
EXIST MOUNTS AND MONOPOLE TO BE VERIFIED FOR STRUCTURAL SUITABILITY BY A STATE LICENSED P.E.

CONFIGURATION
2C

0 1 2 3
ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • SURVEYING
• ENGINEERING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-0858
Fax: (845) 567-8703

T-Mobile
NORTHEAST LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS
T-MOBILE
LANDLORD
RF
CONSTRUCTION

PROJECT NUMBER	DESIGNED BY
8544.CTNH411A	JQ

REV	DATE	REVISION	DRAWN BY
0	02/27/14	FOR COMMENT	SF

ISSUED BY | DATE

SITE INFORMATION
CTNH411A
ANTOLINI-VERIZON COLO
20 ANTOLINI ROAD
NEW HARTFORD,
CT 06057

SHEET TITLE
ELEVATION &
ANTENNA PLAN

SHEET NUMBER
L-2

EXHIBIT B

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

145-ft Existing EEI Monopole

Proposed T-Mobile
Antenna Upgrade

T-Mobile Site Ref: CTNH411A

Verizon Site Ref: New Hartford

20 Antolini Road
New Hartford, CT

CENTEK Project No. 14033.003

Date: March 5, 2014

Prepared for:
T-Mobile Towers
4 Sylvan Way
Parsippany, NJ 07054

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation proposed by T-Mobile on the existing monopole (tower) owned and operated by Verizon Wireless, located in New Hartford, CT.

The host tower is a 145-ft tall, four-section, eighteen sided, tapered monopole, originally designed and manufactured by EEI job no; 8859, dated February 21, 2002. The tower geometry and structure member sizes were obtained from the aforementioned EEI design documents. The foundation system information was obtained from drawing S-1 prepared by URS Corporation for AT&T, dated October 13, 2000. Subsurface information was taken from a geotechnical report prepared by Clarence D. Welti, P.E., P.C., dated March 27, 2000.

Antenna and appurtenance information were obtained from a previous structural analysis report prepared by Centek job no. 12115.CO2 dated October 11, 2012, a tower mapping report prepared by JWB Tower Services, LLC dated March 2, 2014 and a T-Mobile RF data sheet.

The tower consists of four (4) tapered vertical steel sections conforming to ASTM A572-65 (65ksi). The bottom three (3) sections are slip joint connected and the top section is flange connected. The diameter of the pole (flat-flat) is 18.00-in at the top and 49.75-in at the base.

T-Mobile proposes the removal of three (3) panel antennas and six (6) TMA's and the installation of six (6) panel antennas and three (3) TMA's mounted to the existing three (3) T-Arms. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- TOWN (Existing):
  Antennas: One (1) 12-ft x1.5" dia. Omni-directional whip antenna, one (1) Celwave PD620 Omni-driectional whip antenna and one (1) siren mounted on the Sprint platform to the top of the tower.
  Coax Cables: Two (2) 1-5/8" ∅ coax cables and one (1) 1" flex conduit running within the monopole.
- SPRINT (Existing):
  Antennas: Three (3) RFS APXVSPP18-C-A20 panel antennas, three (3) ALU 1900 MHz RRH's and three (3) ALU 800 MHz RRH's mounted on a 12-ft low profile platform with a RAD center elevation of 147-ft above exiting grade.
  Coax Cables: Three (3) 1-1/4" ∅ Hybriflex cables running within the monopole.
- VERIZON WIRELESS (Existing/Reserved):
  Antennas: Six (6) Antel LPA-80063-6CF panel antennas, six (6) Antel BXA-70063-6CF panel antennas, six (6) LPA-171063-12CF panel antennas, six (6) RFS FD9R6004/2C-3L diplexers, six (6) RRH's and one (1) main distribution box mounted on a low profile platform with a RAD center elevation of 139-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower and six (6) 1-5/8" ∅ coax cables and two (2) 1-5/8" ∅ fiber cables running on the exterior of the existing tower.

- METROPCS (Existing):
  Antennas: Three (3) RFS APXV18-206517S panel antennas flush mounted with a RAD center elevation of 113-ft above exiting grade.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running within the monopole.
- VACANT (Existing):
  Antennas: One (1) 12-ft low profile platform with a RAD center elevation of 92-ft above exiting grade.
- AT&T (Existing / Reserved):
  Antennas: Six (6) Powerwave 7770 panel antennas, six (6) Powerwave LGP21401 TMA's, six (6) Powerwave LGP21901 Diplexers, three (3) Bias-T, two (2) KMW AM-X-CD-16-65-00T-RET panel antennas, one (1) Powerwave P65-17-XLH-RR panel antenna, six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrestor mounted on a 12-ft low profile platform with a RAD center elevation of 80-ft above exiting grade.
  Coax Cables: Twelve (12) 7/8" ∅ coax cables, one (1) fiber cable and two (2) dc control cables running within the monopole.
- SPRINT (Existing):
  Antennas: One (1) GPS antenna on a 3-ft standoff with an elevation of 51-ft above exiting grade.
  Coax Cables: One (1) 1/2" ∅ coax cable running on the exterior of the existing monopole.
- T-MOBILE (Existing to Remain):
  Coax Cable: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- T-MOBILE (Existing to Remove):
  Antenna: Three (3) RFS APX16DWV-16DWVS-E-A20 panel antennas, three (3) RFS AMAA1412D-1A20 TMA's and three (3) RFS ATM1900D-1CWA TMA's mounted to three (3) T-Arms with a RAD center elevation of 125-ft above exiting grade.
- **T-MOBILE (Proposed):**
  Antennas: Six (6) Ericsson AIR 21 panel antennas and three (3) Ericsson KRY 112 TMA's mounted to three (3) T-Arms with a RAD center elevation of 125-ft above exiting grade.
  Coax Cables: One (1) 1-5/8" ∅ fiber cable running on the inside of the existing tower.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All existing coax cables to be installed as indicated in this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC[1] and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½" radial ice on the tower structure and its components.

Basic Wind Speed:	Litchfield; v = 80 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	New Hartford; v = 90 mph (3 second gust) equivalent to v = 75 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	TIA-EIA-222-F wind speed controls.	
Load Cases:	Load Case 1; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

[1] The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", the maximum tower steel usage was found to be at **85.3%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L1)	114.00'-145.00'	85.3%	**PASS**
Pole Shaft (L2)	78.67'-114.00'	79.0%	**PASS**
Pole Shaft (L3)	43.17'-78.67'	83.8%	**PASS**
Pole Shaft (L4)	0.00'-43.17'	79.3%	**PASS**

Foundation and Anchors

The existing foundation consists of a 7-ft 6in ∅ x 18-ft long reinforced concrete caisson with a 4.0-ft thick x 22-ft square reinforced concrete pad. The base of the monopole tower is connected to the foundation by means of (20) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 5-ft into the concrete foundation structure.

The original foundation design information was obtained from drawing S-1 prepared by URS Corporation for AT&T, dated October 13, 2000. Subsurface information was taken from a geotechnical report prepared by Clarence D. Welti, P.E., P.C., dated March 27, 2000.

Review of the foundation design consisted of a comparison of the proposed reactions at the base of the monopole tower; from governing Load Case 1 with the original design base reactions from the aforementioned URS drawing. The calculated reactions at the base of the monopole tower were less than the original design reactions. Therefore, the foundation is deemed to have adequate structural capacity to support the existing and proposed loads and hence was found to be within allowable limits.

The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Base Reactions	Vector	Original Design Reactions [1]	Proposed Load
Base	Shear	**29.16 kips**	**26 kips**
	Axial	**31.0 kips**	**38 kips**
	Moment	**3128.4 ft-kips**	**2820 ft-kips**

Note 1: Original design reactions base on a factor of safety of 2.0.

- The flange bolts and flange plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Flange Bolts	Tension	53.0%	PASS
Flange Plate	Bending	30.2%	PASS

- The anchor bolts and base plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Axial and Bending	51.3%	PASS
Base Plate	Bending	87.6%	PASS

Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by T-Mobile. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 18694
LICENSED
PROFESSIONAL ENGINEER

Prepared by:

Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

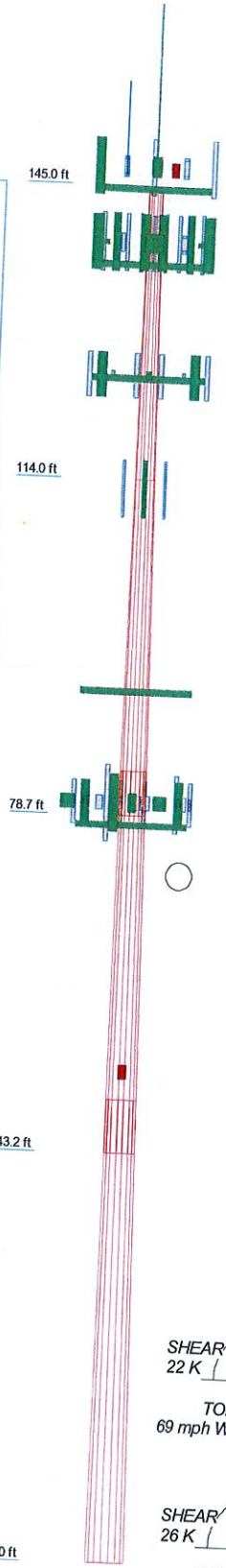
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly RISATower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.



Section	1	2	3	4
Length (ft)	31.00	35.33	40.17	48.83
Number of Sides	18	18	18	18
Thickness (in)	0.1875	0.3125	0.3750	0.4375
Socket Length (ft)			5.67	
Top Dia (in)	18.0000	25.1400	31.5710	38.6535
Bot Dia (in)	25.1400	33.2700	40.6900	49.7500
Grade	A572-65			
Weight (K)	1.3	3.4	5.8	10.1

20.7

AXIAL 46 K
SHEAR 22 K
MOMENT 2423 kip-ft
TORQUE 2 kip-ft
69 mph WIND - 0.5000 in ICE

AXIAL 38 K
SHEAR 26 K
MOMENT 2820 kip-ft
TORQUE 1 kip-ft
REACTIONS - 80 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
PD620 (Town - Existing)	156.5	RRH2x40-07-U (Verizon - Reserved)	139
12' x 1-1/2" Dia Omni (Town - Existing)	151	RRH2x40-07-U (Verizon - Reserved)	139
APXVSPP18-C-A20 (Sprint - Existing)	147	DB-T1-6Z-8AB-0Z (Verizon - Reserved)	139
APXVSPP18-C-A20 (Sprint - Existing)	147	EEI Low Profile Platform (Verizon - Reserved)	137
APXVSPP18-C-A20 (Sprint - Existing)	147	(2) AIR21 (T-Mobile - Proposed)	125
FD-RRH 2x50 800 (Sprint - Existing)	147	(2) AIR21 (T-Mobile - Proposed)	125
FD-RRH 2x50 800 (Sprint - Existing)	147	(2) AIR21 (T-Mobile - Proposed)	125
FD-RRH 2x50 800 (Sprint - Existing)	147	KRY 112 TMA (T-Mobile - Proposed)	125
FD-RRH 4x45 1900 (Sprint - Existing)	147	KRY 112 TMA (T-Mobile - Proposed)	125
FD-RRH 4x45 1900 (Sprint - Existing)	147	KRY 112 TMA (T-Mobile - Proposed)	125
FD-RRH 4x45 1900 (Sprint - Existing)	147	Valmont T-Arm (1) (T-Mobile - Existing)	125
Siren (Town - Existing)	146	Valmont T-Arm (1) (T-Mobile - Existing)	125
EEI 12-ft Low Profile Platform (Sprint - Existing)	145	Valmont T-Arm (1) (T-Mobile - Existing)	125
LPA-80063/6CF (Verizon - Reserved)	139	APXV18-206517S (MetroPCS - Existing)	113
LPA-171063-12CF (Verizon - Reserved)	139	APXV18-206517S (MetroPCS - Existing)	113
BXA-70063/6CF (Verizon - Reserved)	139	APXV18-206517S (MetroPCS - Existing)	113
BXA-70063/6CF (Verizon - Reserved)	139	Uni-Tri Bracket (MetroPCS - Existing)	113
LPA-171063-12CF (Verizon - Reserved)	139	EEI 12-ft Low Profile Platform (Vacant)	92
LPA-80063/6CF (Verizon - Reserved)	139	(2) 7770.00 (ATI - Existing)	80
LPA-80063/6CF (Verizon - Reserved)	139	(2) 7770.00 (ATI - Existing)	80
LPA-171063-12CF (Verizon - Reserved)	139	(2) 7770.00 (ATI - Existing)	80
BXA-70063/6CF (Verizon - Reserved)	139	(2) LPG21401 TMA (ATI - Existing)	80
BXA-70063/6CF (Verizon - Reserved)	139	(2) LPG21401 TMA (ATI - Existing)	80
LPA-171063-12CF (Verizon - Reserved)	139	(2) LPG21401 TMA (ATI - Existing)	80
LPA-80063/6CF (Verizon - Reserved)	139	(2) LGP21901 Diplexer (ATI - Existing)	80
LPA-80063/6CF (Verizon - Reserved)	139	(2) LGP21901 Diplexer (ATI - Existing)	80
LPA-171063-12CF (Verizon - Reserved)	139	(2) LGP21901 Diplexer (ATI - Existing)	80
BXA-70063/6CF (Verizon - Reserved)	139	Bias T (ATI - Existing)	80
BXA-70063/6CF (Verizon - Reserved)	139	Bias T (ATI - Existing)	80
LPA-171063-12CF (Verizon - Reserved)	139	Bias T (ATI - Existing)	80
LPA-80063/6CF (Verizon - Reserved)	139	P65-17-XLH-RR (ATI - Reserved)	80
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	139	AM-X-CD-16-65-00T-RET(72") (ATI - Reserved)	80
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	139	AM-X-CD-16-65-00T-RET(72") (ATI - Reserved)	80
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	139	(2) RRUS-11 (ATI - Reserved)	80
RRH2x40-AWS (Verizon - Reserved)	139	(2) RRUS-11 (ATI - Reserved)	80
RRH2x40-AWS (Verizon - Reserved)	139	(2) RRUS-11 (ATI - Reserved)	80
RRH2x40-AWS (Verizon - Reserved)	139	DC6-48-60-18-8F Surge Arrestor (ATI - Reserved)	80
RRH2x40-07-U (Verizon - Reserved)	139	PiROD 12' Low Profile Circular Platform (ATI - Existing)	78
		GPS (Sprint - Existing)	51
		GPS Mount (Sprint - Existing)	50

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 85.3%

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: 14033.003 - CTNH411A		
Project: 145' EEI Monopole - 20 Antolini Rd., New Hartford, CT		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 03/05/14	Scale: NTS
Path: J:\Jobs\1403300 WDD\3 - CTNH411A\04 Structural\Backup Documents\cad\Rl Files\145' EEI Monopole, New Hartford, CT.rl		Dwg No. E-1

Tower Input Data

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

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, feedline 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		

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	145.00-114.00	31.00	0.00	18	18.0000	25.1400	0.1875	0.5416	A572-65 (65 ksi)
L2	114.00-78.67	35.33	4.67	18	25.1400	33.2700	0.3125	1.2500	A572-65 (65 ksi)
L3	78.67-43.17	40.17	5.67	18	31.5710	40.6900	0.3750	1.5000	A572-65 (65 ksi)
L4	43.17-0.00	48.83		18	38.6535	49.7500	0.4375	1.7500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia.	Area	I	r	C	I/C	J	It/Q	w	w/t
	in	in^2	in^4	in	in	in^3	in^4	in^2	in	
L1	18.2777	10.6007	424.9328	6.3234	9.1440	46.4712	850.4248	5.3013	2.9113	15.527
	25.5278	14.8499	1168.1210	8.8581	12.7711	91.4658	2337.7791	7.4263	4.1680	22.229
L2	25.5278	24.6258	1917.7561	8.8138	12.7711	150.1635	3838.0356	12.3152	3.8746	12.399
	33.7832	32.6897	4485.9784	11.6999	16.9012	265.4243	8977.8595	16.3480	5.3055	16.978
L3	33.1339	37.1311	4565.3534	11.0746	16.0381	284.6569	9136.7139	18.5691	4.8965	13.057
	41.3177	47.9849	9853.1622	14.3118	20.6705	476.6770	19719.2895	23.9970	6.5014	17.337
L4	40.5574	53.0677	9791.7311	13.5667	19.6360	498.6622	19596.3464	26.5389	6.0330	13.79
	50.5175	68.4766	21037.4691	17.5059	25.2730	832.4089	42102.6199	34.2448	7.9860	18.254

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
	ft^2	in					in	in
L1 145.00-114.00				1	1	1		
L2 114.00-78.67				1	1	1		
L3 78.67-43.17				1	1	1		
L4 43.17-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number		C_AA_A	Weight
				ft			ft^2/ft	plf
1 5/8 (Town - Existing)	C	No	Inside Pole	145.00 - 6.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1" Flex Conduit (Town - Existing)	C	No	Inside Pole	145.00 - 6.00	1	No Ice	0.00	0.70
						1/2" Ice	0.00	0.70
HYBRIFLEX 1-1/4" (Sprint - Existing)	C	No	Inside Pole	145.00 - 3.00	3	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
1 5/8 (Verizon - Existing)	C	No	Inside Pole	135.00 - 6.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Verizon - Reserved)	C	No	CaAa (Out Of Face)	135.00 - 6.00	1	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
1 5/8 (Verizon - Reserved)	C	No	CaAa (Out Of Face)	135.00 - 6.00	5	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55
HYBRIFLEX 1-5/8" (Verizon - Reserved)	C	No	CaAa (Out Of Face)	135.00 - 6.00	2	No Ice	0.00	1.90
						1/2" Ice	0.00	3.41
1 5/8 (T-Mobile - Existing)	C	No	Inside Pole	125.00 - 6.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
HYBRIFLEX 1-5/8" (T-Mobile - Proposed)	C	No	Inside Pole	125.00 - 6.00	1	No Ice	0.00	1.90
						1/2" Ice	0.00	1.90
1 5/8 (MetroPCS - Existing)	C	No	Inside Pole	113.00 - 6.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
7/8 (AT&T - Existing)	C	No	Inside Pole	80.00 - 3.00	12	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
RG6-Fiber (AT&T - Existing)	C	No	Inside Pole	80.00 - 3.00	1	No Ice	0.00	1.00
						1/2" Ice	0.00	1.00
#8 AWG Copper WIre (AT&T - Existing)	C	No	Inside Pole	80.00 - 3.00	2	No Ice	0.00	0.05
						1/2" Ice	0.00	0.05
1/2 (Sprint - Existing)	C	No	CaAa (Out Of Face)	50.00 - 6.00	1	No Ice	0.06	0.25
						1/2" Ice	0.16	0.91

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 K
L1	145.00-114.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	114.00-78.67	A	0.000	0.000	0.000	4.158	0.84
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L3	78.67-43.17	A	0.000	0.000	0.000	6.995	1.76
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L4	43.17-0.00	A	0.000	0.000	0.000	7.426	2.04
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	145.00-114.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	114.00-78.67	A	0.500	0.000	0.000	0.000	6.258	1.09
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L3	78.67-43.17	A	0.500	0.000	0.000	0.000	10.528	2.19
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L4	43.17-0.00	A	0.500	0.000	0.000	0.000	11.659	2.47
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	145.00-114.00	-0.1708	0.0986	-0.2384	0.1376
L2	114.00-78.67	-0.2379	0.1373	-0.3347	0.1932
L3	78.67-43.17	-0.2555	0.1475	-0.3790	0.2188
L4	43.17-0.00	-0.2663	0.1537	-0.4455	0.2572

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
12' x 1-1/2" Dia Omni (Town - Existing)	A	From Face	3.00	0.00	0.0000	151.00	No Ice	1.80	1.80	0.03
				0.00			1/2" Ice	3.02	3.02	0.04
PD620 (Town - Existing)	C	From Face	3.00	0.00	0.0000	156.50	No Ice	4.27	4.27	0.05
				0.00			1/2" Ice	7.68	7.68	0.10
Siren (Town - Existing)	C	From Face	1.00	0.00	0.0000	146.00	No Ice	4.80	0.00	0.20
			-2.00				1/2" Ice	5.20	4.80	0.30
APXVSPP18-C-A20 (Sprint - Existing)	A	From Face	0.00	3.00	0.0000	147.00	No Ice	8.26	5.28	0.06
			6.00				1/2" Ice	8.81	5.74	0.11
APXVSPP18-C-A20 (Sprint - Existing)	B	From Face	0.00	3.00	0.0000	147.00	No Ice	8.26	5.28	0.06
			6.00				1/2" Ice	8.81	5.74	0.11
APXVSPP18-C-A20 (Sprint - Existing)	C	From Face	0.00	3.00	0.0000	147.00	No Ice	8.26	5.28	0.06
			6.00				1/2" Ice	8.81	5.74	0.11
FD-RRH 2x50 800 (Sprint - Existing)	A	From Face	0.00	3.00	0.0000	147.00	No Ice	2.40	2.25	0.06
			0.00				1/2" Ice	2.61	2.46	0.09
FD-RRH 2x50 800 (Sprint - Existing)	B	From Face	0.00	3.00	0.0000	147.00	No Ice	2.40	2.25	0.06
			0.00				1/2" Ice	2.61	2.46	0.09
FD-RRH 2x50 800 (Sprint - Existing)	C	From Face	0.00	3.00	0.0000	147.00	No Ice	2.40	2.25	0.06
			0.00				1/2" Ice	2.61	2.46	0.09
FD-RRH 4x45 1900 (Sprint - Existing)	A	From Face	0.00	3.00	0.0000	147.00	No Ice	2.71	2.78	0.06
			0.00				1/2" Ice	2.94	3.02	0.08
FD-RRH 4x45 1900 (Sprint - Existing)	B	From Face	0.00	3.00	0.0000	147.00	No Ice	2.71	2.78	0.06
			0.00				1/2" Ice	2.94	3.02	0.08
FD-RRH 4x45 1900 (Sprint - Existing)	C	From Face	0.00	3.00	0.0000	147.00	No Ice	2.71	2.78	0.06
			0.00				1/2" Ice	2.94	3.02	0.08
EEI 12-ft Low Profile Platform (Sprint - Existing)	C	None		0.00	0.0000	145.00	No Ice	15.00	15.00	1.50
							1/2" Ice	18.40	18.40	1.75
LPA-80063/6CF (Verizon - Reserved)	A	From Face	3.00		0.0000	139.00	No Ice	10.31	9.01	0.03
			6.00				1/2" Ice	10.87	9.55	0.10
LPA-171063-12CF (Verizon - Reserved)	A	From Face	0.00	3.00	0.0000	139.00	No Ice	5.99	6.05	0.01
			4.00				1/2" Ice	6.46	6.52	0.06
BXA-70063/6CF (Verizon - Reserved)	A	From Face	0.00	3.00	0.0000	139.00	No Ice	7.73	4.16	0.02
			1.00				1/2" Ice	8.27	4.60	0.06
BXA-70063/6CF (Verizon - Reserved)	A	From Face	0.00	3.00	0.0000	139.00	No Ice	7.73	4.16	0.02
			-1.00				1/2" Ice	8.27	4.60	0.06
LPA-171063-12CF (Verizon - Reserved)	A	From Face	0.00	3.00	0.0000	139.00	No Ice	5.99	6.05	0.01
			-4.00				1/2" Ice	6.46	6.52	0.06
LPA-80063/6CF (Verizon - Reserved)	A	From Face	0.00	3.00	0.0000	139.00	No Ice	10.31	9.01	0.03
			-6.00				1/2" Ice	10.87	9.55	0.10
			0.00							

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
LPA-80063/6CF (Verizon - Reserved)	B	From Face	3.00	0.00	0.0000	139.00	No Ice	10.31	9.01	0.03
			6.00	0.00			1/2" Ice	10.87	9.55	0.10
LPA-171063-12CF (Verizon - Reserved)	B	From Face	3.00	0.00	0.0000	139.00	No Ice	5.99	6.05	0.01
			4.00	0.00			1/2" Ice	6.46	6.52	0.06
BXA-70063/6CF (Verizon - Reserved)	B	From Face	3.00	0.00	0.0000	139.00	No Ice	7.73	4.16	0.02
			1.00	0.00			1/2" Ice	8.27	4.60	0.06
BXA-70063/6CF (Verizon - Reserved)	B	From Face	3.00	0.00	0.0000	139.00	No Ice	7.73	4.16	0.02
			-1.00	0.00			1/2" Ice	8.27	4.60	0.06
LPA-171063-12CF (Verizon - Reserved)	B	From Face	3.00	0.00	0.0000	139.00	No Ice	5.99	6.05	0.01
			-4.00	0.00			1/2" Ice	6.46	6.52	0.06
LPA-80063/6CF (Verizon - Reserved)	B	From Face	3.00	0.00	0.0000	139.00	No Ice	10.31	9.01	0.03
			-6.00	0.00			1/2" Ice	10.87	9.55	0.10
LPA-80063/6CF (Verizon - Reserved)	C	From Face	3.00	0.00	0.0000	139.00	No Ice	10.31	9.01	0.03
			6.00	0.00			1/2" Ice	10.87	9.55	0.10
LPA-171063-12CF (Verizon - Reserved)	C	From Face	3.00	0.00	0.0000	139.00	No Ice	5.99	6.05	0.01
			4.00	0.00			1/2" Ice	6.46	6.52	0.06
BXA-70063/6CF (Verizon - Reserved)	C	From Face	3.00	0.00	0.0000	139.00	No Ice	7.73	4.16	0.02
			1.00	0.00			1/2" Ice	8.27	4.60	0.06
BXA-70063/6CF (Verizon - Reserved)	C	From Face	3.00	0.00	0.0000	139.00	No Ice	7.73	4.16	0.02
			-1.00	0.00			1/2" Ice	8.27	4.60	0.06
LPA-171063-12CF (Verizon - Reserved)	C	From Face	3.00	0.00	0.0000	139.00	No Ice	5.99	6.05	0.01
			-4.00	0.00			1/2" Ice	6.46	6.52	0.06
LPA-80063/6CF (Verizon - Reserved)	C	From Face	3.00	0.00	0.0000	139.00	No Ice	10.31	9.01	0.03
			-6.00	0.00			1/2" Ice	10.87	9.55	0.10
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	A	From Face	3.00	0.00	0.0000	139.00	No Ice	0.37	0.08	0.00
			0.00	0.00			1/2" Ice	0.45	0.14	0.01
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	B	From Face	3.00	0.00	0.0000	139.00	No Ice	0.37	0.08	0.00
			0.00	0.00			1/2" Ice	0.45	0.14	0.01
(2) FD9R6004/2C-3L Diplexer (Verizon - Reserved)	C	From Face	3.00	0.00	0.0000	139.00	No Ice	0.37	0.08	0.00
			0.00	0.00			1/2" Ice	0.45	0.14	0.01
RRH2x40-AWS (Verizon - Reserved)	A	From Face	3.00	0.00	0.0000	139.00	No Ice	2.52	1.59	0.04
			0.00	0.00			1/2" Ice	2.75	1.80	0.06
RRH2x40-AWS (Verizon - Reserved)	B	From Face	3.00	0.00	0.0000	139.00	No Ice	2.52	1.59	0.04
			0.00	0.00			1/2" Ice	2.75	1.80	0.06
RRH2x40-AWS (Verizon - Reserved)	C	From Face	3.00	0.00	0.0000	139.00	No Ice	2.52	1.59	0.04
			0.00	0.00			1/2" Ice	2.75	1.80	0.06
RRH2x40-07-U (Verizon - Reserved)	A	From Face	3.00	0.00	0.0000	139.00	No Ice	2.25	1.23	0.05
			0.00	0.00			1/2" Ice	2.45	1.39	0.07

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 K
RRH2x40-07-U (Verizon - Reserved)	B	From Face	3.00 0.00 0.00	0.0000	139.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07
RRH2x40-07-U (Verizon - Reserved)	C	From Face	3.00 0.00 0.00	0.0000	139.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07
DB-T1-6Z-8AB-0Z (Verizon - Reserved)	C	From Face	3.00 0.00 0.00	0.0000	139.00	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	0.04 0.08
EEI Low Profile Platform (Verizon - Reserved)	C	None		0.0000	137.00	No Ice 1/2" Ice	22.50 28.20	22.50 28.20	1.50 2.25
(2) AIR21 (T-Mobile - Proposed)	A	From Face	3.50 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
(2) AIR21 (T-Mobile - Proposed)	B	From Face	3.50 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
(2) AIR21 (T-Mobile - Proposed)	C	From Face	3.50 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
KRY 112 TMA (T-Mobile - Proposed)	A	From Face	3.50 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	0.03 0.03
KRY 112 TMA (T-Mobile - Proposed)	B	From Face	3.50 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	0.03 0.03
KRY 112 TMA (T-Mobile - Proposed)	C	From Face	3.50 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	0.03 0.03
Valmont T-Arm (1) (T-Mobile - Existing)	A	From Face	2.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	10.54 14.45	10.54 14.45	0.34 0.41
Valmont T-Arm (1) (T-Mobile - Existing)	B	From Face	2.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	10.54 14.45	10.54 14.45	0.34 0.41
Valmont T-Arm (1) (T-Mobile - Existing)	C	From Face	2.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	10.54 14.45	10.54 14.45	0.34 0.41
APXV18-206517S (MetroPCS - Existing)	A	From Face	1.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	5.17 5.62	3.04 3.47	0.03 0.05
APXV18-206517S (MetroPCS - Existing)	B	From Face	1.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	5.17 5.62	3.04 3.47	0.03 0.05
APXV18-206517S (MetroPCS - Existing)	C	From Face	1.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	5.17 5.62	3.04 3.47	0.03 0.05
Uni-Tri Bracket (MetroPCS - Existing)	C	None		0.0000	113.00	No Ice 1/2" Ice	1.75 1.94	1.75 1.94	0.00 0.00
EEI 12-ft Low Profile Platform (Vacant)	C	None		0.0000	92.00	No Ice 1/2" Ice	15.00 18.40	15.00 18.40	1.50 1.75
(2) 7770.00 (AT&T - Existing)	A	From Face	3.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
(2) 7770.00 (AT&T - Existing)	B	From Face	3.00 0.00	0.0000	80.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) 7770.00 (AT&T - Existing)	C	From Face	0.00 3.00 0.00		0.0000	80.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
(2) LPG21401 TMA (AT&T - Existing)	A	From Face	0.00 3.00 0.00		0.0000	80.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) LPG21401 TMA (AT&T - Existing)	B	From Face	0.00 3.00 0.00		0.0000	80.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) LPG21401 TMA (AT&T - Existing)	C	From Face	0.00 3.00 0.00		0.0000	80.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) LGP21901 Diplexer (AT&T - Existing)	A	From Face	0.00 3.00 0.00		0.0000	80.00	No Ice 1/2" Ice	0.23 0.30	0.12 0.17	0.01 0.01
(2) LGP21901 Diplexer (AT&T - Existing)	B	From Face	0.00 3.00 0.00		0.0000	80.00	No Ice 1/2" Ice	0.23 0.30	0.12 0.17	0.01 0.01
(2) LGP21901 Diplexer (AT&T - Existing)	C	From Face	0.00 3.00 0.00		0.0000	80.00	No Ice 1/2" Ice	0.23 0.30	0.12 0.17	0.01 0.01
Bias T (AT&T - Existing)	A	From Face	0.00 3.00 0.00		0.0000	80.00	No Ice 1/2" Ice	0.16 0.21	0.08 0.12	0.00 0.00
Bias T (AT&T - Existing)	B	From Face	0.00 3.00 0.00		0.0000	80.00	No Ice 1/2" Ice	0.16 0.21	0.08 0.12	0.00 0.00
Bias T (AT&T - Existing)	C	From Face	0.00 3.00 0.00		0.0000	80.00	No Ice 1/2" Ice	0.16 0.21	0.08 0.12	0.00 0.00
P65-17-XLH-RR (AT&T - Reserved)	A	From Face	0.00 3.00 2.00		0.0000	80.00	No Ice 1/2" Ice	11.47 12.08	6.80 7.38	0.06 0.12
AM-X-CD-16-65-00T-RET(72") (AT&T - Reserved)	B	From Face	0.00 3.00 2.00		0.0000	80.00	No Ice 1/2" Ice	8.26 8.81	4.64 5.09	0.05 0.10
AM-X-CD-16-65-00T-RET(72") (AT&T - Reserved)	C	From Face	0.00 3.00 2.00		0.0000	80.00	No Ice 1/2" Ice	8.26 8.81	4.64 5.09	0.05 0.10
(2) RRUS-11 (AT&T - Reserved)	A	From Face	0.00 1.00 2.00		0.0000	80.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
(2) RRUS-11 (AT&T - Reserved)	B	From Face	0.00 1.00 2.00		0.0000	80.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
(2) RRUS-11 (AT&T - Reserved)	C	From Face	0.00 1.00 2.00		0.0000	80.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
DC6-48-60-18-8F Surge Arrestor (AT&T - Reserved)	C	From Face	0.00 0.50 0.00		0.0000	80.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	0.02 0.04
PiROD 12' Low Profile Circular Platform (AT&T - Existing)	C	None	0.00		0.0000	78.00	No Ice 1/2" Ice	15.20 19.60	15.20 19.60	1.55 1.81
GPS (Sprint - Existing)	C	From Face	2.00 0.00		0.0000	51.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	0.01 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Offsets: ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
GPS Mount (Sprint - Existing)	C	From Face	0.00 1.00 0.00 0.00			0.0000	50.00	No Ice 1/2" Ice	0.78 1.10	0.68 1.10	0.03 0.03

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 145.00-114.00	128.78	1.476	24	55.722	A	0.000	55.722	55.722	100.00	0.000	0.000
					B	0.000	55.722		100.00	0.000	0.000
					C	0.000	55.722		100.00	0.000	0.000
L2 114.00-78.67	95.75	1.356	22	85.984	A	0.000	85.984	85.984	100.00	0.000	4.158
					B	0.000	85.984		100.00	0.000	0.000
					C	0.000	85.984		100.00	0.000	0.000
L3 78.67-43.17	60.64	1.19	19	108.462	A	0.000	108.462	108.462	100.00	0.000	6.995
					B	0.000	108.462		100.00	0.000	0.000
					C	0.000	108.462		100.00	0.000	0.000
L4 43.17-0.00	20.80	1	16	161.321	A	0.000	161.321	161.321	100.00	0.000	7.426
					B	0.000	161.321		100.00	0.000	0.000
					C	0.000	161.321		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G 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 145.00-114.00	128.78	1.476	18	0.5000	58.306	A	0.000	58.306	58.306	100.00	0.000	0.000
						B	0.000	58.306		100.00	0.000	0.000
						C	0.000	58.306		100.00	0.000	6.258
L2 114.00-78.67	95.75	1.356	17	0.5000	88.929	A	0.000	88.929	88.929	100.00	0.000	0.000
						B	0.000	88.929		100.00	0.000	0.000
						C	0.000	88.929		100.00	0.000	10.528
L3 78.67-43.17	60.64	1.19	15	0.5000	111.421	A	0.000	111.421	111.421	100.00	0.000	0.000
						B	0.000	111.421		100.00	0.000	0.000
						C	0.000	111.421		100.00	0.000	11.659
L4 43.17-0.00	20.80	1	12	0.5000	164.918	A	0.000	164.918	164.918	100.00	0.000	0.000
						B	0.000	164.918		100.00	0.000	0.000
						C	0.000	164.918		100.00	0.000	16.948

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 145.00-114.00	128.78	1.476	9	55.722	A	0.000	55.722	55.722	100.00	0.000	0.000
					B	0.000	55.722		100.00	0.000	0.000
					C	0.000	55.722		100.00	0.000	0.000
L2 114.00-78.67	95.75	1.356	9	85.984	A	0.000	85.984	85.984	100.00	0.000	4.158
					B	0.000	85.984		100.00	0.000	0.000
					C	0.000	85.984		100.00	0.000	0.000
L3 78.67-43.17	60.64	1.19	8	108.462	A	0.000	108.462	108.462	100.00	0.000	6.995
					B	0.000	108.462		100.00	0.000	0.000
					C	0.000	108.462		100.00	0.000	0.000
L4 43.17-0.00	20.80	1	6	161.321	A	0.000	161.321	161.321	100.00	0.000	7.426
					B	0.000	161.321		100.00	0.000	0.000
					C	0.000	161.321		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	0.84	1.34	A	1	0.65	1	1	1	55.722	1.65	53.18	C
			B	1	0.65	1	1	1	55.722			
			C	1	0.65	1	1	1	55.722			
L2 114.00-78.67	1.76	3.45	A	1	0.65	1	1	1	85.984	2.36	66.71	C
			B	1	0.65	1	1	1	85.984			
			C	1	0.65	1	1	1	85.984			
L3 78.67-43.17	2.04	5.82	A	1	0.65	1	1	1	108.462	2.56	72.03	C
			B	1	0.65	1	1	1	108.462			
			C	1	0.65	1	1	1	108.462			
L4 43.17-0.00	2.18	10.10	A	1	0.65	1	1	1	161.321	3.17	73.36	C
			B	1	0.65	1	1	1	161.321			
			C	1	0.65	1	1	1	161.321			
Sum Weight:	6.82	20.70						OTM	658.90 kip-ft	9.73		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	0.84	1.34	A	1	0.65	1	1	1	55.722	1.65	53.18	C
			B	1	0.65	1	1	1	55.722			
			C	1	0.65	1	1	1	55.722			
L2 114.00-78.67	1.76	3.45	A	1	0.65	1	1	1	85.984	2.36	66.71	C
			B	1	0.65	1	1	1	85.984			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L3 78.67-43.17	2.04	5.82	C	1	0.65	1	1	1	85.984	2.56	72.03	C
			A	1	0.65	1	1	1	108.462			
			B	1	0.65	1	1	1	108.462			
L4 43.17-0.00	2.18	10.10	C	1	0.65	1	1	1	108.462			
			A	1	0.65	1	1	1	161.321	3.17	73.36	C
			B	1	0.65	1	1	1	161.321			
Sum Weight:	6.82	20.70	C	1	0.65	1	1	1	161.321			
								OTM	658.90 kip-ft	9.73		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	0.84	1.34	A	1	0.65	1	1	1	55.722	1.65	53.18	C
			B	1	0.65	1	1	1	55.722			
			C	1	0.65	1	1	1	55.722			
L2 114.00-78.67	1.76	3.45	A	1	0.65	1	1	1	85.984	2.36	66.71	C
			B	1	0.65	1	1	1	85.984			
			C	1	0.65	1	1	1	85.984			
L3 78.67-43.17	2.04	5.82	A	1	0.65	1	1	1	108.462	2.56	72.03	C
			B	1	0.65	1	1	1	108.462			
			C	1	0.65	1	1	1	108.462			
L4 43.17-0.00	2.18	10.10	A	1	0.65	1	1	1	161.321	3.17	73.36	C
			B	1	0.65	1	1	1	161.321			
			C	1	0.65	1	1	1	161.321			
Sum Weight:	6.82	20.70						OTM	658.90 kip-ft	9.73		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	0.84	1.34	A	1	0.65	1	1	1	55.722	1.65	53.18	C
			B	1	0.65	1	1	1	55.722			
			C	1	0.65	1	1	1	55.722			
L2 114.00-78.67	1.76	3.45	A	1	0.65	1	1	1	85.984	2.36	66.71	C
			B	1	0.65	1	1	1	85.984			
			C	1	0.65	1	1	1	85.984			
L3 78.67-43.17	2.04	5.82	A	1	0.65	1	1	1	108.462	2.56	72.03	C
			B	1	0.65	1	1	1	108.462			
			C	1	0.65	1	1	1	108.462			
L4 43.17-0.00	2.18	10.10	A	1	0.65	1	1	1	161.321	3.17	73.36	C
			B	1	0.65	1	1	1	161.321			
			C	1	0.65	1	1	1	161.321			
Sum Weight:	6.82	20.70						OTM	658.90 kip-ft	9.73		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	1.09	1.76	A	1	0.65	1	1	1	58.306	1.35	43.62	C
			B	1	0.65	1	1	1	58.306			
			C	1	0.65	1	1	1	58.306			
L2 114.00-78.67	2.19	4.09	A	1	0.65	1	1	1	88.929	1.92	54.37	C
			B	1	0.65	1	1	1	88.929			
			C	1	0.65	1	1	1	88.929			
L3 78.67-43.17	2.47	6.63	A	1	0.65	1	1	1	111.421	2.07	58.29	C
			B	1	0.65	1	1	1	111.421			
			C	1	0.65	1	1	1	111.421			
L4 43.17-0.00	2.65	11.31	A	1	0.65	1	1	1	164.918	2.58	59.72	C
			B	1	0.65	1	1	1	164.918			
			C	1	0.65	1	1	1	164.918			
Sum Weight:	8.41	23.80						OTM	537.15 kip-ft	7.92		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	1.09	1.76	A	1	0.65	1	1	1	58.306	1.35	43.62	C
			B	1	0.65	1	1	1	58.306			
			C	1	0.65	1	1	1	58.306			
L2 114.00-78.67	2.19	4.09	A	1	0.65	1	1	1	88.929	1.92	54.37	C
			B	1	0.65	1	1	1	88.929			
			C	1	0.65	1	1	1	88.929			
L3 78.67-43.17	2.47	6.63	A	1	0.65	1	1	1	111.421	2.07	58.29	C
			B	1	0.65	1	1	1	111.421			
			C	1	0.65	1	1	1	111.421			
L4 43.17-0.00	2.65	11.31	A	1	0.65	1	1	1	164.918	2.58	59.72	C
			B	1	0.65	1	1	1	164.918			
			C	1	0.65	1	1	1	164.918			
Sum Weight:	8.41	23.80						OTM	537.15 kip-ft	7.92		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	1.09	1.76	A	1	0.65	1	1	1	58.306	1.35	43.62	C
			B	1	0.65	1	1	1	58.306			
			C	1	0.65	1	1	1	58.306			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L2 114.00-78.67	2.19	4.09	A	1	0.65	1	1	1	88.929	1.92	54.37	C
			B	1	0.65	1	1	1	88.929			
			C	1	0.65	1	1	1	88.929			
L3 78.67-43.17	2.47	6.63	A	1	0.65	1	1	1	111.421	2.07	58.29	C
			B	1	0.65	1	1	1	111.421			
			C	1	0.65	1	1	1	111.421			
L4 43.17-0.00	2.65	11.31	A	1	0.65	1	1	1	164.918	2.58	59.72	C
			B	1	0.65	1	1	1	164.918			
			C	1	0.65	1	1	1	164.918			
Sum Weight:	8.41	23.80						OTM	537.15 kip-ft	7.92		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	1.09	1.76	A	1	0.65	1	1	1	58.306	1.35	43.62	C
			B	1	0.65	1	1	1	58.306			
			C	1	0.65	1	1	1	58.306			
L2 114.00-78.67	2.19	4.09	A	1	0.65	1	1	1	88.929	1.92	54.37	C
			B	1	0.65	1	1	1	88.929			
			C	1	0.65	1	1	1	88.929			
L3 78.67-43.17	2.47	6.63	A	1	0.65	1	1	1	111.421	2.07	58.29	C
			B	1	0.65	1	1	1	111.421			
			C	1	0.65	1	1	1	111.421			
L4 43.17-0.00	2.65	11.31	A	1	0.65	1	1	1	164.918	2.58	59.72	C
			B	1	0.65	1	1	1	164.918			
			C	1	0.65	1	1	1	164.918			
Sum Weight:	8.41	23.80						OTM	537.15 kip-ft	7.92		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	0.84	1.34	A	1	0.65	1	1	1	55.722	0.64	20.77	C
			B	1	0.65	1	1	1	55.722			
			C	1	0.65	1	1	1	55.722			
L2 114.00-78.67	1.76	3.45	A	1	0.65	1	1	1	85.984	0.92	26.06	C
			B	1	0.65	1	1	1	85.984			
			C	1	0.65	1	1	1	85.984			
L3 78.67-43.17	2.04	5.82	A	1	0.65	1	1	1	108.462	1.00	28.14	C
			B	1	0.65	1	1	1	108.462			
			C	1	0.65	1	1	1	108.462			
L4 43.17-0.00	2.18	10.10	A	1	0.65	1	1	1	161.321	1.24	28.66	C
			B	1	0.65	1	1	1	161.321			
			C	1	0.65	1	1	1	161.321			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
Sum Weight:	6.82	20.70						OTM	257.38 kip-ft	3.80		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	0.84	1.34	A	1	0.65	1	1	1	55.722	0.64	20.77	C
			B	1	0.65	1	1	1	55.722			
			C	1	0.65	1	1	1	55.722			
L2 114.00-78.67	1.76	3.45	A	1	0.65	1	1	1	85.984	0.92	26.06	C
			B	1	0.65	1	1	1	85.984			
			C	1	0.65	1	1	1	85.984			
L3 78.67-43.17	2.04	5.82	A	1	0.65	1	1	1	108.462	1.00	28.14	C
			B	1	0.65	1	1	1	108.462			
			C	1	0.65	1	1	1	108.462			
L4 43.17-0.00	2.18	10.10	A	1	0.65	1	1	1	161.321	1.24	28.66	C
			B	1	0.65	1	1	1	161.321			
			C	1	0.65	1	1	1	161.321			
Sum Weight:	6.82	20.70						OTM	257.38 kip-ft	3.80		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	0.84	1.34	A	1	0.65	1	1	1	55.722	0.64	20.77	C
			B	1	0.65	1	1	1	55.722			
			C	1	0.65	1	1	1	55.722			
L2 114.00-78.67	1.76	3.45	A	1	0.65	1	1	1	85.984	0.92	26.06	C
			B	1	0.65	1	1	1	85.984			
			C	1	0.65	1	1	1	85.984			
L3 78.67-43.17	2.04	5.82	A	1	0.65	1	1	1	108.462	1.00	28.14	C
			B	1	0.65	1	1	1	108.462			
			C	1	0.65	1	1	1	108.462			
L4 43.17-0.00	2.18	10.10	A	1	0.65	1	1	1	161.321	1.24	28.66	C
			B	1	0.65	1	1	1	161.321			
			C	1	0.65	1	1	1	161.321			
Sum Weight:	6.82	20.70						OTM	257.38 kip-ft	3.80		

Tower Forces - Service - Wind 90 To Face

tnxTower	Job	Page
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	14033.003 - CTNH411A	14 of 22
	Project 145' EEI Monopole - 20 Antolini Rd., New Hartford, CT	Date 09:41:27 03/05/14
	Client T-Mobile	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 145.00-114.00	0.84	1.34	A	1	0.65	1	1	1	55.722	0.64	20.77	C
			B	1	0.65	1	1	1	55.722			
			C	1	0.65	1	1	1	55.722			
L2 114.00-78.67	1.76	3.45	A	1	0.65	1	1	1	85.984	0.92	26.06	C
			B	1	0.65	1	1	1	85.984			
			C	1	0.65	1	1	1	85.984			
L3 78.67-43.17	2.04	5.82	A	1	0.65	1	1	1	108.462	1.00	28.14	C
			B	1	0.65	1	1	1	108.462			
			C	1	0.65	1	1	1	108.462			
L4 43.17-0.00	2.18	10.10	A	1	0.65	1	1	1	161.321	1.24	28.66	C
			B	1	0.65	1	1	1	161.321			
			C	1	0.65	1	1	1	161.321			
Sum Weight:	6.82	20.70						OTM	257.38 kip-ft	3.80		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	20.70			1.69	1.36	
Bracing Weight	0.00			1.69	1.36	
Total Member Self-Weight	20.70					
Total Weight	37.67					
Wind 0 deg - No Ice		-0.02	-26.28	-2717.70	2.65	-0.22
Wind 30 deg - No Ice		12.97	-22.75	-2352.72	-1333.57	0.30
Wind 45 deg - No Ice		18.34	-18.57	-1920.29	-1887.18	0.54
Wind 60 deg - No Ice		22.47	-13.13	-1356.89	-2312.09	0.74
Wind 90 deg - No Ice		25.96	0.02	2.98	-2670.73	0.98
Wind 120 deg - No Ice		22.49	13.16	1362.50	-2313.39	0.96
Wind 135 deg - No Ice		18.37	18.60	1925.50	-1889.01	0.85
Wind 150 deg - No Ice		12.99	22.77	2357.39	-1335.81	0.68
Wind 180 deg - No Ice		0.02	26.28	2721.07	0.06	0.22
Wind 210 deg - No Ice		-12.97	22.75	2356.10	1336.28	-0.30
Wind 225 deg - No Ice		-18.34	18.57	1923.67	1889.89	-0.54
Wind 240 deg - No Ice		-22.47	13.13	1360.26	2314.80	-0.74
Wind 270 deg - No Ice		-25.96	-0.02	0.39	2673.44	-0.98
Wind 300 deg - No Ice		-22.49	-13.16	-1359.13	2316.10	-0.96
Wind 315 deg - No Ice		-18.37	-18.60	-1922.13	1891.72	-0.85
Wind 330 deg - No Ice		-12.99	-22.77	-2354.02	1338.52	-0.68
Member Ice	3.09					
Total Weight Ice	46.49			3.30	3.24	
Wind 0 deg - Ice		-0.01	-22.12	-2299.03	4.15	-0.37
Wind 30 deg - Ice		11.00	-19.15	-1990.13	-1139.43	0.43
Wind 45 deg - Ice		15.56	-15.63	-1624.05	-1613.21	0.79
Wind 60 deg - Ice		19.06	-11.05	-1147.08	-1976.83	1.11
Wind 90 deg - Ice		22.01	0.01	4.20	-2283.67	1.49
Wind 120 deg - Ice		19.07	11.07	1155.25	-1977.73	1.48
Wind 135 deg - Ice		15.57	15.65	1631.93	-1614.49	1.32
Wind 150 deg - Ice		11.02	19.16	1997.63	-1141.00	1.07
Wind 180 deg - Ice		0.01	22.12	2305.63	2.33	0.37
Wind 210 deg - Ice		-11.00	19.15	1996.72	1145.91	-0.43
Wind 225 deg - Ice		-15.56	15.63	1630.65	1619.69	-0.79
Wind 240 deg - Ice		-19.06	11.05	1153.68	1983.31	-1.11
Wind 270 deg - Ice		-22.01	-0.01	2.39	2290.15	-1.49

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 300 deg - Ice		-19.07	-11.07	-1148.65	1984.21	-1.48
Wind 315 deg - Ice		-15.57	-15.65	-1625.34	1620.97	-1.32
Wind 330 deg - Ice		-11.02	-19.16	-1991.03	1147.48	-1.07
Total Weight	37.67			1.69	1.36	
Wind 0 deg - Service		-0.01	-10.27	-1061.52	0.23	-0.08
Wind 30 deg - Service		5.06	-8.89	-918.95	-521.73	0.12
Wind 45 deg - Service		7.17	-7.26	-750.03	-737.98	0.21
Wind 60 deg - Service		8.78	-5.13	-529.95	-903.97	0.29
Wind 90 deg - Service		10.14	0.01	1.25	-1044.06	0.38
Wind 120 deg - Service		8.78	5.14	532.31	-904.47	0.37
Wind 135 deg - Service		7.17	7.26	752.23	-738.70	0.33
Wind 150 deg - Service		5.08	8.89	920.94	-522.61	0.26
Wind 180 deg - Service		0.01	10.27	1063.01	-0.78	0.08
Wind 210 deg - Service		-5.06	8.89	920.44	521.18	-0.12
Wind 225 deg - Service		-7.17	7.26	751.52	737.43	-0.21
Wind 240 deg - Service		-8.78	5.13	531.44	903.42	-0.29
Wind 270 deg - Service		-10.14	-0.01	0.24	1043.51	-0.38
Wind 300 deg - Service		-8.78	-5.14	-530.82	903.92	-0.37
Wind 315 deg - Service		-7.17	-7.26	-750.74	738.15	-0.33
Wind 330 deg - Service		-5.08	-8.89	-919.45	522.06	-0.26

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 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp

Comb. No.	Description
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	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	145 - 114	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-12.00	-0.06	-1.39
			Max. Mx	6	-6.97	-323.23	-0.72
			Max. My	10	-6.90	-0.12	-334.09
			Max. Vy	14	-14.42	322.97	-0.71
			Max. Vx	10	14.77	-0.12	-334.09
			Max. Torque	31			1.42
L2	114 - 78.67	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-19.29	0.70	-1.87
			Max. Mx	14	-13.24	819.13	-0.94
			Max. My	10	-13.19	0.21	-841.00
			Max. Vy	14	-17.71	819.13	-0.94
			Max. Vx	10	18.07	0.21	-841.00
			Max. Torque	31			1.44
L3	78.67 - 43.167	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-31.08	1.78	-2.57
			Max. Mx	14	-23.38	1567.81	-0.83
			Max. My	10	-23.35	0.17	-1601.33
			Max. Vy	14	-23.18	1567.81	-0.83
			Max. Vx	10	23.52	0.17	-1601.33
			Max. Torque	31			1.50
L4	43.167 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-46.49	3.32	-3.46
			Max. Mx	14	-37.65	2770.01	-0.44
			Max. My	10	-37.65	0.06	-2819.50
			Max. Vy	14	-25.99	2770.01	-0.44
			Max. Vx	10	26.31	0.06	-2819.50
			Max. Torque	31			1.56

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	46.49	-0.01	-22.12
	Max. H_x	14	37.67	25.96	0.02
	Max. H_z	2	37.67	0.02	26.28
	Max. M_x	2	2815.97	0.02	26.28
	Max. M_z	6	2767.23	-25.96	-0.02
	Max. Torsion	31	1.56	22.01	0.01
	Min. Vert	1	37.67	0.00	0.00
	Min. H_x	6	37.67	-25.96	-0.02
	Min. H_z	10	37.67	-0.02	-26.28
	Min. M_x	10	-2819.50	-0.02	-26.28
	Min. M_z	14	-2770.01	25.96	0.02
	Min. Torsion	23	-1.56	-22.01	-0.01

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	37.67	0.00	0.00	1.71	1.36	-0.00
Dead+Wind 0 deg - No Ice	37.67	-0.02	-26.28	-2815.97	2.72	-0.18
Dead+Wind 30 deg - No Ice	37.67	12.97	-22.75	-2437.86	-1381.70	0.36
Dead+Wind 45 deg - No Ice	37.67	18.34	-18.57	-1989.82	-1955.31	0.60
Dead+Wind 60 deg - No Ice	37.67	22.47	-13.13	-1406.04	-2395.60	0.80
Dead+Wind 90 deg - No Ice	37.67	25.96	0.02	3.09	-2767.23	1.03
Dead+Wind 120 deg - No Ice	37.67	22.49	13.16	1411.87	-2396.93	0.98
Dead+Wind 135 deg - No Ice	37.67	18.37	18.60	1995.23	-1957.19	0.86
Dead+Wind 150 deg - No Ice	37.67	12.99	22.77	2442.71	-1383.99	0.67
Dead+Wind 180 deg - No Ice	37.67	0.02	26.28	2819.50	0.06	0.18
Dead+Wind 210 deg - No Ice	37.67	-12.97	22.75	2441.39	1384.48	-0.36
Dead+Wind 225 deg - No Ice	37.67	-18.34	18.57	1993.35	1958.09	-0.60
Dead+Wind 240 deg - No Ice	37.67	-22.47	13.13	1409.57	2398.38	-0.80
Dead+Wind 270 deg - No Ice	37.67	-25.96	-0.02	0.44	2770.01	-1.03
Dead+Wind 300 deg - No Ice	37.67	-22.49	-13.16	-1408.33	2399.71	-0.98
Dead+Wind 315 deg - No Ice	37.67	-18.37	-18.60	-1991.69	1959.97	-0.85
Dead+Wind 330 deg - No Ice	37.67	-12.99	-22.77	-2439.18	1386.78	-0.67
Dead+Ice+Temp	46.49	-0.00	0.00	3.46	3.32	-0.00
Dead+Wind 0 deg+Ice+Temp	46.49	-0.01	-22.12	-2416.05	4.32	-0.32
Dead+Wind 30 deg+Ice+Temp	46.49	11.00	-19.15	-2091.44	-1197.43	0.51
Dead+Wind 45 deg+Ice+Temp	46.49	15.56	-15.63	-1706.74	-1695.31	0.88
Dead+Wind 60 deg+Ice+Temp	46.49	19.06	-11.05	-1205.48	-2077.44	1.20
Dead+Wind 90 deg+Ice+Temp	46.49	22.01	0.01	4.46	-2399.90	1.56
Dead+Wind 120 deg+Ice+Temp	46.49	19.07	11.07	1214.14	-2078.38	1.51
Dead+Wind 135 deg+Ice+Temp	46.49	15.57	15.65	1715.10	-1696.64	1.33
Dead+Wind 150 deg+Ice+Temp	46.49	11.02	19.16	2099.42	-1199.06	1.06
Dead+Wind 180 deg+Ice+Temp	46.49	0.01	22.12	2423.10	2.44	0.32
Dead+Wind 210 deg+Ice+Temp	46.49	-11.00	19.15	2098.48	1204.18	-0.50
Dead+Wind 225 deg+Ice+Temp	46.49	-15.56	15.63	1713.77	1702.07	-0.88
Dead+Wind 240 deg+Ice+Temp	46.49	-19.06	11.05	1212.51	2084.19	-1.19
Dead+Wind 270 deg+Ice+Temp	46.49	-22.01	-0.01	2.58	2406.65	-1.56
Dead+Wind 300 deg+Ice+Temp	46.49	-19.07	-11.07	-1207.10	2085.13	-1.52
Dead+Wind 315 deg+Ice+Temp	46.49	-15.57	-15.65	-1708.06	1703.39	-1.34
Dead+Wind 330 deg+Ice+Temp	46.49	-11.02	-19.16	-2092.37	1205.81	-1.06
Dead+Wind 0 deg - Service	37.67	-0.01	-10.27	-1100.48	1.91	-0.07
Dead+Wind 30 deg - Service	37.67	5.06	-8.89	-952.55	-539.64	0.14
Dead+Wind 45 deg - Service	37.67	7.17	-7.26	-777.28	-764.01	0.24
Dead+Wind 60 deg - Service	37.67	8.78	-5.13	-548.91	-936.22	0.32

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 90 deg - Service	37.67	10.14	0.01	2.30	-1081.57	0.41
Dead+Wind 120 deg - Service	37.67	8.78	5.14	553.36	-936.74	0.39
Dead+Wind 135 deg - Service	37.67	7.17	7.26	781.56	-764.74	0.34
Dead+Wind 150 deg - Service	37.67	5.08	8.89	956.63	-540.53	0.26
Dead+Wind 180 deg - Service	37.67	0.01	10.27	1104.03	0.88	0.07
Dead+Wind 210 deg - Service	37.67	-5.06	8.89	956.11	542.42	-0.14
Dead+Wind 225 deg - Service	37.67	-7.17	7.26	780.83	766.80	-0.24
Dead+Wind 240 deg - Service	37.67	-8.78	5.13	552.46	939.01	-0.32
Dead+Wind 270 deg - Service	37.67	-10.14	-0.01	1.26	1084.36	-0.41
Dead+Wind 300 deg - Service	37.67	-8.78	-5.14	-549.81	939.53	-0.39
Dead+Wind 315 deg - Service	37.67	-7.17	-7.26	-778.01	767.53	-0.34
Dead+Wind 330 deg - Service	37.67	-5.08	-8.89	-953.07	543.32	-0.26

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-37.67	0.00	0.00	37.67	0.00	0.000%
2	-0.02	-37.67	-26.28	0.02	37.67	26.28	0.000%
3	12.97	-37.67	-22.75	-12.97	37.67	22.75	0.000%
4	18.34	-37.67	-18.57	-18.34	37.67	18.57	0.000%
5	22.47	-37.67	-13.13	-22.47	37.67	13.13	0.000%
6	25.96	-37.67	0.02	-25.96	37.67	-0.02	0.000%
7	22.49	-37.67	13.16	-22.49	37.67	-13.16	0.000%
8	18.37	-37.67	18.60	-18.37	37.67	-18.60	0.000%
9	12.99	-37.67	22.77	-12.99	37.67	-22.77	0.000%
10	0.02	-37.67	26.28	-0.02	37.67	-26.28	0.000%
11	-12.97	-37.67	22.75	12.97	37.67	-22.75	0.000%
12	-18.34	-37.67	18.57	18.34	37.67	-18.57	0.000%
13	-22.47	-37.67	13.13	22.47	37.67	-13.13	0.000%
14	-25.96	-37.67	-0.02	25.96	37.67	0.02	0.000%
15	-22.49	-37.67	-13.16	22.49	37.67	13.16	0.000%
16	-18.37	-37.67	-18.60	18.37	37.67	18.60	0.000%
17	-12.99	-37.67	-22.77	12.99	37.67	22.77	0.000%
18	0.00	-46.49	0.00	0.00	46.49	-0.00	0.000%
19	-0.01	-46.49	-22.12	0.01	46.49	22.12	0.000%
20	11.00	-46.49	-19.15	-11.00	46.49	19.15	0.000%
21	15.56	-46.49	-15.63	-15.56	46.49	15.63	0.000%
22	19.06	-46.49	-11.05	-19.06	46.49	11.05	0.000%
23	22.01	-46.49	0.01	-22.01	46.49	-0.01	0.000%
24	19.07	-46.49	11.07	-19.07	46.49	-11.07	0.000%
25	15.57	-46.49	15.65	-15.57	46.49	-15.65	0.000%
26	11.02	-46.49	19.16	-11.02	46.49	-19.16	0.000%
27	0.01	-46.49	22.12	-0.01	46.49	-22.12	0.000%
28	-11.00	-46.49	19.15	11.00	46.49	-19.15	0.000%
29	-15.56	-46.49	15.63	15.56	46.49	-15.63	0.000%
30	-19.06	-46.49	11.05	19.06	46.49	-11.05	0.000%
31	-22.01	-46.49	-0.01	22.01	46.49	0.01	0.000%
32	-19.07	-46.49	-11.07	19.07	46.49	11.07	0.000%
33	-15.57	-46.49	-15.65	15.57	46.49	15.65	0.000%
34	-11.02	-46.49	-19.16	11.02	46.49	19.16	0.000%
35	-0.01	-37.67	-10.27	0.01	37.67	10.27	0.000%
36	5.06	-37.67	-8.89	-5.06	37.67	8.89	0.000%
37	7.17	-37.67	-7.26	-7.17	37.67	7.26	0.000%
38	8.78	-37.67	-5.13	-8.78	37.67	5.13	0.000%
39	10.14	-37.67	0.01	-10.14	37.67	-0.01	0.000%
40	8.78	-37.67	5.14	-8.78	37.67	-5.14	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
41	7.17	-37.67	7.26	-7.17	37.67	-7.26	0.000%
42	5.08	-37.67	8.89	-5.08	37.67	-8.89	0.000%
43	0.01	-37.67	10.27	-0.01	37.67	-10.27	0.000%
44	-5.06	-37.67	8.89	5.06	37.67	-8.89	0.000%
45	-7.17	-37.67	7.26	7.17	37.67	-7.26	0.000%
46	-8.78	-37.67	5.13	8.78	37.67	-5.13	0.000%
47	-10.14	-37.67	-0.01	10.14	37.67	0.01	0.000%
48	-8.78	-37.67	-5.14	8.78	37.67	5.14	0.000%
49	-7.17	-37.67	-7.26	7.17	37.67	7.26	0.000%
50	-5.08	-37.67	-8.89	5.08	37.67	8.89	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	0.00023746
3	Yes	5	0.00000001	0.00091138
4	Yes	5	0.00000001	0.00098630
5	Yes	5	0.00000001	0.00087923
6	Yes	4	0.00000001	0.00093934
7	Yes	5	0.00000001	0.00091648
8	Yes	5	0.00000001	0.00098845
9	Yes	5	0.00000001	0.00089465
10	Yes	4	0.00000001	0.00023669
11	Yes	5	0.00000001	0.00089389
12	Yes	5	0.00000001	0.00098858
13	Yes	5	0.00000001	0.00091679
14	Yes	4	0.00000001	0.00090519
15	Yes	5	0.00000001	0.00088120
16	Yes	5	0.00000001	0.00098766
17	Yes	5	0.00000001	0.00091233
18	Yes	4	0.00000001	0.00002202
19	Yes	5	0.00000001	0.00037622
20	Yes	6	0.00000001	0.00011961
21	Yes	6	0.00000001	0.00013204
22	Yes	6	0.00000001	0.00011512
23	Yes	5	0.00000001	0.00039819
24	Yes	6	0.00000001	0.00012220
25	Yes	6	0.00000001	0.00013294
26	Yes	6	0.00000001	0.00011694
27	Yes	5	0.00000001	0.00037745
28	Yes	6	0.00000001	0.00011773
29	Yes	6	0.00000001	0.00013322
30	Yes	6	0.00000001	0.00012214
31	Yes	5	0.00000001	0.00039803
32	Yes	6	0.00000001	0.00011529
33	Yes	6	0.00000001	0.00013255
34	Yes	6	0.00000001	0.00012064
35	Yes	4	0.00000001	0.00009186
36	Yes	5	0.00000001	0.00010228
37	Yes	5	0.00000001	0.00011431
38	Yes	5	0.00000001	0.00009531
39	Yes	4	0.00000001	0.00021990
40	Yes	5	0.00000001	0.00010384
41	Yes	5	0.00000001	0.00011540

42	Yes	5	0.00000001	0.00009900
43	Yes	4	0.00000001	0.00009243
44	Yes	5	0.00000001	0.00009904
45	Yes	5	0.00000001	0.00011563
46	Yes	5	0.00000001	0.00010413
47	Yes	4	0.00000001	0.00021748
48	Yes	5	0.00000001	0.00009582
49	Yes	5	0.00000001	0.00011477
50	Yes	5	0.00000001	0.00010257

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	145 - 114	39.410	43	2.6549	0.0080
L2	114 - 78.67	23.404	43	2.1046	0.0026
L3	83.337 - 43.167	12.017	43	1.4251	0.0011
L4	48.834 - 0	3.982	43	0.7626	0.0005

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
156.50	PD620	43	39.410	2.6549	0.0080	12164
151.00	12' x 1-1/2" Dia Omni	43	39.410	2.6549	0.0080	12164
147.00	APXVSPP18-C-A20	43	39.410	2.6549	0.0080	12164
146.00	Siren	43	39.410	2.6549	0.0080	12164
145.00	EEI 12-ft Low Profile Platform	43	39.410	2.6549	0.0080	12164
139.00	LPA-80063/6CF	43	36.129	2.5560	0.0068	10137
137.00	EEI Low Profile Platform	43	35.043	2.5228	0.0064	7602
125.00	(2) AIR21	43	28.713	2.3154	0.0042	3040
113.00	APXV18-206517S	43	22.954	2.0840	0.0025	2025
92.00	EEI 12-ft Low Profile Platform	43	14.783	1.6182	0.0013	2742
80.00	(2) 7770.00	43	11.029	1.3536	0.0010	3168
78.00	PiROD 12' Low Profile Circular Platform	43	10.457	1.3116	0.0010	3124
51.00	GPS	43	4.335	0.7999	0.0005	2608
50.00	GPS Mount	43	4.169	0.7826	0.0005	2608

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	145 - 114	100.342	10	6.7521	0.0305
L2	114 - 78.67	59.663	10	5.3632	0.0099
L3	83.337 - 43.167	30.659	10	3.6353	0.0042
L4	48.834 - 0	10.165	10	1.9464	0.0018

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
156.50	PD620	10	100.342	6.7521	0.0305	4901
151.00	12' x 1-1/2" Dia Omni	10	100.342	6.7521	0.0305	4901
147.00	APXVSPP18-C-A20	10	100.342	6.7521	0.0305	4901
146.00	Siren	10	100.342	6.7521	0.0305	4901
145.00	EEI 12-ft Low Profile Platform	10	100.342	6.7521	0.0305	4901
139.00	LPA-80063/6CF	10	92.007	6.5033	0.0258	4084
137.00	EEI Low Profile Platform	10	89.247	6.4196	0.0243	3062
125.00	(2) AIR21	10	73.164	5.8965	0.0158	1222
113.00	APXV18-206517S	10	58.519	5.3112	0.0094	811
92.00	EEI 12-ft Low Profile Platform	10	37.710	4.1270	0.0048	1088
80.00	(2) 7770.00	10	28.139	3.4530	0.0039	1250
78.00	PiROD 12' Low Profile Circular Platform	10	26.681	3.3460	0.0038	1232
51.00	GPS	10	11.065	2.0416	0.0019	1025
50.00	GPS Mount	10	10.643	1.9975	0.0018	1024

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	145 - 114 (1)	TP25.14x18x0.1875	31.00	0.00	0.0	39.000	14.8499	-6.90	579.14	0.012
L2	114 - 78.67 (2)	TP33.27x25.14x0.3125	35.33	0.00	0.0	39.000	31.6245	-13.19	1233.36	0.011
L3	78.67 - 43.167 (3)	TP40.69x31.571x0.375	40.17	0.00	0.0	39.000	46.4537	-23.35	1811.70	0.013
L4	43.167 - 0 (4)	TP49.75x38.6535x0.4375	48.83	0.00	0.0	39.000	68.4766	-37.65	2670.59	0.014

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	145 - 114 (1)	TP25.14x18x0.1875	334.09	43.831	39.000	1.124	0.00	0.000	39.000	0.000
L2	114 - 78.67 (2)	TP33.27x25.14x0.3125	840.99	40.639	39.000	1.042	0.00	0.000	39.000	0.000
L3	78.67 - 43.167 (3)	TP40.69x31.571x0.375	1601.33	43.027	39.000	1.103	0.00	0.000	39.000	0.000
L4	43.167 - 0 (4)	TP49.75x38.6535x0.4375	2819.50	40.646	39.000	1.042	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	145 - 114 (1)	TP25.14x18x0.1875	14.77	0.995	26.000	0.078	0.17	0.011	26.000	0.000
L2	114 - 78.67 (2)	TP33.27x25.14x0.3125	18.07	0.571	26.000	0.044	0.13	0.003	26.000	0.000
L3	78.67 - 43.167 (3)	TP40.69x31.571x0.375	23.52	0.506	26.000	0.039	0.10	0.001	26.000	0.000
L4	43.167 - 0 (4)	TP49.75x38.6535x0.4375	26.31	0.384	26.000	0.030	0.18	0.001	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	145 - 114 (1)	0.012	1.124	0.000	0.078	0.000	1.137 ✔	1.333	H1-3+VT ✔
L2	114 - 78.67 (2)	0.011	1.042	0.000	0.044	0.000	1.053 ✔	1.333	H1-3+VT ✔
L3	78.67 - 43.167 (3)	0.013	1.103	0.000	0.039	0.000	1.117 ✔	1.333	H1-3+VT ✔
L4	43.167 - 0 (4)	0.014	1.042	0.000	0.030	0.000	1.057 ✔	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	145 - 114	Pole	TP25.14x18x0.1875	1	-6.90	772.00	85.3	Pass
L2	114 - 78.67	Pole	TP33.27x25.14x0.3125	2	-13.19	1644.07	79.0	Pass
L3	78.67 - 43.167	Pole	TP40.69x31.571x0.375	3	-23.35	2415.00	83.8	Pass
L4	43.167 - 0	Pole	TP49.75x38.6535x0.4375	4	-37.65	3559.90	79.3	Pass
							Summary	
						Pole (L1)	85.3	Pass
						RATING =	**85.3**	**Pass**

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Subject:	Flange Bolts and Flangeplate Analysis
Location:	145-ft EEI Monopole New Hartford, CT
Rev. 0: 3/05/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14033.003

Flange Bolt and Flange Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 324·ft·kips	(Input From tnxTower)
Shear Force =	Shear := 14.8·kips	(Input From tnxTower)
Axial Force =	Axial := 12.0·kips	(Input From tnxTower)

Flange Bolt Data:

Use ASTM A325

Number of Flange Bolts =	N := 24	(User Input)
Diameter of Bolt Circle =	D_{bc} := 29.0·in	(User Input)
Bolt Ultimate Strength =	F_u := 120·ksi	(User Input)
Bolt Yield Strength =	F_y := 92·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Flange Bolts =	D := 1.0·in	(User Input)
Threads per Inch =	n := 8	(User Input)

Flange Plate Data:

Use ASTM A871 GR 60

Plate Yield Strength =	Fy_{bp} := 60·ksi	(User Input)
Flange Plate Thickness =	t_{bp} := 1.5·in	(User Input)
Flange Plate Diameter =	D_{bp} := 32.0·in	(User Input)
Outer Pole Diameter =	D_{pole} := 25.14·in	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 14.5 \cdot in$

Distance to Bolts = $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N}\right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 3.75 \cdot in$ $d_7 = 14.01 \cdot in$

$d_2 = 7.25 \cdot in$ $d_8 = 12.56 \cdot in$

$d_3 = 10.25 \cdot in$ $d_9 = 10.25 \cdot in$

$d_4 = 12.56 \cdot in$ $d_{10} = 7.25 \cdot in$

$d_5 = 14.01 \cdot in$ $d_{11} = 3.75 \cdot in$

$d_6 = 14.50 \cdot in$ $d_{12} = 0.00 \cdot in$

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 12.6 \cdot in$

Moment Arms of Bolts about Neutral Axis = $MA_i := if\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 0.00 \cdot in$ $MA_7 = 1.44 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 0.00 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 0.00 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 1.44 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 1.93 \cdot in$ $MA_{12} = 0.00 \cdot in$

Effective Width of Flangeplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 15.8 \cdot in$

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i \left(d_i\right)^2 = 2.523 \times 10^3 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 0.785 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 0.606 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 0.878 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.22 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.066 \cdot in^3$

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 21.8 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot \left(0.33 \cdot A_g \cdot F_u\right) = 41.5 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Gross}} = 53 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Gross}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Flange Plate Analysis:

Force from Bolts = $C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$

$C_1 = 6.3 \cdot kips$
$C_2 = 11.7 \cdot kips$
$C_3 = 16.3 \cdot kips$
$C_4 = 19.9 \cdot kips$
$C_5 = 22.1 \cdot kips$
$C_6 = 22.8 \cdot kips$
$C_7 = 22.1 \cdot kips$
$C_8 = 19.9 \cdot kips$
$C_9 = 16.3 \cdot kips$
$C_{10} = 11.7 \cdot kips$
$C_{11} = 6.3 \cdot kips$
$C_{12} = 0.5 \cdot kips$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} t_{bp}^2\right)} = 18.1 \cdot ksi$$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 59.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 30.2 \cdot \%$

Condition3 = $Condition2 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition2 = "Ok"

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Subject:	Anchor Bolt and Base Plate Anlaysis
Location:	145-ft EEI Monopole New Hartford, CT
Rev. 0: 3/05/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14033.003

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 2820·ft·kips	(Input From tnxTower)
Shear Force =	Shear := 26·kips	(Input From tnxTower)
Axial Force =	Axial := 38·kips	(Input From tnxTower)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	N := 20	(User Input)
Diameter of Bolt Circle =	D_{bc} := 69·in	(User Input)
Bolt "Column" Distance =	l := 3.0·in	(User Input)
Bolt Ultimate Strength =	F_u := 100·ksi	(User Input)
Bolt Yield Strength =	F_y := 75·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Anchor Bolts =	D := 2.25·in	(User Input)
Threads per Inch =	n := 4.5	(User Input)

Base Plate Data:

Use ASTM A572 60

Plate Yield Strength =	Fy_{bp} := 60·ksi	(User Input)
Base Plate Thickness =	t_{bp} := 2.75·in	(User Input)
Base Plate Diameter =	D_{bp} := 75·in	(User Input)
Outer Pole Diameter =	D_{pole} := 49.75·in	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 34.5 \cdot in$

Distance to Bolts = $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N}\right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 10.66 \cdot in$ $d_7 = 27.91 \cdot in$

$d_2 = 20.28 \cdot in$ $d_8 = 20.28 \cdot in$

$d_3 = 27.91 \cdot in$ $d_9 = 10.66 \cdot in$

$d_4 = 32.81 \cdot in$ $d_{10} = 0.00 \cdot in$

$d_5 = 34.50 \cdot in$ $d_{11} = -10.66 \cdot in$

$d_6 = 32.81 \cdot in$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 24.9 \cdot in$

Moment Arms of Bolts about Neutral Axis = $MA_i := if\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 0.00 \cdot in$ $MA_7 = 3.04 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 3.04 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 7.94 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 9.63 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 7.94 \cdot in$ etc

Effective Width of Baseplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 44.9 \cdot in$

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i \left(d_i\right)^2 = 1.19 \times 10^4 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.508 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.826 \cdot in^3$

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 96.2 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot \left(0.33 \cdot A_g \cdot F_u\right) = 174.9 \cdot kips$ (1.333 increase allowed per TIA/EIA)

$T_{ALL.Net} := 1.333 \cdot \left(0.60 \cdot A_n \cdot F_y\right) = 194.812 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} \cdot 100 = 49$ Bolts are "upset bolts". Use net area per AISC

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Net}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Check Anchor Bolt Bending Stress:

Maximum Bending Moment = $M_x := \left(\frac{Shear}{N}\right) \cdot l = 0.325 \cdot ft \cdot kips$

Maximum Bending Stress = $f_{bx} := \frac{M_x}{S_x} = 4.7 \cdot ksi$

Allowable Bending Stress = $F_{bx} := 1.333 \cdot 0.6 \cdot F_y = 60 \cdot ksi$ (1.333 increase allowed per TIA/EIA)

Check Combined Stress Requirement:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required.

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n = 0 \cdot in \\ 0 & \text{otherwise} \end{cases}$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n = 0 \cdot ksi \\ 0 & \text{otherwise} \end{cases}$$

Check Anchor Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{Max} := OM \cdot \frac{R_{bc}}{I_p} + \frac{Axial}{N} = 100 \cdot kips$$

Maximum Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = 30.8 \cdot ksi$$

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} = 87.364$$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^{\,2}}\right] \cdot F_y}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^{\,3}}} & \text{if } \dfrac{K \cdot l}{r} \le C_c = 45 \cdot ksi \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases}$$

Allowable Compressive Stress =

$$F_a := 1.333 \cdot F_a = 60 \cdot ksi$$

(1.333 increase allowed per TIA/EIA)

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}}\right) \cdot 100 = 51.3$$

Condition 2 =

$$Condition2 := if\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \le 1.00, "OK", "Overstressed"\right)$$

Condition2 = "OK"

Base Plate Analysis:

Force from Bolts = $C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$

$C_1 = 32.2 \cdot kips$ $C_7 = 81.3 \cdot kips$

$C_2 = 59.6 \cdot kips$ $C_8 = 59.6 \cdot kips$

$C_3 = 81.3 \cdot kips$ $C_9 = 32.2 \cdot kips$

$C_4 = 95.2 \cdot kips$ $C_{10} = 1.9 \cdot kips$

$C_5 = 100.0 \cdot kips$ $C_{11} = -28.4 \cdot kips$

$C_6 = 95.2 \cdot kips$ etc.

Maximum Bending Stress in Plate = $f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} \cdot t_{bp}^2\right)} = 52.4 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 59.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} \cdot 100 = 87.6$

Condition3 = $Condition3 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition3 = "Ok"

Network Modernization RFDS v3.0

T-Mobile

Site ID	CTNH411A	Latitude	41.82761
Site Name	Antolini - Verizon Colo	Longitude	-73.01344
Address	20 Antolini Road, New Hartford, CONNECTICUT, 06057	Site Type	Structure (Non-Building)
Market	CONNECTICUT	Site Class	Monopole
		Landlord	Verizon Wireless

Configuration

2C

Approvals	
Market RF	
Market Development	

RFDS Revision		Date: 01/14/2014
RFDS Final		
Work Order #		NOC#: (888) 218-6664

Site Information

Existing Configuration					Proposed Configuration			
1	2	3	4	Cabinet #	1	2	3	4
UMTS	GSM			Technology	GSM/UMTS/LTE	GSM		
3106	S12000			Cabinet type	3106	S12000		
1				CBU				
				DUW30	2			
				DUL20	1			
				DUG20	1			
				DUS41				
				RBS6601				
	6			dTRU/TRX				
6				RU22 B4	6			
				RUS01 B2				
				RUS01 B4				

- [ ] Relocate cabinet
- [ ] Add cabinet
- [ ] Swap cabinet
- [ ] Remove cabinet
- [X] Make cabinet dark

Scope of Work

Keep existing 3106 UMTS cabinet, replace CBU and RAX/TX boards with DUW30. Turn off and keep in place existing S12000 GSM cabinet. Add another DUW30, DUL20 and DUG20 and keep 6 RU22 B4 radios in the existing 3106 cabinet. Install 3 E/// TMAs and remove all existing TMAs. Install power upgrade kit 6131.

ALPHA - Scope of Work

- [ ] Add new mount
- [ ] Relocate antenna
- [X] Add antenna
- [X] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [X] Swap TMA
- [X] Remove TMA

- [ ] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [X] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Keep existing UMTS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Keep existing coax lines at position 1/left for LMU. Keep existing coax lines at position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 4. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA and remove existing TMAs.

BETA - Scope of Work

- [ ] Add new mount
- [ ] Relocate antenna
- [X] Add antenna
- [X] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [X] Swap TMA
- [X] Remove TMA

- [ ] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [X] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Keep existing UMTS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Keep existing coax lines at position 1/left for LMU. Keep existing coax lines at position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 4. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA and remove existing TMAs.

GAMMA - Scope of Work

- [ ] Add new mount
- [ ] Relocate antenna
- [X] Add antenna
- [X] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [X] Swap TMA
- [X] Remove TMA

- [ ] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [X] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Keep existing UMTS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Keep existing coax lines at position 1/left for LMU. Keep existing coax lines at position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 4. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA and remove existing TMAs.

DELTA - Scope of Work

- [ ] Add new mount
- [ ] Relocate antenna
- [ ] Add antenna
- [ ] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [ ] Swap TMA
- [ ] Remove TMA

- [ ] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [ ] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Network Modernization RFDS v3.0

T-Mobile

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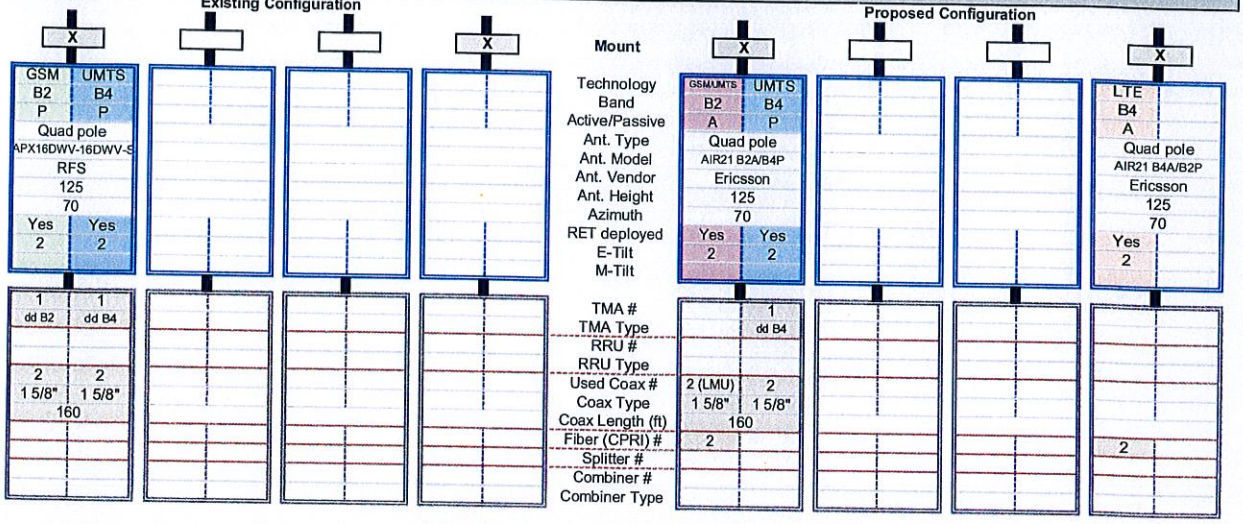
Configuration

2C

Approvals	
Market RF	
Market Development	

RFDS Revision		Date 01/14/2014
RFDS Final		

ALPHA (view from behind)

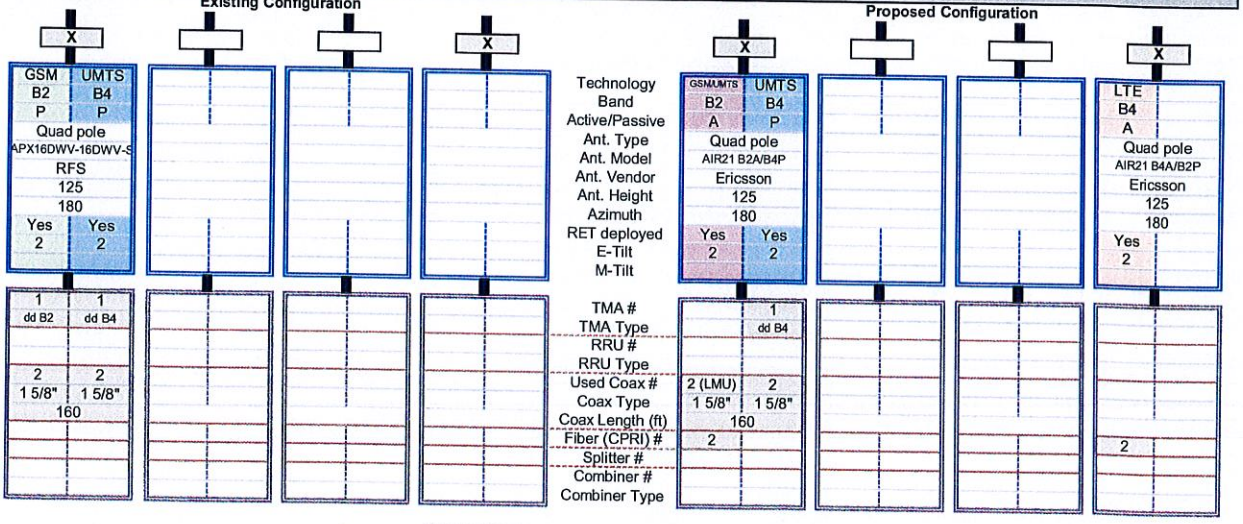


	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
X	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna		Add coax cables
	Add TMA	X	Add fiber cables
X	Swap TMA		Add hybrid combiner
X	Remove TMA		Add filter combiner

Scope of work

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Keep existing UMTS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Keep existing coax lines at position 1/left for LMU. Keep existing coax lines at position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 4. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA and remove existing TMAs.

BETA (view from behind)



	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
X	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna		Add coax cables
	Add TMA	X	Add fiber cables
X	Swap TMA		Add hybrid combiner
X	Remove TMA		Add filter combiner

Scope of work

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Keep existing UMTS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Keep existing coax lines at position 1/left for LMU. Keep existing coax lines at position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 4. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA and remove existing TMAs.

Network Modernization RFDS v3.0

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		Landlord	Verizon Wireless

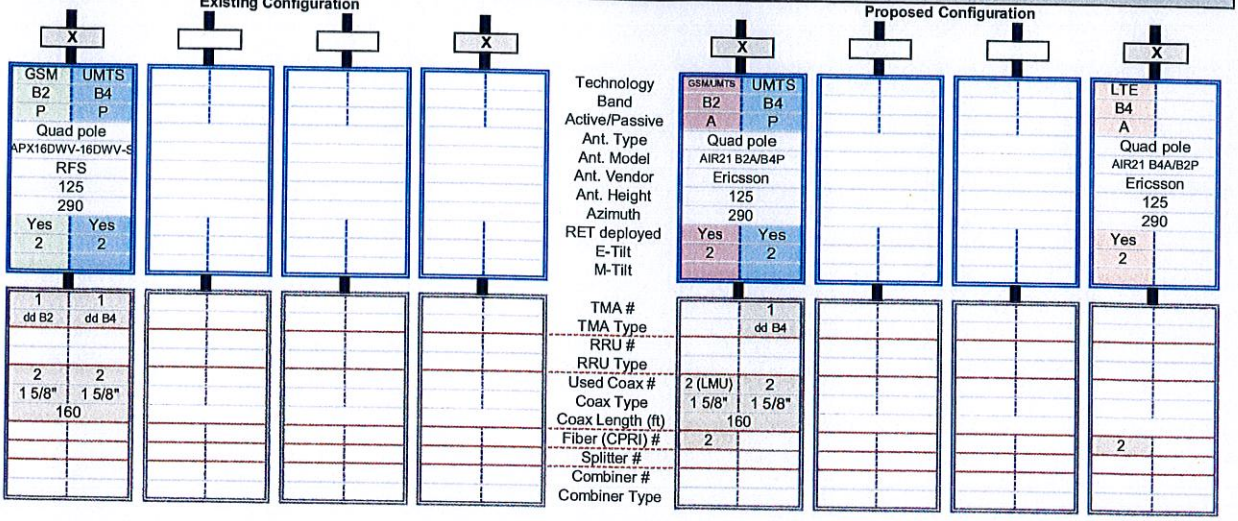
Configuration
2C

Approvals	
Market RF	
Market Development	

RFDS Revision	
RFDS Final	

Date: 01/14/2014

GAMMA (view from behind)



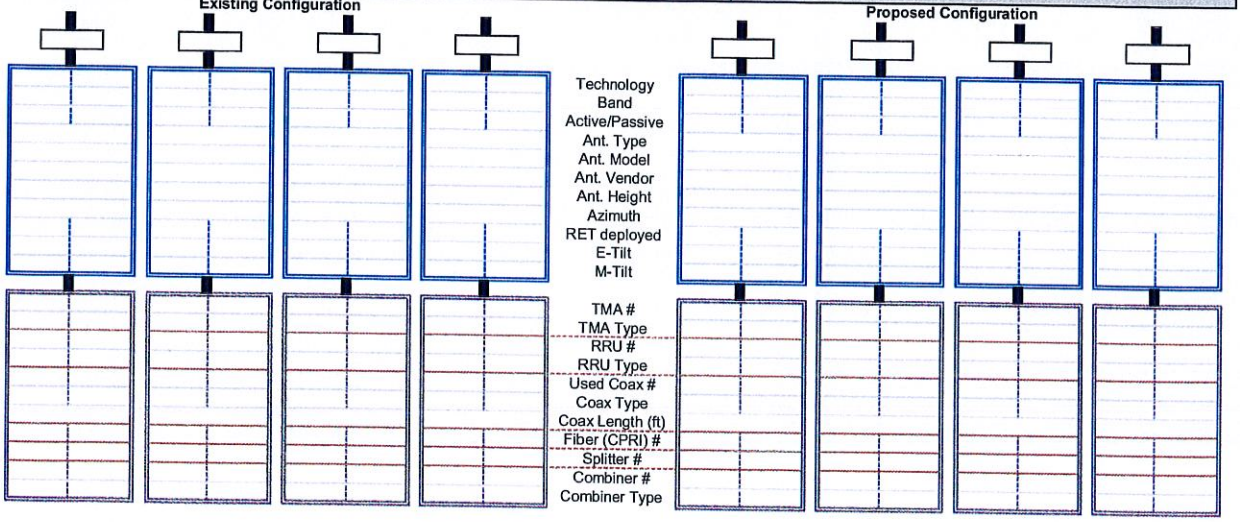
- [ ] Add new mount
- [ ] Relocate antenna
- [X] Add antenna
- [X] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [X] Swap TMA
- [X] Remove TMA

- [ ] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [X] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Scope of work

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Keep existing UMTS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Keep existing coax lines at position 1/left for LMU. Keep existing coax lines at position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 4. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA and remove existing TMAs.

DELTA (view from behind)



- [ ] Add new mount
- [ ] Relocate antenna
- [ ] Add antenna
- [ ] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [ ] Swap TMA
- [ ] Remove TMA

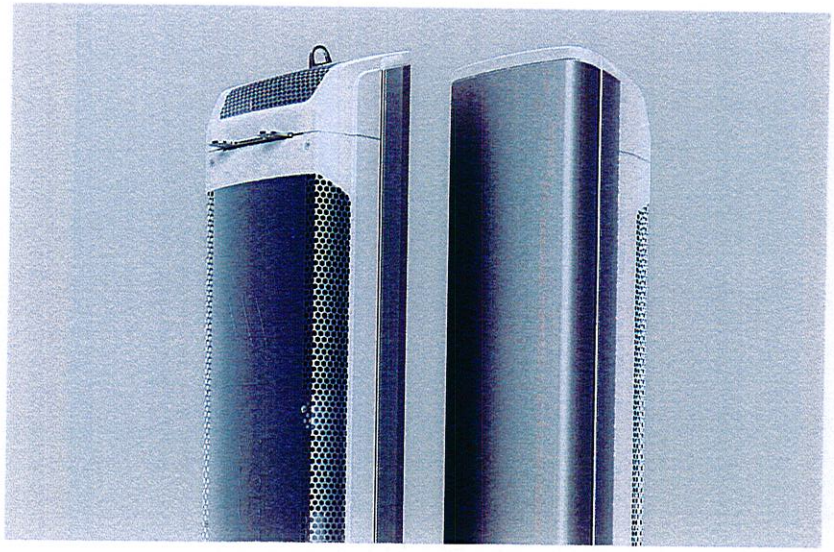
- [ ] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [ ] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Scope of work

ERICSSON

DATA-SHEET FOR

AIR 21, 1.3 M, B2A B4P



The Antenna-Integrated Radio (AIR) is a single tower-mounted unit that can replace the antenna/s and radio for one sector. Additional electronics such as ASC? and a RET Actuator and control are also included. A passive antenna function for an extra band is optional.

ericsson.com

ANTENNA-INTEGRATED RADIO

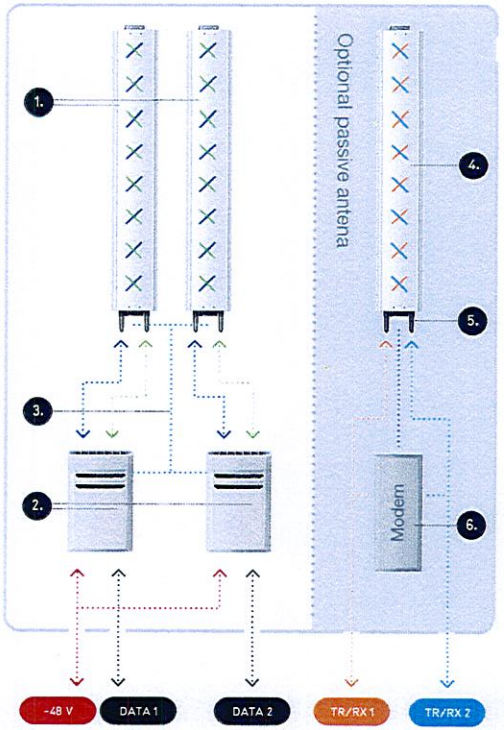
Figure 2 →
Three-sector tower site
with three AIR units.e

The Antenna-Integrated Radio (AIR) is a single tower-mounted unit that can replace the antenna/s and radio for one sector. Additional electronics such as ASC? and a RET Actuator and control are also included. A passive antenna function for an extra band is optional. (The option has to be specified when ordering, retrofit is not possible).
The height and width are the same as for a passive antenna with similar characteristics. The depth is increased to house the radios' electronics. Digital Units (DUs) from Ericsson's RBS 6000 family provide the baseband function and support GSM, WCDMA and LTE.

Digital Units (DUs) from Ericsson's RBS 6000 family provide the baseband function and support GSM, WCDMA and LTE.

One or two DUs, depending on capacity and the standards to be supported, are needed for a three-sector site with AIR units.

The AIR is especially suited for state of the art mobile broadband basestations utilizing advanced MIMO techniques. Less tower-mounted equipment is required and the unit's attractive appearance enables it to blend in well with other existing equipment. The same applies to sites with multiple access technologies on different frequency bands. With Air, it is only necessary to swap antennas in order to add new 3G/4G technology on-site or at a new site. The AIR also saves power compared to traditional macro RBSs that use long feeders for antenna connections.



← Figure 2
Example of hardware that a single AIR unit can replace

Functionality for the AIR unit

Figure 2 shows an example of the hardware that a single AIR unit can replace. The function of the AIR unit is the same, but the implementation is different.
The AIR unit's active band has two radios (2) connected to a pair of cross-polarized antenna arrays (1). Remote electrical tilt (3) is included. Air supports 2 TX for the down-link and 4 RX for the up-link.
The passive antenna function on the frequency band not used by the AIR unit's active part is optional. The passive function includes an antenna array (4) and a RET motor (5) with a modem to control it (6).
The tilts for the active part and the passive part are controlled independently, but each band has the same tilt for both arrays and for both polarizations.

Configuration Example

Figure 3 shows a typical configuration with WCDMA with 2 × 2 MIMO for Band 1.
One AIR unit is deployed in each sector.
A common base band unit with a DUW inside provides base band processing and back-haul.
The AIR units can be specified with passive antennas for Band 4.

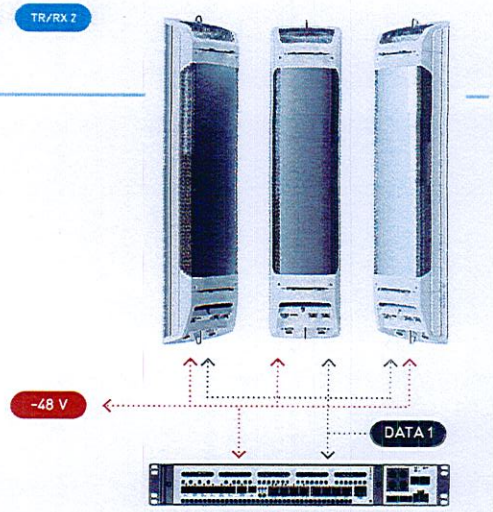
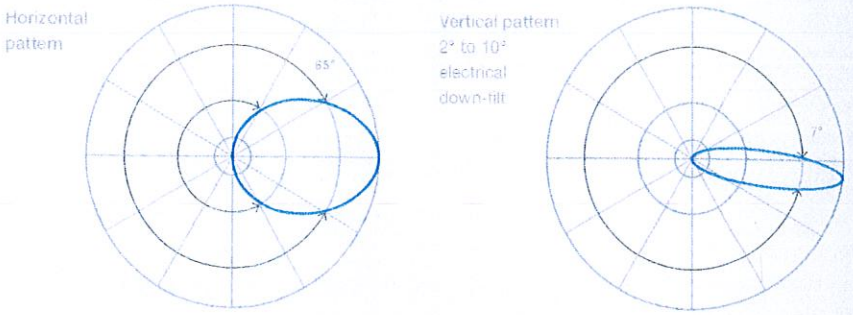


Figure 3 →
Three sector configuration example: RBS 6601 with three AIR units.

Figure 4
Antenna
Characteristics



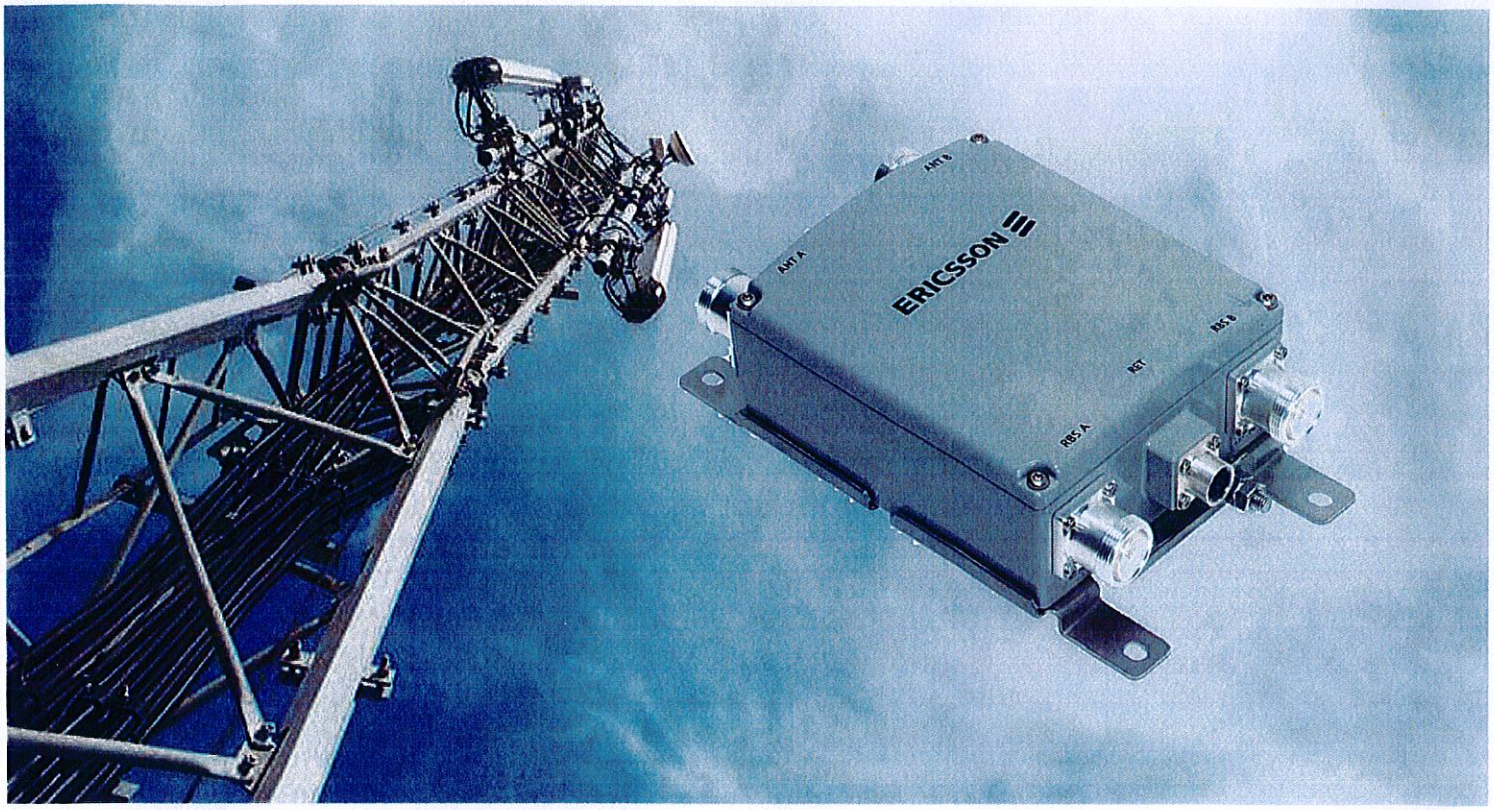
Technical Specification

RADIO	
Active frequency band	Band 2 (1850-1910 / 1930-1990 MHz)
Passive frequency band (optional)	Band 4 (1710-1755 / 2110-2155 MHz)
Downlink EIRP in bore-sight direction for the active band	2 x 63 dBm
Uplink sensitivity	TBD*
Remote electrical tilt	-2° to -12°, independently controlled per frequency band
MIMO	2 x 2 for DL 4 RX branches to be used for diversity/beam-steering
Instantaneous bandwidth	20 MHz
Capacity (single standard per sector)	Up to 8 carriers GSM Up to 4 carriers WCDMA with 2 x 2 DL MIMO Up to 20 MHz LTE with 2 x 2 DL MIMO
Multi-RAT capability	Single standard or two simultaneous standards (Capacity above is reduced for multi-RAT)
Bore-sight antenna gain for passive antenna option	17.5 dBi
Nominal beam-width, azimuth	65°
Nominal beam-width, elevation	7°
Additional antenna parameters	See Figure 3
MECHANICAL	
Weight	32 kg (70 lb) for active only 38 kg (83 lb) for active and passive
Size (H x W x D)	56" x 12" x 8" (1422 mm x 300 mm x 200 mm)
Wind load (frontal/lateral/rear-side) @ 150 km/h wind speed	580 N / 300 N / 720 N
INTERFACES	
AIR – DU	DATA 1, Data 2: CPRI links (SFP modules with LC socket + flanges that match protective cover TYCO C20611458)
Power	- 48 V DC (TYCO/Ericsson RPT 447 04)
Passive antenna (option)	TX/RX 1, TX/RX 2: RF connectors (7/16 female)
SUPPORTING BASE-BAND	
RBS 6601	One or two units depending on configuration.

*Target: 1 dB better than best-in-class RRU connected to same size best-in-class antenna

DOUBLE TMA 17/21, PREMIUM

3GPP/AISG compatible with RET interface



Improving a radio uplink by using tower mounted amplifiers is perceived as a key method of optimizing radio networks. By ensuring maximum coverage including in-door penetration, a TMA supports the design of cost-efficient networks and extended talk-time handsets, low dropped call rates and high traffic billing.

TMA design
This Double Premium TMA for 17/2100 MHz has 12dB gain and is 3GPP/AISG 2.0 compatible, with a RET interface. It has superior RF performance, small size and low weight. There is a corresponding TMA version called ASC that has a higher gain and a VSWR measuring coupler.

System integration
The Double TMA 17/2100 is a part of Ericsson's TMA family. Power, control and supervision are provided by the RBS 3000. If sold to other RBS brand installations, it can be controlled and supervised from the "Antenna System & TMA Control Module", AST-CM, via the RF feeder.

3GPP/AISG
TMA communication is based on the 3GPP/AISG protocol standard and has a RET port for controlling antenna RET units. The communication port allows multiple RETs or Antenna Line Devices to be supervised and controlled via the TMA.

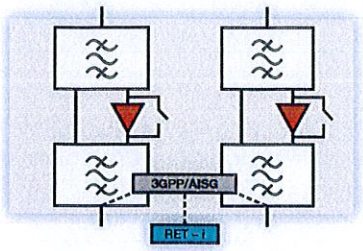
Future-proof
The Double TMA 17/21 Premium is designed for co-existence with future complementary, mast-mounted devices.

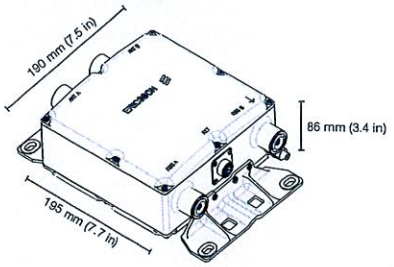
Excellent reliability
As the world's largest supplier of TMAs, Ericsson has a well-proven track record of reliable TMA designs. Reliability enhancing features include dual LNAs, weatherproof design, integrated alarm and lightning protection.

ERICSSON

Features

- Specified and verified as an integrated system solution for Ericsson RBSs
- Possible to power both TMAs from one feeder, or from both feeders
- High power capacity
- Automatic LNA by-pass function
- Built in lightning protection
- Excellent RF performance
- Connectors "in line"
- Distance between connectors simplifies sealing work
- A range of accessories for flexible site configurations





Technical Specifications for Double TMA 1700/2100, MHz Premium

Product name Double TMA 17/21, Premium 3GPP/ASIG compatible with RET interface	**Product number** KRY 112 144/1
Radio performance	
Bandwidth:	45 MHz
Receiving pass band:	1710 - 1755 MHz
Transmitting pass band:	2110 - 2155 MHz
RX Gain:	12± 1 dB
Input IP3:	16 dBm*
IM3 at antenna port (2x43dBM):	-128 dBm
Noise figure midband:	1.0 dB*
TX max input power (Max Peak):	57 dBm
TX insertion loss:	0.25 dB*
RX return loss:	22 dB*
TX return loss:	22 dB*
Electrical specifications	
Input power:	+12 - 32 VDC
Power consumption:	< 4.5 W
Mechanical specifications	
Dimensions (W x H x D):	155 x 176 x 71 mm
Weight:	5 kg
RF connectors:	7-16 DIN female
Ground connectors:	M8
DC/Alarm:	Superimposed on the RF signal
Mounting:	Pole or wall mounting
RET connectors:	Din con. IEC 60130-9 - Ed. 3.0 female
Environmental specifications	
Temperature range, full performance:	-40°C - +55°C
MTBF:	80 years
Sealing:	IP67
Lightning protection:	IEC 62305-1, IEC 61000-6
Safety approval:	International: CB certified, IEC 60 529 Europe: EN 60 529 North America: NRTL, NEMA 3R
Safety standard:	UL 60950-1, IEC 60950-1

* Typical values

Ericsson AB
www.ericsson.com

36/287 01 - FGC 101 764, rev A

JWB Tower Services, LLC
148 Governor Street
New Britain, CT 06053
(800) 819-3084

Monopole Inventory
General Information

Site Name:		South End Fire
Site Number:		
FCC Number:		1250610
Manufacturer ID #		EEI
Street Address:		20 Antolini Road
City/State/Zip Code:		New Hartford, CT
County:		
Lat:	N/S	41° 49' 39"
Long:	E/W	73° 00' 48"
Performed By:		JWB
Date:		3/2/2014

Antenna Information: Elevations are Above Foundation

CARRIER	Town of New Hartford					PIC #	1
MOUNT	See Sprint Mount Below						
Type:		Manf.:					
Elev. C/L:		Bottom:		Top:		Leg:	
Face Width:		Height:		Projection:		Azimuth/s:	
ANTENNA							
Type:	Omni	Manf.:	Celwave	Model:	PD620-3		
Elev. C/L:		Bottom:	146'	Top:	167'	Leg:	
Quantity:	1	Dim: (HxWxD)	21'x3"			Azimuth/s:	
ANTENNA							
Type:	Omni	Manf.:	Unknown	Model:			
Elev. C/L:		Bottom:		Top:		Leg:	
Quantity:	1	Dim: (HxWxD)	12'x1.5"			Azimuth/s:	
Siren							
Quantity:	1	Manf.:	Unknown	Model:	36"x24"		
COAX							
Quantity:	2	Size:	1 5/8"	Jumper:	1/2"	Color:	N/A
Quantity:	1	Size:	1" Flex	Jumper:	N/A	Color:	N/A

CARRIER	Sprint					PIC #	2
MOUNT							
Type:	Lo-pro Plat	Manf.:	EEI				
Elev. C/L:	145'	Bottom:		Top:		Leg:	
Face Width:	12'	Height:	4"	Projection:	N/A	Azimuth/s:	
ANTENNA							
Type:	Panel	Manf.:	RFS	Model:	APXVSPP18-C-A20		
Elev. C/L:	147'	Bottom:		Top:		Leg:	
Quantity:	3	Dim: (HxWxD)	72"x12"x8"			Azimuth/s:	
RET							
Quantity:	9 (3 per ant)	Manf.:	RFS	Model:	3"x3"x1.5"		
RRH							
Quantity:	3	Manf.:	Alcatel-Lucent	Model:	FD-RRH 4X45 1900		
RRH							
Quantity:	3	Manf.:	Alcatel-Lucent	Model:	FD-RRH-2X50 800		
COAX							
Quantity:	3	Size:	1 1/4" HYBRIFLEX	Jumper:	N/A	Color:	N/A

CARRIER	Verizon	PIC #	3

MOUNT

Type:	T-Arm	Manf.:	Valmont / SitePro				
Elev. C/L:	137'	Bottom:		Top:		Leg:	
Face Width:	12'	Height:	4"	Projection:	4'	Azimuth/s:	

ANTENNA 1 - Outer

Type:	Panel	Manf.:	Antel/Amphenol	Model:	LPA-80080-4CF		
Elev. C/L:	139'	Bottom:		Top:		Leg:	
Quantity:	6	Dim: (HxWxD)	48"x6"x13"			Azimuth/s:	

ANTENNA 2 - Center

Type:	Panel	Manf.:	Antel/Amphenol	Model:	BXA-70063-6CF		
Elev. C/L:	139'	Bottom:		Top:		Leg:	
Quantity:	3	Dim: (HxWxD)	71"x11"x6"			Azimuth/s:	

ANTENNA 3 - Inner

Type:	Panel	Manf.:	Unknown	Model:			
Elev. C/L:	139'	Bottom:		Top:		Leg:	
Quantity:	3	Dim: (HxWxD)	48"x12"x6"			Azimuth/s:	

COAX

Quantity:	12	Size:	1 5/8"	Jumper:	1/2"	Color:	N/A

CARRIER	T-Mobile	PIC #	4

MOUNT

Type:	T-Arm	Manf.:	Valmont / SitePro				
Elev. C/L:	125'	Bottom:		Top:		Leg:	
Face Width:	12'	Height:	4"	Projection:	4'	Azimuth/s:	

ANTENNA

Type:	Panel	Manf.:	RFS	Model:	APX16DWV-16DWVS		
Elev. C/L:	125'	Bottom:		Top:		Leg:	
Quantity:	3	Dim: (HxWxD)				Azimuth/s:	

TMA'S

Quantity:	3	Manf.:	RFS	Model:	ATM1900D-1CWA

TMA'S

Quantity:	3	Manf.:	RFS	Model:	ATMAP1412D-1A20

COAX

Quantity:	12	Size:	1 5/8"	Jumper:	1/2"	Color:	N/A

CARRIER	MetroPCS					PIC #	5

MOUNT

Type:	Flush	Manf.:	Unknown/Chain Mount				
Elev. C/L:	113'	Bottom:		Top:		Leg:	
Face Width:	2.5"	Height:	N/A	Projection:	N/A	Azimuth/s:	

ANTENNA

Type:	Panel	Manf.:	RFS	Model:	APXV18-206517S		
Elev. C/L:	113'	Bottom:		Top:		Leg:	
Quantity:	3	Dim: (HxWxD)				Azimuth/s:	

COAX

Quantity:	6	Size:	1 5/8"	Jumper:	1/2"	Color:	N/A

CARRIER	Empty					PIC #	6

MOUNT

Type:	Lo-Pro Plat	Manf.:	EEI				
Elev. C/L:	92'	Bottom:		Top:		Leg:	
Face Width:	12'	Height:	4"	Projection:	N/A	Azimuth/s:	

CARRIER	AT&T	PIC #	7

MOUNT

Type:	Lo-Pro Plat	Manf.:	Unknown				
Elev. C/L:	78'	Bottom:		Top:		Leg:	
Face Width:	12'-6"	Height:	5"	Projection:	N/A	Azimuth/s:	

ANTENNA

Type:	Panel	Manf.:	Powerwave	Model:	7770		
Elev. C/L:	80'	Bottom:		Top:		Leg:	
Quantity:	6	Dim: (HxWxD)				Azimuth/s:	

TMA'S

Quantity:	6	Manf.:	Powerwave	Model:	LGP21401

Diplexer's

Quantity:	6	Manf.:	Powerwave	Model:	LGP21901

Bias T's

Quantity:	3	Manf.:	Unknown	Model:	1.5"x5"x1.5"

ANTENNA 2 Inner

Type:	Panel	Manf.:	KMW	Model:	AM-X-CD-16-65-00T		
Elev. C/L:	80	Bottom:		Top:		Leg:	
Quantity:	2	Dim: (HxWxD)	72"x12"x6"			Azimuth/s:	

ANTENNA 3 Inner

Type:	Panel	Manf.:	Powerwave	Model:	P65-17-XLH-RR		
Elev. C/L:	80	Bottom:		Top:		Leg:	
Quantity:	1	Dim: (HxWxD)				Azimuth/s:	

RRU

Quantity:	3	Manf.:	Ericsson	Model:	RRUS 11 B12 / KRC 161 241/1

Surge Arrester

Quantity:	1	Manf.:	Striksorb	Model:	

COAX

Quantity:	12	Size:	7/8"	Jumper:	1/2"	Color:	N/A
Quantity:	2	Size:	5/8"	Jumper:	N/A	Color:	N/A
Quantity:	1	Size:	3/8"	Jumper:	N/A	Color:	N/A

CARRIER	Sprint					PIC #	8

MOUNT

Type:	Standoff	Manf.:	Unknown				
Elev. C/L:	50'	Bottom:		Top:		Leg:	
Face Width:	4"	Height:	4"	Projection:	3'	Azimuth/s:	

ANTENNA

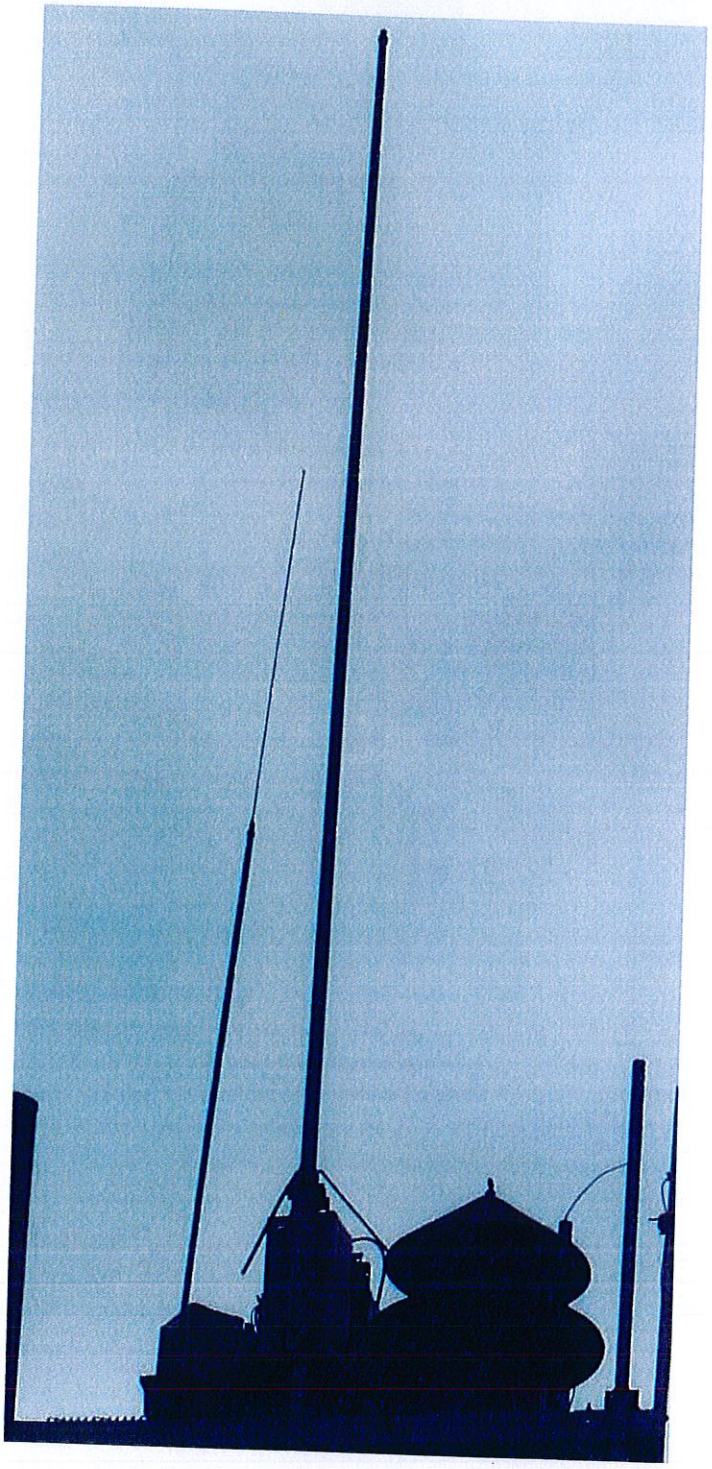
Type:	GPS	Manf.:	Unknown	Model:			
Elev. C/L:	51'	Bottom:		Top:		Leg:	
Quantity:	1	Dim: (HxWxD)	6'x4"			Azimuth/s:	

TMA'S

Quantity:	N/A	Manf.:	N/A	Model:	N/A

COAX OUTSIDE

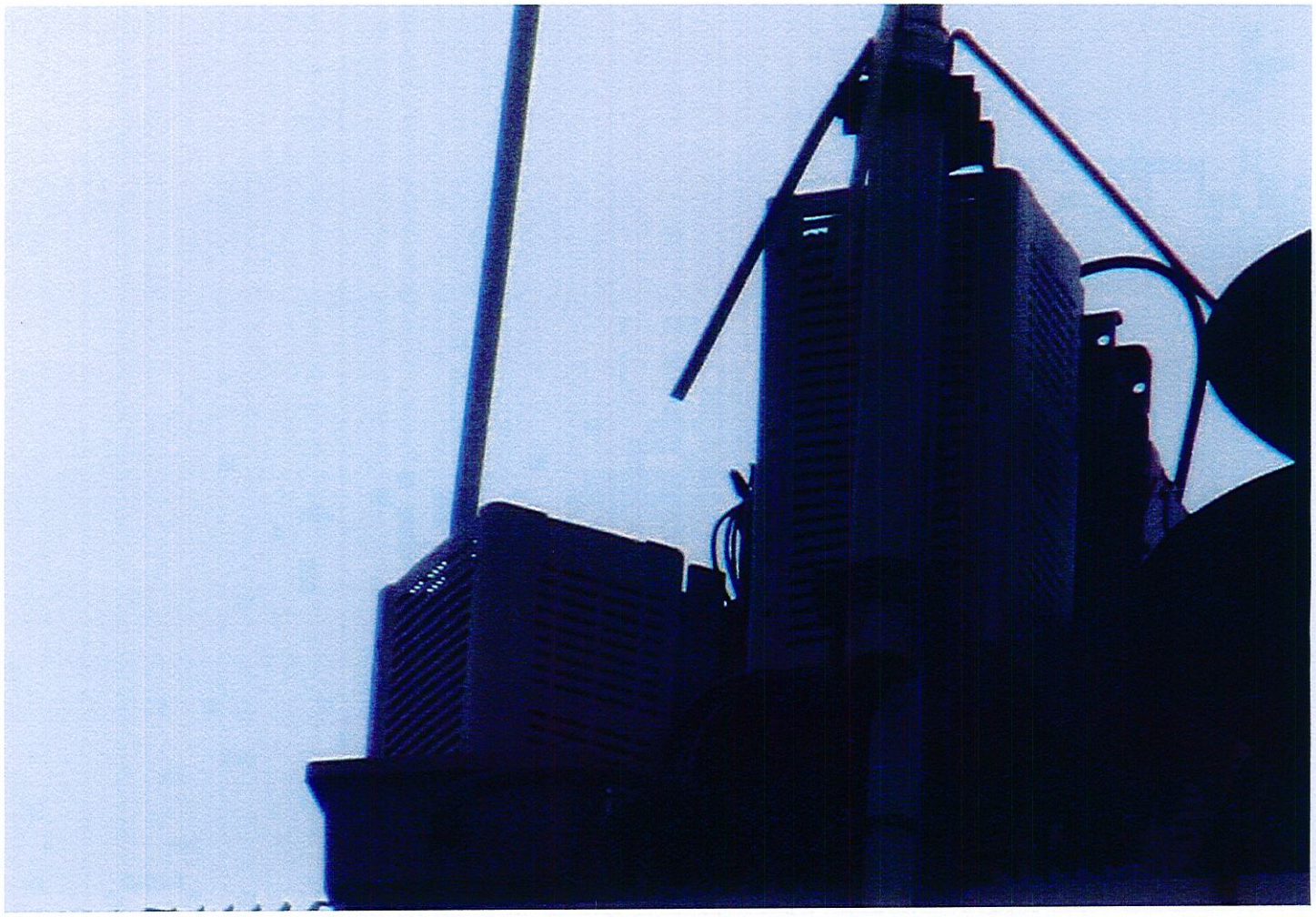
Quantity:	1	Size:	1/2"	Jumper:	N/A	Color:	N/A



1.0 Town

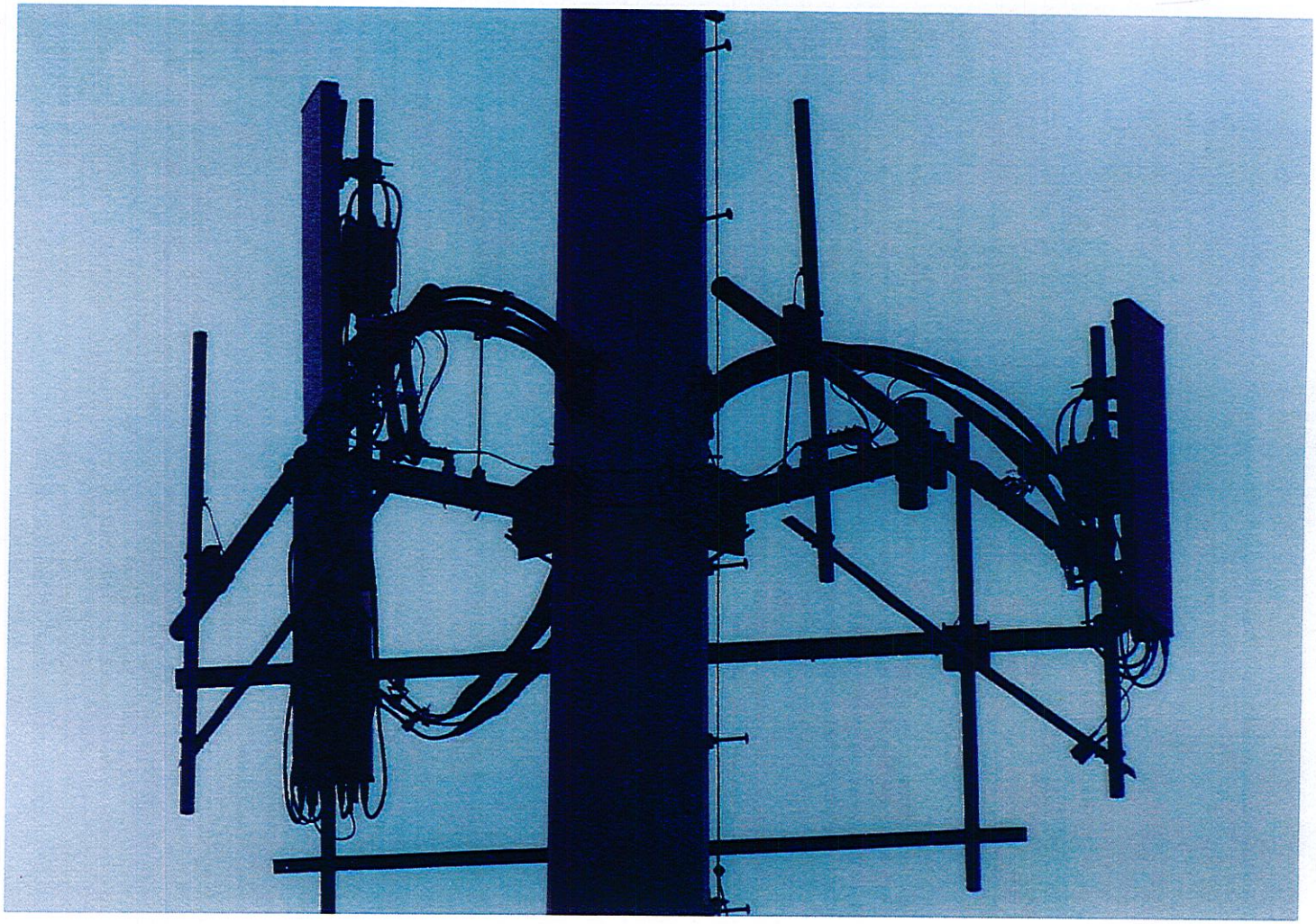
2.0 Sprint

2.1 Sprint



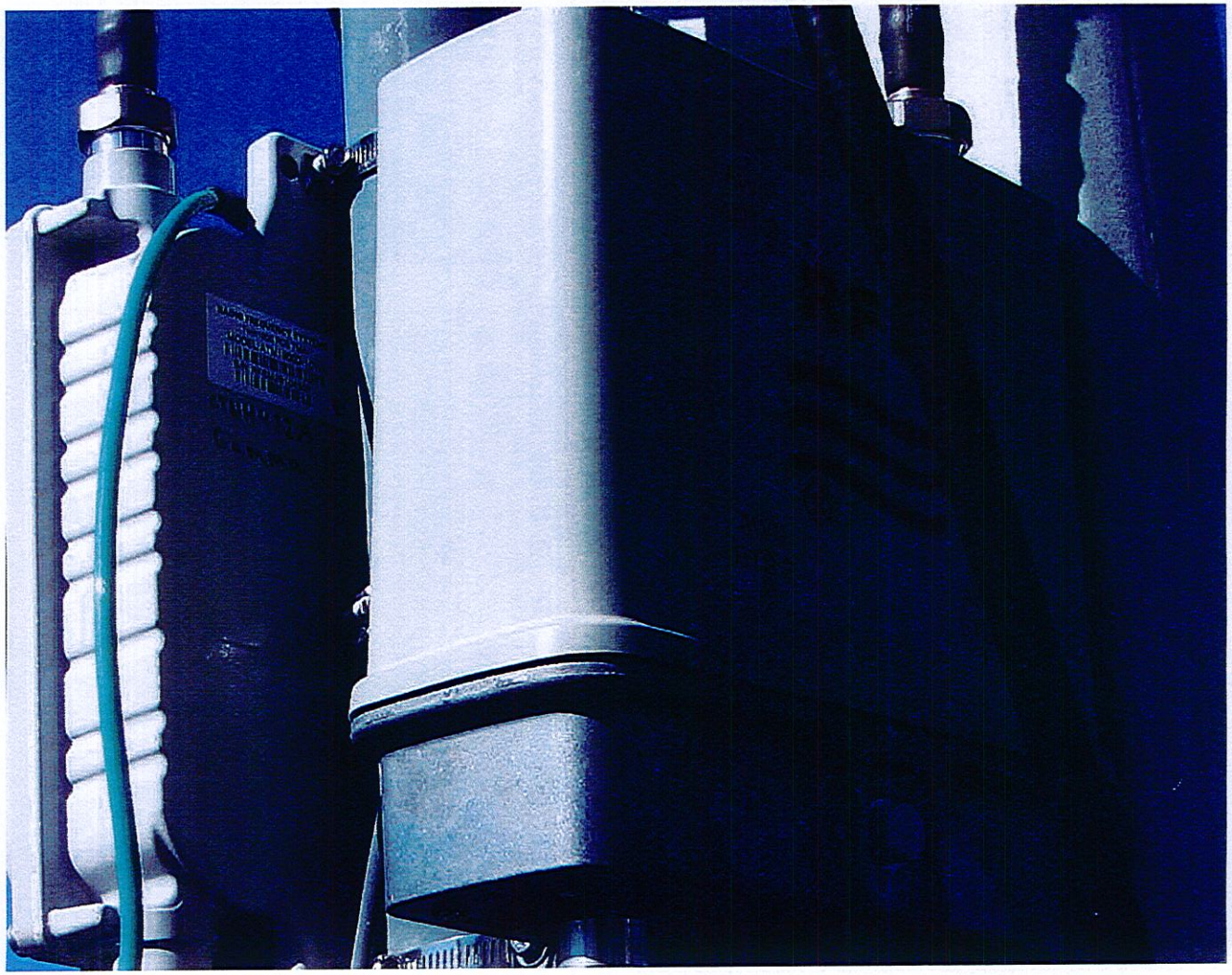
2.2 Sprint

3.0 Verizon



4.0 T-Mobile

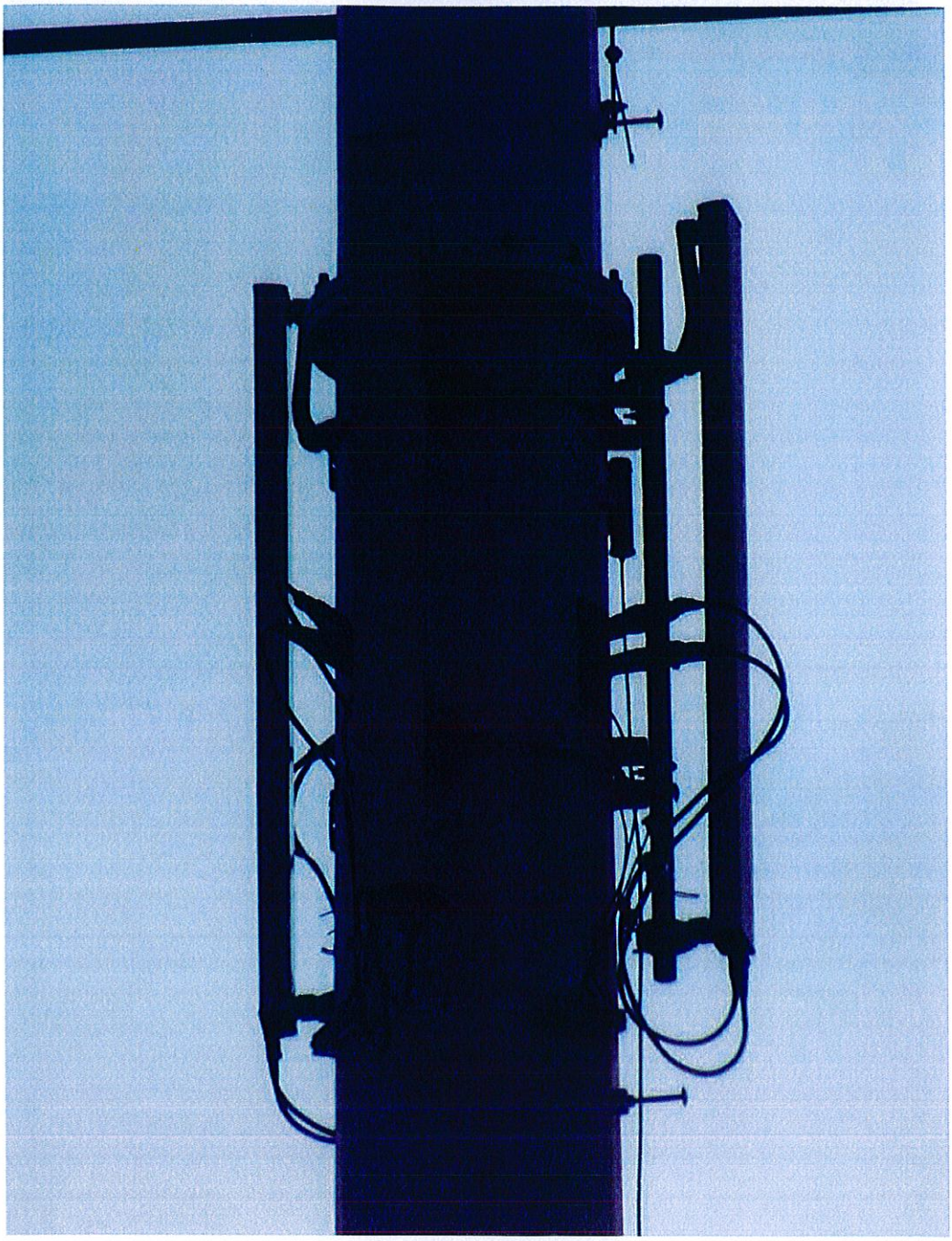
4.1 T-Mobile



4.2 T-Mobile

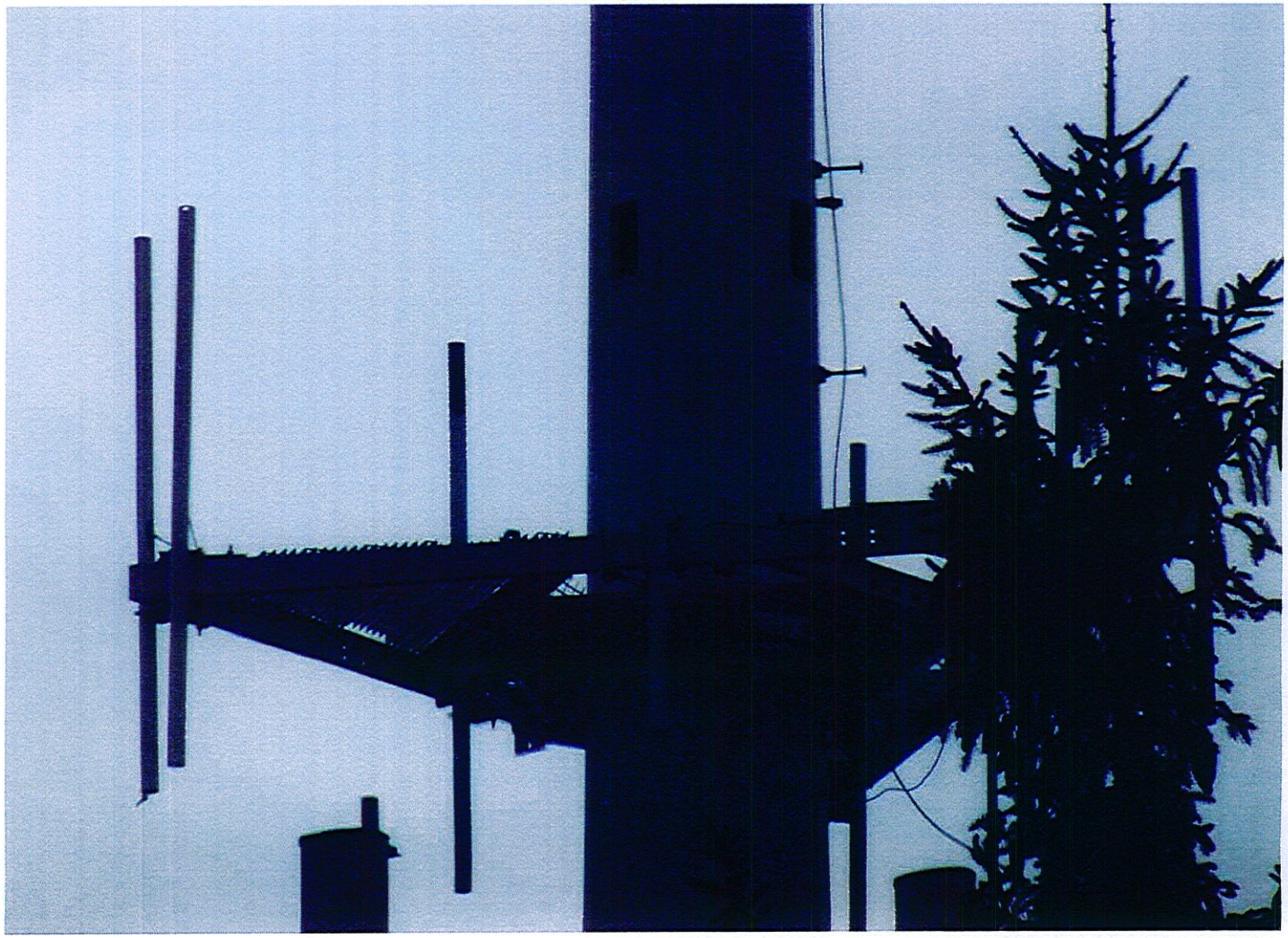

RADIO FREQUENCY SYSTEMS
Twin1900 PCS TMA
MODEL: ATM1900D-1CWA
S/N: RFSM28104502

4.3 T-Mobile

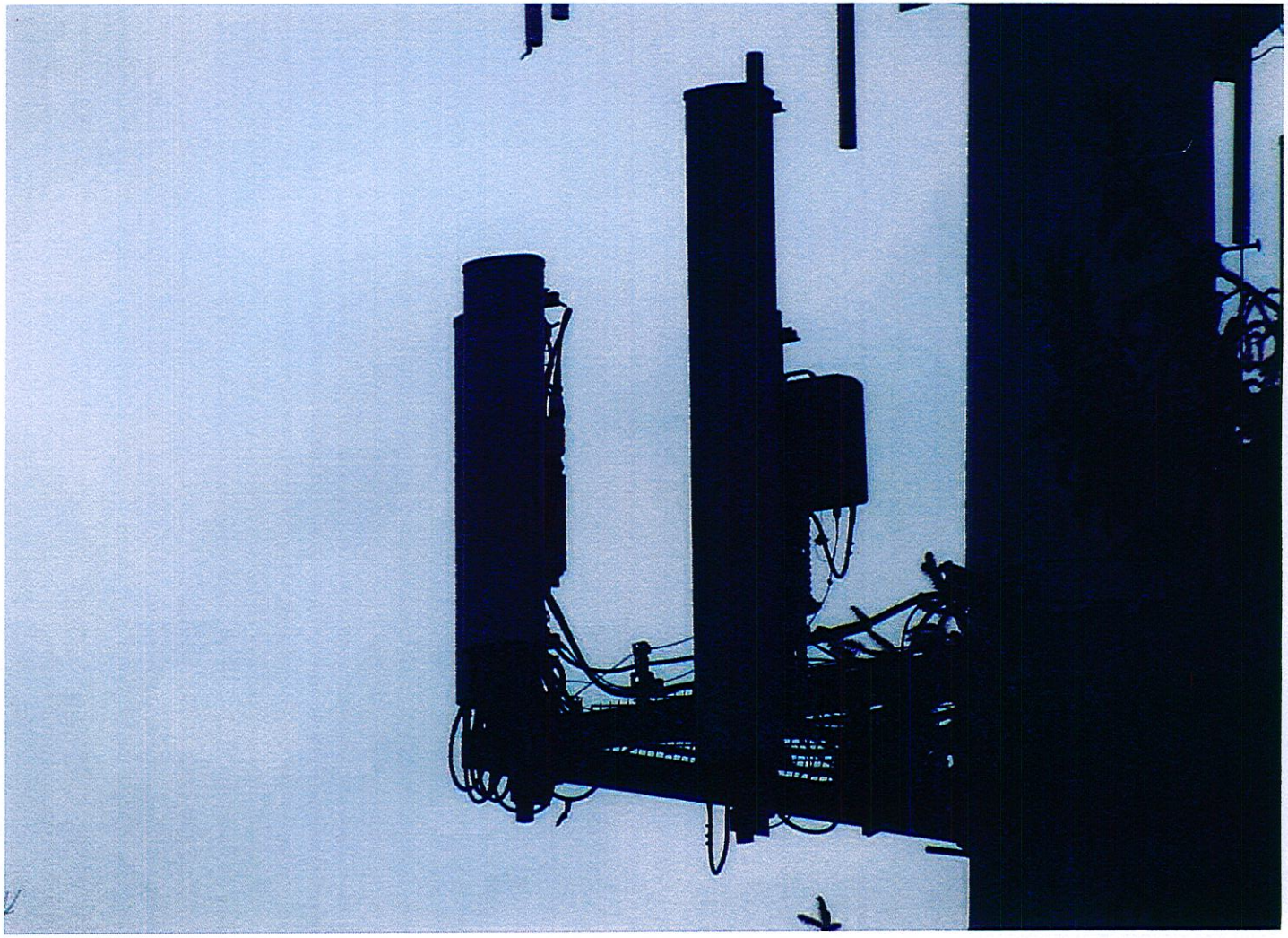


5.0 MetroPCS

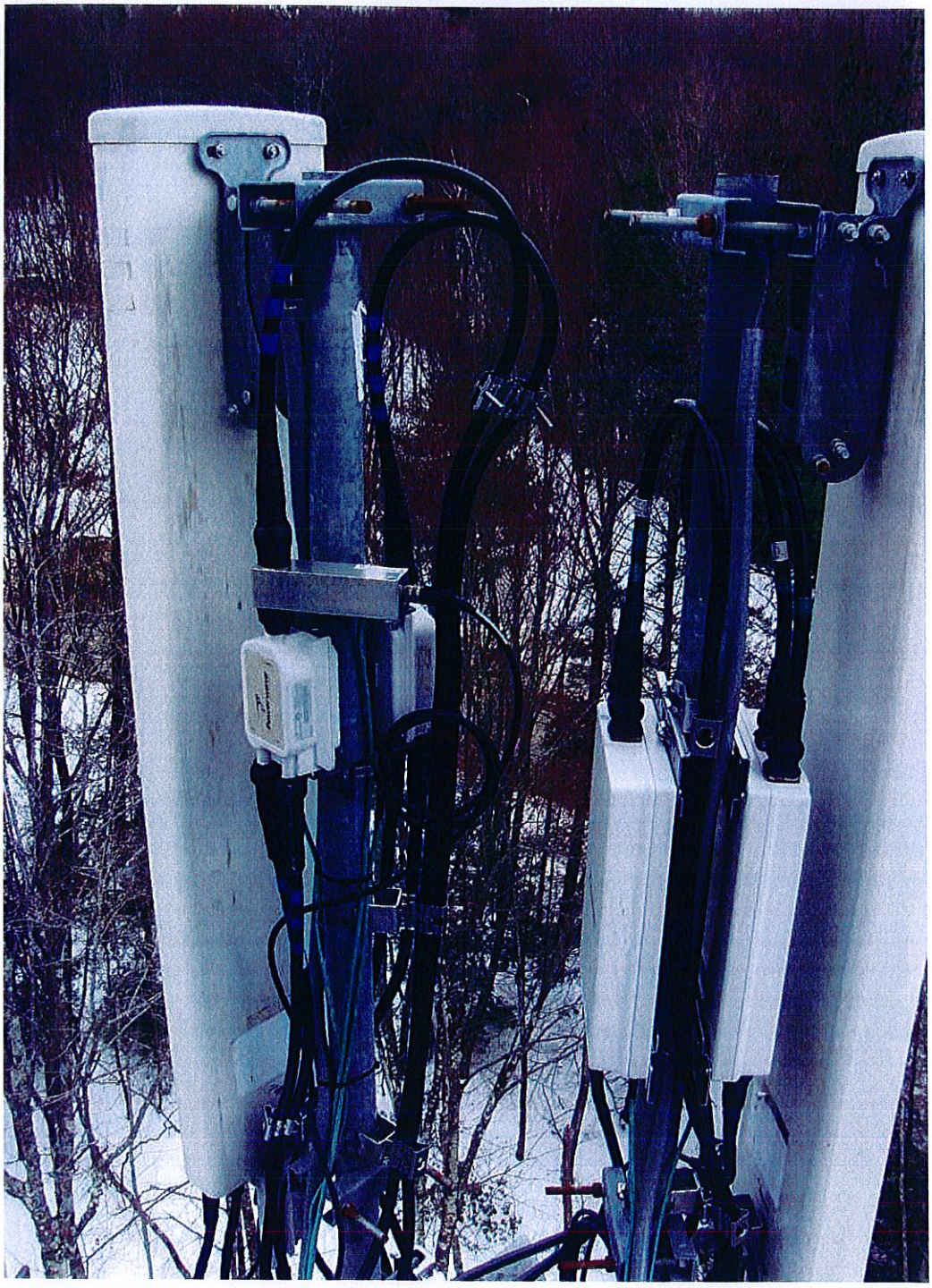
5.1 MetroPCS



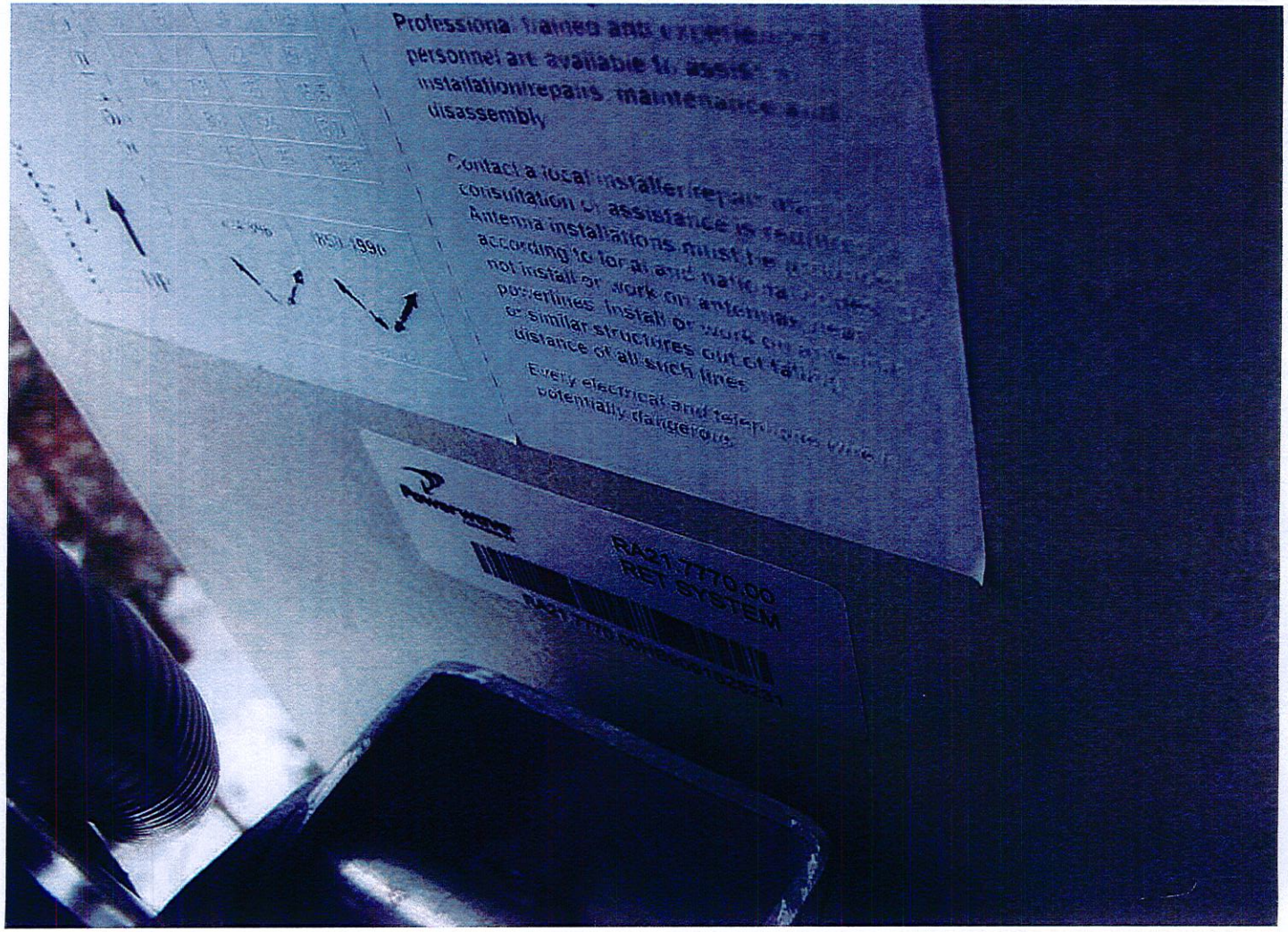
6.0 Empty



7.0 AT&T



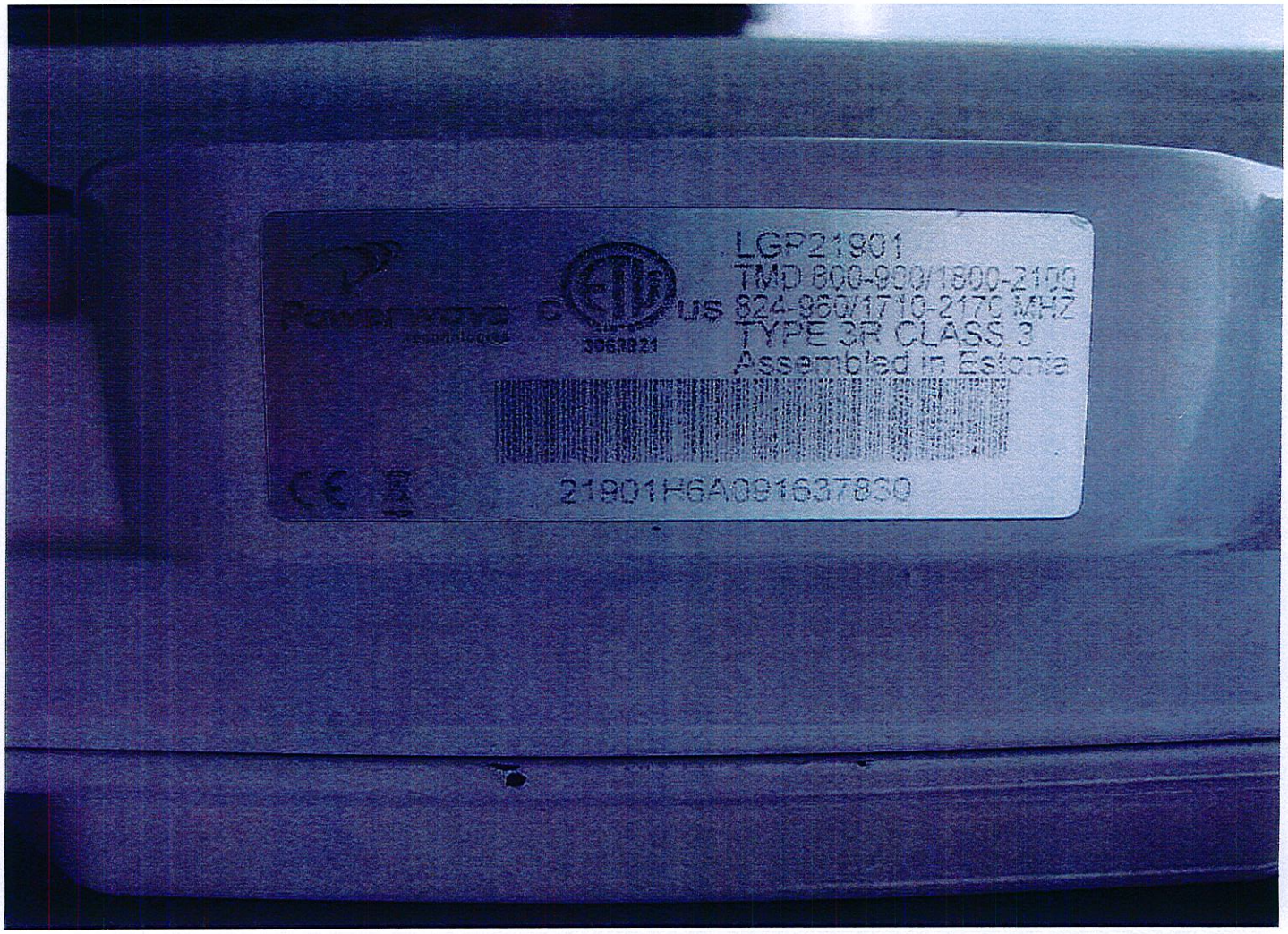
7.1 AT&T


Professiona
personnel are available
installation/repairs maintenance
disassembly
Contact a local installer
consultation
Antenna installations
according to
not install or work on antennas
or similar structures
distance of all such lines
potentially dangerous
RAZR T770.00
RET SYSTEM

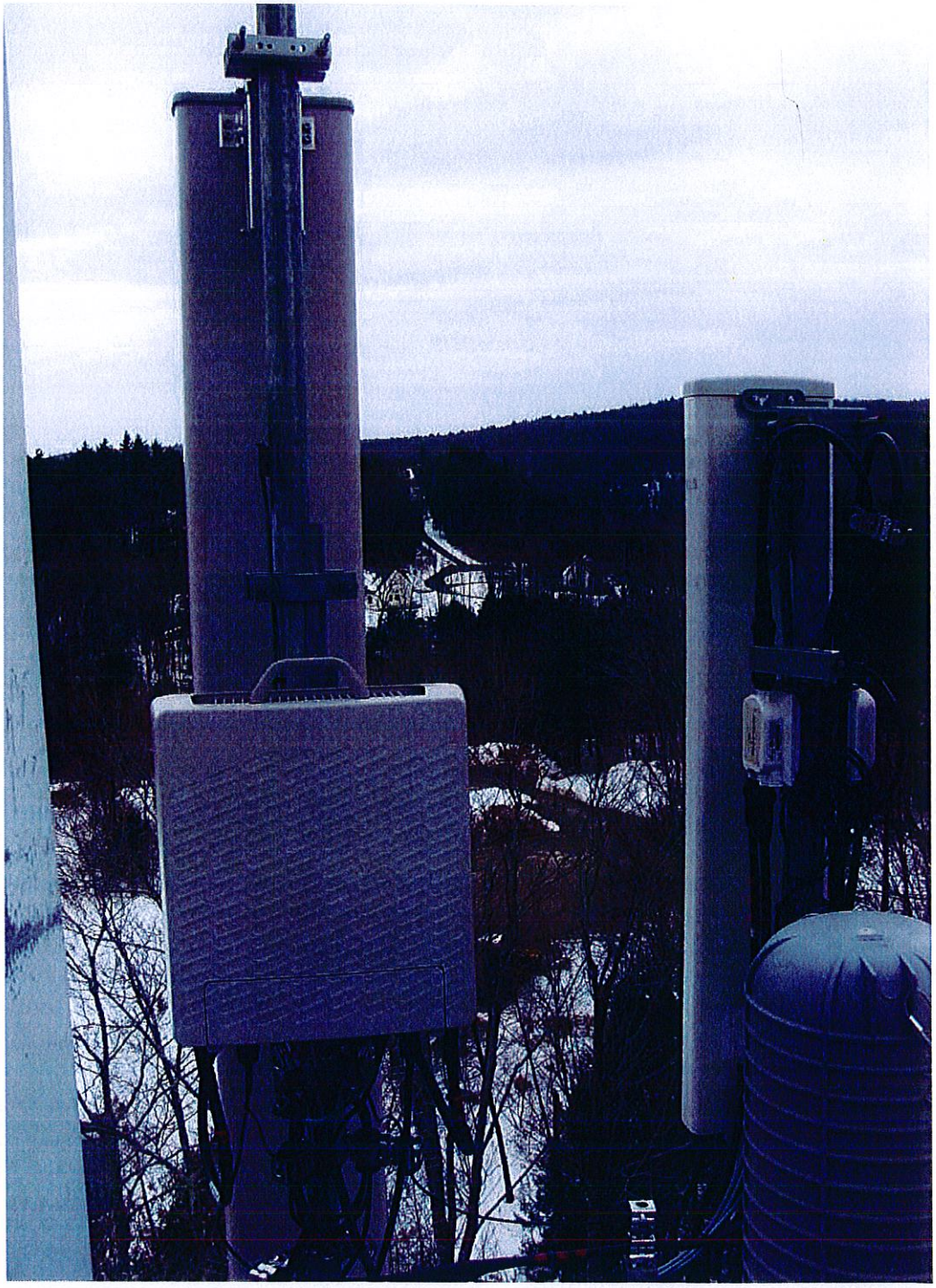
7.2 AT&T


Powerwave
LGP21401
TMA-DDD 850/1900
824-849/1850-1910MHZ
21401FB9083623984

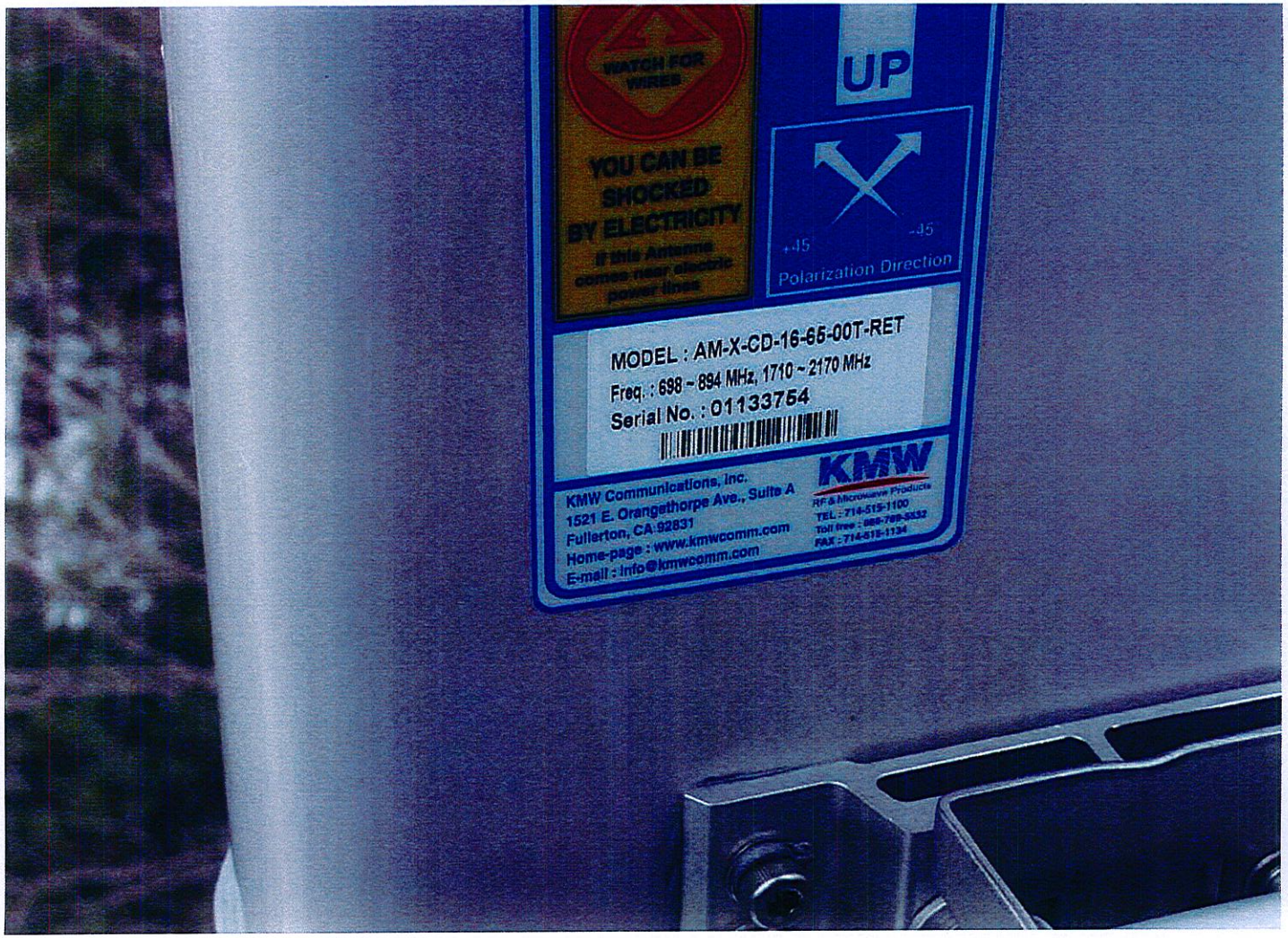
7.3 AT&T


LGP21901
TMD 800-900/1800-2100
824-960/1710-2170 MHZ
TYPE 3R CLASS 3
Assembled in Estonia
21901H6A091637830

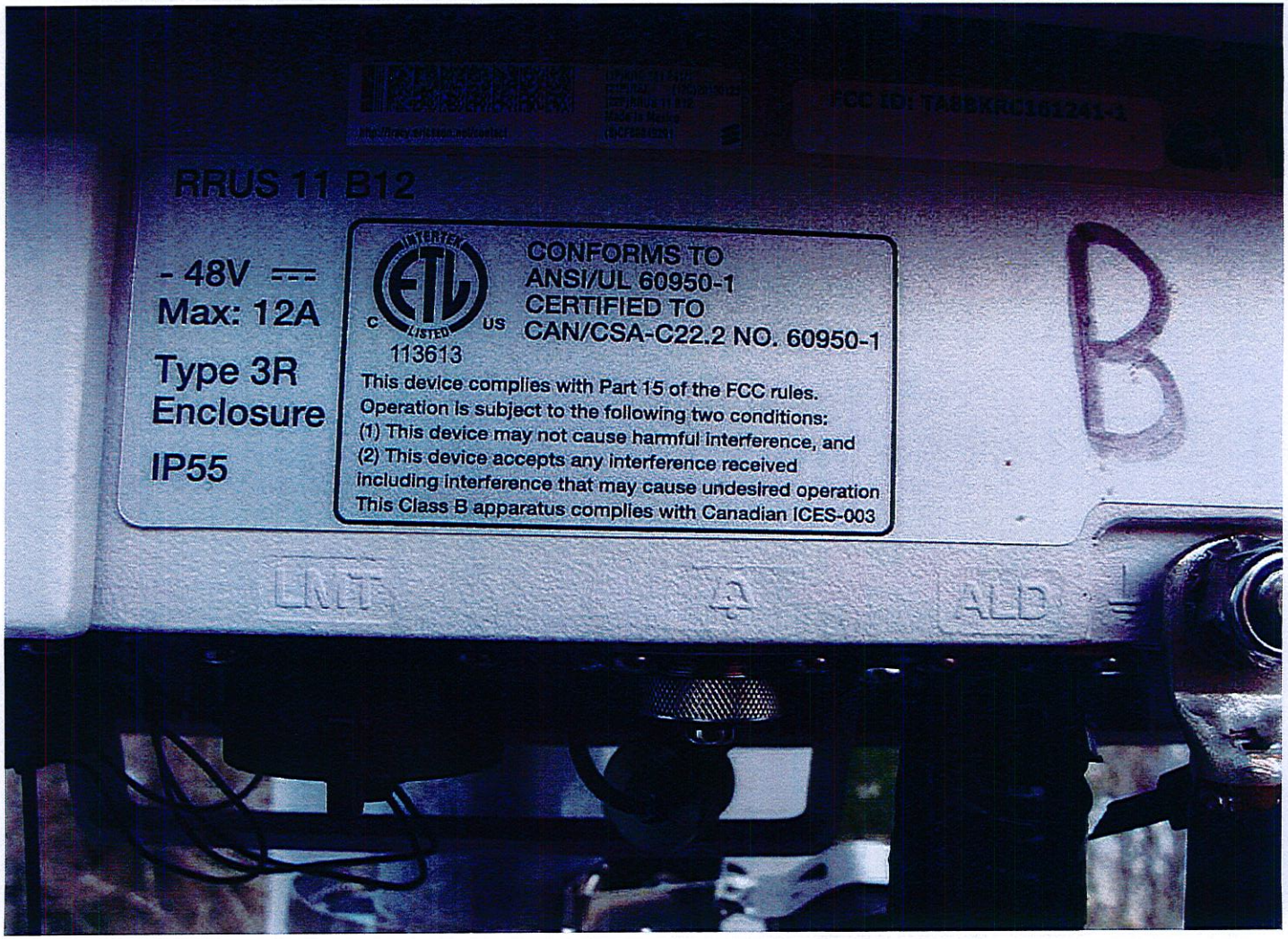
7.4 AT&T



7.5 AT&T

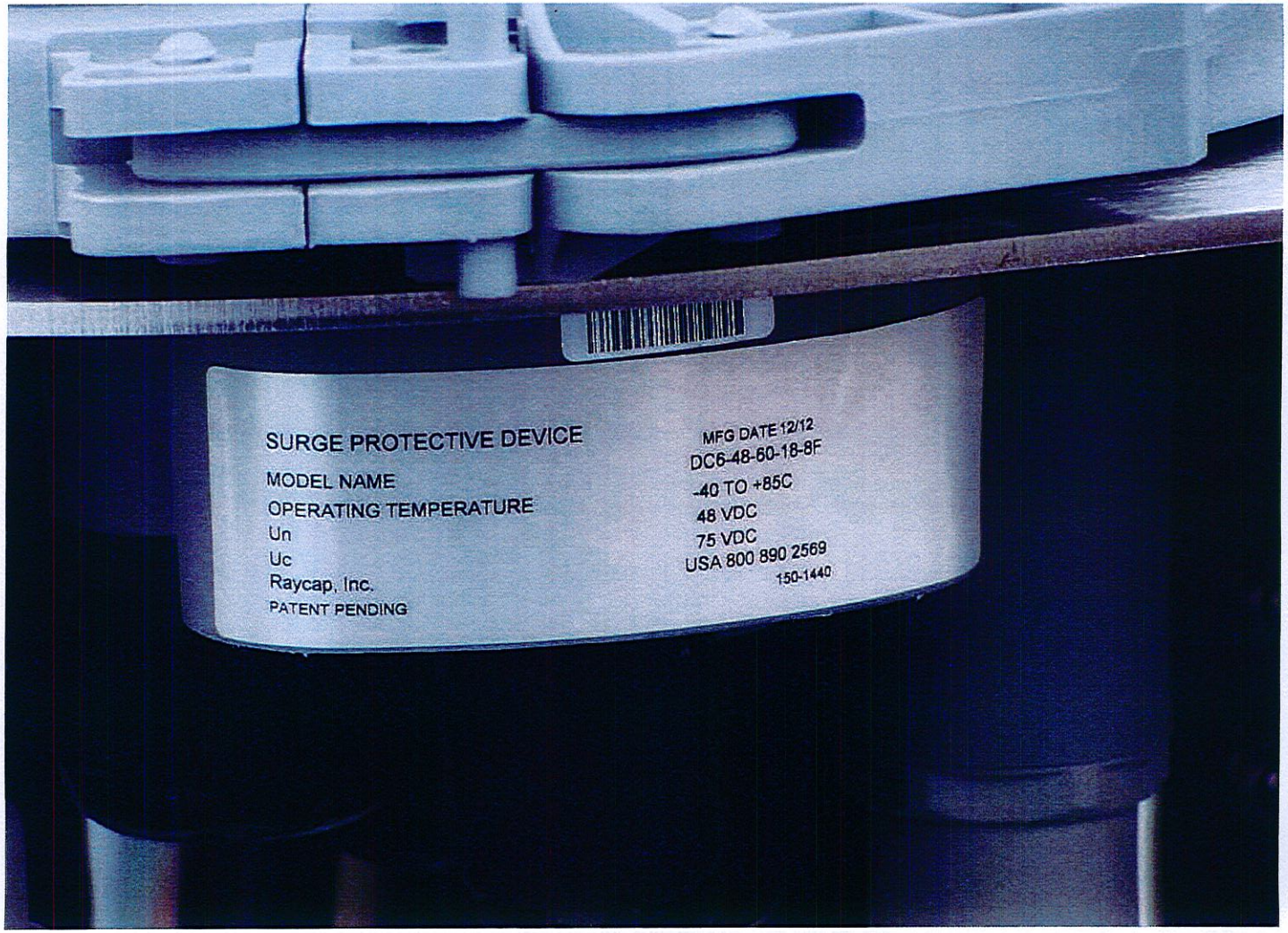

WATCH FOR WIRES
YOU CAN BE SHOCKED BY ELECTRICITY
If this Antenna comes near electric power lines
UP
+45
-45
Polarization Direction
MODEL : AM-X-CD-16-65-00T-RET
Freq. : 698 ~ 894 MHz, 1710 ~ 2170 MHz
Serial No. : 01133754
KMW Communications, Inc.
1521 E. Orangethorpe Ave., Suite A
Fullerton, CA 92831
Home-page : www.kmwcomm.com
E-mail : info@kmwcomm.com
KMW
RF & Microwave Products
TEL : 714-515-1100
Toll free : 888-789-5832
FAX : 714-515-1134

7.6 AT&T


RRUS 11 B12
- 48V ⎓
Max: 12A
Type 3R
Enclosure
IP55
CONFORMS TO
ANSI/UL 60950-1
CERTIFIED TO
CAN/CSA-C22.2 NO. 60950-1
113613
This device complies with Part 15 of the FCC rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device accepts any interference received
including interference that may cause undesired operation
This Class B apparatus complies with Canadian ICES-003
B

7.7 AT&T

7.8 AT&T


SURGE PROTECTIVE DEVICE
MODEL NAME
OPERATING TEMPERATURE
Un
Uc
Raycap, Inc.
PATENT PENDING
MFG DATE 12/12
DC6-48-60-18-8F
-40 TO +85C
48 VDC
75 VDC
USA 800 890 2569
150-1440

7.9 AT&T

8.0 Sprint GPS

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: CTNH411A

Antolini / Verizon Colo
20 Antolini Road
New Hartford, CT 06057

March 17, 2014

EBI PROJECT NUMBER: 62141313

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

EBI Consulting
environmental | engineering | due diligence

March 17, 2014

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

Re: Emissions Values for Site: **CTNH411A - Antolini / Verizon Colo**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at 20 Antolini Road, New Hartford, 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 cellular 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 20 Antolini Road, New Hartford, 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, the actual antenna pattern gain value in the direction of the sample area was used. For this report the sample point is 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 (1935.000 MHz—to 1945.000 MHz / 1980.000 MHz—to 1985.000 MHz) were considered for each sector of the proposed installation.
2) 2 UMTS channels (2110.000 to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation.
3) 2 LTE channels (2110.000 to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation.
4) 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.
5) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The actual gain in this direction was used per the manufactures supplied specifications.
6) The antenna used in this modeling is the Ericsson AIR21 for LTE, UMTS and GSM. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 15.6 dBd gain value at its main lobe. Actual antenna gain values were used for all calculations as per the manufacturers specifications

7) The antenna mounting height centerline of the proposed antennas is **125 feet** above ground level (AGL)
8) 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 calculation were done with respect to uncontrolled / general public threshold limits

Site ID	CTNH411A - Antolini / Verizon Colo
Site Addresss	20 Antolini Road, New Hartford, CT 06057
Site Type	Monopole

Sector 1

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	125	119	None	0	0	48.326044	1.226855	0.12269%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	125	119	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	125	119	1-5/8"	0	0	24.163022	0.613428	0.06134%
2B	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	125	119	1-5/8"	0	0	24.163022	0.613428	0.06134%
														Sector total Power Density Value:		0.245%	

Sector 2

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	125	119	None	0	0	48.326044	1.226855	0.12269%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	125	119	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	125	119	1-5/8"	0	0	24.163022	0.613428	0.06134%
2B	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	125	119	1-5/8"	0	0	24.163022	0.613428	0.06134%
														Sector total Power Density Value:		0.245%	

Sector 3

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	125	119	None	0	0	48.326044	1.226855	0.12269%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	125	119	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	125	119	1-5/8"	0	0	24.163022	0.613428	0.06134%
2B	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	125	119	1-5/8"	0	0	24.163022	0.613428	0.06134%
														Sector total Power Density Value:		0.245%	

Site Composite MPE %	
Carrier	MPE %
T-Mobile	0.736%
AT&T	50.970%
MetroPCS	5.150%
Nextel	6.570%
South End Fire District	0.610%
Sprint	3.960%
Verizon Wireless	20.620%
Total Site MPE %	88.616%

EBI Consulting
environmental | engineering | due diligence

Summary

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

The anticipated Maximum Composite contributions from the T-Mobile facility are **0.736% (0.245% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **88.616%** 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 within the allowable 100% threshold standard per the federal government.

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803