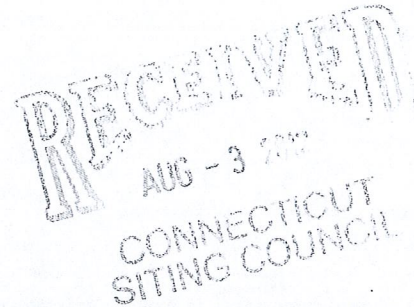


280 Trumbull Street  
Hartford, CT 06103-3597  
Main (860) 275-8200  
Fax (860) 275-8299  
kbaldwin@rc.com  
Direct (860) 275-8345

August 2, 2012

Linda Roberts  
Executive Director  
Connecticut Siting Council  
10 Franklin Square  
New Britain, CT 06051



Re: **EM-VER-003-120217 – 174 Ashford Center Road, Ashford, Connecticut**  
**EM-VER-133-120229 – Baltic-Hanover Road, Sprague, Connecticut**  
**EM-VER-023-1111114A – 14 Canton Springs Road, Canton, Connecticut**  
**EM-VER-023-1111114B – 650 Albany Turnpike, Canton, Connecticut**  
**EM-VER-060-120301 – 370 Rockland Road, Guilford, Connecticut**  
**EM-VER-091-120123 – 18 Titicus Mountain Road, New Fairfield, Connecticut**  
**EM-VER-092-120112 – 20 Antolini Road, New Hartford, Connecticut**

**Completion of Construction Activity**

Dear Ms. Roberts:

The purpose of this letter is to notify the Siting Council that construction activity associated with the above-referenced Cellco Partnership d/b/a Verizon Wireless telecommunications facilities has been completed.

If you have any questions or need any additional information regarding this facility please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Copy to:  
Sandy M. Carter



*Law Offices*

BOSTON

PROVIDENCE

HARTFORD

NEW LONDON

STAMFORD

WHITE PLAINS

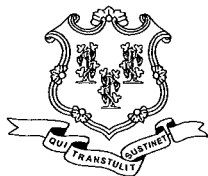
NEW YORK CITY

ALBANY

SARASOTA

*www.rc.com*

11801779-v1



# STATE OF CONNECTICUT

## CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: [siting.council@ct.gov](mailto:siting.council@ct.gov)

[www.ct.gov/csc](http://www.ct.gov/csc)

December 2, 2011

Kenneth C. Baldwin, Esq.  
Robinson & Cole LLP  
280 Trumbull Street  
Hartford, CT 06103

RE: **EM-VER-023-111114A** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 14 Canton Springs Road, Canton, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated November 9, 2011. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

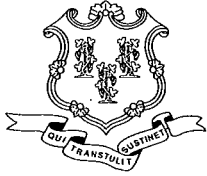
Linda Roberts  
Executive Director

LR/CDM/laf

c: The Honorable Richard J. Barlow, First Selectman, Town of Canton  
Robert H. Skinner, Chief Administrative Officer, Town of Canton  
Susan Brodeur, Land Use Coordinator, Town of Canton







# STATE OF CONNECTICUT

## CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: [siting.council@ct.gov](mailto:siting.council@ct.gov)

[www.ct.gov/csc](http://www.ct.gov/csc)

November 15, 2011

The Honorable Richard J. Barlow  
First Selectman  
Town of Canton  
4 Market Street  
P. O. Box 168  
Collinsville, CT 06022-0168

RE: **EM-VER-023-111114A** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 14 Canton Springs Road, Canton, Connecticut.

Dear First Selectman Barlow:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by November 30, 2011.

Thank you for your cooperation and consideration.

Very truly yours;

Linda Roberts  
Executive Director

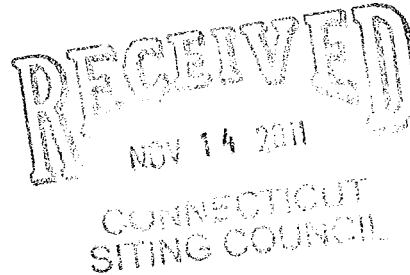
LR/jbw

Enclosure: Notice of Intent

c: Robert H. Skinner, Chief Administrative Officer, Town of Canton  
Susan Brodeur, Land Use Coordinator, Town of Canton

280 Trumbull Street  
Hartford, CT 06103-3597  
Main (860) 275-8200  
Fax (860) 275-8299  
kbaldwin@rc.com  
Direct (860) 275-8345

November 9, 2011



Linda Roberts  
Executive Director  
Connecticut Siting Council  
10 Franklin Square  
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap  
14 Canton Springs Road, Canton, Connecticut**

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains wireless telecommunications antennas at the 120-foot level on the existing 140-foot tower at the above-referenced address. The tower is owned by Cellco. The Council approved Cellco’s use of the existing tower in 1999. Cellco now intends to modify its installation by replacing six (6) of its existing antennas with nine (9) newer model antennas (six (6) model LPA-171063-8BF PCS antennas; and adding three (3) model BXA-70063/6CF LTE antennas), for a total of fifteen (15) antennas, all at the 120-foot level on the tower. Cellco also intends to install six (6) additional coax cables inside the monopole tower. Attached behind Tab 1 are the specifications for the proposed replacement antennas.



*Law Offices*

BOSTON

PROVIDENCE

HARTFORD

NEW LONDON

STAMFORD

WHITE PLAINS

NEW YORK CITY

ALBANY

SARASOTA

*www.rc.com*

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Richard Barlow, First Selectman of the Town of Canton. A copy of this letter is also being sent to Canton Volunteer Fire Company Inc., the owner of the property on which the tower is located.

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

1. The proposed modifications will not result in an increase in the overall height of the existing tower. Cellco’s antennas will be located at the same 120-foot level on the existing 140-foot tower.

# ROBINSON & COLE<sub>LLP</sub>

Linda Roberts  
November 9, 2011  
Page 2

2. The proposed modifications will not involve any modifications to ground-mounted equipment and, therefore, will not require the extension of the site boundaries.

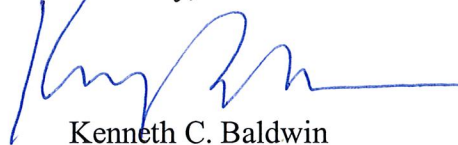
3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. The operation of the replacement antennas will not increase radio frequency (RF) power density levels at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative power density table for Cellco's modified facility is included behind Tab 2.

Also attached is a Structural Analysis Report confirming that the tower and foundation can support Cellco's proposed antennas modification. (See Tab 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Richard Barlow, Canton First Selectman  
Canton Volunteer Fire Company Inc.  
Sandy M. Carter





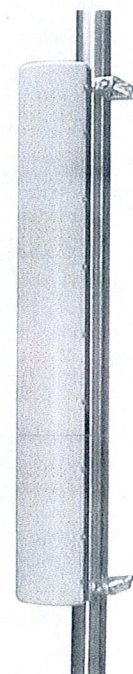
## LPA-171063-8CF-EDIN-X

V-Pol | Log Periodic | 63° | 17.0-17.5 dBi

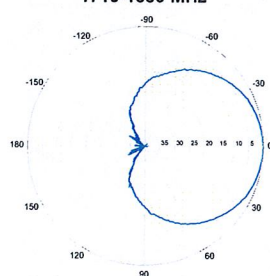
Replace "X" with desired electrical downtilt.

Antenna is available with NE connector(s).  
 Replace "EDIN" with "NE" in the model number  
 when ordering.

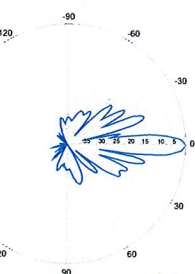
| Electrical Characteristics                |                                              | 1710-2170 MHz       |                                |                    |        |        |         |
|-------------------------------------------|----------------------------------------------|---------------------|--------------------------------|--------------------|--------|--------|---------|
| Frequency bands                           | 1710-1755 MHz                                | 1850-1990 MHz       | 1920-2170 MHz                  |                    |        |        |         |
| Polarization                              | Vertical                                     |                     |                                |                    |        |        |         |
| Horizontal beamwidth                      | 61°                                          | 63°                 | 60°                            |                    |        |        |         |
| Vertical beamwidth                        | 6°                                           | 7°                  | 6°                             |                    |        |        |         |
| Gain                                      | 14.9 dBd (17.0 dBi)                          | 15.4 dBd (17.5 dBi) | 14.9 dBd (17.0 dBi)            |                    |        |        |         |
| Electrical downtilt (X)                   | 0, 2                                         |                     |                                |                    |        |        |         |
| Impedance                                 | 50Ω                                          |                     |                                |                    |        |        |         |
| VSWR                                      | ≤ 1.5:1                                      |                     |                                |                    |        |        |         |
| Null fill                                 | 5% (-26.02 dB)                               |                     |                                |                    |        |        |         |
| Input power                               | 250 W                                        |                     |                                |                    |        |        |         |
| Lightning protection                      | Direct Ground                                |                     |                                |                    |        |        |         |
| Connector(s)                              | 1 Port / EDIN or NE / Female / Center (Back) |                     |                                |                    |        |        |         |
| Mechanical Characteristics                |                                              |                     |                                |                    |        |        |         |
| Dimensions Length x Width x Depth         | 1207 x 203 x 203 mm                          |                     | 47.5 x 8.0 x 8.0 in            |                    |        |        |         |
| Weight without mounting brackets          | 5.2 kg                                       |                     | 11.5 lbs                       |                    |        |        |         |
| Survival wind speed                       | >201 km/hr                                   |                     | >125 mph                       |                    |        |        |         |
| Wind area                                 | Front: 0.20 m² Side: 0.27 m²                 |                     | Front: 2.2 ft² Side: 2.9 ft²   |                    |        |        |         |
| Wind load @ 161 km/hr (100 mph)           | Front: 246 N Side: 323 N                     |                     | Front: 55.3 lbf Side: 72.7 lbf |                    |        |        |         |
| Mounting Options                          |                                              | Part Number         |                                | Fits Pipe Diameter |        | Weight |         |
| 2-Point Mounting Bracket Kit              | 26799997                                     |                     | 50-102 mm 2.0-4.0 in           |                    | 2.3 kg |        | 5.0 lbs |
| 2-Point Mounting and Downtilt Bracket Kit | 26799999                                     |                     | 50-102 mm 2.0-4.0 in           |                    | 2.3 kg |        | 5.0 lbs |



1710-1880 MHz

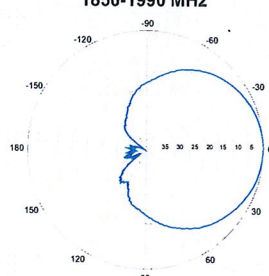


Horizontal

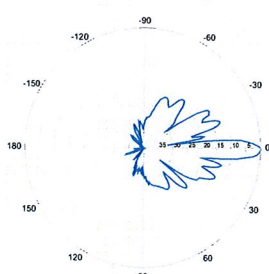


0° | Vertical

1850-1990 MHz

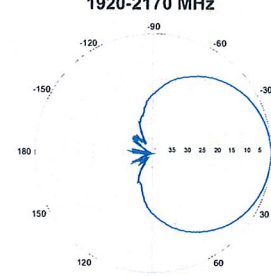


Horizontal

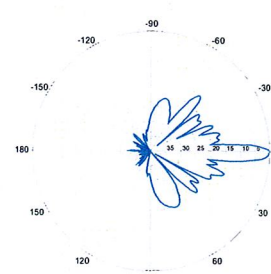


0° | Vertical

1920-2170 MHz



Horizontal

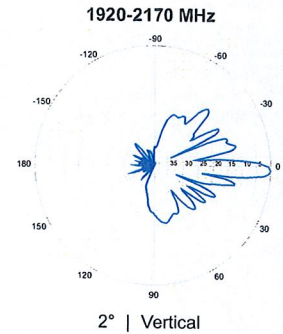
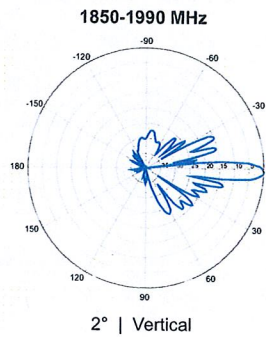
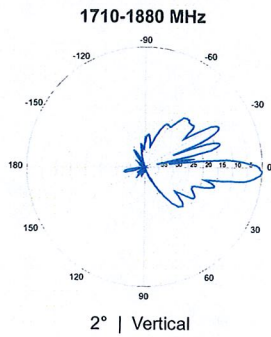


0° | Vertical

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

**LPA-171063-8CF-EDIN-X**

V-Pol | Log Periodic | 63° | 17.0-17.5 dBi



Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.



# BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

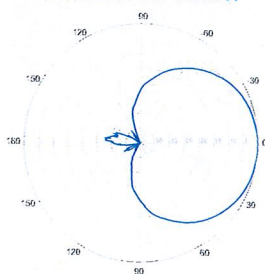
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

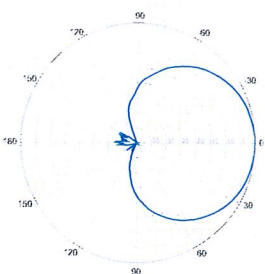
| Electrical Characteristics           | 696-900 MHz                                                                           |                           |                            |                           |
|--------------------------------------|---------------------------------------------------------------------------------------|---------------------------|----------------------------|---------------------------|
| Frequency bands                      | 696-806 MHz                                                                           |                           | 806-900 MHz                |                           |
| Polarization                         | ±45°                                                                                  |                           |                            |                           |
| Horizontal beamwidth                 | 65°                                                                                   |                           | 63°                        |                           |
| Vertical beamwidth                   | 13°                                                                                   |                           | 11°                        |                           |
| Gain                                 | 14.0 dBd (16.1 dBi)                                                                   |                           | 14.5 dBd (16.6 dBi)        |                           |
| Electrical downtilt (X)              | 0, 2, 3, 4, 5, 6, 8, 10                                                               |                           |                            |                           |
| Impedance                            | 50Ω                                                                                   |                           |                            |                           |
| VSWR                                 | ≤1.35:1                                                                               |                           |                            |                           |
| Upper sidelobe suppression (0°)      | -18.3 dB                                                                              |                           | -18.2 dB                   |                           |
| Front-to-back ratio (+/-30°)         | -33.4 dB                                                                              |                           | -36.3 dB                   |                           |
| Null fill                            | 5% (-26.02 dB)                                                                        |                           |                            |                           |
| Isolation between ports              | < -25 dB                                                                              |                           |                            |                           |
| Input power                          | 500 W                                                                                 |                           |                            |                           |
| Lightning protection                 | Direct Ground                                                                         |                           |                            |                           |
| Connector(s)                         | 2 Ports / EDIN or NE / Female / Center (Back)                                         |                           |                            |                           |
| Mechanical Characteristics           |                                                                                       |                           |                            |                           |
| Dimensions Length x Width x Depth    | 1804 x 285 x 132 mm                                                                   |                           | 71.0 x 11.2 x 5.2 in       |                           |
| Depth with z-brackets                | 172 mm                                                                                |                           | 6.8 in                     |                           |
| Weight without mounting brackets     | 7.9 kg                                                                                |                           | 17 lbs                     |                           |
| Survival wind speed                  | > 201 km/hr                                                                           |                           | > 125 mph                  |                           |
| Wind area                            | Front: 0.51 m <sup>2</sup>                                                            | Side: 0.24 m <sup>2</sup> | Front: 5.5 ft <sup>2</sup> | Side: 2.6 ft <sup>2</sup> |
| Wind load @ 161 km/hr (100 mph)      | Front: 759 N                                                                          | Side: 391 N               | Front: 169 lbf             | Side: 89 lbf              |
| Mounting Options                     | Part Number                                                                           | Fits Pipe Diameter        |                            | Weight                    |
| 3-Point Mounting Bracket Kit         | 36210003                                                                              | 50-160 mm                 | 2.0-6.3 in                 | 6.3 kg 14 lbs             |
| 3-Point Downtilt Bracket Kit (0-14°) | 36210004                                                                              | 50-160 mm                 | 2.0-6.3 in                 | 7.3 kg 16 lbs             |
| Downtilt Mounting Applications       | A mounting bracket and downtilt bracket kit must be ordered for downtilt applications |                           |                            |                           |
| Concealment Configurations           | For concealment configurations, order BXA-70063-6CF-EDIN-X-FP                         |                           |                            |                           |



BXA-70063-6CF-EDIN-X

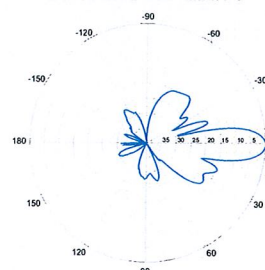


Horizontal | 750 MHz

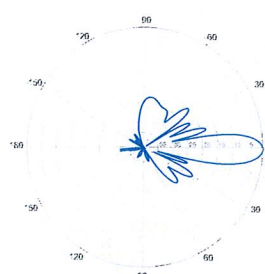


Horizontal | 850 MHz

BXA-70063-6CF-EDIN-0

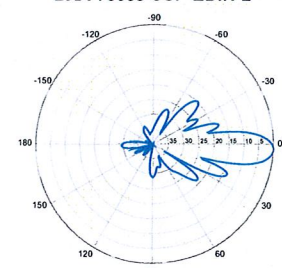


0° | Vertical | 750 MHz

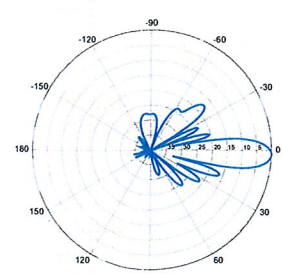


0° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-2



2° | Vertical | 750 MHz



2° | Vertical | 850 MHz

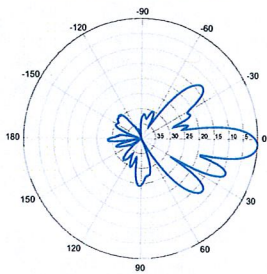
Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.



**BXA-70063-6CF-EDIN-X**

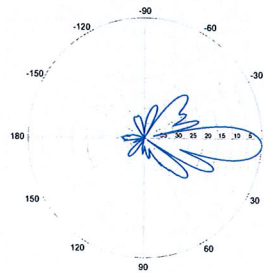
X-Pol | FET Panel | 63° | 14.5 dBd

**BXA-70063-6CF-EDIN-3**



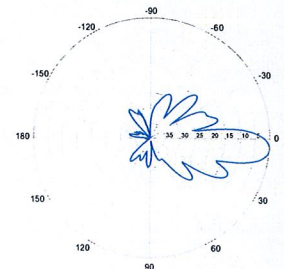
3° | Vertical | 750 MHz

**BXA-70063-6CF-EDIN-4**

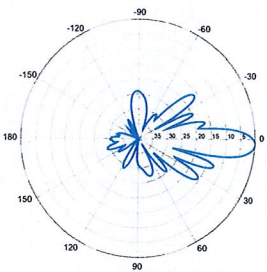


4° | Vertical | 750 MHz

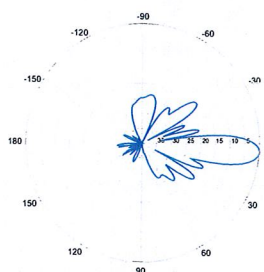
**BXA-70063-6CF-EDIN-5**



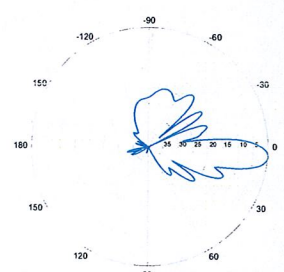
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

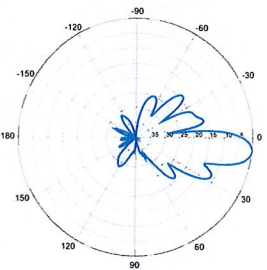


4° | Vertical | 850 MHz



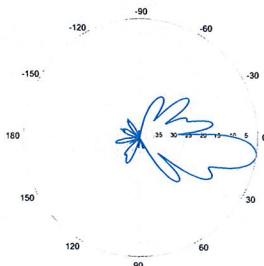
5° | Vertical | 850 MHz

**BXA-70063-6CF-EDIN-6**



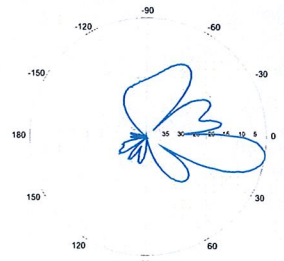
6° | Vertical | 750 MHz

**BXA-70063-6CF-EDIN-8**

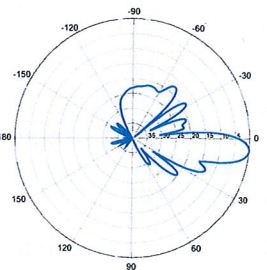


8° | Vertical | 750 MHz

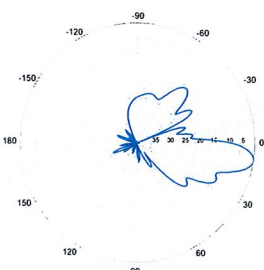
**BXA-70063-6CF-EDIN-10**



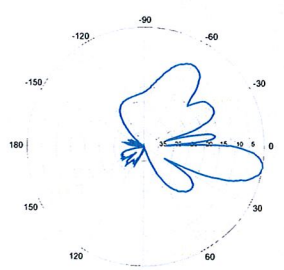
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

| Site Name: Canton             |            | General   | Power  | Density          |        |                    |              |        |  |
|-------------------------------|------------|-----------|--------|------------------|--------|--------------------|--------------|--------|--|
| Tower Height: Verizon @ 120ft |            |           |        |                  |        |                    |              |        |  |
| CARRIER                       | # OF CHAN. | WATTS ERP | HEIGHT | CALC. POWER DENS | FREQ.  | MAX. PERMISS. EXP. | FRACTION MPE | Total  |  |
| *Cingular UMTS                | 1          | 500       | 154    | 0.0076           | 880    | 0.5867             | 1.29%        |        |  |
| *Cingular GSM                 | 2          | 296       | 154    | 0.0090           | 880    | 0.5867             | 1.53%        |        |  |
| *Cingular GSM                 | 1          | 427       | 154    | 0.0065           | 1900   | 1.0000             | 0.65%        |        |  |
| *Pocket                       | 3          | 631       | 83     | 0.0988           | 2130   | 1.0000             | 9.88%        |        |  |
| *Sprint                       | 11         | 844.54    | 90     | 0.0004           | 1962.5 | 1.0000             | 0.04%        |        |  |
| *Canton FD                    | 1          | 71        | 140    | 0.0013           | 300    | 0.2                | 0.65%        |        |  |
| *Nextel                       | 9          | 100       | 110    | 0.0267           | 851    | 0.5673             | 4.71%        |        |  |
| *T-Mobile                     | 8          | 121       | 100    | 0.0348           | 1935   | 1.0000             | 3.48%        |        |  |
| Verizon PCS                   | 7          | 288       | 120    | 0.0503           | 1970   | 1.0000             | 5.03%        |        |  |
| Verizon Cellular              | 9          | 276       | 120    | 0.0620           | 869    | 0.5793             | 10.71%       |        |  |
| Verizon AWS                   | 1          | 719       | 120    | 0.0180           | 2145   | 1.0000             | 1.80%        |        |  |
| Verizon 700                   | 2          | 722       | 120    | 0.0361           | 698    | 0.4653             | 7.75%        |        |  |
|                               |            |           |        |                  |        |                    |              | 47.52% |  |
| * Source: Siting Council      |            |           |        |                  |        |                    |              |        |  |
|                               |            |           |        |                  |        |                    |              |        |  |
|                               |            |           |        |                  |        |                    |              |        |  |



## **Structural Analysis Report**

*140-ft Existing EEI Monopole*

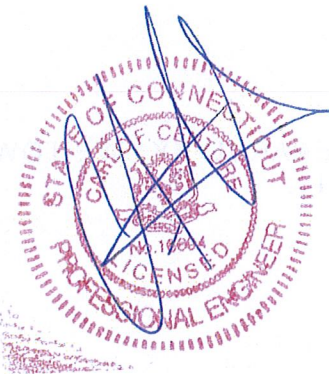
*Proposed Verizon Wireless  
Antenna Upgrade*

*Verizon Site Ref: Canton*

*14 Canton Springs Road  
Canton, CT*

*Centek Project No. 11074.CO28*

*Date: September 29, 2011*



**Prepared for:**

**Verizon Wireless  
99 East River Road, 9<sup>th</sup> Floor  
East Hartford, CT 06108**

## **Table of Contents**

### **SECTION 1 - REPORT**

- INTRODUCTION.
- ANTENNA AND APPURTENANCE SUMMARY.
- PRIMARY ASSUMPTIONS USED IN THE ANALYSIS.
- ANALYSIS.
- TOWER LOADING.
- TOWER CAPACITY.
- FOUNDATION AND ANCHORS.
- CONCLUSION.

### **SECTION 2 – CONDITIONS & SOFTWARE**

- STANDARD ENGINEERING CONDITIONS.
- GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM.

### **SECTION 3 – CALCULATIONS**

- RISATower INPUT/OUTPUT SUMMARY.
- RISATower DETAILED OUTPUT.
- ANCHOR BOLT AND BASE PLATE ANALYSIS.
- SPREAD FOOTING W/ PIER ANALYSIS.

### **SECTION 4 – REFERENCE MATERIAL**

- VERIZON RF DATA SHEET.
- ANTENNA CUT SHEETS.
- TOWER INVENTORY MAPPING REPORT PREPARED BY JWB TOWER SERVICES, LLC DATED SEPTEMBER 11, 2011.



## Introduction

The purpose of this report is to summarize the results of the non-linear, P- $\Delta$  structural analysis of the antenna upgrade proposed by Verizon Wireless on the existing monopole (tower) located in Canton, CT.

The host tower is a 140-ft tall, four-section, eighteen sided, tapered monopole, originally designed and manufactured by EEI job no; 4960, dated May 13, 1999. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural report prepared by Centek Engineering dated November 12, 2008. Antenna and appurtenance information were obtained from the tower mapping and inventory report prepared by JWB Tower Services, LLC (JWB) dated September 11, 2011 and a Verizon RF data sheet.

The tower is made up of four (4) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 18.00-in at the top and 51.00-in at the base.

Verizon is proposing the removal of six (6) panel antennas and the installation of nine (9) panel antennas mounted to the existing platform w/ handrails. 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) 20-ft x 2" dia. Omni-directional whip antenna mounted on a 4-ft side arm with an elevation of 138-ft above exiting grade.  
Coax Cables: Two (2) 7/8"  $\varnothing$  coax cables running on the inside of the existing monopole.
- AT&T (Existing):  
Antennas: Six (6) CSS DUO1417-8686 panel antennas, three (3) Kathrein 800-10121 panel antennas, six (6) Cleargain 1900/800 TMA's, three (3) CSS combiners, three (3) Kathrein 782-10250 combiners and three (3) Kathrein Smart Bias-T mounted on a 13-ft platform w/ handrails with a RAD center elevation of 130-ft above exiting grade.  
Coax Cables: Twelve (12) 7/8"  $\varnothing$  coax cables running on the inside of the existing monopole.
- NEXTEL (Existing):  
Antennas: Twelve (12) Andrew DB844H90E-XY panel antennas and two (2) LMU's mounted on a 13-ft platform w/ handrails with a RAD center elevation of 112-ft above exiting grade.  
Coax Cables: Twelve (12) 1-1/4"  $\varnothing$  and two (2) 1/2"  $\varnothing$  coax cables running on the inside of the existing monopole.



- **T-MOBILE (Existing):**  
Antennas: Four (4) EMS RR90-17-02DP panel antennas mounted on a 14-ft low profile platform with a RAD center elevation of 100-ft above exiting grade.  
Coax Cables: Eight (8) 1-5/8" Ø coax cables running on the inside of the existing monopole.
- **SPRINT (Existing):**  
Antennas: Four (4) Andrew DB980F90T2E-M and two (2) Andrew DB978F30T2E-M panel antennas mounted on a 14-ft low profile platform with a RAD center elevation of 91-ft above exiting grade.  
Coax Cables: Six (6) 1-1/4" Ø coax cables running on the inside of the existing monopole.
- **METROPCS (Existing):**  
Antennas: Three (3) RFS APXV18-206517S panel antennas flush mounted with a RAD center elevation of 83-ft above exiting grade.  
Coax Cables: Six (6) 1-5/8" Ø coax cables running on the inside of the existing monopole.
- **VERIZON (Existing to Remain):**  
Antennas: Four (4) Antel LPA-80080/4CF panel antennas, two (2) Antel LPA-80063/4CF panel antennas and one (1) GPS antenna mounted to a 13-ft platform w/ handrails with a RAD center elevation of 120-ft above exiting grade.  
Coax Cables: Twelve (12) 1-5/8" Ø and one (1) 1/2" Ø coax cables running on the inside of the existing monopole.
- **VERIZON (Existing to Remove):**  
Antennas: Six (6) Andrew DB950F65E-M panel antennas mounted to a 13-ft platform w/ handrails with a RAD center elevation of 120-ft above exiting grade.
- **VERIZON (Proposed):**  
Antennas: Three (3) Antel BXA-70063-6CF and six (6) Antel LPA-171063-8CF panel antennas mounted to a 13-ft platform w/ handrails with a RAD center elevation of 120-ft above exiting grade.  
Coax Cables: Six (6) 1-5/8" Ø coax cables running on the inside of the existing monopole.

### 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 RISATower. 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 80 mph basic wind speed (fastest mile) with no ice and 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).

## 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 tower structure and its components.

|                   |                                                                                                                                                                                                                                                                                           |                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Basic Wind Speed: | Hartford; $v = 80$ mph (fastest mile)                                                                                                                                                                                                                                                     | [Section 16 of TIA/EIA-222-F-96]                                                                |
|                   | Canton; $v = 95$ mph (3 second gust) equivalent to $v = 77.5$ mph (fastest mile)                                                                                                                                                                                                          | [Appendix K of the 2005 CT Building Code Supplement]                                            |
|                   | TIA/EIA wind speed controls.                                                                                                                                                                                                                                                              |                                                                                                 |
| Load Cases:       | <u>Load Case 1</u> ; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design of monopole towers.                                                                                                 | [Section 2.3.16 of TIA/EIA-222-F-96]                                                            |
|                   | <u>Load Case 2</u> ; 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. This load case typically controls the design of lattice towers. | [Section 2.3.16 of TIA/EIA-222-F-96]                                                            |
|                   | <u>Load Case 3</u> ; Seismic – not checked                                                                                                                                                                                                                                                | [Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type |



## **Tower Capacity**

Tower stresses were calculated utilizing the structural analysis software RISATower. 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 RISATower "Section Capacity Table", this tower was found to be at **52.9%** of its total capacity.

| <b>Tower Section</b> | <b>Component</b> | <b>Stress Ratio<br/>(percentage of<br/>capacity)</b> | <b>Result</b> |
|----------------------|------------------|------------------------------------------------------|---------------|
| Pole Shaft (L3)      | 40.26'-79.83'    | 52.9%                                                | <b>PASS</b>   |

## **Foundation and Anchors**

The existing foundation consists of a 6.5-ft Ø x 4.5-ft long reinforced concrete pier on a 24.0-ft square x 3-ft thick reinforce concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned structural analysis report prepared by Centek. Engineering The base of the tower is connected to the foundation by means of (20) 2.25"Ø, ASTM A615-75 anchor bolts embedded approximately 5-ft into the concrete foundation structure.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

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

| <b>Reactions</b> | <b>Vector</b> | <b>Proposed Load</b> |
|------------------|---------------|----------------------|
| Base             | Shear         | <b>22 kips</b>       |
|                  | Axial         | <b>39 kips</b>       |
|                  | Moment        | <b>2207 ft-kips</b>  |

- The foundation was found to be within allowable limits.

| <b>Foundation</b>            | <b>Design Limit</b> | <b>IBC 2003/2005<br/>CT State Building Code<br/>Section 3108.4.2 FS<sup>(1)</sup></b> | <b>Proposed Loading<br/>FS<sup>(1)</sup></b> | <b>Result</b> |
|------------------------------|---------------------|---------------------------------------------------------------------------------------|----------------------------------------------|---------------|
| Reinf. Conc.<br>Pad and Pier | OTM <sup>(2)</sup>  | 2.0                                                                                   | 2.78                                         | <b>PASS</b>   |

1. FS denote Factor of Safety

2. OTM denotes Overturning Moment

- 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    | Compression  | 46.3%                                 | PASS   |
| Base Plate      | Bending      | 54.8%                                 | PASS   |

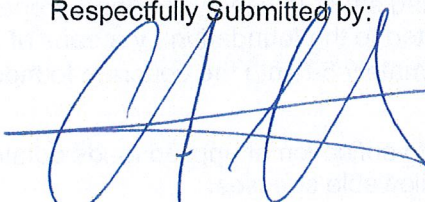
### Conclusion

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 Verizon Wireless. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

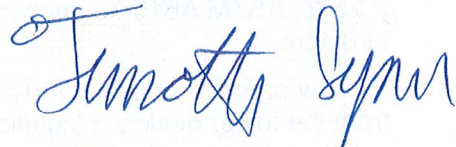
Please feel free to call with any questions or comments.

Respectfully Submitted by:

  
Carlo F. Centore, PE  
Principal ~ Structural Engineer



Prepared by:

  
Timothy J. Lynn, EIT  
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

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

### RISATower Features:

- RISATower 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.
- RISATower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.



| Section            | 1       | 2       | 3       | 4       |
|--------------------|---------|---------|---------|---------|
| Length (ft)        | 24.64   | 39.06   | 44.16   | 45.54   |
| Number of Sides    | 18      | 18      | 18      | 18      |
| Thickness (in)     | 0.1875  | 0.3125  | 0.4375  | 0.5000  |
| Socket Length (ft) | 3.53    | 4.59    | 5.28    | 39.7435 |
| Top Dia (in)       | 18.0000 | 22.9814 | 30.9366 | 51.0000 |
| Bot Dia (in)       | 24.2521 | 32.7041 | 41.9334 |         |
| Grade              |         |         | A572-65 |         |
| Weight (K)         | 1.0     | 3.6     | 7.5     | 11.0    |

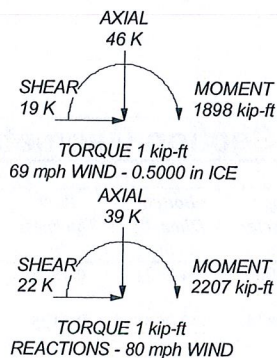
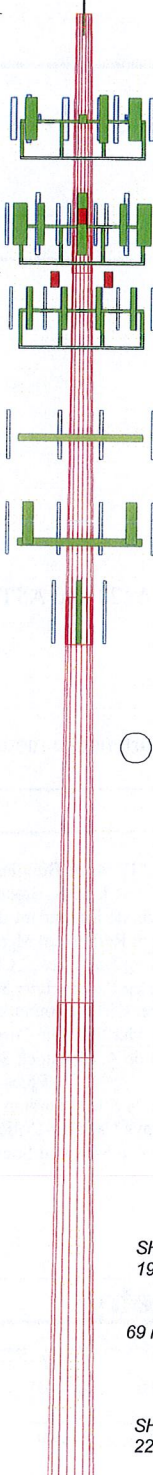
140.0 ft

115.4 ft

79.8 ft

40.3 ft

0.0 ft



## DESIGNED APPURTENANCE LOADING

| TYPE                                       | ELEVATION | TYPE                                             | ELEVATION |
|--------------------------------------------|-----------|--------------------------------------------------|-----------|
| 20' x 2" Dia Omni (Town - Existing)        | 148       | BXA-70063/6CF (Verizon - Proposed)               | 120       |
| 4' Side Mount Standoff (Town - Existing)   | 138       | LPA-171063-8CF (Verizon - Proposed)              | 120       |
| (2) DUO1417-8686 (ATI - Existing)          | 130       | LPA-80080-4CF (Verizon - Existing)               | 120       |
| 800 10121 (ATI - Existing)                 | 130       | LPA-80063/4CF (Verizon - Existing)               | 120       |
| (2) CG 1900/800-DB-FB TMA (ATI - Existing) | 130       | LPA-171063-8CF (Verizon - Proposed)              | 120       |
| Combiner (ATI - Existing)                  | 130       | BXA-70063/6CF (Verizon - Proposed)               | 120       |
| Smart Bias T (ATI - Existing)              | 130       | LPA-171063-8CF (Verizon - Proposed)              | 120       |
| 782 10250 (ATI - Existing)                 | 130       | LPA-80063/4CF (Verizon - Existing)               | 120       |
| (2) DUO1417-8686 (ATI - Existing)          | 130       | GPS (Verizon - Existing)                         | 120       |
| 800 10121 (ATI - Existing)                 | 130       | 13' Platform w/rails (Verizon - Existing)        | 118       |
| (2) CG 1900/800-DB-FB TMA (ATI - Existing) | 130       | LMU (Nextel - Existing)                          | 114       |
| Combiner (ATI - Existing)                  | 130       | LMU (Nextel - Existing)                          | 114       |
| Smart Bias T (ATI - Existing)              | 130       | (4) DB844H90E-XY (Nextel - Existing)             | 112       |
| 782 10250 (ATI - Existing)                 | 130       | (4) DB844H90E-XY (Nextel - Existing)             | 112       |
| (2) DUO1417-8686 (ATI - Existing)          | 130       | 13' Platform w/rails (Nextel - Existing)         | 110       |
| 800 10121 (ATI - Existing)                 | 130       | 14-ft Low Profile Platform (T-Mobile - Existing) | 100       |
| (2) CG 1900/800-DB-FB TMA (ATI - Existing) | 130       | (2) RR90-17-02DP (T-Mobile - Existing)           | 100       |
| Combiner (ATI - Existing)                  | 130       | (2) RR90-17-02DP (T-Mobile - Existing)           | 100       |
| Smart Bias T (ATI - Existing)              | 130       | (2) DB978F30T2E-M (Sprint - Existing)            | 91.5      |
| 782 10250 (ATI - Existing)                 | 130       | (2) DB980F90T2E-M (Sprint - Existing)            | 91        |
| 13' Platform w/rails (ATI - Existing)      | 128       | (2) DB980F90T2E-M (Sprint - Existing)            | 91        |
| LPA-80080-4CF (Verizon - Existing)         | 120       | 14-ft Low Profile Platform (Sprint - Existing)   | 90        |
| LPA-171063-8CF (Verizon - Proposed)        | 120       | Uni-Tri Bracket (MetroPCS - Existing)            | 83        |
| BXA-70063/6CF (Verizon - Proposed)         | 120       | APXV18-206517S (MetroPCS - Existing)             | 83        |
| LPA-171063-8CF (Verizon - Proposed)        | 120       | APXV18-206517S (MetroPCS - Existing)             | 83        |
| LPA-80080-4CF (Verizon - Existing)         | 120       | APXV18-206517S (MetroPCS - Existing)             | 83        |
| LPA-80080-4CF (Verizon - Existing)         | 120       | APXV18-206517S (MetroPCS - Existing)             | 83        |
| LPA-171063-8CF (Verizon - Proposed)        | 120       |                                                  |           |

## 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 members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
5. Welds are fabricated with ER-70S-6 electrodes.
6. TOWER RATING: 52.9%

**Centek Engineering Inc.**

63-2 North Branford Rd.

Branford, CT 06405

Phone: (203) 488-0580

FAX: (203) 488-8587

Job: **11074.CO28 - Canton**

Project: **140' EEI Monopole - 14 Canton Springs Rd, Canton, CT**

Client: Verizon Wireless

Drawn by: T.JL

App'd:

Code: TIA/EIA-222-F

Date: 09/29/11

Scale: NTS

Path:

Dwg No. E-1

J:\004\1107400 CO28 - Verizon Wireless - Canton, CT\004\1107400 EEI Monopole Canton





|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 2 of 21           |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

### Tapered Pole Properties

| Section | Tip Dia.<br>in | Area<br>in <sup>2</sup> | I<br>in <sup>4</sup> | r<br>in | C<br>in | I/C<br>in <sup>3</sup> | J<br>in <sup>4</sup> | I/Q<br>in <sup>2</sup> | w<br>in | w/t    |
|---------|----------------|-------------------------|----------------------|---------|---------|------------------------|----------------------|------------------------|---------|--------|
| L1      | 18.2777        | 10.6007                 | 424.9328             | 6.3234  | 9.1440  | 46.4712                | 850.4248             | 5.3013                 | 2.8380  | 15.136 |
|         | 24.6262        | 14.3214                 | 1047.8077            | 8.5429  | 12.3201 | 85.0489                | 2096.9941            | 7.1621                 | 3.9384  | 21.005 |
| L2      | 24.2282        | 22.4847                 | 1459.7753            | 8.0475  | 11.6746 | 125.0391               | 2921.4715            | 11.2445                | 3.4947  | 11.183 |
|         | 33.2086        | 32.1284                 | 4258.8427            | 11.4990 | 16.6137 | 256.3455               | 8523.2892            | 16.0673                | 5.2059  | 16.659 |
| L3      | 32.5745        | 42.3518                 | 4977.1676            | 10.8272 | 15.7158 | 316.6988               | 9960.8842            | 21.1799                | 4.6748  | 10.685 |
|         | 42.5803        | 57.6222                 | 12535.3942           | 14.7310 | 21.3022 | 588.4563               | 25087.2828           | 28.8166                | 6.6103  | 15.109 |
| L4      | 41.6819        | 62.2795                 | 12117.6844           | 13.9315 | 20.1897 | 600.1905               | 24251.3135           | 31.1457                | 6.1149  | 12.23  |
|         | 51.7868        | 80.1435                 | 25821.9188           | 17.9275 | 25.9080 | 996.6774               | 51677.8148           | 40.0794                | 8.0960  | 16.192 |

| Tower<br>Elevation   | Gusset<br>Area<br>(per face) | Gusset<br>Thickness | Gusset Grade | Adjust. Factor<br>A <sub>f</sub> | Adjust. Factor<br>A <sub>r</sub> | Weight Mult. | Double Angle<br>Stitch Bolt<br>Spacing<br>Diagonals | Double Angle<br>Stitch Bolt<br>Spacing<br>Horizontals |
|----------------------|------------------------------|---------------------|--------------|----------------------------------|----------------------------------|--------------|-----------------------------------------------------|-------------------------------------------------------|
| ft                   | ft <sup>2</sup>              | in                  |              |                                  |                                  |              | in                                                  | in                                                    |
| L1 140.00-<br>115.36 |                              |                     |              | 1                                | 1                                | 1            |                                                     |                                                       |
| L2 115.36-<br>79.83  |                              |                     |              | 1                                | 1                                | 1            |                                                     |                                                       |
| L3 79.83-40.26       |                              |                     |              | 1                                | 1                                | 1            |                                                     |                                                       |
| L4 40.26-0.00        |                              |                     |              | 1                                | 1                                | 1            |                                                     |                                                       |

### Feed Line/Linear Appurtenances - Entered As Area

| Description                    | Face<br>or<br>Leg | Allow<br>Shield | Component<br>Type | Placement<br>ft | Total<br>Number |          | C <sub>A</sub> A <sub>A</sub><br>ft <sup>2</sup> /ft | Weight<br>plf |
|--------------------------------|-------------------|-----------------|-------------------|-----------------|-----------------|----------|------------------------------------------------------|---------------|
| 7/8<br>(Town - Existing)       | A                 | No              | Inside Pole       | 140.00 - 3.00   | 2               | No Ice   | 0.00                                                 | 0.54          |
| 7/8<br>(AT&T - Existing)       | A                 | No              | Inside Pole       | 130.00 - 3.00   | 12              | 1/2" Ice | 0.00                                                 | 0.54          |
| 1 5/8<br>(Verizon - Existing)  | B                 | No              | Inside Pole       | 120.00 - 3.00   | 12              | 1/2" Ice | 0.00                                                 | 0.54          |
| 1/2<br>(Verizon - Existing)    | B                 | No              | Inside Pole       | 120.00 - 3.00   | 1               | 1/2" Ice | 0.00                                                 | 1.04          |
| 1 1/4<br>(Nextel - Existing)   | C                 | No              | Inside Pole       | 110.00 - 3.00   | 12              | No Ice   | 0.00                                                 | 0.25          |
| 1/2<br>(Nextel - Existing)     | C                 | No              | Inside Pole       | 110.00 - 3.00   | 2               | 1/2" Ice | 0.00                                                 | 0.66          |
| 1 5/8<br>(T-Mobile - Existing) | A                 | No              | Inside Pole       | 100.00 - 3.00   | 8               | No Ice   | 0.00                                                 | 0.25          |
| 1 1/4<br>(Sprint - Existing)   | B                 | No              | Inside Pole       | 90.00 - 3.00    | 6               | 1/2" Ice | 0.00                                                 | 1.04          |
| 1 5/8<br>(MetroPCS - Existing) | C                 | No              | Inside Pole       | 83.00 - 3.00    | 6               | No Ice   | 0.00                                                 | 0.66          |
| 1 5/8<br>(Verizon - Proposed)  | B                 | No              | Inside Pole       | 120.00 - 3.00   | 6               | 1/2" Ice | 0.00                                                 | 1.04          |

### Feed Line/Linear Appurtenances Section Areas

|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 3 of 21           |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

| Tower Section | Tower Elevation<br>ft | Face | $A_R$<br>ft <sup>2</sup> | $A_F$<br>ft <sup>2</sup> | $C_A A_A$<br>In Face<br>ft <sup>2</sup> | $C_A A_A$<br>Out Face<br>ft <sup>2</sup> | Weight<br>K |
|---------------|-----------------------|------|--------------------------|--------------------------|-----------------------------------------|------------------------------------------|-------------|
| L1            | 140.00-115.36         | A    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.12        |
|               |                       | B    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.09        |
|               |                       | C    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.00        |
| L2            | 115.36-79.83          | A    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.44        |
|               |                       | B    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.71        |
|               |                       | C    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.27        |
| L3            | 79.83-40.26           | A    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.63        |
|               |                       | B    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.91        |
|               |                       | C    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.58        |
| L4            | 40.26-0.00            | A    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.59        |
|               |                       | B    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.85        |
|               |                       | C    | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.55        |

### Feed Line/Linear Appurtenances Section Areas - With Ice

| Tower Section | Tower Elevation<br>ft | Face or Leg | Ice Thickness<br>in | $A_R$<br>ft <sup>2</sup> | $A_F$<br>ft <sup>2</sup> | $C_A A_A$<br>In Face<br>ft <sup>2</sup> | $C_A A_A$<br>Out Face<br>ft <sup>2</sup> | Weight<br>K |
|---------------|-----------------------|-------------|---------------------|--------------------------|--------------------------|-----------------------------------------|------------------------------------------|-------------|
| L1            | 140.00-115.36         | A           | 0.500               | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.12        |
|               |                       | B           |                     | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.09        |
|               |                       | C           |                     | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.00        |
| L2            | 115.36-79.83          | A           | 0.500               | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.44        |
|               |                       | B           |                     | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.71        |
|               |                       | C           |                     | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.27        |
| L3            | 79.83-40.26           | A           | 0.500               | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.63        |
|               |                       | B           |                     | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.91        |
|               |                       | C           |                     | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.58        |
| L4            | 40.26-0.00            | A           | 0.500               | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.59        |
|               |                       | B           |                     | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.85        |
|               |                       | C           |                     | 0.000                    | 0.000                    | 0.000                                   | 0.000                                    | 0.55        |

### Feed Line Center of Pressure

| Section | Elevation<br>ft | $CP_x$<br>in | $CP_z$<br>in | $CP_x$<br>Ice<br>in | $CP_z$<br>Ice<br>in |
|---------|-----------------|--------------|--------------|---------------------|---------------------|
| L1      | 140.00-115.36   | 0.0000       | 0.0000       | 0.0000              | 0.0000              |
| L2      | 115.36-79.83    | 0.0000       | 0.0000       | 0.0000              | 0.0000              |
| L3      | 79.83-40.26     | 0.0000       | 0.0000       | 0.0000              | 0.0000              |
| L4      | 40.26-0.00      | 0.0000       | 0.0000       | 0.0000              | 0.0000              |

### Discrete Tower Loads



|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 4 of 21           |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

| Description                                       | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustment<br>° | Placement<br>ft |                    | C <sub>AA</sub><br>Front<br>ft <sup>2</sup> | C <sub>AA</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K          |
|---------------------------------------------------|-------------------|----------------|-------------------------------------------------------|----------------------------|-----------------|--------------------|---------------------------------------------|--------------------------------------------|----------------------|
| 4' Side Mount Standoff<br>(Town - Existing)       | C                 | From Face      | 2.00<br>0.00<br>0.00                                  | 0.0000                     | 138.00          | No Ice<br>1/2" Ice | 2.72<br>4.91                                | 2.72<br>4.91                               | 0.05<br>0.09         |
| 20' x 2" Dia Omni<br>(Town - Existing)            | C                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 148.00          | No Ice<br>1/2" Ice | 4.00<br>6.03                                | 4.00<br>6.03                               | 0.02<br>0.05         |
| 13' Platform w/rails<br>(AT&T - Existing)         | C                 | None           |                                                       | 0.0000                     | 128.00          | No Ice             | 31.30                                       | 31.30                                      | 1.82                 |
| (2) DUO1417-8686<br>(AT&T - Existing)             | A                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 40.20<br>6.53<br>6.94                       | 40.20<br>4.20<br>4.57                      | 2.45<br>0.02<br>0.06 |
| 800 10121<br>(AT&T - Existing)                    | A                 | From Face      | 4.00<br>-2.00<br>0.00                                 | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 5.46<br>5.88                                | 3.29<br>3.64                               | 0.05<br>0.08         |
| (2) CG 1900/800-DB-FB<br>TMA<br>(AT&T - Existing) | A                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 1.55<br>1.72                                | 0.81<br>0.94                               | 0.02<br>0.03         |
| Combiner<br>(AT&T - Existing)                     | A                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 0.68<br>0.80                                | 0.19<br>0.28                               | 0.00<br>0.00         |
| Smart Bias T<br>(AT&T - Existing)                 | A                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 0.16<br>0.21                                | 0.08<br>0.12                               | 0.00<br>0.00         |
| 782 10250<br>(AT&T - Existing)                    | A                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 0.52<br>0.63                                | 0.27<br>0.36                               | 0.01<br>0.01         |
| (2) DUO1417-8686<br>(AT&T - Existing)             | B                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 6.53<br>6.94                                | 4.20<br>4.57                               | 0.02<br>0.06         |
| 800 10121<br>(AT&T - Existing)                    | B                 | From Face      | 4.00<br>-2.00<br>0.00                                 | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 5.46<br>5.88                                | 3.29<br>3.64                               | 0.05<br>0.08         |
| (2) CG 1900/800-DB-FB<br>TMA<br>(AT&T - Existing) | B                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 1.55<br>1.72                                | 0.81<br>0.94                               | 0.02<br>0.03         |
| Combiner<br>(AT&T - Existing)                     | B                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 0.68<br>0.80                                | 0.19<br>0.28                               | 0.00<br>0.00         |
| Smart Bias T<br>(AT&T - Existing)                 | B                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 0.16<br>0.21                                | 0.08<br>0.12                               | 0.00<br>0.00         |
| 782 10250<br>(AT&T - Existing)                    | B                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 0.52<br>0.63                                | 0.27<br>0.36                               | 0.01<br>0.01         |
| (2) DUO1417-8686<br>(AT&T - Existing)             | C                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 6.53<br>6.94                                | 4.20<br>4.57                               | 0.02<br>0.06         |
| 800 10121<br>(AT&T - Existing)                    | C                 | From Face      | 4.00<br>-2.00<br>0.00                                 | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 5.46<br>5.88                                | 3.29<br>3.64                               | 0.05<br>0.08         |
| (2) CG 1900/800-DB-FB<br>TMA<br>(AT&T - Existing) | C                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 1.55<br>1.72                                | 0.81<br>0.94                               | 0.02<br>0.03         |
| Combiner<br>(AT&T - Existing)                     | C                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice | 0.68<br>0.80                                | 0.19<br>0.28                               | 0.00<br>0.00         |
| Smart Bias T                                      | C                 | From Face      | 4.00                                                  | 0.0000                     | 130.00          | No Ice             | 0.16                                        | 0.08                                       | 0.00                 |

|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 5 of 21           |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

| Description                                  | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustment<br>° | Placement<br>ft | C <sub>A</sub> A <sub>A</sub><br>Front<br>ft <sup>2</sup> | C <sub>A</sub> A <sub>A</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K  |
|----------------------------------------------|-------------------|----------------|-------------------------------------------------------|----------------------------|-----------------|-----------------------------------------------------------|----------------------------------------------------------|--------------|
| (AT&T - Existing)                            |                   |                | 0.00<br>0.00                                          |                            |                 | 1/2" Ice<br>0.21                                          | 0.12                                                     | 0.00         |
| 782 10250<br>(AT&T - Existing)               | C                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 130.00          | No Ice<br>1/2" Ice<br>0.52<br>0.63                        | 0.27<br>0.36                                             | 0.01<br>0.01 |
| 13' Platform w/rails<br>(Verizon - Existing) | C                 | None           |                                                       | 0.0000                     | 118.00          | No Ice<br>1/2" Ice<br>31.30<br>40.20                      | 31.30<br>40.20                                           | 1.82<br>2.45 |
| LPA-80080-4CF<br>(Verizon - Existing)        | A                 | From Face      | 4.00<br>-6.00<br>0.00                                 | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>2.62<br>2.92                        | 6.06<br>6.45                                             | 0.01<br>0.05 |
| LPA-171063-8CF<br>(Verizon - Proposed)       | A                 | From Face      | 4.00<br>-4.00<br>0.00                                 | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>3.69<br>4.06                        | 3.69<br>4.06                                             | 0.01<br>0.04 |
| BXA-70063/6CF<br>(Verizon - Proposed)        | A                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>7.73<br>8.27                        | 4.16<br>4.60                                             | 0.02<br>0.06 |
| LPA-171063-8CF<br>(Verizon - Proposed)       | A                 | From Face      | 4.00<br>4.00<br>0.00                                  | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>3.69<br>4.06                        | 3.69<br>4.06                                             | 0.01<br>0.04 |
| LPA-80080-4CF<br>(Verizon - Existing)        | A                 | From Face      | 4.00<br>6.00<br>0.00                                  | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>2.62<br>2.92                        | 6.06<br>6.45                                             | 0.01<br>0.05 |
| LPA-80080-4CF<br>(Verizon - Existing)        | B                 | From Face      | 4.00<br>-6.00<br>0.00                                 | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>2.62<br>2.92                        | 6.06<br>6.45                                             | 0.01<br>0.05 |
| LPA-171063-8CF<br>(Verizon - Proposed)       | B                 | From Face      | 4.00<br>-4.00<br>0.00                                 | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>3.69<br>4.06                        | 3.69<br>4.06                                             | 0.01<br>0.04 |
| BXA-70063/6CF<br>(Verizon - Proposed)        | B                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>7.73<br>8.27                        | 4.16<br>4.60                                             | 0.02<br>0.06 |
| LPA-171063-8CF<br>(Verizon - Proposed)       | B                 | From Face      | 4.00<br>4.00<br>0.00                                  | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>3.69<br>4.06                        | 3.69<br>4.06                                             | 0.01<br>0.04 |
| LPA-80080-4CF<br>(Verizon - Existing)        | B                 | From Face      | 4.00<br>6.00<br>0.00                                  | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>2.62<br>2.92                        | 6.06<br>6.45                                             | 0.01<br>0.05 |
| LPA-80063/4CF<br>(Verizon - Existing)        | C                 | From Face      | 4.00<br>-6.00<br>0.00                                 | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>7.00<br>7.41                        | 6.08<br>6.48                                             | 0.02<br>0.07 |
| LPA-171063-8CF<br>(Verizon - Proposed)       | C                 | From Face      | 4.00<br>-4.00<br>0.00                                 | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>3.69<br>4.06                        | 3.69<br>4.06                                             | 0.01<br>0.04 |
| BXA-70063/6CF<br>(Verizon - Proposed)        | C                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>7.73<br>8.27                        | 4.16<br>4.60                                             | 0.02<br>0.06 |
| LPA-171063-8CF<br>(Verizon - Proposed)       | C                 | From Face      | 4.00<br>4.00<br>0.00                                  | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>3.69<br>4.06                        | 3.69<br>4.06                                             | 0.01<br>0.04 |
| LPA-80063/4CF<br>(Verizon - Existing)        | C                 | From Face      | 4.00<br>6.00<br>0.00                                  | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>7.00<br>7.41                        | 6.08<br>6.48                                             | 0.02<br>0.07 |
| GPS<br>(Verizon - Existing)                  | C                 | From Face      | 2.00<br>0.00<br>0.00                                  | 0.0000                     | 120.00          | No Ice<br>1/2" Ice<br>1.00<br>1.50                        | 1.00<br>1.50                                             | 0.01<br>0.01 |
| 13' Platform w/rails<br>(Nextel - Existing)  | C                 | None           |                                                       | 0.0000                     | 110.00          | No Ice<br>1/2" Ice<br>31.30<br>40.20                      | 31.30<br>40.20                                           | 1.82<br>2.45 |



|                                                                                                                                                         |         |                                                      |                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|---------------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page<br>6 of 21           |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date<br>17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by<br>TJL        |

| Description                                         | Face<br>or<br>Leg | Offset<br>Type | Offsets:<br>Horz<br>Lateral<br>Vert<br>ft<br>ft<br>ft | Azimuth<br>Adjustment<br>° | Placement<br>ft |                    | C <sub>AA</sub><br>Front<br>ft <sup>2</sup> | C <sub>AA</sub><br>Side<br>ft <sup>2</sup> | Weight<br>K  |
|-----------------------------------------------------|-------------------|----------------|-------------------------------------------------------|----------------------------|-----------------|--------------------|---------------------------------------------|--------------------------------------------|--------------|
| LMU<br>(Nextel - Existing)                          | A                 | From Face      | 2.00<br>0.00<br>0.00                                  | 0.0000                     | 114.00          | No Ice<br>1/2" Ice | 1.00<br>1.50                                | 1.00<br>1.50                               | 0.01<br>0.01 |
| LMU<br>(Nextel - Existing)                          | B                 | From Face      | 2.00<br>0.00<br>0.00                                  | 0.0000                     | 114.00          | No Ice<br>1/2" Ice | 1.00<br>1.50                                | 1.00<br>1.50                               | 0.01<br>0.01 |
| (4) DB844H90E-XY<br>(Nextel - Existing)             | A                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 112.00          | No Ice<br>1/2" Ice | 2.87<br>3.18                                | 3.73<br>4.10                               | 0.01<br>0.04 |
| (4) DB844H90E-XY<br>(Nextel - Existing)             | B                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 112.00          | No Ice<br>1/2" Ice | 2.87<br>3.18                                | 3.73<br>4.10                               | 0.01<br>0.04 |
| (4) DB844H90E-XY<br>(Nextel - Existing)             | C                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 112.00          | No Ice<br>1/2" Ice | 2.87<br>3.18                                | 3.73<br>4.10                               | 0.01<br>0.04 |
| 14-ft Low Profile Platform<br>(T-Mobile - Existing) | C                 | None           |                                                       | 0.0000                     | 100.00          | No Ice<br>1/2" Ice | 16.50<br>20.00                              | 16.50<br>20.00                             | 1.55<br>1.80 |
| (2) RR90-17-02DP<br>(T-Mobile - Existing)           | A                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 100.00          | No Ice<br>1/2" Ice | 4.36<br>4.77                                | 1.97<br>2.31                               | 0.02<br>0.04 |
| (2) RR90-17-02DP<br>(T-Mobile - Existing)           | B                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 100.00          | No Ice<br>1/2" Ice | 4.36<br>4.77                                | 1.97<br>2.31                               | 0.02<br>0.04 |
| 14-ft Low Profile Platform<br>(Sprint - Existing)   | C                 | None           |                                                       | 0.0000                     | 90.00           | No Ice<br>1/2" Ice | 16.50<br>20.00                              | 16.50<br>20.00                             | 1.55<br>1.80 |
| (2) DB980F90T2E-M<br>(Sprint - Existing)            | A                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 91.00           | No Ice<br>1/2" Ice | 3.90<br>4.28                                | 2.29<br>2.65                               | 0.01<br>0.03 |
| (2) DB980F90T2E-M<br>(Sprint - Existing)            | B                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 91.00           | No Ice<br>1/2" Ice | 3.90<br>4.28                                | 2.29<br>2.65                               | 0.01<br>0.03 |
| (2) DB978F30T2E-M<br>(Sprint - Existing)            | C                 | From Face      | 4.00<br>0.00<br>0.00                                  | 0.0000                     | 91.50           | No Ice<br>1/2" Ice | 5.60<br>5.99                                | 3.06<br>3.39                               | 0.02<br>0.05 |
| Uni-Tri Bracket<br>(MetroPCS - Existing)            | C                 | None           |                                                       | 0.0000                     | 83.00           | No Ice<br>1/2" Ice | 1.75<br>1.94                                | 1.75<br>1.94                               | 0.00<br>0.00 |
| APXV18-206517S<br>(MetroPCS - Existing)             | A                 | From Face      | 1.50<br>0.00<br>0.00                                  | 0.0000                     | 83.00           | No Ice<br>1/2" Ice | 5.17<br>5.62                                | 3.04<br>3.47                               | 0.03<br>0.05 |
| APXV18-206517S<br>(MetroPCS - Existing)             | B                 | From Face      | 1.50<br>0.00<br>0.00                                  | 0.0000                     | 83.00           | No Ice<br>1/2" Ice | 5.17<br>5.62                                | 3.04<br>3.47                               | 0.03<br>0.05 |
| APXV18-206517S<br>(MetroPCS - Existing)             | C                 | From Face      | 1.50<br>0.00<br>0.00                                  | 0.0000                     | 83.00           | No Ice<br>1/2" Ice | 5.17<br>5.62                                | 3.04<br>3.47                               | 0.03<br>0.05 |

## Tower Pressures - No Ice

$$G_H = 1.690$$

|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 7 of 21           |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

| Section Elevation | z      | K <sub>Z</sub> | q <sub>z</sub> | A <sub>G</sub>  | F a c e | A <sub>F</sub>  | A <sub>R</sub>  | A <sub>leg</sub> | Leg %  | C <sub>A</sub> A <sub>A</sub> In Face | C <sub>A</sub> A <sub>A</sub> Out Face |
|-------------------|--------|----------------|----------------|-----------------|---------|-----------------|-----------------|------------------|--------|---------------------------------------|----------------------------------------|
| ft                | ft     |                | psf            | ft <sup>2</sup> |         | ft <sup>2</sup> | ft <sup>2</sup> | ft <sup>2</sup>  |        | ft <sup>2</sup>                       | ft <sup>2</sup>                        |
| L1 140.00-115.36  | 127.07 | 1.47           | 24             | 43.379          | A       | 0.000           | 43.379          | 43.379           | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | B       | 0.000           | 43.379          |                  | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | C       | 0.000           | 43.379          |                  | 100.00 | 0.000                                 | 0.000                                  |
| L2 115.36-79.83   | 96.90  | 1.36           | 22             | 83.739          | A       | 0.000           | 83.739          | 83.739           | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | B       | 0.000           | 83.739          |                  | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | C       | 0.000           | 83.739          |                  | 100.00 | 0.000                                 | 0.000                                  |
| L3 79.83-40.26    | 59.64  | 1.184          | 19             | 122.029         | A       | 0.000           | 122.029         | 122.029          | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | B       | 0.000           | 122.029         |                  | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | C       | 0.000           | 122.029         |                  | 100.00 | 0.000                                 | 0.000                                  |
| L4 40.26-0.00     | 19.40  | 1              | 16             | 154.412         | A       | 0.000           | 154.412         | 154.412          | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | B       | 0.000           | 154.412         |                  | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | C       | 0.000           | 154.412         |                  | 100.00 | 0.000                                 | 0.000                                  |

### Tower Pressure - With Ice

$$G_H = 1.690$$

| Section Elevation | z      | K <sub>Z</sub> | q <sub>z</sub> | t <sub>z</sub> | A <sub>G</sub>  | F a c e | A <sub>F</sub>  | A <sub>R</sub>  | A <sub>leg</sub> | Leg %  | C <sub>A</sub> A <sub>A</sub> In Face | C <sub>A</sub> A <sub>A</sub> Out Face |
|-------------------|--------|----------------|----------------|----------------|-----------------|---------|-----------------|-----------------|------------------|--------|---------------------------------------|----------------------------------------|
| ft                | ft     |                | psf            | in             | ft <sup>2</sup> |         | ft <sup>2</sup> | ft <sup>2</sup> | ft <sup>2</sup>  |        | ft <sup>2</sup>                       | ft <sup>2</sup>                        |
| L1 140.00-115.36  | 127.07 | 1.47           | 18             | 0.5000         | 45.432          | A       | 0.000           | 45.432          | 45.432           | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                |                 | B       | 0.000           | 45.432          |                  | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                |                 | C       | 0.000           | 45.432          |                  | 100.00 | 0.000                                 | 0.000                                  |
| L2 115.36-79.83   | 96.90  | 1.36           | 17             | 0.5000         | 86.699          | A       | 0.000           | 86.699          | 86.699           | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                |                 | B       | 0.000           | 86.699          |                  | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                |                 | C       | 0.000           | 86.699          |                  | 100.00 | 0.000                                 | 0.000                                  |
| L3 79.83-40.26    | 59.64  | 1.184          | 14             | 0.5000         | 125.326         | A       | 0.000           | 125.326         | 125.326          | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                |                 | B       | 0.000           | 125.326         |                  | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                |                 | C       | 0.000           | 125.326         |                  | 100.00 | 0.000                                 | 0.000                                  |
| L4 40.26-0.00     | 19.40  | 1              | 12             | 0.5000         | 157.767         | A       | 0.000           | 157.767         | 157.767          | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                |                 | B       | 0.000           | 157.767         |                  | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                |                 | C       | 0.000           | 157.767         |                  | 100.00 | 0.000                                 | 0.000                                  |

### Tower Pressure - Service

$$G_H = 1.690$$

| Section Elevation | z      | K <sub>Z</sub> | q <sub>z</sub> | A <sub>G</sub>  | F a c e | A <sub>F</sub>  | A <sub>R</sub>  | A <sub>leg</sub> | Leg %  | C <sub>A</sub> A <sub>A</sub> In Face | C <sub>A</sub> A <sub>A</sub> Out Face |
|-------------------|--------|----------------|----------------|-----------------|---------|-----------------|-----------------|------------------|--------|---------------------------------------|----------------------------------------|
| ft                | ft     |                | psf            | ft <sup>2</sup> |         | ft <sup>2</sup> | ft <sup>2</sup> | ft <sup>2</sup>  |        | ft <sup>2</sup>                       | ft <sup>2</sup>                        |
| L1 140.00-115.36  | 127.07 | 1.47           | 9              | 43.379          | A       | 0.000           | 43.379          | 43.379           | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | B       | 0.000           | 43.379          |                  | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | C       | 0.000           | 43.379          |                  | 100.00 | 0.000                                 | 0.000                                  |
| L2 115.36-79.83   | 96.90  | 1.36           | 9              | 83.739          | A       | 0.000           | 83.739          | 83.739           | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | B       | 0.000           | 83.739          |                  | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | C       | 0.000           | 83.739          |                  | 100.00 | 0.000                                 | 0.000                                  |
| L3 79.83-40.26    | 59.64  | 1.184          | 8              | 122.029         | A       | 0.000           | 122.029         | 122.029          | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | B       | 0.000           | 122.029         |                  | 100.00 | 0.000                                 | 0.000                                  |
|                   |        |                |                |                 | C       | 0.000           | 122.029         |                  | 100.00 | 0.000                                 | 0.000                                  |
| L4 40.26-0.00     | 19.40  | 1              | 6              | 154.412         | A       | 0.000           | 154.412         | 154.412          | 100.00 | 0.000                                 | 0.000                                  |

|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 8 of 21           |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

| Section Elevation | z  | K <sub>z</sub> | q <sub>z</sub> | A <sub>G</sub>  | F <sub>a c e</sub> | A <sub>F</sub>  | A <sub>R</sub>  | A <sub>leg</sub> | Leg %  | C <sub>A A</sub> In Face | C <sub>A A</sub> Out Face |
|-------------------|----|----------------|----------------|-----------------|--------------------|-----------------|-----------------|------------------|--------|--------------------------|---------------------------|
| ft                | ft |                | psf            | ft <sup>2</sup> |                    | ft <sup>2</sup> | ft <sup>2</sup> | ft <sup>2</sup>  |        | ft <sup>2</sup>          | ft <sup>2</sup>           |
|                   |    |                |                |                 | B                  | 0.000           | 154.412         |                  | 100.00 | 0.000                    | 0.000                     |
|                   |    |                |                |                 | C                  | 0.000           | 154.412         |                  | 100.00 | 0.000                    | 0.000                     |

### Tower Forces - No Ice - Wind Normal To Face

| Section Elevation | Add Weight | Self Weight | F <sub>a c e</sub> | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>  | F    | w     | Ctrl. Face |
|-------------------|------------|-------------|--------------------|---|----------------|----------------|----------------|----------------|-----------------|------|-------|------------|
| ft                | K          | K           |                    |   |                |                |                |                | ft <sup>2</sup> | K    | plf   |            |
| L1 140.00-115.36  | 0.21       | 1.04        | A                  | 1 | 0.65           | 1              | 1              | 1              | 43.379          | 1.15 | 46.58 | C          |
|                   |            |             | B                  | 1 | 0.65           | 1              | 1              | 1              | 43.379          |      |       |            |
|                   |            |             | C                  | 1 | 0.65           | 1              | 1              | 1              | 43.379          |      |       |            |
| L2 115.36-79.83   | 1.42       | 3.63        | A                  | 1 | 0.65           | 1              | 1              | 1              | 83.739          | 2.05 | 57.62 | C          |
|                   |            |             | B                  | 1 | 0.65           | 1              | 1              | 1              | 83.739          |      |       |            |
|                   |            |             | C                  | 1 | 0.65           | 1              | 1              | 1              | 83.739          |      |       |            |
| L3 79.83-40.26    | 2.12       | 7.51        | A                  | 1 | 0.65           | 1              | 1              | 1              | 122.029         | 2.59 | 65.39 | C          |
|                   |            |             | B                  | 1 | 0.65           | 1              | 1              | 1              | 122.029         |      |       |            |
|                   |            |             | C                  | 1 | 0.65           | 1              | 1              | 1              | 122.029         |      |       |            |
| L4 40.26-0.00     | 1.99       | 11.04       | A                  | 1 | 0.65           | 1              | 1              | 1              | 154.412         | 2.78 | 69.03 | C          |
|                   |            |             | B                  | 1 | 0.65           | 1              | 1              | 1              | 154.412         |      |       |            |
|                   |            |             | C                  | 1 | 0.65           | 1              | 1              | 1              | 154.412         |      |       |            |
| Sum Weight:       | 5.74       | 23.22       |                    |   |                |                |                | OTM            | 552.44 kip-ft   | 8.56 |       |            |

### Tower Forces - No Ice - Wind 45 To Face

| Section Elevation | Add Weight | Self Weight | F <sub>a c e</sub> | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>  | F    | w     | Ctrl. Face |
|-------------------|------------|-------------|--------------------|---|----------------|----------------|----------------|----------------|-----------------|------|-------|------------|
| ft                | K          | K           |                    |   |                |                |                |                | ft <sup>2</sup> | K    | plf   |            |
| L1 140.00-115.36  | 0.21       | 1.04        | A                  | 1 | 0.65           | 1              | 1              | 1              | 43.379          | 1.15 | 46.58 | C          |
|                   |            |             | B                  | 1 | 0.65           | 1              | 1              | 1              | 43.379          |      |       |            |
|                   |            |             | C                  | 1 | 0.65           | 1              | 1              | 1              | 43.379          |      |       |            |
| L2 115.36-79.83   | 1.42       | 3.63        | A                  | 1 | 0.65           | 1              | 1              | 1              | 83.739          | 2.05 | 57.62 | C          |
|                   |            |             | B                  | 1 | 0.65           | 1              | 1              | 1              | 83.739          |      |       |            |
|                   |            |             | C                  | 1 | 0.65           | 1              | 1              | 1              | 83.739          |      |       |            |
| L3 79.83-40.26    | 2.12       | 7.51        | A                  | 1 | 0.65           | 1              | 1              | 1              | 122.029         | 2.59 | 65.39 | C          |
|                   |            |             | B                  | 1 | 0.65           | 1              | 1              | 1              | 122.029         |      |       |            |
|                   |            |             | C                  | 1 | 0.65           | 1              | 1              | 1              | 122.029         |      |       |            |
| L4 40.26-0.00     | 1.99       | 11.04       | A                  | 1 | 0.65           | 1              | 1              | 1              | 154.412         | 2.78 | 69.03 | C          |
|                   |            |             | B                  | 1 | 0.65           | 1              | 1              | 1              | 154.412         |      |       |            |
|                   |            |             | C                  | 1 | 0.65           | 1              | 1              | 1              | 154.412         |      |       |            |
| Sum Weight:       | 5.74       | 23.22       |                    |   |                |                |                | OTM            | 552.44 kip-ft   | 8.56 |       |            |

### Tower Forces - No Ice - Wind 60 To Face



|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 9 of 21           |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

| Section<br>Elevation | Add<br>Weight | Self<br>Weight | F<br>a<br>c<br>e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>   | F    | w     | Ctrl.<br>Face |
|----------------------|---------------|----------------|------------------|---|----------------|----------------|----------------|----------------|------------------|------|-------|---------------|
| ft                   | K             | K              |                  |   |                |                |                |                | ft <sup>2</sup>  | K    | plf   |               |
| L1 140.00-<br>115.36 | 0.21          | 1.04           | A                | 1 | 0.65           | 1              | 1              | 1              | 43.379           | 1.15 | 46.58 | C             |
|                      |               |                | B                | 1 | 0.65           | 1              | 1              | 1              | 43.379           |      |       |               |
|                      |               |                | C                | 1 | 0.65           | 1              | 1              | 1              | 43.379           |      |       |               |
| L2 115.36-<br>79.83  | 1.42          | 3.63           | A                | 1 | 0.65           | 1              | 1              | 1              | 83.739           | 2.05 | 57.62 | C             |
|                      |               |                | B                | 1 | 0.65           | 1              | 1              | 1              | 83.739           |      |       |               |
|                      |               |                | C                | 1 | 0.65           | 1              | 1              | 1              | 83.739           |      |       |               |
| L3 79.83-<br>40.26   | 2.12          | 7.51           | A                | 1 | 0.65           | 1              | 1              | 1              | 122.029          | 2.59 | 65.39 | C             |
|                      |               |                | B                | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |               |
|                      |               |                | C                | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |               |
| L4 40.26-0.00        | 1.99          | 11.04          | A                | 1 | 0.65           | 1              | 1              | 1              | 154.412          | 2.78 | 69.03 | C             |
|                      |               |                | B                | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |               |
|                      |               |                | C                | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |               |
| Sum Weight:          | 5.74          | 23.22          |                  |   |                |                |                | OTM            | 552.44<br>kip-ft | 8.56 |       |               |

### Tower Forces - No Ice - Wind 90 To Face

| Section<br>Elevation | Add<br>Weight | Self<br>Weight | F<br>a<br>c<br>e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>   | F    | w     | Ctrl.<br>Face |
|----------------------|---------------|----------------|------------------|---|----------------|----------------|----------------|----------------|------------------|------|-------|---------------|
| ft                   | K             | K              |                  |   |                |                |                |                | ft <sup>2</sup>  | K    | plf   |               |
| L1 140.00-<br>115.36 | 0.21          | 1.04           | A                | 1 | 0.65           | 1              | 1              | 1              | 43.379           | 1.15 | 46.58 | C             |
|                      |               |                | B                | 1 | 0.65           | 1              | 1              | 1              | 43.379           |      |       |               |
|                      |               |                | C                | 1 | 0.65           | 1              | 1              | 1              | 43.379           |      |       |               |
| L2 115.36-<br>79.83  | 1.42          | 3.63           | A                | 1 | 0.65           | 1              | 1              | 1              | 83.739           | 2.05 | 57.62 | C             |
|                      |               |                | B                | 1 | 0.65           | 1              | 1              | 1              | 83.739           |      |       |               |
|                      |               |                | C                | 1 | 0.65           | 1              | 1              | 1              | 83.739           |      |       |               |
| L3 79.83-<br>40.26   | 2.12          | 7.51           | A                | 1 | 0.65           | 1              | 1              | 1              | 122.029          | 2.59 | 65.39 | C             |
|                      |               |                | B                | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |               |
|                      |               |                | C                | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |               |
| L4 40.26-0.00        | 1.99          | 11.04          | A                | 1 | 0.65           | 1              | 1              | 1              | 154.412          | 2.78 | 69.03 | C             |
|                      |               |                | B                | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |               |
|                      |               |                | C                | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |               |
| Sum Weight:          | 5.74          | 23.22          |                  |   |                |                |                | OTM            | 552.44<br>kip-ft | 8.56 |       |               |

### Tower Forces - With Ice - Wind Normal To Face

| Section<br>Elevation | Add<br>Weight | Self<br>Weight | F<br>a<br>c<br>e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>  | F    | w     | Ctrl.<br>Face |
|----------------------|---------------|----------------|------------------|---|----------------|----------------|----------------|----------------|-----------------|------|-------|---------------|
| ft                   | K             | K              |                  |   |                |                |                |                | ft <sup>2</sup> | K    | plf   |               |
| L1 140.00-<br>115.36 | 0.21          | 1.37           | A                | 1 | 0.65           | 1              | 1              | 1              | 45.432          | 0.90 | 36.58 | C             |
|                      |               |                | B                | 1 | 0.65           | 1              | 1              | 1              | 45.432          |      |       |               |
|                      |               |                | C                | 1 | 0.65           | 1              | 1              | 1              | 45.432          |      |       |               |
| L2 115.36-<br>79.83  | 1.42          | 4.26           | A                | 1 | 0.65           | 1              | 1              | 1              | 86.699          | 1.59 | 44.74 | C             |
|                      |               |                | B                | 1 | 0.65           | 1              | 1              | 1              | 86.699          |      |       |               |
|                      |               |                | C                | 1 | 0.65           | 1              | 1              | 1              | 86.699          |      |       |               |
| L3 79.83-<br>40.26   | 2.12          | 8.43           | A                | 1 | 0.65           | 1              | 1              | 1              | 125.326         | 1.99 | 50.37 | C             |
|                      |               |                | B                | 1 | 0.65           | 1              | 1              | 1              | 125.326         |      |       |               |
|                      |               |                | C                | 1 | 0.65           | 1              | 1              | 1              | 125.326         |      |       |               |

|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 10 of 21          |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

| Section Elevation | Add Weight | Self Weight | F a c e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>   | F    | w     | Ctrl. Face |
|-------------------|------------|-------------|---------|---|----------------|----------------|----------------|----------------|------------------|------|-------|------------|
| ft                | K          | K           |         |   |                |                |                |                | ft <sup>2</sup>  | K    | plf   |            |
| L4 40.26-0.00     | 1.99       | 12.19       | A       | 1 | 0.65           | 1              | 1              | 1              | 157.767          | 2.13 | 52.90 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 157.767          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 157.767          |      |       |            |
| Sum Weight:       | 5.74       | 26.25       |         |   |                |                |                | OTM            | 428.77<br>kip-ft | 6.61 |       |            |

### Tower Forces - With Ice - Wind 45 To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>   | F    | w     | Ctrl. Face |
|-------------------|------------|-------------|---------|---|----------------|----------------|----------------|----------------|------------------|------|-------|------------|
| ft                | K          | K           |         |   |                |                |                |                | ft <sup>2</sup>  | K    | plf   |            |
| L1 140.00-115.36  | 0.21       | 1.37        | A       | 1 | 0.65           | 1              | 1              | 1              | 45.432           | 0.90 | 36.58 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 45.432           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 45.432           |      |       |            |
| L2 115.36-79.83   | 1.42       | 4.26        | A       | 1 | 0.65           | 1              | 1              | 1              | 86.699           | 1.59 | 44.74 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 86.699           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 86.699           |      |       |            |
| L3 79.83-40.26    | 2.12       | 8.43        | A       | 1 | 0.65           | 1              | 1              | 1              | 125.326          | 1.99 | 50.37 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 125.326          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 125.326          |      |       |            |
| L4 40.26-0.00     | 1.99       | 12.19       | A       | 1 | 0.65           | 1              | 1              | 1              | 157.767          | 2.13 | 52.90 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 157.767          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 157.767          |      |       |            |
| Sum Weight:       | 5.74       | 26.25       |         |   |                |                |                | OTM            | 428.77<br>kip-ft | 6.61 |       |            |

### Tower Forces - With Ice - Wind 60 To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>   | F    | w     | Ctrl. Face |
|-------------------|------------|-------------|---------|---|----------------|----------------|----------------|----------------|------------------|------|-------|------------|
| ft                | K          | K           |         |   |                |                |                |                | ft <sup>2</sup>  | K    | plf   |            |
| L1 140.00-115.36  | 0.21       | 1.37        | A       | 1 | 0.65           | 1              | 1              | 1              | 45.432           | 0.90 | 36.58 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 45.432           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 45.432           |      |       |            |
| L2 115.36-79.83   | 1.42       | 4.26        | A       | 1 | 0.65           | 1              | 1              | 1              | 86.699           | 1.59 | 44.74 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 86.699           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 86.699           |      |       |            |
| L3 79.83-40.26    | 2.12       | 8.43        | A       | 1 | 0.65           | 1              | 1              | 1              | 125.326          | 1.99 | 50.37 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 125.326          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 125.326          |      |       |            |
| L4 40.26-0.00     | 1.99       | 12.19       | A       | 1 | 0.65           | 1              | 1              | 1              | 157.767          | 2.13 | 52.90 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 157.767          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 157.767          |      |       |            |
| Sum Weight:       | 5.74       | 26.25       |         |   |                |                |                | OTM            | 428.77<br>kip-ft | 6.61 |       |            |

|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 11 of 21          |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

### Tower Forces - With Ice - Wind 90 To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>   | F    | w     | Ctrl. Face |
|-------------------|------------|-------------|---------|---|----------------|----------------|----------------|----------------|------------------|------|-------|------------|
| ft                | K          | K           |         |   |                |                |                |                | ft <sup>2</sup>  | K    | plf   |            |
| L1 140.00-115.36  | 0.21       | 1.37        | A       | 1 | 0.65           | 1              | 1              | 1              | 45.432           | 0.90 | 36.58 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 45.432           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 45.432           |      |       |            |
| L2 115.36-79.83   | 1.42       | 4.26        | A       | 1 | 0.65           | 1              | 1              | 1              | 86.699           | 1.59 | 44.74 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 86.699           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 86.699           |      |       |            |
| L3 79.83-40.26    | 2.12       | 8.43        | A       | 1 | 0.65           | 1              | 1              | 1              | 125.326          | 1.99 | 50.37 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 125.326          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 125.326          |      |       |            |
| L4 40.26-0.00     | 1.99       | 12.19       | A       | 1 | 0.65           | 1              | 1              | 1              | 157.767          | 2.13 | 52.90 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 157.767          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 157.767          |      |       |            |
| Sum Weight:       | 5.74       | 26.25       |         |   |                |                |                | OTM            | 428.77<br>kip-ft | 6.61 |       |            |

### Tower Forces - Service - Wind Normal To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>   | F    | w     | Ctrl. Face |
|-------------------|------------|-------------|---------|---|----------------|----------------|----------------|----------------|------------------|------|-------|------------|
| ft                | K          | K           |         |   |                |                |                |                | ft <sup>2</sup>  | K    | plf   |            |
| L1 140.00-115.36  | 0.21       | 1.04        | A       | 1 | 0.65           | 1              | 1              | 1              | 43.379           | 0.45 | 18.19 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 43.379           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 43.379           |      |       |            |
| L2 115.36-79.83   | 1.42       | 3.63        | A       | 1 | 0.65           | 1              | 1              | 1              | 83.739           | 0.80 | 22.51 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 83.739           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 83.739           |      |       |            |
| L3 79.83-40.26    | 2.12       | 7.51        | A       | 1 | 0.65           | 1              | 1              | 1              | 122.029          | 1.01 | 25.54 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |            |
| L4 40.26-0.00     | 1.99       | 11.04       | A       | 1 | 0.65           | 1              | 1              | 1              | 154.412          | 1.09 | 26.96 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |            |
| Sum Weight:       | 5.74       | 23.22       |         |   |                |                |                | OTM            | 215.80<br>kip-ft | 3.34 |       |            |

### Tower Forces - Service - Wind 45 To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>  | F    | w     | Ctrl. Face |
|-------------------|------------|-------------|---------|---|----------------|----------------|----------------|----------------|-----------------|------|-------|------------|
| ft                | K          | K           |         |   |                |                |                |                | ft <sup>2</sup> | K    | plf   |            |
| L1 140.00-115.36  | 0.21       | 1.04        | A       | 1 | 0.65           | 1              | 1              | 1              | 43.379          | 0.45 | 18.19 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 43.379          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 43.379          |      |       |            |
| L2 115.36-79.83   | 1.42       | 3.63        | A       | 1 | 0.65           | 1              | 1              | 1              | 83.739          | 0.80 | 22.51 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 83.739          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 83.739          |      |       |            |



|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 12 of 21          |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

| Section Elevation | Add Weight | Self Weight | F a c e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>   | F    | w     | Ctrl. Face |
|-------------------|------------|-------------|---------|---|----------------|----------------|----------------|----------------|------------------|------|-------|------------|
| ft                | K          | K           |         |   |                |                |                |                | ft <sup>2</sup>  | K    | plf   |            |
| L3 79.83-40.26    | 2.12       | 7.51        | A       | 1 | 0.65           | 1              | 1              | 1              | 122.029          | 1.01 | 25.54 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |            |
| L4 40.26-0.00     | 1.99       | 11.04       | A       | 1 | 0.65           | 1              | 1              | 1              | 154.412          | 1.09 | 26.96 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |            |
| Sum Weight:       | 5.74       | 23.22       |         |   |                |                |                | OTM            | 215.80<br>kip-ft | 3.34 |       |            |

### Tower Forces - Service - Wind 60 To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>   | F    | w     | Ctrl. Face |
|-------------------|------------|-------------|---------|---|----------------|----------------|----------------|----------------|------------------|------|-------|------------|
| ft                | K          | K           |         |   |                |                |                |                | ft <sup>2</sup>  | K    | plf   |            |
| L1 140.00-115.36  | 0.21       | 1.04        | A       | 1 | 0.65           | 1              | 1              | 1              | 43.379           | 0.45 | 18.19 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 43.379           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 43.379           |      |       |            |
| L2 115.36-79.83   | 1.42       | 3.63        | A       | 1 | 0.65           | 1              | 1              | 1              | 83.739           | 0.80 | 22.51 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 83.739           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 83.739           |      |       |            |
| L3 79.83-40.26    | 2.12       | 7.51        | A       | 1 | 0.65           | 1              | 1              | 1              | 122.029          | 1.01 | 25.54 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |            |
| L4 40.26-0.00     | 1.99       | 11.04       | A       | 1 | 0.65           | 1              | 1              | 1              | 154.412          | 1.09 | 26.96 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |            |
| Sum Weight:       | 5.74       | 23.22       |         |   |                |                |                | OTM            | 215.80<br>kip-ft | 3.34 |       |            |

### Tower Forces - Service - Wind 90 To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C <sub>F</sub> | R <sub>R</sub> | D <sub>F</sub> | D <sub>R</sub> | A <sub>E</sub>   | F    | w     | Ctrl. Face |
|-------------------|------------|-------------|---------|---|----------------|----------------|----------------|----------------|------------------|------|-------|------------|
| ft                | K          | K           |         |   |                |                |                |                | ft <sup>2</sup>  | K    | plf   |            |
| L1 140.00-115.36  | 0.21       | 1.04        | A       | 1 | 0.65           | 1              | 1              | 1              | 43.379           | 0.45 | 18.19 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 43.379           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 43.379           |      |       |            |
| L2 115.36-79.83   | 1.42       | 3.63        | A       | 1 | 0.65           | 1              | 1              | 1              | 83.739           | 0.80 | 22.51 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 83.739           |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 83.739           |      |       |            |
| L3 79.83-40.26    | 2.12       | 7.51        | A       | 1 | 0.65           | 1              | 1              | 1              | 122.029          | 1.01 | 25.54 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 122.029          |      |       |            |
| L4 40.26-0.00     | 1.99       | 11.04       | A       | 1 | 0.65           | 1              | 1              | 1              | 154.412          | 1.09 | 26.96 | C          |
|                   |            |             | B       | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |            |
|                   |            |             | C       | 1 | 0.65           | 1              | 1              | 1              | 154.412          |      |       |            |
| Sum Weight:       | 5.74       | 23.22       |         |   |                |                |                | OTM            | 215.80<br>kip-ft | 3.34 |       |            |

|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 13 of 21          |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

### Force Totals

| Load Case                | Vertical Forces<br>K | Sum of Forces<br>X<br>K | Sum of Forces<br>Z<br>K | Sum of Overturning Moments, $M_x$<br>kip-ft | Sum of Overturning Moments, $M_z$<br>kip-ft | Sum of Torques<br>kip-ft |
|--------------------------|----------------------|-------------------------|-------------------------|---------------------------------------------|---------------------------------------------|--------------------------|
| Leg Weight               | 23.22                |                         |                         |                                             |                                             |                          |
| Bracing Weight           | 0.00                 |                         |                         |                                             |                                             |                          |
| Total Member Self-Weight | 23.22                |                         |                         | 0.25                                        | 0.00                                        |                          |
| Total Weight             | 38.61                |                         |                         | 0.25                                        | 0.00                                        |                          |
| Wind 0 deg - No Ice      |                      | 0.00                    | -22.47                  | -2152.43                                    | 0.00                                        | 0.00                     |
| Wind 30 deg - No Ice     |                      | 11.12                   | -19.46                  | -1864.03                                    | -1061.24                                    | 0.33                     |
| Wind 45 deg - No Ice     |                      | 15.72                   | -15.89                  | -1521.93                                    | -1500.82                                    | 0.47                     |
| Wind 60 deg - No Ice     |                      | 19.25                   | -11.23                  | -1076.09                                    | -1838.12                                    | 0.57                     |
| Wind 90 deg - No Ice     |                      | 22.23                   | 0.00                    | 0.25                                        | -2122.47                                    | 0.66                     |
| Wind 120 deg - No Ice    |                      | 19.25                   | 11.23                   | 1076.59                                     | -1838.12                                    | 0.57                     |
| Wind 135 deg - No Ice    |                      | 15.72                   | 15.89                   | 1522.42                                     | -1500.82                                    | 0.47                     |
| Wind 150 deg - No Ice    |                      | 11.12                   | 19.46                   | 1864.52                                     | -1061.24                                    | 0.33                     |
| Wind 180 deg - No Ice    |                      | 0.00                    | 22.47                   | 2152.93                                     | 0.00                                        | 0.00                     |
| Wind 210 deg - No Ice    |                      | -11.12                  | 19.46                   | 1864.52                                     | 1061.24                                     | -0.33                    |
| Wind 225 deg - No Ice    |                      | -15.72                  | 15.89                   | 1522.42                                     | 1500.82                                     | -0.47                    |
| Wind 240 deg - No Ice    |                      | -19.25                  | 11.23                   | 1076.59                                     | 1838.12                                     | -0.57                    |
| Wind 270 deg - No Ice    |                      | -22.23                  | 0.00                    | 0.25                                        | 2122.47                                     | -0.66                    |
| Wind 300 deg - No Ice    |                      | -19.25                  | -11.23                  | -1076.09                                    | 1838.12                                     | -0.57                    |
| Wind 315 deg - No Ice    |                      | -15.72                  | -15.89                  | -1521.93                                    | 1500.82                                     | -0.47                    |
| Wind 330 deg - No Ice    |                      | -11.12                  | -19.46                  | -1864.03                                    | 1061.24                                     | -0.33                    |
| Member Ice               | 3.03                 |                         |                         |                                             |                                             |                          |
| Total Weight Ice         | 45.73                |                         |                         | 0.59                                        | 0.00                                        |                          |
| Wind 0 deg - Ice         |                      | 0.00                    | -18.82                  | -1834.76                                    | 0.00                                        | 0.00                     |
| Wind 30 deg - Ice        |                      | 9.32                    | -16.30                  | -1588.87                                    | -906.08                                     | 0.44                     |
| Wind 45 deg - Ice        |                      | 13.18                   | -13.31                  | -1297.20                                    | -1281.39                                    | 0.62                     |
| Wind 60 deg - Ice        |                      | 16.14                   | -9.41                   | -917.08                                     | -1569.38                                    | 0.76                     |
| Wind 90 deg - Ice        |                      | 18.64                   | 0.00                    | 0.59                                        | -1812.16                                    | 0.88                     |
| Wind 120 deg - Ice       |                      | 16.14                   | 9.41                    | 918.27                                      | -1569.38                                    | 0.76                     |
| Wind 135 deg - Ice       |                      | 13.18                   | 13.31                   | 1298.39                                     | -1281.39                                    | 0.62                     |
| Wind 150 deg - Ice       |                      | 9.32                    | 16.30                   | 1590.06                                     | -906.08                                     | 0.44                     |
| Wind 180 deg - Ice       |                      | 0.00                    | 18.82                   | 1835.95                                     | 0.00                                        | 0.00                     |
| Wind 210 deg - Ice       |                      | -9.32                   | 16.30                   | 1590.06                                     | 906.08                                      | -0.44                    |
| Wind 225 deg - Ice       |                      | -13.18                  | 13.31                   | 1298.39                                     | 1281.39                                     | -0.62                    |
| Wind 240 deg - Ice       |                      | -16.14                  | 9.41                    | 918.27                                      | 1569.38                                     | -0.76                    |
| Wind 270 deg - Ice       |                      | -18.64                  | 0.00                    | 0.59                                        | 1812.16                                     | -0.88                    |
| Wind 300 deg - Ice       |                      | -16.14                  | -9.41                   | -917.08                                     | 1569.38                                     | -0.76                    |
| Wind 315 deg - Ice       |                      | -13.18                  | -13.31                  | -1297.20                                    | 1281.39                                     | -0.62                    |
| Wind 330 deg - Ice       |                      | -9.32                   | -16.30                  | -1588.87                                    | 906.08                                      | -0.44                    |
| Total Weight             | 38.61                |                         |                         | 0.25                                        | 0.00                                        |                          |
| Wind 0 deg - Service     |                      | 0.00                    | -8.78                   | -840.64                                     | 0.00                                        | 0.00                     |
| Wind 30 deg - Service    |                      | 4.34                    | -7.60                   | -727.99                                     | -414.55                                     | 0.13                     |
| Wind 45 deg - Service    |                      | 6.14                    | -6.21                   | -594.35                                     | -586.26                                     | 0.18                     |
| Wind 60 deg - Service    |                      | 7.52                    | -4.39                   | -420.20                                     | -718.01                                     | 0.22                     |
| Wind 90 deg - Service    |                      | 8.68                    | 0.00                    | 0.25                                        | -829.09                                     | 0.26                     |
| Wind 120 deg - Service   |                      | 7.52                    | 4.39                    | 420.69                                      | -718.01                                     | 0.22                     |
| Wind 135 deg - Service   |                      | 6.14                    | 6.21                    | 594.85                                      | -586.26                                     | 0.18                     |
| Wind 150 deg - Service   |                      | 4.34                    | 7.60                    | 728.48                                      | -414.55                                     | 0.13                     |
| Wind 180 deg - Service   |                      | 0.00                    | 8.78                    | 841.14                                      | 0.00                                        | 0.00                     |
| Wind 210 deg - Service   |                      | -4.34                   | 7.60                    | 728.48                                      | 414.55                                      | -0.13                    |
| Wind 225 deg - Service   |                      | -6.14                   | 6.21                    | 594.85                                      | 586.26                                      | -0.18                    |
| Wind 240 deg - Service   |                      | -7.52                   | 4.39                    | 420.69                                      | 718.01                                      | -0.22                    |
| Wind 270 deg - Service   |                      | -8.68                   | 0.00                    | 0.25                                        | 829.09                                      | -0.26                    |
| Wind 300 deg - Service   |                      | -7.52                   | -4.39                   | -420.20                                     | 718.01                                      | -0.22                    |
| Wind 315 deg - Service   |                      | -6.14                   | -6.21                   | -594.35                                     | 586.26                                      | -0.18                    |

|                                                                                                                                                         |         |                                                      |                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|---------------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page<br>14 of 21          |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date<br>17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by<br>TJL        |

| Load Case              | Vertical Forces<br>K | Sum of Forces<br>X<br>K | Sum of Forces<br>Z<br>K | Sum of Overturning Moments, $M_x$<br>kip-ft | Sum of Overturning Moments, $M_z$<br>kip-ft | Sum of Torques<br>kip-ft |
|------------------------|----------------------|-------------------------|-------------------------|---------------------------------------------|---------------------------------------------|--------------------------|
| Wind 330 deg - Service |                      | -4.34                   | -7.60                   | -727.99                                     | 414.55                                      | -0.13                    |

## 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  |
| 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 |



|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 15 of 21          |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

| Comb. No. | Description                 |
|-----------|-----------------------------|
| 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          | 140 - 115.36   | Pole           | Max Tension      | 1               | 0.00    | 0.00                     | 0.00                     |
|             |                |                | Max. Compression | 18              | -5.56   | 0.00                     | -0.81                    |
|             |                |                | Max. Mx          | 6               | -3.15   | -58.41                   | -0.30                    |
|             |                |                | Max. My          | 10              | -3.12   | 0.00                     | -59.20                   |
|             |                |                | Max. Vy          | 6               | 7.66    | -58.41                   | -0.30                    |
|             |                |                | Max. Vx          | 10              | 8.01    | 0.00                     | -59.20                   |
|             |                |                | Max. Torque      | 23              |         |                          | -1.51                    |
| L2          | 115.36 - 79.83 | Pole           | Max Tension      | 1               | 0.00    | 0.00                     | 0.00                     |
|             |                |                | Max. Compression | 18              | -20.07  | 0.00                     | -0.60                    |
|             |                |                | Max. Mx          | 14              | -14.53  | 509.69                   | -0.24                    |
|             |                |                | Max. My          | 10              | -14.51  | 0.00                     | -520.38                  |
|             |                |                | Max. Vy          | 14              | -16.67  | 509.69                   | -0.24                    |
|             |                |                | Max. Vx          | 10              | 16.91   | 0.00                     | -520.38                  |
|             |                |                | Max. Torque      | 31              |         |                          | 1.68                     |
| L3          | 79.83 - 40.26  | Pole           | Max Tension      | 1               | 0.00    | 0.00                     | 0.00                     |
|             |                |                | Max. Compression | 18              | -30.11  | 0.00                     | -0.60                    |
|             |                |                | Max. Mx          | 6               | -23.89  | -1223.83                 | -0.25                    |
|             |                |                | Max. My          | 10              | -23.88  | 0.00                     | -1244.11                 |
|             |                |                | Max. Vy          | 6               | 19.58   | -1223.83                 | -0.25                    |
|             |                |                | Max. Vx          | 10              | 19.82   | 0.00                     | -1244.11                 |
|             |                |                | Max. Torque      | 23              |         |                          | -0.90                    |
| L4          | 40.26 - 0      | Pole           | Max Tension      | 1               | 0.00    | 0.00                     | 0.00                     |
|             |                |                | Max. Compression | 18              | -45.73  | 0.00                     | -0.60                    |
|             |                |                | Max. Mx          | 6               | -38.60  | -2176.14                 | -0.26                    |
|             |                |                | Max. My          | 10              | -38.60  | 0.00                     | -2207.44                 |
|             |                |                | Max. Vy          | 6               | 22.25   | -2176.14                 | -0.26                    |
|             |                |                | Max. Vx          | 10              | 22.49   | 0.00                     | -2207.44                 |
|             |                |                | Max. Torque      | 23              |         |                          | -0.90                    |

### Maximum Reactions

| Location | Condition           | Gov. Load Comb. | Vertical K | Horizontal, X K | Horizontal, Z K |
|----------|---------------------|-----------------|------------|-----------------|-----------------|
| Pole     | Max. Vert           | 27              | 45.73      | 0.00            | -18.82          |
|          | Max. H <sub>x</sub> | 14              | 38.61      | 22.23           | -0.00           |
|          | Max. H <sub>z</sub> | 2               | 38.61      | 0.00            | 22.47           |
|          | Max. M <sub>x</sub> | 2               | 2206.92    | 0.00            | 22.47           |
|          | Max. M <sub>z</sub> | 6               | 2176.14    | -22.23          | -0.00           |
|          | Max. Torsion        | 31              | 0.90       | 18.64           | 0.00            |
|          | Min. Vert           | 1               | 38.61      | 0.00            | 0.00            |
|          | Min. H <sub>x</sub> | 6               | 38.61      | -22.23          | -0.00           |
|          | Min. H <sub>z</sub> | 10              | 38.61      | 0.00            | -22.47          |
|          | Min. M <sub>x</sub> | 10              | -2207.44   | 0.00            | -22.47          |
|          | Min. M <sub>z</sub> | 14              | -2176.14   | 22.23           | -0.00           |
|          | Min. Torsion        | 23              | -0.90      | -18.64          | 0.00            |

|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 16 of 21          |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

## Tower Mast Reaction Summary

| Load<br>Combination         | Vertical<br>K | Shear <sub>y</sub><br>K | Shear <sub>z</sub><br>K | Overturning<br>Moment, M <sub>x</sub><br>kip-ft | Overturning<br>Moment, M <sub>z</sub><br>kip-ft | Torque<br>kip-ft |
|-----------------------------|---------------|-------------------------|-------------------------|-------------------------------------------------|-------------------------------------------------|------------------|
| Dead Only                   | 38.61         | 0.00                    | 0.00                    | 0.25                                            | 0.00                                            | 0.00             |
| Dead+Wind 0 deg - No Ice    | 38.61         | 0.00                    | -22.47                  | -2206.92                                        | 0.00                                            | 0.00             |
| Dead+Wind 30 deg - No Ice   | 38.61         | 11.12                   | -19.46                  | -1911.22                                        | -1088.06                                        | 0.33             |
| Dead+Wind 45 deg - No Ice   | 38.61         | 15.72                   | -15.89                  | -1560.47                                        | -1538.75                                        | 0.47             |
| Dead+Wind 60 deg - No Ice   | 38.61         | 19.25                   | -11.23                  | -1103.35                                        | -1884.58                                        | 0.58             |
| Dead+Wind 90 deg - No Ice   | 38.61         | 22.23                   | 0.00                    | 0.26                                            | -2176.14                                        | 0.66             |
| Dead+Wind 120 deg - No Ice  | 38.61         | 19.25                   | 11.23                   | 1103.86                                         | -1884.59                                        | 0.58             |
| Dead+Wind 135 deg - No Ice  | 38.61         | 15.72                   | 15.89                   | 1560.98                                         | -1538.75                                        | 0.47             |
| Dead+Wind 150 deg - No Ice  | 38.61         | 11.12                   | 19.46                   | 1911.74                                         | -1088.06                                        | 0.33             |
| Dead+Wind 180 deg - No Ice  | 38.61         | 0.00                    | 22.47                   | 2207.44                                         | 0.00                                            | 0.00             |
| Dead+Wind 210 deg - No Ice  | 38.61         | -11.12                  | 19.46                   | 1911.74                                         | 1088.06                                         | -0.33            |
| Dead+Wind 225 deg - No Ice  | 38.61         | -15.72                  | 15.89                   | 1560.98                                         | 1538.75                                         | -0.47            |
| Dead+Wind 240 deg - No Ice  | 38.61         | -19.25                  | 11.23                   | 1103.86                                         | 1884.59                                         | -0.58            |
| Dead+Wind 270 deg - No Ice  | 38.61         | -22.23                  | 0.00                    | 0.26                                            | 2176.14                                         | -0.66            |
| Dead+Wind 300 deg - No Ice  | 38.61         | -19.25                  | -11.23                  | -1103.35                                        | 1884.58                                         | -0.58            |
| Dead+Wind 315 deg - No Ice  | 38.61         | -15.72                  | -15.89                  | -1560.47                                        | 1538.75                                         | -0.47            |
| Dead+Wind 330 deg - No Ice  | 38.61         | -11.12                  | -19.46                  | -1911.22                                        | 1088.06                                         | -0.33            |
| Dead+Ice+Temp               | 45.73         | 0.00                    | 0.00                    | 0.60                                            | 0.00                                            | 0.00             |
| Dead+Wind 0 deg+Ice+Temp    | 45.73         | 0.00                    | -18.82                  | -1896.71                                        | 0.00                                            | 0.00             |
| Dead+Wind 30 deg+Ice+Temp   | 45.73         | 9.32                    | -16.30                  | -1642.52                                        | -936.63                                         | 0.45             |
| Dead+Wind 45 deg+Ice+Temp   | 45.73         | 13.18                   | -13.31                  | -1341.00                                        | -1324.60                                        | 0.64             |
| Dead+Wind 60 deg+Ice+Temp   | 45.73         | 16.14                   | -9.41                   | -948.05                                         | -1622.31                                        | 0.78             |
| Dead+Wind 90 deg+Ice+Temp   | 45.73         | 18.64                   | 0.00                    | 0.63                                            | -1873.29                                        | 0.90             |
| Dead+Wind 120 deg+Ice+Temp  | 45.73         | 16.14                   | 9.41                    | 949.31                                          | -1622.31                                        | 0.78             |
| Dead+Wind 135 deg+Ice+Temp  | 45.73         | 13.18                   | 13.31                   | 1342.27                                         | -1324.61                                        | 0.64             |
| Dead+Wind 150 deg+Ice+Temp  | 45.73         | 9.32                    | 16.30                   | 1643.79                                         | -936.64                                         | 0.45             |
| Dead+Wind 180 deg+Ice+Temp  | 45.73         | 0.00                    | 18.82                   | 1897.98                                         | 0.00                                            | 0.00             |
| Dead+Wind 210 deg+Ice+Temp  | 45.73         | -9.32                   | 16.30                   | 1643.79                                         | 936.64                                          | -0.45            |
| Dead+Wind 225 deg+Ice+Temp  | 45.73         | -13.18                  | 13.31                   | 1342.27                                         | 1324.61                                         | -0.64            |
| Dead+Wind 240 deg+Ice+Temp  | 45.73         | -16.14                  | 9.41                    | 949.31                                          | 1622.31                                         | -0.78            |
| Dead+Wind 270 deg+Ice+Temp  | 45.73         | -18.64                  | 0.00                    | 0.63                                            | 1873.29                                         | -0.90            |
| Dead+Wind 300 deg+Ice+Temp  | 45.73         | -16.14                  | -9.41                   | -948.05                                         | 1622.31                                         | -0.78            |
| Dead+Wind 315 deg+Ice+Temp  | 45.73         | -13.18                  | -13.31                  | -1341.00                                        | 1324.60                                         | -0.64            |
| Dead+Wind 330 deg+Ice+Temp  | 45.73         | -9.32                   | -16.30                  | -1642.52                                        | 936.63                                          | -0.45            |
| Dead+Wind 0 deg - Service   | 38.61         | 0.00                    | -8.78                   | -862.28                                         | 0.00                                            | 0.00             |
| Dead+Wind 30 deg - Service  | 38.61         | 4.34                    | -7.60                   | -746.72                                         | -425.20                                         | 0.13             |
| Dead+Wind 45 deg - Service  | 38.61         | 6.14                    | -6.21                   | -609.65                                         | -601.32                                         | 0.18             |
| Dead+Wind 60 deg - Service  | 38.61         | 7.52                    | -4.39                   | -431.01                                         | -736.47                                         | 0.23             |
| Dead+Wind 90 deg - Service  | 38.61         | 8.68                    | 0.00                    | 0.26                                            | -850.40                                         | 0.26             |
| Dead+Wind 120 deg - Service | 38.61         | 7.52                    | 4.39                    | 431.53                                          | -736.47                                         | 0.23             |
| Dead+Wind 135 deg - Service | 38.61         | 6.14                    | 6.21                    | 610.17                                          | -601.32                                         | 0.18             |
| Dead+Wind 150 deg - Service | 38.61         | 4.34                    | 7.60                    | 747.24                                          | -425.20                                         | 0.13             |
| Dead+Wind 180 deg - Service | 38.61         | 0.00                    | 8.78                    | 862.80                                          | 0.00                                            | 0.00             |
| Dead+Wind 210 deg - Service | 38.61         | -4.34                   | 7.60                    | 747.24                                          | 425.20                                          | -0.13            |
| Dead+Wind 225 deg - Service | 38.61         | -6.14                   | 6.21                    | 610.17                                          | 601.32                                          | -0.18            |
| Dead+Wind 240 deg - Service | 38.61         | -7.52                   | 4.39                    | 431.53                                          | 736.47                                          | -0.23            |
| Dead+Wind 270 deg - Service | 38.61         | -8.68                   | 0.00                    | 0.26                                            | 850.40                                          | -0.26            |
| Dead+Wind 300 deg - Service | 38.61         | -7.52                   | -4.39                   | -431.01                                         | 736.47                                          | -0.23            |
| Dead+Wind 315 deg - Service | 38.61         | -6.14                   | -6.21                   | -609.65                                         | 601.32                                          | -0.18            |
| Dead+Wind 330 deg - Service | 38.61         | -4.34                   | -7.60                   | -746.72                                         | 425.20                                          | -0.13            |

## Solution Summary

|                                                                                                                                                         |                                                                 |                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job                                                             | Page                      |
|                                                                                                                                                         | 11074.CO28 - Canton                                             | 17 of 21                  |
|                                                                                                                                                         | Project<br>140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date<br>17:17:10 09/29/11 |
|                                                                                                                                                         | Client<br>Verizon Wireless                                      | Designed by<br>TJL        |

| Load<br>Comb. | Sum of Applied Forces |         |         | Sum of Reactions |         |         | % Error |
|---------------|-----------------------|---------|---------|------------------|---------|---------|---------|
|               | PX<br>K               | PY<br>K | PZ<br>K | PX<br>K          | PY<br>K | PZ<br>K |         |
| 1             | 0.00                  | -38.61  | 0.00    | 0.00             | 38.61   | 0.00    | 0.000%  |
| 2             | 0.00                  | -38.61  | -22.47  | 0.00             | 38.61   | 22.47   | 0.000%  |
| 3             | 11.12                 | -38.61  | -19.46  | -11.12           | 38.61   | 19.46   | 0.000%  |
| 4             | 15.72                 | -38.61  | -15.89  | -15.72           | 38.61   | 15.89   | 0.000%  |
| 5             | 19.25                 | -38.61  | -11.23  | -19.25           | 38.61   | 11.23   | 0.000%  |
| 6             | 22.23                 | -38.61  | 0.00    | -22.23           | 38.61   | -0.00   | 0.000%  |
| 7             | 19.25                 | -38.61  | 11.23   | -19.25           | 38.61   | -11.23  | 0.000%  |
| 8             | 15.72                 | -38.61  | 15.89   | -15.72           | 38.61   | -15.89  | 0.000%  |
| 9             | 11.12                 | -38.61  | 19.46   | -11.12           | 38.61   | -19.46  | 0.000%  |
| 10            | 0.00                  | -38.61  | 22.47   | 0.00             | 38.61   | -22.47  | 0.000%  |
| 11            | -11.12                | -38.61  | 19.46   | 11.12            | 38.61   | -19.46  | 0.000%  |
| 12            | -15.72                | -38.61  | 15.89   | 15.72            | 38.61   | -15.89  | 0.000%  |
| 13            | -19.25                | -38.61  | 11.23   | 19.25            | 38.61   | -11.23  | 0.000%  |
| 14            | -22.23                | -38.61  | 0.00    | 22.23            | 38.61   | -0.00   | 0.000%  |
| 15            | -19.25                | -38.61  | -11.23  | 19.25            | 38.61   | 11.23   | 0.000%  |
| 16            | -15.72                | -38.61  | -15.89  | 15.72            | 38.61   | 15.89   | 0.000%  |
| 17            | -11.12                | -38.61  | -19.46  | 11.12            | 38.61   | 19.46   | 0.000%  |
| 18            | 0.00                  | -45.73  | 0.00    | 0.00             | 45.73   | 0.00    | 0.000%  |
| 19            | 0.00                  | -45.73  | -18.82  | 0.00             | 45.73   | 18.82   | 0.000%  |
| 20            | 9.32                  | -45.73  | -16.30  | -9.32            | 45.73   | 16.30   | 0.000%  |
| 21            | 13.18                 | -45.73  | -13.31  | -13.18           | 45.73   | 13.31   | 0.000%  |
| 22            | 16.14                 | -45.73  | -9.41   | -16.14           | 45.73   | 9.41    | 0.000%  |
| 23            | 18.64                 | -45.73  | 0.00    | -18.64           | 45.73   | 0.00    | 0.000%  |
| 24            | 16.14                 | -45.73  | 9.41    | -16.14           | 45.73   | -9.41   | 0.000%  |
| 25            | 13.18                 | -45.73  | 13.31   | -13.18           | 45.73   | -13.31  | 0.000%  |
| 26            | 9.32                  | -45.73  | 16.30   | -9.32            | 45.73   | -16.30  | 0.000%  |
| 27            | 0.00                  | -45.73  | 18.82   | 0.00             | 45.73   | -18.82  | 0.000%  |
| 28            | -9.32                 | -45.73  | 16.30   | 9.32             | 45.73   | -16.30  | 0.000%  |
| 29            | -13.18                | -45.73  | 13.31   | 13.18            | 45.73   | -13.31  | 0.000%  |
| 30            | -16.14                | -45.73  | 9.41    | 16.14            | 45.73   | -9.41   | 0.000%  |
| 31            | -18.64                | -45.73  | 0.00    | 18.64            | 45.73   | 0.00    | 0.000%  |
| 32            | -16.14                | -45.73  | -9.41   | 16.14            | 45.73   | 9.41    | 0.000%  |
| 33            | -13.18                | -45.73  | -13.31  | 13.18            | 45.73   | 13.31   | 0.000%  |
| 34            | -9.32                 | -45.73  | -16.30  | 9.32             | 45.73   | 16.30   | 0.000%  |
| 35            | 0.00                  | -38.61  | -8.78   | 0.00             | 38.61   | 8.78    | 0.000%  |
| 36            | 4.34                  | -38.61  | -7.60   | -4.34            | 38.61   | 7.60    | 0.000%  |
| 37            | 6.14                  | -38.61  | -6.21   | -6.14            | 38.61   | 6.21    | 0.000%  |
| 38            | 7.52                  | -38.61  | -4.39   | -7.52            | 38.61   | 4.39    | 0.000%  |
| 39            | 8.68                  | -38.61  | 0.00    | -8.68            | 38.61   | 0.00    | 0.000%  |
| 40            | 7.52                  | -38.61  | 4.39    | -7.52            | 38.61   | -4.39   | 0.000%  |
| 41            | 6.14                  | -38.61  | 6.21    | -6.14            | 38.61   | -6.21   | 0.000%  |
| 42            | 4.34                  | -38.61  | 7.60    | -4.34            | 38.61   | -7.60   | 0.000%  |
| 43            | 0.00                  | -38.61  | 8.78    | 0.00             | 38.61   | -8.78   | 0.000%  |
| 44            | -4.34                 | -38.61  | 7.60    | 4.34             | 38.61   | -7.60   | 0.000%  |
| 45            | -6.14                 | -38.61  | 6.21    | 6.14             | 38.61   | -6.21   | 0.000%  |
| 46            | -7.52                 | -38.61  | 4.39    | 7.52             | 38.61   | -4.39   | 0.000%  |
| 47            | -8.68                 | -38.61  | 0.00    | 8.68             | 38.61   | 0.00    | 0.000%  |
| 48            | -7.52                 | -38.61  | -4.39   | 7.52             | 38.61   | 4.39    | 0.000%  |
| 49            | -6.14                 | -38.61  | -6.21   | 6.14             | 38.61   | 6.21    | 0.000%  |
| 50            | -4.34                 | -38.61  | -7.60   | 4.34             | 38.61   | 7.60    | 0.000%  |

## Non-Linear Convergence Results

| Load<br>Combination | Converged? | Number<br>of Cycles | Displacement<br>Tolerance | Force<br>Tolerance |
|---------------------|------------|---------------------|---------------------------|--------------------|
| 1                   | Yes        | 4                   | 0.00000001                | 0.00000001         |



|                                                                                                                                                                       |         |                                                      |                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|---------------------------|
| <b><i>RISATower</i></b><br><br><b><i>Centek Engineering Inc.</i></b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page<br>18 of 21          |
|                                                                                                                                                                       | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date<br>17:17:10 09/29/11 |
|                                                                                                                                                                       | Client  | Verizon Wireless                                     | Designed by<br>TJL        |

|    |     |   |            |            |
|----|-----|---|------------|------------|
| 2  | Yes | 4 | 0.00000001 | 0.00003745 |
| 3  | Yes | 5 | 0.00000001 | 0.00009013 |
| 4  | Yes | 5 | 0.00000001 | 0.00009927 |
| 5  | Yes | 5 | 0.00000001 | 0.00008389 |
| 6  | Yes | 4 | 0.00000001 | 0.00031487 |
| 7  | Yes | 5 | 0.00000001 | 0.00009139 |
| 8  | Yes | 5 | 0.00000001 | 0.00009919 |
| 9  | Yes | 5 | 0.00000001 | 0.00008576 |
| 10 | Yes | 4 | 0.00000001 | 0.00003747 |
| 11 | Yes | 5 | 0.00000001 | 0.00008576 |
| 12 | Yes | 5 | 0.00000001 | 0.00009919 |
| 13 | Yes | 5 | 0.00000001 | 0.00009139 |
| 14 | Yes | 4 | 0.00000001 | 0.00031487 |
| 15 | Yes | 5 | 0.00000001 | 0.00008389 |
| 16 | Yes | 5 | 0.00000001 | 0.00009927 |
| 17 | Yes | 5 | 0.00000001 | 0.00009013 |
| 18 | Yes | 4 | 0.00000001 | 0.00000001 |
| 19 | Yes | 5 | 0.00000001 | 0.00007499 |
| 20 | Yes | 5 | 0.00000001 | 0.00019399 |
| 21 | Yes | 5 | 0.00000001 | 0.00021425 |
| 22 | Yes | 5 | 0.00000001 | 0.00018414 |
| 23 | Yes | 5 | 0.00000001 | 0.00007797 |
| 24 | Yes | 5 | 0.00000001 | 0.00019716 |
| 25 | Yes | 5 | 0.00000001 | 0.00021461 |
| 26 | Yes | 5 | 0.00000001 | 0.00018704 |
| 27 | Yes | 5 | 0.00000001 | 0.00007510 |
| 28 | Yes | 5 | 0.00000001 | 0.00018704 |
| 29 | Yes | 5 | 0.00000001 | 0.00021461 |
| 30 | Yes | 5 | 0.00000001 | 0.00019716 |
| 31 | Yes | 5 | 0.00000001 | 0.00007797 |
| 32 | Yes | 5 | 0.00000001 | 0.00018414 |
| 33 | Yes | 5 | 0.00000001 | 0.00021425 |
| 34 | Yes | 5 | 0.00000001 | 0.00019399 |
| 35 | Yes | 4 | 0.00000001 | 0.00001828 |
| 36 | Yes | 4 | 0.00000001 | 0.00025365 |
| 37 | Yes | 4 | 0.00000001 | 0.00027816 |
| 38 | Yes | 4 | 0.00000001 | 0.00022080 |
| 39 | Yes | 4 | 0.00000001 | 0.00006340 |
| 40 | Yes | 4 | 0.00000001 | 0.00026393 |
| 41 | Yes | 4 | 0.00000001 | 0.00027805 |
| 42 | Yes | 4 | 0.00000001 | 0.00022851 |
| 43 | Yes | 4 | 0.00000001 | 0.00001830 |
| 44 | Yes | 4 | 0.00000001 | 0.00022851 |
| 45 | Yes | 4 | 0.00000001 | 0.00027805 |
| 46 | Yes | 4 | 0.00000001 | 0.00026393 |
| 47 | Yes | 4 | 0.00000001 | 0.00006340 |
| 48 | Yes | 4 | 0.00000001 | 0.00022080 |
| 49 | Yes | 4 | 0.00000001 | 0.00027816 |
| 50 | Yes | 4 | 0.00000001 | 0.00025365 |

### Maximum Tower Deflections - Service Wind

| Section No. | Elevation<br>ft | Horz.<br>Deflection<br>in | Gov.<br>Load<br>Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|---------------------------|-----------------------|-----------|------------|
| L1          | 140 - 115.36    | 21.707                    | 43                    | 1.3280    | 0.0078     |
| L2          | 118.89 - 79.83  | 15.901                    | 43                    | 1.2746    | 0.0025     |
| L3          | 84.42 - 40.26   | 7.795                     | 43                    | 0.9038    | 0.0007     |
| L4          | 45.54 - 0       | 2.193                     | 43                    | 0.4488    | 0.0002     |

|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 19 of 21          |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

| Section No. | Elevation<br>ft | Horz.<br>Deflection<br>in | Gov.<br>Load<br>Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|---------------------------|-----------------------|-----------|------------|
|-------------|-----------------|---------------------------|-----------------------|-----------|------------|

### Critical Deflections and Radius of Curvature - Service Wind

| Elevation<br>ft | Appurtenance               | Gov.<br>Load<br>Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of<br>Curvature<br>ft |
|-----------------|----------------------------|-----------------------|------------------|-----------|------------|------------------------------|
| 148.00          | 20' x 2" Dia Omni          | 43                    | 21.707           | 1.3280    | 0.0078     | 38365                        |
| 138.00          | 4' Side Mount Standoff     | 43                    | 21.147           | 1.3262    | 0.0072     | 38365                        |
| 130.00          | (2) DUO1417-8686           | 43                    | 18.921           | 1.3153    | 0.0050     | 19182                        |
| 128.00          | 13' Platform w/rails       | 43                    | 18.369           | 1.3108    | 0.0045     | 15985                        |
| 120.00          | LPA-80080-4CF              | 43                    | 16.197           | 1.2807    | 0.0027     | 9661                         |
| 118.00          | 13' Platform w/rails       | 43                    | 15.665           | 1.2693    | 0.0024     | 8924                         |
| 114.00          | LMU                        | 43                    | 14.618           | 1.2411    | 0.0018     | 7934                         |
| 112.00          | (4) DB844H90E-XY           | 43                    | 14.104           | 1.2246    | 0.0016     | 7543                         |
| 110.00          | 13' Platform w/rails       | 43                    | 13.596           | 1.2067    | 0.0014     | 7189                         |
| 100.00          | 14-ft Low Profile Platform | 43                    | 11.162           | 1.1000    | 0.0008     | 5821                         |
| 91.50           | (2) DB978F30T2E-M          | 43                    | 9.254            | 0.9947    | 0.0007     | 5011                         |
| 91.00           | (2) DB980F90T2E-M          | 43                    | 9.146            | 0.9883    | 0.0007     | 4970                         |
| 90.00           | 14-ft Low Profile Platform | 43                    | 8.934            | 0.9755    | 0.0007     | 4890                         |
| 83.00           | Uni-Tri Bracket            | 43                    | 7.518            | 0.8858    | 0.0007     | 4501                         |

### Maximum Tower Deflections - Design Wind

| Section No. | Elevation<br>ft | Horz.<br>Deflection<br>in | Gov.<br>Load<br>Comb. | Tilt<br>° | Twist<br>° |
|-------------|-----------------|---------------------------|-----------------------|-----------|------------|
| L1          | 140 - 115.36    | 55.476                    | 10                    | 3.3909    | 0.0243     |
| L2          | 118.89 - 79.83  | 40.652                    | 10                    | 3.2575    | 0.0084     |
| L3          | 84.42 - 40.26   | 19.936                    | 10                    | 2.3113    | 0.0024     |
| L4          | 45.54 - 0       | 5.610                     | 10                    | 1.1481    | 0.0008     |

### Critical Deflections and Radius of Curvature - Design Wind

| Elevation<br>ft | Appurtenance               | Gov.<br>Load<br>Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of<br>Curvature<br>ft |
|-----------------|----------------------------|-----------------------|------------------|-----------|------------|------------------------------|
| 148.00          | 20' x 2" Dia Omni          | 10                    | 55.476           | 3.3909    | 0.0243     | 15231                        |
| 138.00          | 4' Side Mount Standoff     | 10                    | 54.048           | 3.3865    | 0.0225     | 15231                        |
| 130.00          | (2) DUO1417-8686           | 10                    | 48.363           | 3.3600    | 0.0159     | 7615                         |
| 128.00          | 13' Platform w/rails       | 10                    | 46.954           | 3.3489    | 0.0143     | 6345                         |
| 120.00          | LPA-80080-4CF              | 10                    | 41.408           | 3.2731    | 0.0090     | 3833                         |
| 118.00          | 13' Platform w/rails       | 10                    | 40.050           | 3.2440    | 0.0079     | 3538                         |
| 114.00          | LMU                        | 10                    | 37.376           | 3.1725    | 0.0061     | 3140                         |
| 112.00          | (4) DB844H90E-XY           | 10                    | 36.061           | 3.1305    | 0.0054     | 2983                         |
| 110.00          | 13' Platform w/rails       | 10                    | 34.763           | 3.0850    | 0.0048     | 2840                         |
| 100.00          | 14-ft Low Profile Platform | 10                    | 28.543           | 2.8126    | 0.0030     | 2292                         |
| 91.50           | (2) DB978F30T2E-M          | 10                    | 23.665           | 2.5436    | 0.0025     | 1969                         |
| 91.00           | (2) DB980F90T2E-M          | 10                    | 23.391           | 2.5273    | 0.0025     | 1952                         |
| 90.00           | 14-ft Low Profile Platform | 10                    | 22.848           | 2.4945    | 0.0025     | 1921                         |

|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 20 of 21          |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

| Elevation | Appurtenance    | Gov. Load Comb. | Deflection | Tilt   | Twist  | Radius of Curvature |
|-----------|-----------------|-----------------|------------|--------|--------|---------------------|
| ft        |                 |                 | in         | °      | °      | ft                  |
| 83.00     | Uni-Tri Bracket | 10              | 19.228     | 2.2652 | 0.0024 | 1766                |

### Compression Checks

### Pole Design Data

| Section No. | Elevation          | Size                     | L     | L <sub>u</sub> | Kl/r | F <sub>a</sub> | A               | Actual P | Allow. P <sub>a</sub> | Ratio P        |
|-------------|--------------------|--------------------------|-------|----------------|------|----------------|-----------------|----------|-----------------------|----------------|
|             | ft                 |                          | ft    | ft             |      | ksi            | in <sup>2</sup> | K        | K                     | P <sub>a</sub> |
| L1          | 140 - 115.36 (1)   | TP24.2521x18x0.1875      | 24.64 | 0.00           | 0.0  | 39.000         | 13.7884         | -3.12    | 537.75                | 0.006          |
| L2          | 115.36 - 79.83 (2) | TP32.7041x22.9814x0.3125 | 39.06 | 0.00           | 0.0  | 39.000         | 30.9952         | -14.51   | 1208.81               | 0.012          |
| L3          | 79.83 - 40.26 (3)  | TP41.9334x30.9366x0.4375 | 44.16 | 0.00           | 0.0  | 39.000         | 55.7964         | -23.88   | 2176.06               | 0.011          |
| L4          | 40.26 - 0 (4)      | TP51x39.7436x0.5         | 45.54 | 0.00           | 0.0  | 39.000         | 80.1435         | -38.60   | 3125.60               | 0.012          |

### Pole Bending Design Data

| Section No. | Elevation          | Size                     | Actual M <sub>x</sub> | Actual f <sub>bx</sub> | Allow. F <sub>bx</sub> | Ratio f <sub>bx</sub> | Actual M <sub>y</sub> | Actual f <sub>by</sub> | Allow. F <sub>by</sub> | Ratio f <sub>by</sub> |
|-------------|--------------------|--------------------------|-----------------------|------------------------|------------------------|-----------------------|-----------------------|------------------------|------------------------|-----------------------|
|             | ft                 |                          | kip-ft                | ksi                    | ksi                    | F <sub>bx</sub>       | kip-ft                | ksi                    | ksi                    | F <sub>by</sub>       |
| L1          | 140 - 115.36 (1)   | TP24.2521x18x0.1875      | 59.20                 | 9.013                  | 39.000                 | 0.231                 | 0.00                  | 0.000                  | 39.000                 | 0.000                 |
| L2          | 115.36 - 79.83 (2) | TP32.7041x22.9814x0.3125 | 520.38                | 26.183                 | 39.000                 | 0.671                 | 0.00                  | 0.000                  | 39.000                 | 0.000                 |
| L3          | 79.83 - 40.26 (3)  | TP41.9334x30.9366x0.4375 | 1244.11               | 27.067                 | 39.000                 | 0.694                 | 0.00                  | 0.000                  | 39.000                 | 0.000                 |
| L4          | 40.26 - 0 (4)      | TP51x39.7436x0.5         | 2207.44               | 26.578                 | 39.000                 | 0.681                 | 0.00                  | 0.000                  | 39.000                 | 0.000                 |

### Pole Shear Design Data

| Section No. | Elevation          | Size                     | Actual V | Actual f <sub>v</sub> | Allow. F <sub>v</sub> | Ratio f <sub>v</sub> | Actual T | Actual f <sub>vt</sub> | Allow. F <sub>vt</sub> | Ratio f <sub>vt</sub> |
|-------------|--------------------|--------------------------|----------|-----------------------|-----------------------|----------------------|----------|------------------------|------------------------|-----------------------|
|             | ft                 |                          | K        | ksi                   | ksi                   | F <sub>v</sub>       | kip-ft   | ksi                    | ksi                    | F <sub>vt</sub>       |
| L1          | 140 - 115.36 (1)   | TP24.2521x18x0.1875      | 8.01     | 0.581                 | 26.000                | 0.045                | 0.00     | 0.000                  | 26.000                 | 0.000                 |
| L2          | 115.36 - 79.83 (2) | TP32.7041x22.9814x0.3125 | 16.91    | 0.546                 | 26.000                | 0.042                | 0.00     | 0.000                  | 26.000                 | 0.000                 |
| L3          | 79.83 - 40.26 (3)  | TP41.9334x30.9366x0.4375 | 19.82    | 0.355                 | 26.000                | 0.027                | 0.00     | 0.000                  | 26.000                 | 0.000                 |
| L4          | 40.26 - 0 (4)      | TP51x39.7436x0.5         | 22.49    | 0.281                 | 26.000                | 0.022                | 0.00     | 0.000                  | 26.000                 | 0.000                 |

|                                                                                                                                                         |         |                                                      |             |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------|-------------|-------------------|
| <b>RISATower</b><br><br><b>Centek Engineering Inc.</b><br>63-2 North Branford Rd.<br>Branford, CT 06405<br>Phone: (203) 488-0580<br>FAX: (203) 488-8587 | Job     | 11074.CO28 - Canton                                  | Page        | 21 of 21          |
|                                                                                                                                                         | Project | 140' EEI Monopole - 14 Canton Springs Rd, Canton, CT | Date        | 17:17:10 09/29/11 |
|                                                                                                                                                         | Client  | Verizon Wireless                                     | Designed by | TJL               |

### Pole Interaction Design Data

| Section No. | Elevation<br>ft       | Ratio<br>$P$<br>$P_a$ | Ratio<br>$f_{bx}$<br>$F_{bx}$ | Ratio<br>$f_{by}$<br>$F_{by}$ | Ratio<br>$f_v$<br>$F_v$ | Ratio<br>$f_{vt}$<br>$F_{vt}$ | Comb.<br>Stress<br>Ratio | Allow.<br>Stress<br>Ratio | Criteria  |
|-------------|-----------------------|-----------------------|-------------------------------|-------------------------------|-------------------------|-------------------------------|--------------------------|---------------------------|-----------|
| L1          | 140 - 115.36<br>(1)   | 0.006                 | 0.231                         | 0.000                         | 0.045                   | 0.000                         | 0.237 ✓                  | 1.333                     | H1-3+VT ✓ |
| L2          | 115.36 - 79.83<br>(2) | 0.012                 | 0.671                         | 0.000                         | 0.042                   | 0.000                         | 0.684 ✓                  | 1.333                     | H1-3+VT ✓ |
| L3          | 79.83 - 40.26<br>(3)  | 0.011                 | 0.694                         | 0.000                         | 0.027                   | 0.000                         | 0.705 ✓                  | 1.333                     | H1-3+VT ✓ |
| L4          | 40.26 - 0 (4)         | 0.012                 | 0.681                         | 0.000                         | 0.022                   | 0.000                         | 0.694 ✓                  | 1.333                     | H1-3+VT ✓ |

### Section Capacity Table

| Section No. | Elevation<br>ft | Component<br>Type | Size                     | Critical<br>Element | P<br>K | SF* $P_{allow}$<br>K | %<br>Capacity   | Pass<br>Fail     |
|-------------|-----------------|-------------------|--------------------------|---------------------|--------|----------------------|-----------------|------------------|
| L1          | 140 - 115.36    | Pole              | TP24.2521x18x0.1875      | 1                   | -3.12  | 716.82               | 17.8            | Pass             |
| L2          | 115.36 - 79.83  | Pole              | TP32.7041x22.9814x0.3125 | 2                   | -14.51 | 1611.34              | 51.3            | Pass             |
| L3          | 79.83 - 40.26   | Pole              | TP41.9334x30.9366x0.4375 | 3                   | -23.88 | 2900.69              | 52.9            | Pass             |
| L4          | 40.26 - 0       | Pole              | TP51x39.7436x0.5         | 4                   | -38.60 | 4166.42              | 52.1            | Pass             |
|             |                 |                   |                          |                     |        |                      | Summary         |                  |
|             |                 |                   |                          |                     |        |                      | Pole (L3)       | 52.9 Pass        |
|             |                 |                   |                          |                     |        |                      | <b>RATING =</b> | <b>52.9 Pass</b> |



**Anchor Bolt and Base Plate Analysis:****Input Data:**Tower Reactions:

|                      |                    |                        |
|----------------------|--------------------|------------------------|
| Overturning Moment = | OM := 2207-ft-kips | (Input From RisaTower) |
| Shear Force =        | Shear := 22-kips   | (Input From RisaTower) |
| Axial Force =        | Axial := 39-kips   | (Input From RisaTower) |

Anchor Bolt Data:

Use ASTM A615 Grade 75

|                            |                            |              |
|----------------------------|----------------------------|--------------|
| Number of Anchor Bolts =   | N := 20                    | (User Input) |
| Diameter of Bolt Circle =  | $D_{bc} := 60.0\text{-in}$ | (User Input) |
| Bolt "Column" Distance =   | $l := 3.0\text{-in}$       | (User Input) |
| Bolt Ultimate Strenght =   | $F_u := 100\text{-ksi}$    | (User Input) |
| Bolt Yield Strenght =      | $F_y := 75\text{-ksi}$     | (User Input) |
| Bolt Modulus =             | $E := 29000\text{-ksi}$    | (User Input) |
| Diameter of Anchor Bolts = | $D := 2.25\text{-in}$      | (User Input) |
| Threads per Inch =         | $n := 4.5$                 | (User Input) |

Base Plate Data:

Use ASTM A572 Grade 60

|                        |                              |              |
|------------------------|------------------------------|--------------|
| Plate Yield Strength = | $F_{ybp} := 60\text{-ksi}$   | (User Input) |
| Base Plate Thickness = | $t_{bp} := 2.25\text{-in}$   | (User Input) |
| Base Plate Diameter =  | $D_{bp} := 66.0\text{-in}$   | (User Input) |
| Outer Pole Diameter =  | $D_{pole} := 51.0\text{-in}$ | (User Input) |

### Geometric Layout Data:

#### Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =:

$$R_{bc} := \frac{D_{bc}}{2} = 30\text{-in}$$

Distance to Bolts =

$$i := 1..N$$

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

$$d_1 = 9.27\text{-in} \quad d_9 = 9.27\text{-in}$$

$$d_2 = 17.63\text{-in} \quad d_{10} = 0.00\text{-in}$$

$$d_3 = 24.27\text{-in} \quad d_{11} = -9.27\text{-in}$$

$$d_4 = 28.53\text{-in} \quad d_{12} = -17.63\text{-in}$$

$$d_5 = 30.00\text{-in} \quad d_{13} = -24.27\text{-in}$$

$$d_6 = 28.53\text{-in} \quad d_{14} = -28.53\text{-in}$$

$$d_7 = 24.27\text{-in} \quad d_{15} = -30.00\text{-in}$$

$$d_8 = 17.63\text{-in} \quad d_{16} = -28.53\text{-in}$$

#### Critical Distances For Bending in Plate:

Outer Pole Radius =

$$R_{pole} := \frac{D_{pole}}{2} = 25.5\text{-in}$$

Moment Arms of Bolts about Neutral Axis =

$$MA_i := \text{if}(d_i \geq R_{pole}, d_i - R_{pole}, 0\text{in})$$

$$MA_1 = 0.00\text{-in} \quad MA_9 = 0.00\text{-in}$$

$$MA_2 = 0.00\text{-in} \quad MA_{10} = 0.00\text{-in}$$

$$MA_3 = 0.00\text{-in} \quad MA_{11} = 0.00\text{-in}$$

$$MA_4 = 3.03\text{-in} \quad MA_{12} = 0.00\text{-in}$$

$$MA_5 = 4.50\text{-in} \quad MA_{13} = 0.00\text{-in}$$

$$MA_6 = 3.03\text{-in} \quad MA_{14} = 0.00\text{-in}$$

$$MA_7 = 0.00\text{-in} \quad MA_{15} = 0.00\text{-in}$$

$$MA_8 = 0.00\text{-in} \quad MA_{16} = 0.00\text{-in}$$

Effective Width of Baseplate for Bending =

$$B_{eff} := 0.8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 33.5\text{-in}$$

## Anchor Bolt Analysis:

### Calculated Anchor Bolt Properties:

Polar Moment of Inertia =

$$I_p := \sum_i (d_i)^2 = 9 \times 10^3 \cdot \text{in}^2$$

Gross Area of Bolt =

$$A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot \text{in}^2$$

Net Area of Bolt =

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

Net Diameter =

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

Radius of Gyration of Bolt =

$$r := \frac{D_n}{4} = 0.508 \cdot \text{in}$$

Section Modulus of Bolt =

$$S_x := \frac{\pi \cdot D_n^3}{32} = 0.826 \cdot \text{in}^3$$

### Check Anchor Bolt Tension Force:

Maximum Tensile Force =

$$T_{\text{Max}} := OM \cdot \frac{R_{bc}}{I_p} - \frac{\text{Axial}}{N} = 86.3 \cdot \text{kips}$$

Allowable Tensile Force =

$$T_{\text{ALL.Gross}} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 174.9 \cdot \text{kips} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

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

Bolt Tension % of Capacity =

$$\frac{T_{\text{Max}}}{T_{\text{ALL.Net}}} = 44.3\% \quad \text{Bolts are "upset bolts". Use net area per AISC}$$

Condition1 =

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

Condition1 = "OK"

### Check Anchor Bolt Bending Stress:

Maximum Bending Moment =

$$M_x := \left( \frac{\text{Shear}}{N} \right) \cdot l = 0.275 \cdot \text{ft} \cdot \text{kips}$$

Maximum Bending Stress =

$$f_{bx} := \frac{M_x}{S_x} = 4 \cdot \text{ksi}$$

Allowable Bending Stress =

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



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."

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

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

Check Anchor Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{Max} := OM \cdot \frac{R_{bc}}{l_p} + \frac{Axial}{N} = 90.2 \text{ kips}$$

Maximum Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = 27.8 \text{ ksi}$$

$$K := 0.65$$

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

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

Allowable Compressive Stress =

$$F_a := 1.333 \cdot F_a = 60 \text{ ksi} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Combined Stress % of Capacity =

$$\left( \frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \right) = 46.3 \%$$

Condition 2 =

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

Condition2 = "OK"



### Base Plate Analysis:

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

$C_1 = 29.2\text{-kips}$

$C_9 = 29.2\text{-kips}$

$C_2 = 53.8\text{-kips}$

$C_{10} = 2.0\text{-kips}$

$C_3 = 73.4\text{-kips}$

$C_{11} = -25.3\text{-kips}$

$C_4 = 85.9\text{-kips}$

$C_{12} = -49.9\text{-kips}$

$C_5 = 90.2\text{-kips}$

$C_{13} = -69.5\text{-kips}$

$C_6 = 85.9\text{-kips}$

$C_{14} = -82.0\text{-kips}$

$C_7 = 73.4\text{-kips}$

$C_{15} = -86.3\text{-kips}$

$C_8 = 53.8\text{-kips}$

$C_{16} = -82.0\text{-kips}$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{(B_{eff} t_{bp})^2} = 32.8\text{-ksi}$$

Allowable Bending Stress in Plate =

$$F_{bp} := 1.33 \cdot 0.75 \cdot F_y = 59.9\text{-ksi}$$

Plate Bending Stress % of Capacity =

$$\frac{f_{bp}}{F_{bp}} = 54.8\%$$

Condition3 =

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

Condition3 = "Ok"

**Standard Monopole Foundation:****Input Data:**Tower Data

|                     |                          |                             |
|---------------------|--------------------------|-----------------------------|
| Overtuming Moment = | OM := 2207-ft-kips       | (User Input from RISATower) |
| Shear Force =       | Shear := 22-kip          | (User Input from RISATower) |
| Axial Force =       | Axial := 39-kip          | (User Input from RISATower) |
| Tower Height =      | H <sub>t</sub> := 140-ft | (User Input)                |

Footing Data:

|                                 |                            |              |
|---------------------------------|----------------------------|--------------|
| Overall Depth of Footing =      | D <sub>f</sub> := 6.5-ft   | (User Input) |
| Length of Pier =                | L <sub>p</sub> := 4.5-ft   | (User Input) |
| Extension of Pier Above Grade = | L <sub>pag</sub> := 1.0-ft | (User Input) |
| Diameter of Pier =              | d <sub>p</sub> := 6.5-ft   | (User Input) |
| Thickness of Footing =          | T <sub>f</sub> := 3.0-ft   | (User Input) |
| Width of Footing =              | W <sub>f</sub> := 24.0-ft  | (User Input) |

Anchor Bolt Data:

|                                         |                                |              |
|-----------------------------------------|--------------------------------|--------------|
| Length of Anchor Bolts =                | L <sub>st</sub> := 72-in       | (User Input) |
| Projection of Anchor Bolts Above Pier = | A <sub>BP</sub> := 12.0-in     | (User Input) |
| Anchor Bolt Diameter =                  | d <sub>anchor</sub> := 2.25-in | (User Input) |
| Base Plate Bolt Circle =                | MP := 60.0-in                  | (User Input) |

Material Properties:

|                                            |                              |                                     |
|--------------------------------------------|------------------------------|-------------------------------------|
| Concrete Compressive Strength =            | f <sub>c</sub> := 4000-psi   | (User Input)                        |
| Steel Reinforcement Yield Strength =       | f <sub>y</sub> := 60000-psi  | (User Input)                        |
| Anchor Bolt Yield Strength =               | f <sub>ya</sub> := 75000-psi | (User Input)                        |
| Internal Friction Angle of Soil =          | Φ <sub>s</sub> := 30-deg     | (User Input)                        |
| Allowable Soil Bearing Capacity =          | q <sub>s</sub> := 4000-psf   | (User Input)                        |
| Unit Weight of Soil =                      | γ <sub>soil</sub> := 100-pcf | (User Input)                        |
| Unit Weight of Concrete =                  | γ <sub>conc</sub> := 150-pcf | (User Input)                        |
| Foundation Bouyancy =                      | Bouyancy := 0                | (User Input) (Yes=1 / No=0)         |
| Depth to Neglect =                         | n := 1-ft                    | (User Input)                        |
| Cohesion of Clay Type Soil =               | c := 0-ksf                   | (User Input) (Use 0 for Sandy Soil) |
| Seismic Zone Factor =                      | Z := 2                       | (User Input) (UBC-1997 Fig 23-2)    |
| Coefficient of Friction Between Concrete = | μ := 0.45                    | (User Input)                        |

Pier Reinforcement:

|                                 |                              |              |                   |
|---------------------------------|------------------------------|--------------|-------------------|
| Bar Size =                      | $BS_{pier} := 8$             | (User Input) |                   |
| Bar Diameter =                  | $d_{bpier} := 1.0\text{-in}$ | (User Input) |                   |
| Number of Bars =                | $NB_{pier} := 44$            | (User Input) |                   |
| Clear Cover of Reinforcement =  | $Cvr_{pier} := 3\text{-in}$  | (User Input) |                   |
| Reinforcement Location Factor = | $\alpha_{pier} := 1.0$       | (User Input) | (ACI-2008 12.2.4) |
| Coating Factor =                | $\beta_{pier} := 1.0$        | (User Input) | (ACI-2008 12.2.4) |
| Concrete Strength Factor =      | $\lambda_{pier} := 1.0$      | (User Input) | (ACI-2008 12.2.4) |
| Reinforcement Size Factor =     | $\gamma_{pier} := 1.0$       | (User Input) | (ACI-2008 12.2.4) |
| Diameter of Tie =               | $d_{Tie} := 0.5\text{-in}$   | (User Input) |                   |

Pad Reinforcement:

|                                 |                              |              |                   |
|---------------------------------|------------------------------|--------------|-------------------|
| Bar Size =                      | $BS_{top} := 8$              | (User Input) | (Top of Pad)      |
| Bar Diameter =                  | $d_{btop} := 1.0\text{-in}$  | (User Input) | (Top of Pad)      |
| Number of Bars =                | $NB_{top} := 28$             | (User Input) | (Top of Pad)      |
| Bar Size =                      | $BS_{bot} := 8$              | (User Input) | (Bottom of Pad)   |
| Bar Diameter =                  | $d_{bbot} := 1.0\text{-in}$  | (User Input) | (Bottom of Pad)   |
| Number of Bars =                | $NB_{bot} := 40$             | (User Input) | (Bottom of Pad)   |
| Clear Cover of Reinforcement =  | $Cvr_{pad} := 3.0\text{-in}$ | (User Input) |                   |
| Reinforcement Location Factor = | $\alpha_{pad} := 1.0$        | (User Input) | (ACI-2008 12.2.4) |
| Coating Factor =                | $\beta_{pad} := 1.0$         | (User Input) | (ACI-2008 12.2.4) |
| Concrete Strength Factor =      | $\lambda_{pad} := 1.0$       | (User Input) | (ACI-2008 12.2.4) |
| Reinforcement Size Factor =     | $\gamma_{pad} := 1.0$        | (User Input) | (ACI-2008 12.2.4) |

**Calculated Factors:**

|                                        |                                                                                                                                                                                                                                        |         |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Pier Reinforcement Bar Area =          | $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785\text{-in}^2$                                                                                                                                                                     |         |
| Pad Top Reinforcement Bar Area =       | $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.785\text{-in}^2$                                                                                                                                                                       |         |
| Pad Bottom Reinforcement Bar Area =    | $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.785\text{-in}^2$                                                                                                                                                                       |         |
| Coefficient of Lateral Soil Pressure = | $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$                                                                                                                                                                                 |         |
| Load Factor =                          | $LF := \begin{cases} 1.333 & \text{if } H_t \leq 700\text{-ft} \\ 1.7 & \text{if } H_t \geq 1200\text{-ft} \\ 1.333 + \left( \frac{H_t - 700\text{ft}}{1200\text{ft} - 700\text{ft}} \right) \cdot 0.4 & \text{otherwise} \end{cases}$ | = 1.333 |



### Stability of Footing:

Adjusted Concrete Unit Weight =

$$\gamma_c := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{conc}} - 62.4 \text{pcf}, \gamma_{\text{conc}}) = 150 \text{pcf}$$

Adjusted Soil Unit Weight =

$$\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{soil}} - 62.4 \text{pcf}, \gamma_{\text{soil}}) = 100 \text{pcf}$$

Passive Pressure =

$$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0.3 \text{ksf}$$

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.05 \text{ksf}$$

$$P_{top} := \text{if}(n < (D_f - T_f), P_{pt}, P_{pn}) = 1.05 \text{ksf}$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.95 \text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.5 \text{ksf}$$

$$T_p := \text{if}(n < (D_f - T_f), T_f, (D_f - n)) = 3$$

$$A_p := W_f T_p = 72$$

Ultimate Shear =

$$S_u := P_{ave} \cdot A_p = 108 \text{kip}$$

Weight of Concrete Pad =

$$WT_c := \left[ \left( W_f^2 \cdot T_f \right) + \frac{d_p^2 \cdot \pi}{4} L_p \right] \cdot \gamma_c = 281.599 \text{kip}$$

Weight of Soil Above Footing =

$$WT_{s1} := \left[ \left( W_f^2 - \frac{d_p^2 \cdot \pi}{4} \right) \cdot (L_p - L_{pag} - n) \right] \cdot \gamma_s = 135.7 \text{kip}$$

Weight of Soil Wedge at Back Face =

$$WT_{s2} := \left( \frac{D_f^2 \cdot \tan(\Phi_s)}{2} \cdot W_f \right) \cdot \gamma_s = 29.272 \text{kip}$$

Weight of Soil Wedge at back face Corners =

$$WT_{s3} := 2 \cdot \left[ \left( D_f \right)^3 \cdot \frac{\tan(\Phi_s)}{3} \right] \cdot \gamma_s = 10.57 \text{kips}$$

Total Weight =

$$WT_{tot} := WT_c + WT_{s1} + \text{Axial} = 456.303 \text{kip}$$

Resisting Moment =

$$M_r := (WT_{tot}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + \left[ (WT_{s2} + WT_{s3}) \cdot \left( W_f + \frac{D_f \tan(\Phi_s)}{3} \right) \right] = 6590 \text{kip-ft}$$

Overturning Moment =

$$M_{ot} := OM + \text{Shear} \cdot (L_p + T_f) = 2372 \text{kip-ft}$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 2.78$$

Factor of Safety Required =

$$FS_{req} := 2$$

$$\text{OverTurning\_Moment\_Check} := \text{if}(FS \geq FS_{req}, \text{"Okay"}, \text{"No Good"})$$

$$\text{OverTurning\_Moment\_Check} = \text{"Okay"}$$



### Shear Capacity in Pier:

Shear Resistance of Pier =

$$S_p := \frac{\mu \cdot W_{T_{tot}}}{FS_{req}} = 102.668 \cdot \text{kips}$$

$$\text{Shear\_Check} := \text{if}(S_p > \text{Shear}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Shear\_Check} = \text{"Okay"}$$

### Bearing Pressure Caused by Footing:

Area of the Mat =

$$A_{mat} := W_f^2 = 576$$

Section Modulus of Mat =

$$S := \frac{W_f^3}{6} = 2304 \cdot \text{ft}^3$$

Maximum Pressure in Mat =

$$P_{max} := \frac{W_{T_{tot}}}{A_{mat}} + \frac{M_{ot}}{S} = 1.822 \cdot \text{ksf}$$

$$\text{Max\_Pressure\_Check} := \text{if}(P_{max} < q_s, \text{"Okay"}, \text{"No Good"})$$

$$\text{Max\_Pressure\_Check} = \text{"Okay"}$$

Minimum Pressure in Mat =

$$P_{min} := \frac{W_{T_{tot}}}{A_{mat}} - \frac{M_{ot}}{S} = -0.237 \cdot \text{ksf}$$

$$\text{Min\_Pressure\_Check} := \text{if}((P_{min} \geq 0) \cdot (P_{min} < q_s), \text{"Okay"}, \text{"No Good"})$$

$$\text{Min\_Pressure\_Check} = \text{"No Good"}$$

Distance to Resultant of Pressure Distribution =

$$X_p := \frac{\frac{P_{max}}{P_{max} - P_{min}} \cdot \frac{1}{3}}{\frac{W_f}{W_f}} = 7.078$$

Distance to Kern =

$$X_k := \frac{W_f}{6} = 4$$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity =

$$e := \frac{M_{ot}}{W_{T_{tot}}} = 5.198$$

Adjusted Soil Pressure =

$$P_a := \frac{2 \cdot W_{T_{tot}}}{3 \cdot W_f \left( \frac{W_f}{2} - e \right)} = 1.864 \cdot \text{ksf}$$

$$q_{adj} := \text{if}(P_{min} < 0, P_a, P_{max}) = 1.864 \cdot \text{ksf}$$

$$\text{Pressure\_Check} := \text{if}(q_{adj} < q_s, \text{"Okay"}, \text{"No Good"})$$

$$\text{Pressure\_Check} = \text{"Okay"}$$

**Concrete Bearing Capacity:**

Strength Reduction Factor =

$$\Phi_C := 0.65 \quad (\text{ACI-2008 9.3.2.2})$$

Bearing Strength Between Pier and Pad =

$$P_b := \Phi_C \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 1.056 \times 10^4 \text{ kips} \quad (\text{ACI-2008 10.14})$$

$$\text{Bearing\_Check} := \text{if}(P_b > \text{LF} \cdot \text{Axial}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Bearing\_Check} = \text{"Okay"}$$

**Shear Strength of Concrete:**Beam Shear:

(Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$$\phi_C := 0.85 \quad (\text{ACI 9.3.2.5})$$

$$d := T_f - C_{vrpad} - d_{bbot} = 32 \text{ in}$$

$$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$$

$$d_2 := d_1 - d$$

$$L := \left( \frac{W_f}{2} - e \right) \cdot 3$$

$$\text{Slope} := \text{if} \left( L > W_f, \frac{P_{\max} - P_{\min}}{W_f}, \frac{q_{adj}}{L} \right)$$

$$V_{req} := \text{LF} \cdot \left[ (q_{adj} - \text{Slope} \cdot d_1) + \left( \frac{\text{Slope} \cdot d_1}{2} \right) \right] \cdot W_f \cdot d_1$$

$$V_{Avail} := \phi_C \cdot 2 \cdot \sqrt{f_c \cdot \text{psi}} \cdot W_f \cdot d \quad (\text{ACI-2008 11.2.1.1})$$

$$\text{Beam\_Shear\_Check} := \text{if}(V_{req} < V_{Avail}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Beam\_Shear\_Check} = \text{"Okay"}$$

Punching Shear:

(Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear =

$$b_o := (d_p + d) \cdot \pi = 28.8$$

Area Included Inside Perimeter =

$$A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 66$$

Area Outside of Perimeter =

$$A_{out} := A_{mat} - A_{bo} = 510$$

Guess Value =

$$v_u := 1 \text{ ksf}$$

(From "Foundation Analysis  
and design", By Joseph  
Bowles, Eq. 8-9)

Given

$$d^2 + d_p \cdot d = \frac{W_{T_{\text{tot}}}}{\pi \cdot v_u}$$

$$v_u := \text{Find}(v_u) = 5.9 \text{ ksf}$$

$$V_u := v_u \cdot d \cdot W_f = 380.3 \text{ kips}$$

Required Shear Strength =

$$V_{\text{req}} := L F \cdot V_u = 506.9 \text{ kips}$$

Available Shear Strength =

$$V_{\text{Avail}} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot \text{psi}} \cdot b_o \cdot d = 2377.9 \text{ kip} \quad (\text{ACI-2008 11.11.2.1})$$

$$\text{Punching\_Shear\_Check} := \text{if}(V_{\text{req}} < V_{\text{Avail}}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Punching\_Shear\_Check} = \text{"Okay"}$$

## Steel Reinforcement in Pad:

### Required Reinforcement for Bending:

Strength Reduction Factor =

$$\phi_m := .90 \quad (\text{ACI-2008 9.3.2.1})$$

$$q_b := q_{\text{adj}} - d_1 \cdot \text{Slope} = 1.064 \text{ ksf}$$

Maximum Bending at Face of Pier =

$$M_n := \frac{1}{L F \cdot \phi_m} \cdot \left[ (q_{\text{adj}} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 1223.1 \text{ kip-ft}$$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \text{ psi} \leq f_c \leq 4000 \text{ psi} \\ 0.65 & \text{if } f_c > 8000 \text{ psi} \end{cases} = 0.85$$

$$\left[ \left[ 0.85 - \frac{\left( \frac{f_c}{\text{psi}} - 4000 \right)}{1000} \right] \cdot 0.5 \right] \quad \text{otherwise} \quad (\text{ACI-2008 10.2.7.3})$$

$$R_u := \frac{M_n}{\phi_m \cdot W_f \cdot d^2} = 8 \text{ ksf}$$

$$\rho := \frac{0.85 \cdot f_c}{f_y} \left( 1 - \sqrt{1 - \frac{2 \cdot R_u}{0.85 \cdot f_c}} \right) = 0.0009$$

$$\rho_{\text{min}} := 1.333 \cdot \rho = 0.00124$$



Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \text{ psi} \\ .0020 & \text{otherwise} \end{cases} \quad (\text{ACI -2008 7.12.2.1})$$

Check Bottom Bars:

$$A_s := \max(\rho, \rho_{min}, \rho_{sh}) \cdot W_f \cdot d = 16.6 \text{ in}^2$$

$$A_{sprov} := A_{bbot} \cdot NB_{bot} = 31.4 \text{ in}^2$$

$$Pad\_Reinforcement\_Bot := \text{if}(A_{sprov} > A_s, \text{"Okay"}, \text{"No Good"})$$

$$Pad\_Reinforcement\_Bot = \text{"Okay"}$$

Check top Bars:

$$A_s := \rho_{sh} \cdot (W_f \cdot d) = 16.6 \text{ in}^2$$

$$A_{sprov} := A_{btop} \cdot NB_{top} = 22 \text{ in}^2$$

$$Pad\_Reinforcement\_Top := \text{if}(A_{sprov} > A_s, \text{"Okay"}, \text{"No Good"})$$

$$Pad\_Reinforcement\_Top = \text{"Okay"}$$

**Development Length Pad Reinforcement:**

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot C_{vrpad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 6.21 \text{ in}$$

Spacing or Cover Dimension =

$$c := \text{if}\left(C_{vrpad} < \frac{B_{sPad}}{2}, C_{vrpad}, \frac{B_{sPad}}{2}\right) = 3 \text{ in}$$

Transverse Reinforcement Index =

$$k_{tr} := 0 \quad (\text{ACI-2008 12.2.3})$$

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \text{ psi}} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 23.7 \text{ in}$$

Minimum Development Length =

$$L_{dbmin} := 12 \text{ in} \quad (\text{ACI-2008 12.2.1})$$

$$L_{dbtCheck} := \text{if}(L_{dbt} \geq L_{dbmin}, \text{"Use L.dbt"}, \text{"Use L.dbmin"})$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - C_{vrpad} = 102 \text{ in}$$

$$L_{pad\_Check} := \text{if}(L_{Pad} > L_{dbt}, \text{"Okay"}, \text{"No Good"})$$

$$L_{pad\_Check} = \text{"Okay"}$$



### Steel Reinforcement in Pier:

Area of Pier =

$$A_p := \frac{\pi \cdot d_p^2}{4} = 4778.36 \cdot \text{in}^2$$

$$A_{smin} := 0.01 \cdot 0.05 \cdot A_p = 2.39 \cdot \text{in}^2 \quad (\text{ACI-2008 10.8.4 \& 10.9.1})$$

$$A_{sprov} := N_{B_{pier}} \cdot A_{B_{pier}} = 34.56 \cdot \text{in}^2$$

$$\text{Steel\_Area\_Check} := \text{if}(A_{sprov} > A_{smin}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Steel\_Area\_Check} = \text{"Okay"}$$

Bar Spacing In Pier =

$$B_{sPier} := \frac{d_p \cdot \pi}{N_{B_{pier}}} - d_{B_{pier}} = 4.569 \cdot \text{in}$$

Diameter of Reinforcement Cage =

$$\text{Diam}_{cage} := d_p - 2 \cdot C_{vr_{pier}} = 72 \cdot \text{in}$$

Maximum Moment in Pier =

$$M_p := \left[ OM + \text{Shear} \cdot \left( L_p + \frac{A_{BP}}{2} \right) \right] \cdot LF = 37062.7 \cdot \text{in-kips}$$

Pier Check evaluated from outside program and results are listed below;

$$(D \ N \ n \ P_u \ M_{xu}) := \left( d_p \cdot 12 \ N_{B_{pier}} \ B_{s_{pier}} \ \frac{\text{Axial} \cdot 1.333}{\text{kips}} \ \frac{M_p}{\text{in-kips}} \right)$$

$$(D \ N \ n \ P_u \ M_{xu}) = (78 \ 44 \ 8 \ 51.987 \ 3.706 \times 10^4)$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := (0 \ 0 \ 0 \ 0)$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := \phi P'_n (D, N, n, P_u, M_{xu})^T$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) = (86.268 \ 6.15 \times 10^4 \ -60 \ 7.274 \times 10^{-3})$$

$$\text{Axial\_Load\_Check} := \text{if}(\phi P_n \geq P_u, \text{"Okay"}, \text{"No Good"})$$

$$\text{Axial\_Load\_Check} = \text{"Okay"}$$

$$\text{Bending\_Check} := \text{if}(\phi M_{xn} \geq M_{xu}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Bending\_Check} = \text{"Okay"}$$

## Development Length Pier Reinforcement:

### Available Length in Foundation:

$$L_{\text{pier}} := L_p - C_{\text{vr}}_{\text{pier}} = 51\text{-in}$$

$$L_{\text{pad}} := T_f - C_{\text{vr}}_{\text{pad}} = 33\text{-in}$$

### Tension:

(ACI-2008 12.2.3)

Spacing or Cover Dimension =

$$c := \text{if} \left( C_{\text{vr}}_{\text{pier}} < \frac{B_{\text{sPier}}}{2}, C_{\text{vr}}_{\text{pier}}, \frac{B_{\text{sPier}}}{2} \right) = 2.285\text{-in}$$

Transverse Reinforcement =

$$k_{\text{tr}} := 0 \quad (\text{ACI-2008 12.2.3})$$

$$L_{\text{dbt}} := \frac{3 f_y \alpha_{\text{pier}} \beta_{\text{pier}} \gamma_{\text{pier}} \lambda_{\text{pier}}}{40 \sqrt{f_c \text{ psi}} \left( \frac{c + k_{\text{tr}}}{d_{\text{bpier}}} \right)} \cdot d_{\text{bpier}} = 31.14\text{-in}$$

Minimum Development Length =

Pier reinforcement bars are standard 90 degree hooks and therefore development in the pad is computed as follows:

$$L_{\text{dh}} := \frac{1200 \cdot d_{\text{bpier}}}{\sqrt{\frac{f_c}{\text{psi}}}} \cdot 7 = 13.282\text{-in} \quad (\text{ACI 12.2.1})$$

$$L_{\text{db}} := \max(L_{\text{dbt}}, L_{\text{dbmin}})$$

$$L_{\text{tension\_Check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{dbt}}, \text{"Okay"}, \text{"No Good"})$$

$$L_{\text{tension\_Check}} = \text{"Okay"}$$

### Compression:

(ACI-2008 12.3.2)

$$L_{\text{dbc1}} := \frac{.02 \cdot d_{\text{bpier}} \cdot f_y}{\sqrt{f_c \text{ psi}}} = 18.974\text{-in}$$

$$L_{\text{dbmin}} := 0.0003 \cdot \frac{\text{in}^2}{\text{lb}} \cdot (d_{\text{bpier}} \cdot f_y) = 18\text{-in}$$

$$L_{\text{dbc}} := \text{if}(L_{\text{dbc1}} \geq L_{\text{dbmin}}, L_{\text{dbc1}}, L_{\text{dbmin}}) = 18.974\text{-in}$$

$$L_{\text{compression\_Check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{dbc}}, \text{"Okay"}, \text{"No Good"})$$

$$L_{\text{compression\_Check}} = \text{"Okay"}$$

**Tie Size and Spacing in Column:**

Minimum Tie Size =

$$Tie_{min} := \text{if}(BS_{pier} \leq 10, 3, 4) = 3$$

Used #4 Ties

Seismic Factor =

$$z := \text{if}(Z \leq 2, 1, 0.5) = 1 \quad (\text{ACI-2008 21.10.5})$$

$$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 16 \cdot \text{in}$$

$$s_{lim2} := 48 \cdot d_{Tie} \cdot z = 24 \cdot \text{in}$$

$$s_{lim3} := D_f \cdot z = 78 \cdot \text{in}$$

$$s_{lim4} := 18 \cdot \text{in}$$

Maximum Spacing =

$$s_{tie} := \min \begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix} = 16 \cdot \text{in}$$

Number of Ties Required =

$$n_{tie} := \frac{L_{pier} - 3 \cdot \text{in}}{s_{tie}} + 1 = 4$$

**Check Anchor Steel Embedment:**

Depth Available =

$$D_{ab} := L_{st} - A_{BP} = 5 \cdot \text{ft}$$

Length of Anchor Bolt =

$$L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot \text{in}}{\sqrt{f_c \cdot \text{psi}}} = 10.87 \cdot \text{ft}$$

$$\text{Depth\_Check} := \text{if}(D_{ab} \geq L_{anchor}, \text{"Okay"}, \text{"No Good"})$$

Depth\_Check = "No Good"

**Note:** Anchor plate is provided

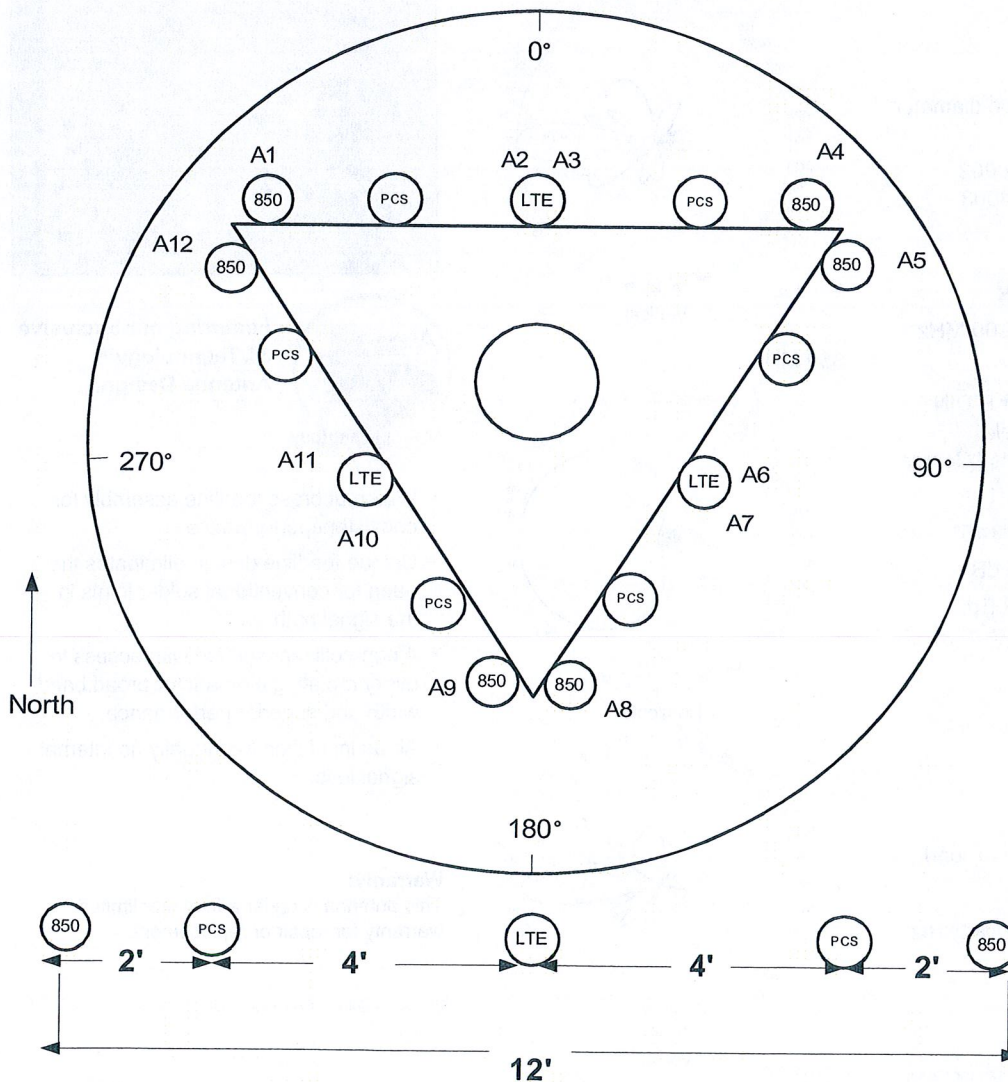


|                                                                         |  |                      |  |                               |  |                        |  |                 |  |              |  |
|-------------------------------------------------------------------------|--|----------------------|--|-------------------------------|--|------------------------|--|-----------------|--|--------------|--|
| <b>SITE NAME</b>                                                        |  | <b>CANTON CT</b>     |  | <b>ECP - CELL #</b>           |  | <b>8</b>               |  | <b>13</b>       |  |              |  |
| <b>LATITUDE</b>                                                         |  | <b>41-49-22.35 N</b> |  | <b>LONGITUDE</b>              |  | <b>72-53-42.36 W</b>   |  |                 |  |              |  |
| Additional Comments: LTE antenna add and adding 6 additional main lines |  |                      |  | <b>SAVE BUTTON</b>            |  |                        |  |                 |  |              |  |
|                                                                         |  |                      |  | <b>STRUCTURE TYPE</b>         |  |                        |  |                 |  |              |  |
| <b>700 Mhz - LTE ANTENNA ADD</b>                                        |  | <b>ALPHA</b>         |  | <b>BETA</b>                   |  | <b>GAMMA</b>           |  |                 |  |              |  |
| EQUIPMENT TYPE                                                          |  | eNodeB               |  | eNodeB                        |  | eNodeB                 |  |                 |  |              |  |
| ANTENNA TYPE                                                            |  | BXA-70063-6CF_2      |  | BXA-70063-6CF_4               |  | BXA-70063-6CF_2        |  |                 |  |              |  |
| QTY OF ANTENNAS PER FACE                                                |  | 1                    |  | 1                             |  | 1                      |  |                 |  |              |  |
| ORIENTATION (DEG)                                                       |  | 340                  |  | 100                           |  | 220                    |  |                 |  |              |  |
| DOWN TILT ( MECH/DEG )                                                  |  | 0                    |  | 2                             |  | 0                      |  |                 |  |              |  |
| RAD CTR (FT AGL)                                                        |  | 120                  |  | 120                           |  | 120                    |  |                 |  |              |  |
| TMA - QTY / MODEL                                                       |  |                      |  |                               |  |                        |  |                 |  |              |  |
| DIPLEXER - QTY / MODEL                                                  |  |                      |  |                               |  |                        |  |                 |  |              |  |
| <b>850 Cellular - Current Config</b>                                    |  | <b>ALPHA</b>         |  | <b>BETA</b>                   |  | <b>GAMMA</b>           |  |                 |  |              |  |
| EQUIPMENT TYPE                                                          |  | #N/A                 |  | #N/A                          |  | #N/A                   |  |                 |  |              |  |
| ANTENNA TYPE                                                            |  | LPA-80080/4CF        |  | LPA-80080/4CF                 |  | LPA-80063/4CF          |  |                 |  |              |  |
| QTY OF ANTENNAS PER FACE                                                |  | 2                    |  | 2                             |  | 2                      |  |                 |  |              |  |
| ORIENTATION (DEG)                                                       |  | 340                  |  | 100                           |  | 220                    |  |                 |  |              |  |
| DOWN TILT ( MECH/DEG )                                                  |  | 0                    |  | 0                             |  | 0                      |  |                 |  |              |  |
| RAD CTR (FT AGL)                                                        |  | 120                  |  | 120                           |  | 120.1                  |  |                 |  |              |  |
| TMA - QTY / MODEL                                                       |  |                      |  |                               |  |                        |  |                 |  |              |  |
| DIPLEXER - QTY / MODEL                                                  |  |                      |  |                               |  |                        |  |                 |  |              |  |
| <b>850 Cellular - Future Config</b>                                     |  | <b>ALPHA</b>         |  | <b>BETA</b>                   |  | <b>GAMMA</b>           |  |                 |  |              |  |
| EQUIPMENT TYPE                                                          |  | #N/A                 |  | #N/A                          |  | #N/A                   |  |                 |  |              |  |
| ANTENNA TYPE                                                            |  | LPA-80080/4CF        |  | LPA-80080/4CF                 |  | LPA-80063/4CF          |  |                 |  |              |  |
| QTY OF ANTENNAS PER FACE                                                |  | 2                    |  | 2                             |  | 2                      |  |                 |  |              |  |
| ORIENTATION (DEG)                                                       |  | 340                  |  | 100                           |  | 220                    |  |                 |  |              |  |
| DOWN TILT ( MECH/DEG )                                                  |  | 0                    |  | 2                             |  | 0                      |  |                 |  |              |  |
| RAD CTR (FT AGL)                                                        |  | 120                  |  | 120                           |  | 120.1                  |  |                 |  |              |  |
| TMA - QTY / MODEL                                                       |  |                      |  |                               |  |                        |  |                 |  |              |  |
| DIPLEXER - QTY / MODEL                                                  |  |                      |  |                               |  |                        |  |                 |  |              |  |
| DIPLEX WITH LTE CABLE                                                   |  |                      |  |                               |  |                        |  |                 |  |              |  |
| <b>1900 PCS - Current Config</b>                                        |  | <b>ALPHA</b>         |  | <b>BETA</b>                   |  | <b>GAMMA</b>           |  |                 |  |              |  |
| EQUIPMENT TYPE                                                          |  | PCS Modcell 4.0      |  | PCS Modcell 4.0               |  | PCS Modcell 4.0        |  |                 |  |              |  |
| ANTENNA TYPE                                                            |  | DB950F65E-M_0        |  | DB950F65E-M_0                 |  | DB950F65E-M_0          |  |                 |  |              |  |
| QTY OF ANTENNAS PER FACE                                                |  | 2                    |  | 2                             |  | 2                      |  |                 |  |              |  |
| ORIENTATION (DEG)                                                       |  | 340                  |  | 100                           |  | 220                    |  |                 |  |              |  |
| DOWN TILT (MECH/DEG )                                                   |  | 0                    |  | 0                             |  | 0                      |  |                 |  |              |  |
| RAD CTR (FT AGL)                                                        |  | 120                  |  | 120                           |  | 120.1                  |  |                 |  |              |  |
| TMA - QTY / MODEL                                                       |  |                      |  |                               |  |                        |  |                 |  |              |  |
| DIPLEXER - QTY / MODEL                                                  |  |                      |  |                               |  |                        |  |                 |  |              |  |
| <b>1900 PCS - Future Config</b>                                         |  | <b>ALPHA</b>         |  | <b>BETA</b>                   |  | <b>GAMMA</b>           |  |                 |  |              |  |
| EQUIPMENT TYPE                                                          |  | PCS Modcell 4.0      |  | PCS Modcell 4.0               |  | PCS Modcell 4.0        |  |                 |  |              |  |
| ANTENNA TYPE                                                            |  | LPA-171063-8CF_2     |  | LPA-171063-8CF_2              |  | LPA-171063-8CF_2       |  |                 |  |              |  |
| QTY OF ANTENNAS PER FACE                                                |  | 2                    |  | 2                             |  | 2                      |  |                 |  |              |  |
| ORIENTATION (DEG)                                                       |  | 340                  |  | 100                           |  | 220                    |  |                 |  |              |  |
| DOWN TILT ( MECH/DEG )                                                  |  | 0                    |  | 0                             |  | 0                      |  |                 |  |              |  |
| RAD CTR (FT AGL)                                                        |  | 120                  |  | 120                           |  | 120.1                  |  |                 |  |              |  |
| TMA - QTY / MODEL                                                       |  |                      |  |                               |  |                        |  |                 |  |              |  |
| DIPLEX WITH CELLULAR CABLE                                              |  |                      |  |                               |  |                        |  |                 |  |              |  |
| <b>NUMBER OF CABLE'S NEEDED</b>                                         |  |                      |  | <b>ESTIMATED CABLE LENGTH</b> |  |                        |  |                 |  |              |  |
| MAINLINE SIZE                                                           |  | 1 5/8"               |  | TOTAL # OF MAINLINES          |  | 18                     |  | MAINLINE (FT)   |  |              |  |
| JUMPER SIZE                                                             |  | 1/2 "                |  | TOTAL # OF TOP JUMPERS        |  | 18                     |  | TOP JUMPER (FT) |  | 12           |  |
| Equipment Cable Ordering                                                |  | MAIN CABLE           |  | 12                            |  | +                      |  | 6               |  | TOP JUMPER # |  |
|                                                                         |  |                      |  |                               |  |                        |  | 12              |  | +            |  |
|                                                                         |  |                      |  |                               |  |                        |  |                 |  | 6            |  |
| <b>TX / RX FREQUENCIES</b>                                              |  |                      |  |                               |  | <b>TX POWER OUTPUT</b> |  |                 |  |              |  |
| Cellular A-Band                                                         |  | PCS F / AWS-Band     |  | 700 Mhz C - B                 |  | Cellular (Watts)       |  |                 |  | 20           |  |



|                            |       |         |                |                          |       |         |                  |                 |       |         |                    |             |  |    |
|----------------------------|-------|---------|----------------|--------------------------|-------|---------|------------------|-----------------|-------|---------|--------------------|-------------|--|----|
| TX - 869-880,890-891.5 MHz |       |         |                | TX - 1970-1975 / 2145-21 |       |         |                  | TX - 746-757    |       |         |                    | PCS (Watts) |  | 16 |
| RX - 824-835,845-846.5 MHz |       |         |                | RX - 1890-1895 / 1745-17 |       |         |                  | RX - 776-787    |       |         |                    | LTE (Watts) |  | 40 |
| <b>ALPHA</b>               |       |         |                | <b>BETA</b>              |       |         |                  | <b>GAMMA</b>    |       |         |                    |             |  |    |
| Ant.                       | Freq. | Func.   | Color Code     | Ant.                     | Freq. | Func.   | Color Code       | Ant.            | Freq. | Func.   | Color Code         |             |  |    |
| A1                         | 800   | Tx1/Rx0 | RED            | A7                       | 800   | Tx2/Rx0 | BLUE             | A13             | 800   | Tx3/Rx0 | GREEN              |             |  |    |
| A2                         | 1900  | Tx1/Rx0 | RED/WHITE      | A8                       | 1900  | Tx2/Rx0 | BLUE/WHITE       | A14             | 1900  | Tx3/Rx0 | GREEN/WHITE        |             |  |    |
| A3                         | 700   | Tx1/Rx0 | RED/ORANGE     | A9                       | 700   | Tx2/Rx0 | BLUE/ORANGE      | A15             | 700   | Tx3/Rx0 | GREEN/ORANGE       |             |  |    |
| A4                         | 700   | Tx4/Rx1 | RED/RED/ORANGE | A10                      | 700   | Tx5/Rx1 | BLUE/BLUE/ORANGE | A16             | 700   | Tx6/Rx1 | GREEN/GREEN/ORANGE |             |  |    |
| A5                         | 1900  | Tx4/Rx1 | RED/RED/WHITE  | A11                      | 1900  | Tx5/Rx1 | BLUE/BLUE/WHITE  | A17             | 1900  | Tx6/Rx1 | GREEN/GREEN/WHITE  |             |  |    |
| A6                         | 800   | Tx4/Rx1 | RED/RED        | A12                      | 800   | Tx5/Rx1 | BLUE/BLUE        | A18             | 800   | Tx6/Rx1 | GREEN/GREEN        |             |  |    |
| <b>RF ENGINEER</b>         |       |         |                | <b>RF MANAGER</b>        |       |         |                  | <b>INITIALS</b> |       |         |                    | <b>DATE</b> |  |    |
| Prepared By: Mark Brauer   |       |         |                | Steve Weatherbee         |       |         |                  | MB              |       |         |                    | 8/31/2011   |  |    |

## Site Configuration





## Mechanical specifications

|                                 |                     |                     |
|---------------------------------|---------------------|---------------------|
| Length                          | 1804 mm             | 71.0 in             |
| Width                           | 285 mm              | 11.2 in             |
| Depth                           | 114 mm              | 4.5 in              |
| Depth with z-bracket            | 154 mm              | 6.1 in              |
| Weight <sup>4)</sup>            | 7.9 kg              | 17.0 lbs            |
| Wind Area Fore/Aft              | 0.51 m <sup>2</sup> | 5.5 ft <sup>2</sup> |
| Wind Area Side                  | 0.21 m <sup>2</sup> | 2.2 ft <sup>2</sup> |
| Max Wind Survivability          | >201 km/hr          | >125 mph            |
| Wind Load @ 100 mph (161 km/hr) |                     |                     |
| Fore/Aft                        | 753 N               | 169 lbf             |
| Side                            | 351 N               | 79 lbf              |

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiber-glass radome.

## Mounting & Downtilting

Mounting hardware attaches to pipe diameter  $\varnothing 50$ -160 mm;  $\varnothing 2.0$ -6.3 in

|                      |          |
|----------------------|----------|
| Mounting Bracket Kit | 36210002 |
| Downtilt Bracket Kit | 36114003 |

## Electrical specifications

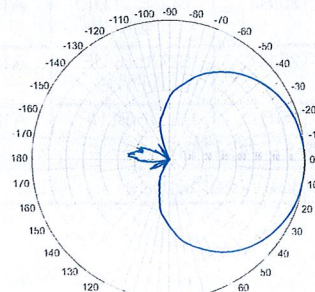
|                                       |                                           |
|---------------------------------------|-------------------------------------------|
| Frequency Range                       | 696-900 MHz                               |
| Impedance                             | 50 $\Omega$                               |
| Connector <sup>3)</sup>               | NE or E-DIN<br>Female<br>2 ports / Center |
| VSWR <sup>1)</sup>                    | $\leq 1.4:1$                              |
| Polarization                          | Slant $\pm 45^\circ$                      |
| Isolation Between Ports <sup>2)</sup> | < -25 dB                                  |
| Gain <sup>1)</sup>                    | 14.5 dBd                                  |
| Power Rating <sup>2)</sup>            | 500 W                                     |
| Half Power Angle <sup>1)</sup>        |                                           |
| Horizontal Beamwidth                  | $63^\circ$                                |
| Vertical Beamwidth                    | $11^\circ$                                |
| Electrical downtilt <sup>5)</sup>     | $0^\circ$                                 |
| Null fill <sup>1)</sup>               | 5%                                        |
| Lightning protection                  | Direct ground                             |

Patented Dipole Design: U.S. Patent No. 6,608,600 B2

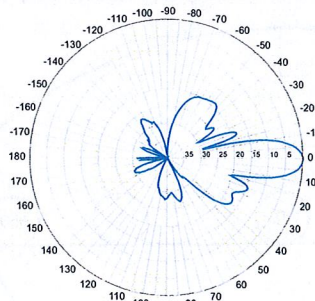
- 1) Typical values.
- 2) Power rating limited by connector only.
- 3) NE indicates an elongated N connector.  
E-DIN indicates an elongated DIN connector.
- 4) Antenna weight does not include brackets.
- 5) Add'l downtilts may be available. Check website for details.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation-pattern<sup>1)</sup>  
750 MHz

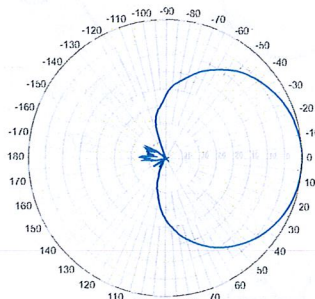


Horizontal

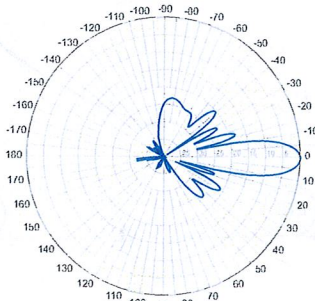


Vertical

850 MHz



Horizontal

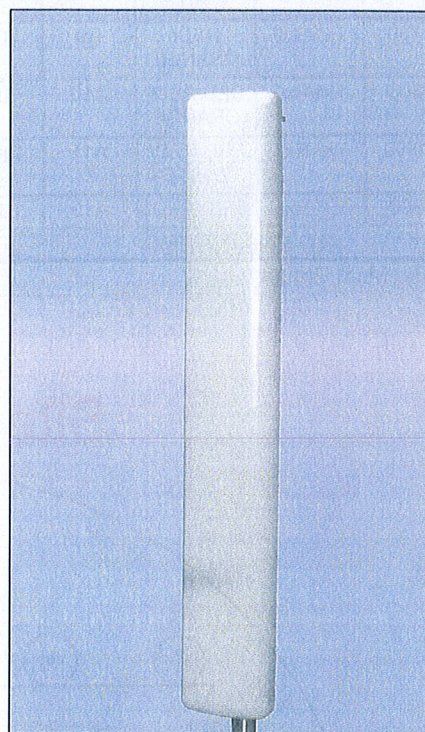


Vertical

696-900 MHz

## BXA-70063/6CF

When ordering replace "\_\_\_" with connector type.



Featuring our Exclusive  
3T Technology™  
Antenna Design:

- Watercut brass feedline assembly for consistent performance.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

### Warranty:

This antenna is under a five-year limited warranty for repair or replacement.

Revision Date: 08/07/08



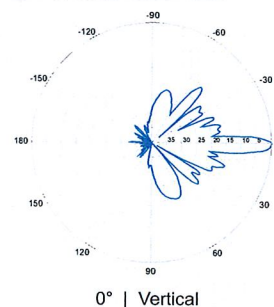
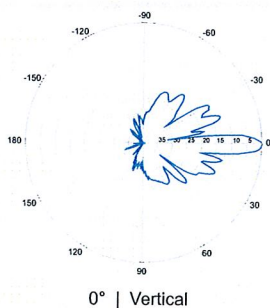
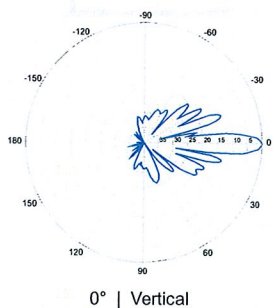
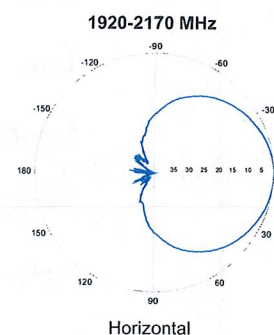
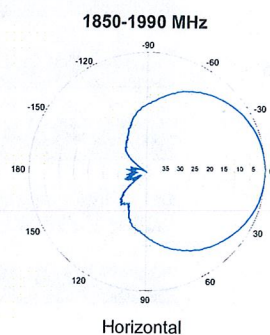
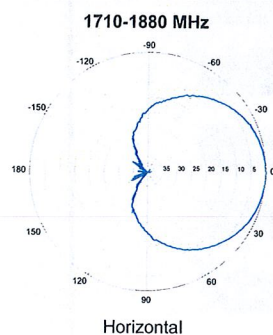
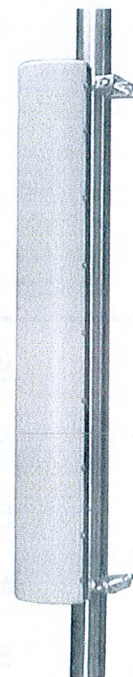
## LPA-171063-8CF-EDIN-X

V-Pol | Log Periodic | 63° | 17.0-17.5 dBi

Replace "X" with desired electrical downtilt.

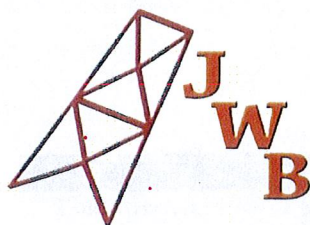
Antenna is available with NE connector(s).  
 Replace "EDIN" with "NE" in the model number  
 when ordering.

| Electrical Characteristics                |                                                      | 1710-2170 MHz       |                                                      |                |
|-------------------------------------------|------------------------------------------------------|---------------------|------------------------------------------------------|----------------|
| Frequency bands                           | 1710-1755 MHz                                        | 1850-1990 MHz       |                                                      | 1920-2170 MHz  |
| Polarization                              | Vertical                                             |                     |                                                      |                |
| Horizontal beamwidth                      | 61°                                                  | 63°                 | 60°                                                  |                |
| Vertical beamwidth                        | 6°                                                   | 7°                  | 6°                                                   |                |
| Gain                                      | 14.9 dBd (17.0 dBi)                                  | 15.4 dBd (17.5 dBi) | 14.9 dBd (17.0 dBi)                                  |                |
| Electrical downtilt (X)                   | 0, 2                                                 |                     |                                                      |                |
| Impedance                                 | 50Ω                                                  |                     |                                                      |                |
| VSWR                                      | ≤ 1.5:1                                              |                     |                                                      |                |
| Null fill                                 | 5% (-26.02 dB)                                       |                     |                                                      |                |
| Input power                               | 250 W                                                |                     |                                                      |                |
| Lightning protection                      | Direct Ground                                        |                     |                                                      |                |
| Connector(s)                              | 1 Port / EDIN or NE / Female / Center (Back)         |                     |                                                      |                |
| Mechanical Characteristics                |                                                      |                     |                                                      |                |
| Dimensions Length x Width x Depth         | 1207 x 203 x 203 mm                                  |                     | 47.5 x 8.0 x 8.0 in                                  |                |
| Weight without mounting brackets          | 5.2 kg                                               |                     | 11.5 lbs                                             |                |
| Survival wind speed                       | >201 km/hr                                           |                     | >125 mph                                             |                |
| Wind area                                 | Front: 0.20 m <sup>2</sup> Side: 0.27 m <sup>2</sup> |                     | Front: 2.2 ft <sup>2</sup> Side: 2.9 ft <sup>2</sup> |                |
| Wind load @ 161 km/hr (100 mph)           | Front: 246 N Side: 323 N                             |                     | Front: 55.3 lbf Side: 72.7 lbf                       |                |
| Mounting Options                          |                                                      | Part Number         | Fits Pipe Diameter                                   | Weight         |
| 2-Point Mounting Bracket Kit              | 26799997                                             | 50-102 mm           | 2.0-4.0 in                                           | 2.3 kg 5.0 lbs |
| 2-Point Mounting and Downtilt Bracket Kit | 26799999                                             | 50-102 mm           | 2.0-4.0 in                                           | 2.3 kg 5.0 lbs |



Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.





JWB Tower Services, LLC  
148 Governor Street  
New Britain, CT 06053  
(800) 819-3084  
(860) 256-8175 fax

## Monopole Inventory General Information

|                      |                        |             |
|----------------------|------------------------|-------------|
| Site Name:           | Canton Fire Department |             |
| Site Number:         |                        |             |
| FCC Number:          |                        |             |
| Manufacturer ID #    | EEL                    |             |
| Street Address:      | 14 Canton Springs Road |             |
| City/State/Zip Code: | Canton, CT             |             |
| County:              |                        |             |
| Lat:                 | N/S                    | 41° 49' 22" |
| Long:                | E/W                    | 72° 53' 43" |
| Performed By:        | JWB                    |             |
| Date:                | 9/11/2011              |             |

# Antenna Information:

| CARRIER                              |              | Town         |                 | PIC #                                                    |            |
|--------------------------------------|--------------|--------------|-----------------|----------------------------------------------------------|------------|
|                                      |              |              |                 | 3                                                        |            |
| <b>MOUNT</b>                         |              |              |                 |                                                          |            |
| Type:                                | Standoff     | Manf.:       | Unknown         |                                                          |            |
| Elev. C/L:                           | 138'         | Bottom:      | Top:            | Leg:                                                     |            |
| Face Width:                          | 4"           | Height:      | 4"              | Projection:                                              | 4'         |
|                                      |              |              |                 | Azimuth/s:                                               |            |
| <b>ANTENNA</b>                       |              |              |                 |                                                          |            |
| Type:                                | Omni         | Manf.:       | Unknown         |                                                          | Model:     |
| Elev. C/L:                           |              | Bottom:      | 138'            | Top:                                                     | 158'       |
| Quantity:                            | 1            | Dim: (HxWxD) | 20'x2"          |                                                          | Azimuth/s: |
| <b>TMA'S</b>                         |              |              |                 |                                                          |            |
| Quantity:                            | N/A          | Manf.:       |                 |                                                          | Model:     |
| <b>COAX</b>                          |              |              |                 |                                                          |            |
| One coax doesn't appear to be in use |              |              |                 |                                                          |            |
| Quantity:                            | 2            | Size:        | 7/8"            | Jumper:                                                  | 1/2"       |
|                                      |              | Color:       | N/A             |                                                          |            |
| CARRIER                              |              | AT&T         |                 | PIC #                                                    |            |
|                                      |              |              |                 | 4                                                        |            |
| <b>MOUNT</b>                         |              |              |                 |                                                          |            |
| Type:                                | Plat w/ rail | Manf.:       | EEI             |                                                          |            |
| Elev. C/L:                           | 128'         | Bottom:      | Top:            | Leg:                                                     |            |
| Face Width:                          | 13'          | Height:      | 3'              | Projection:                                              | N/A        |
|                                      |              |              |                 | Azimuth/s:                                               |            |
| <b>ANTENNA 1 - Outer</b>             |              |              |                 |                                                          |            |
| Type:                                | Panel        | Manf.:       | CSS             |                                                          | Model:     |
| Elev. C/L:                           | 130'         | Bottom:      | Top:            | Leg:                                                     |            |
| Quantity:                            | 6            | Dim: (HxWxD) |                 |                                                          | Azimuth/s: |
| <b>ANTENNA 2 - Inner</b>             |              |              |                 |                                                          |            |
| Type:                                | Panel        | Manf.:       | Kathrein        |                                                          | Model:     |
| Elev. C/L:                           | 130'         | Bottom:      | Top:            | Leg:                                                     |            |
| Quantity:                            | 3            | Dim: (HxWxD) |                 |                                                          | Azimuth/s: |
| <b>TMA'S - Outer</b>                 |              |              |                 |                                                          |            |
| Quantity:                            | 6            | Manf.:       | ADC - Cleargain |                                                          | Model:     |
|                                      |              |              |                 | DD1900 w/800 bypass<br>12"x10"x3"                        |            |
| <b>TMA'S Inner</b>                   |              |              |                 |                                                          |            |
| Quantity:                            | 3            | Manf.:       | Kathrein        |                                                          | Model:     |
| Quantity:                            | 3            | Manf.:       | Kathrein        |                                                          | Model:     |
| Quantity:                            | 3            | Manf.:       | CSS             |                                                          | Model:     |
|                                      |              |              |                 | TMA: 78210250<br>Bias T: 4"x4"x2"<br>Combiner: 10"x7"x2" |            |
| <b>COAX</b>                          |              |              |                 |                                                          |            |
| Quantity:                            | 12           | Size:        | 7/8"            | Jumper:                                                  | 1/2"       |
|                                      |              | Color:       | N/A             |                                                          |            |



| CARRIER                  |              | Verizon       |                | PIC #       |                      | 5          |     |
|--------------------------|--------------|---------------|----------------|-------------|----------------------|------------|-----|
| <b>MOUNT</b>             |              |               |                |             |                      |            |     |
| Type:                    | Plat w/ rail | Manf.:        | EEI            |             |                      |            |     |
| Elev. C/L:               | 118'         | Bottom:       | Top:           | Leg:        |                      |            |     |
| Face Width:              | 13'          | Height:       | 4"             | Projection: | N/A                  | Azimuth/s: |     |
| <b>ANTENNA 1 - Outer</b> |              |               |                |             |                      |            |     |
| Type:                    | Panel        | Manf.:        | Antel/Amphenol | Model:      | LPA-80063/4CF        |            |     |
| Elev. C/L:               | 120'         | Bottom:       | Top:           | Leg:        |                      |            |     |
| Quantity:                | 2            | Dim: (HxWxD)  |                |             |                      |            |     |
| <b>ANTENNA 2 - Outer</b> |              |               |                |             |                      |            |     |
| Type:                    | Panel        | Manf.:        | Antel/Amphenol | Model:      | LPA-80080/4CF        |            |     |
| Elev. C/L:               | 120'         | Bottom:       | Top:           | Leg:        |                      |            |     |
| Quantity:                | 4            | Dim: (HxWxD)  |                |             |                      |            |     |
| <b>ANTENNA 3 - Inner</b> |              |               |                |             |                      |            |     |
| Type:                    | Panel        | Manf.:        | Andrew/Decibel | Model:      | DB950F65E-M          |            |     |
| Elev. C/L:               | 120'         | Bottom:       | Top:           | Leg:        |                      |            |     |
| Quantity:                | 6            | Dim: (HxWxD)  |                |             |                      |            |     |
| <b>GPS</b>               |              |               |                |             |                      |            |     |
| Quantity:                | 1            | Manf.:        | Unknown        | Model:      | 6"x4"                |            |     |
| <b>COAX</b>              |              |               |                |             |                      |            |     |
| Quantity:                | 12           | Size:         | 1 5/8"         | Jumper:     | 1/2"                 | Color:     | N/A |
| Quantity:                | 1            | Size:         | 1/2"           | Jumper:     | N/A                  | Color:     | N/A |
| CARRIER                  |              | Sprint Nextel |                | PIC #       |                      | 6          |     |
| <b>MOUNT</b>             |              |               |                |             |                      |            |     |
| Type:                    | Plat w/ rail | Manf.:        | EEI            |             |                      |            |     |
| Elev. C/L:               | 110'         | Bottom:       | Top:           | Leg:        |                      |            |     |
| Face Width:              | 13'          | Height:       | 4"             | Projection: | N/A                  | Azimuth/s: |     |
| <b>ANTENNA</b>           |              |               |                |             |                      |            |     |
| Type:                    | Panel        | Manf.:        | Decibel        | Model:      | DB844... Label Faded |            |     |
| Elev. C/L:               | 112'         | Bottom:       | Top:           | Leg:        |                      |            |     |
| Quantity:                | 12           | Dim: (HxWxD)  | 48"x6.5"x8"    | Azimuth/s:  |                      |            |     |
| <b>LMU</b>               |              |               |                |             |                      |            |     |
| Quantity:                | 2            | Manf.:        | Unkown         | Model:      | 4"x2"                |            |     |
| <b>COAX</b>              |              |               |                |             |                      |            |     |
| Quantity:                | 12           | Size:         | 1 1/4"         | Jumper:     | 1/2"                 | Color:     | N/A |
| Quantity:                | 2            | Size:         | 1/2"           | Jumper:     | N/A                  | Color:     | N/A |



|                |                 |                 |                 |              |             |                            |            |
|----------------|-----------------|-----------------|-----------------|--------------|-------------|----------------------------|------------|
| <b>CARRIER</b> |                 | <b>T-Mobile</b> |                 | <b>PIC #</b> |             | <b>7</b>                   |            |
| <b>MOUNT</b>   |                 |                 |                 |              |             |                            |            |
| Type:          | <u>Platform</u> | Manf.:          | <u>Unknown</u>  |              |             |                            |            |
| Elev. C/L:     | <u>100'</u>     | Bottom:         | <u>Top:</u>     | Leg:         |             |                            |            |
| Face Width:    | <u>13'-6"</u>   | Height:         | <u>6"</u>       | Projection:  |             | Azimuth/s: <u>        </u> |            |
| <b>ANTENNA</b> |                 |                 |                 |              |             |                            |            |
| Type:          | <u>Panel</u>    | Manf.:          | <u>EMS</u>      | Model:       |             | <u>RR901702DP</u>          |            |
| Elev. C/L:     | <u>100'</u>     | Bottom:         | <u>Top:</u>     | Leg:         |             |                            |            |
| Quantity:      | <u>4</u>        | Dim: (HxWxD)    | <u>        </u> | Azimuth/s:   |             | <u>        </u>            |            |
| <b>TMA'S</b>   |                 |                 |                 |              |             |                            |            |
| Quantity:      | <u>N/A</u>      | Manf.:          | <u>        </u> | Model:       |             | <u>        </u>            |            |
| <b>COAX</b>    |                 |                 |                 |              |             |                            |            |
| Quantity:      | <u>8</u>        | Size:           | <u>1 5/8"</u>   | Jumper:      | <u>1/2"</u> | Color:                     | <u>N/A</u> |

|                  |                    |               |                 |              |             |                            |            |
|------------------|--------------------|---------------|-----------------|--------------|-------------|----------------------------|------------|
| <b>CARRIER</b>   |                    | <b>Sprint</b> |                 | <b>PIC #</b> |             | <b>8</b>                   |            |
| <b>MOUNT</b>     |                    |               |                 |              |             |                            |            |
| Type:            | <u>Lo-Pro Plat</u> | Manf.:        | <u>Summit</u>   |              |             |                            |            |
| Elev. C/L:       | <u>90'</u>         | Bottom:       | <u>Top:</u>     | Leg:         |             |                            |            |
| Face Width:      | <u>14'</u>         | Height:       | <u>3"</u>       | Projection:  |             | Azimuth/s: <u>        </u> |            |
| <b>ANTENNA 1</b> |                    |               |                 |              |             |                            |            |
| Type:            | <u>Panel</u>       | Manf.:        | <u>Decibel</u>  | Model:       |             | <u>980F90T2E-M</u>         |            |
| Elev. C/L:       | <u>91'</u>         | Bottom:       | <u>Top:</u>     | Leg:         |             |                            |            |
| Quantity:        | <u>4</u>           | Dim: (HxWxD)  | <u>        </u> | Azimuth/s:   |             | <u>        </u>            |            |
| <b>ANTENNA 2</b> |                    |               |                 |              |             |                            |            |
| Type:            | <u>Panel</u>       | Manf.:        | <u>Decibel</u>  | Model:       |             | <u>978F30T2E-M</u>         |            |
| Elev. C/L:       | <u>91'-6"</u>      | Bottom:       | <u>Top:</u>     | Leg:         |             |                            |            |
| Quantity:        | <u>2</u>           | Dim: (HxWxD)  | <u>        </u> | Azimuth/s:   |             | <u>        </u>            |            |
| <b>TMA'S</b>     |                    |               |                 |              |             |                            |            |
| Quantity:        | <u>N/A</u>         | Manf.:        | <u>        </u> | Model:       |             | <u>        </u>            |            |
| <b>COAX</b>      |                    |               |                 |              |             |                            |            |
| Quantity:        | <u>6</u>           | Size:         | <u>1 1/4"</u>   | Jumper:      | <u>1/2"</u> | Color:                     | <u>N/A</u> |

|                |              |                 |                            |              |             |                       |            |
|----------------|--------------|-----------------|----------------------------|--------------|-------------|-----------------------|------------|
| <b>CARRIER</b> |              | <b>MetroPCS</b> |                            | <b>PIC #</b> |             | <b>9</b>              |            |
| <b>MOUNT</b>   |              |                 |                            |              |             |                       |            |
| Type:          | <u>Flush</u> | Manf.:          | <u>Unknown/Chain Mount</u> |              |             |                       |            |
| Elev. C/L:     | <u>83'</u>   | Bottom:         | <u>Top:</u>                | Leg:         |             |                       |            |
| Face Width:    | <u>2.5"</u>  | Height:         | <u>N/A</u>                 | Projection:  |             | <u>N/A</u>            |            |
| <b>ANTENNA</b> |              |                 |                            |              |             |                       |            |
| Type:          | <u>Panel</u> | Manf.:          | <u>RFS</u>                 | Model:       |             | <u>APXV18-206517S</u> |            |
| Elev. C/L:     | <u>83'</u>   | Bottom:         | <u>Top:</u>                | Leg:         |             |                       |            |
| Quantity:      | <u>3</u>     | Dim: (HxWxD)    | <u>        </u>            | Azimuth/s:   |             | <u>        </u>       |            |
| <b>COAX</b>    |              |                 |                            |              |             |                       |            |
| Quantity:      | <u>6</u>     | Size:           | <u>1 5/8"</u>              | Jumper:      | <u>1/2"</u> | Color:                | <u>N/A</u> |





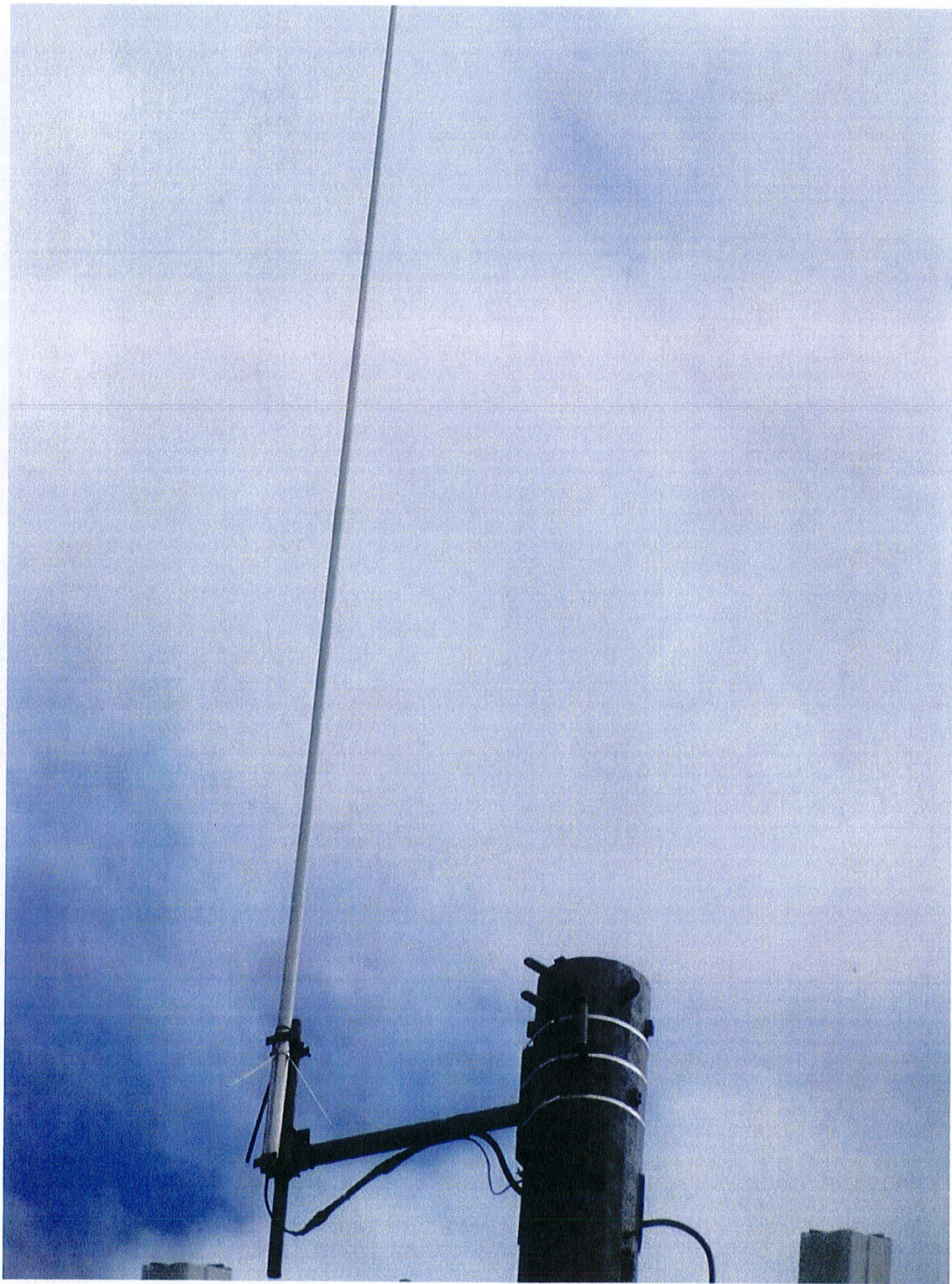
1.0 Elevation





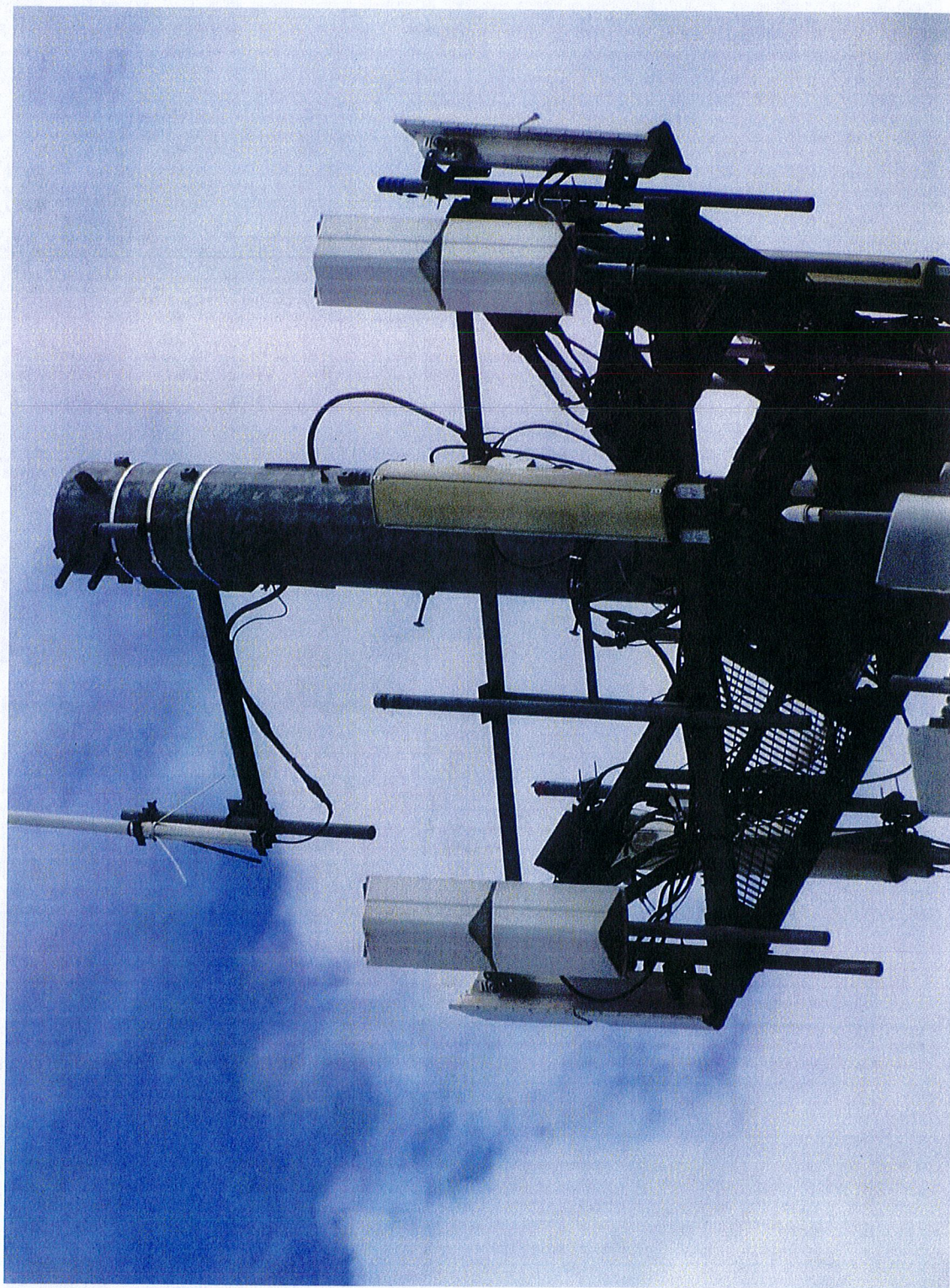
2.0 Base





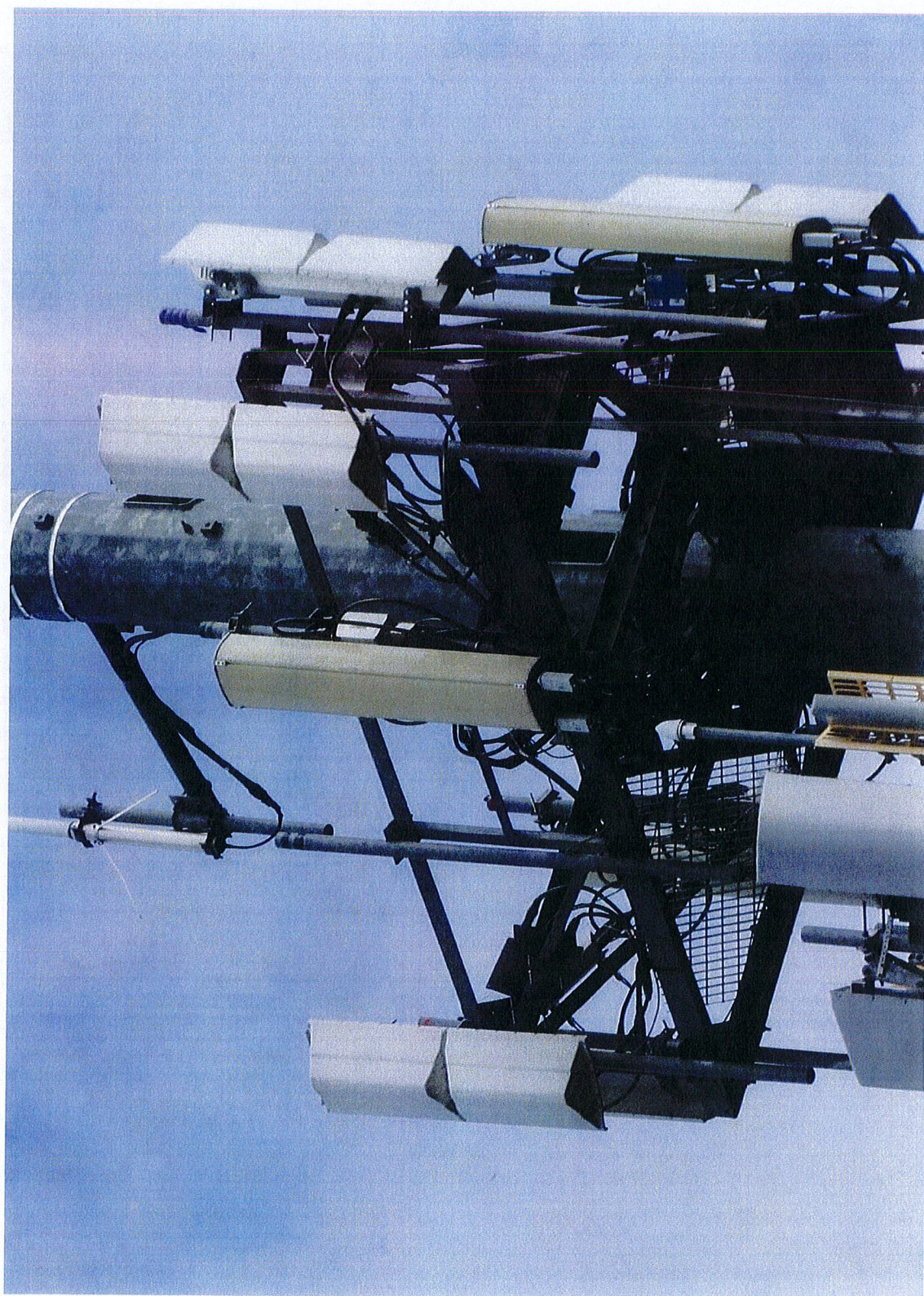
3.0 Town





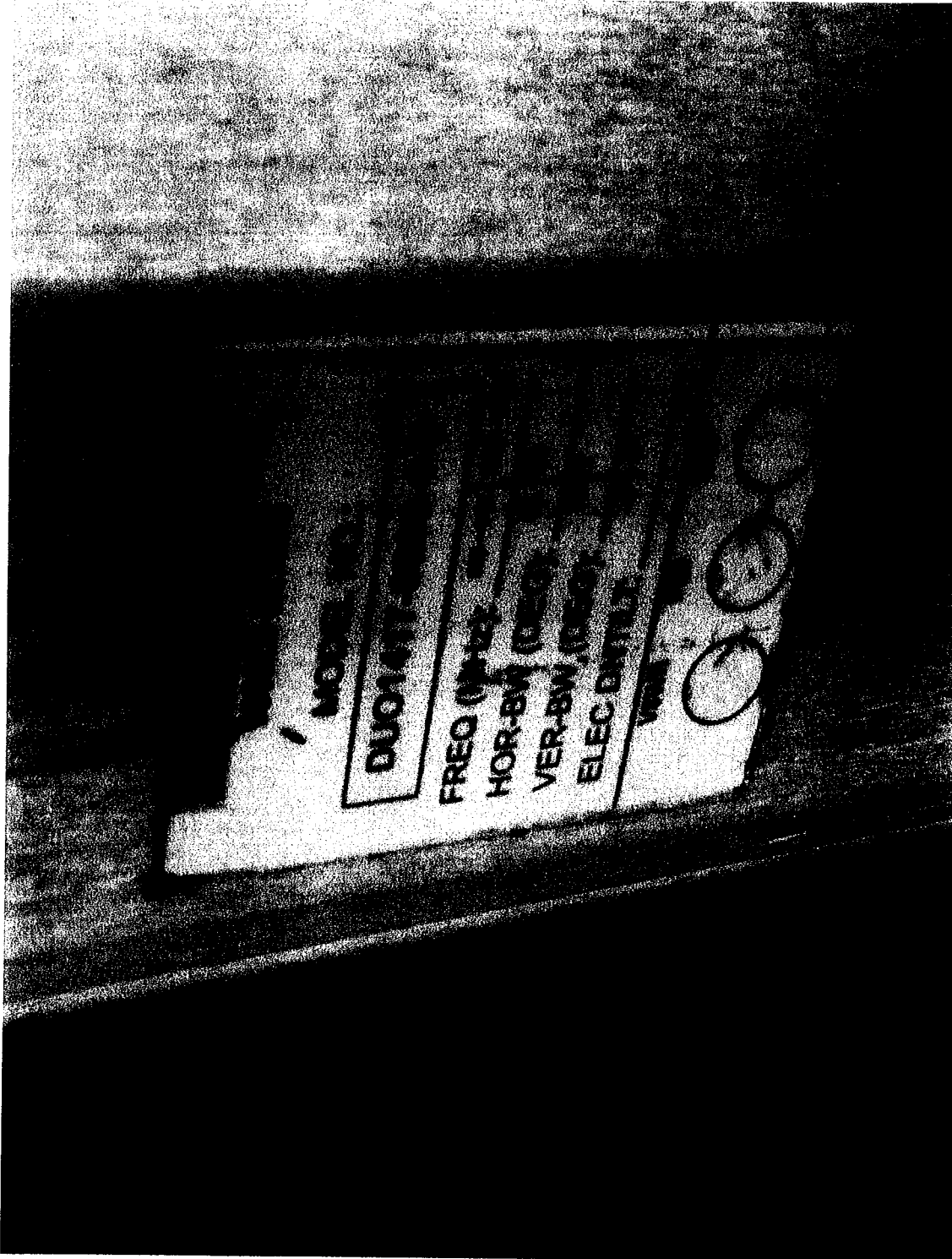
4.1 ATT





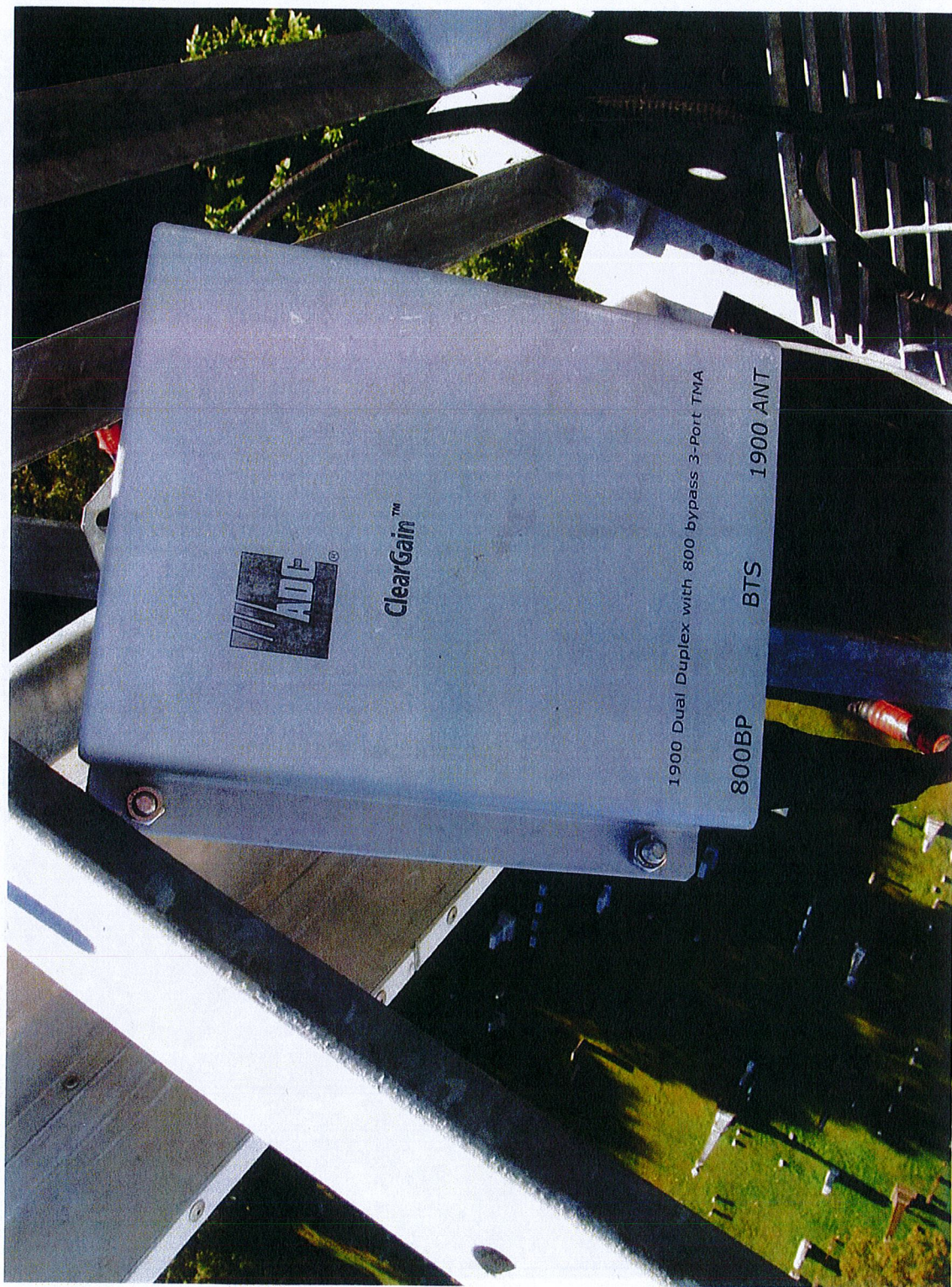
4.2 ATT





4.3 ATT





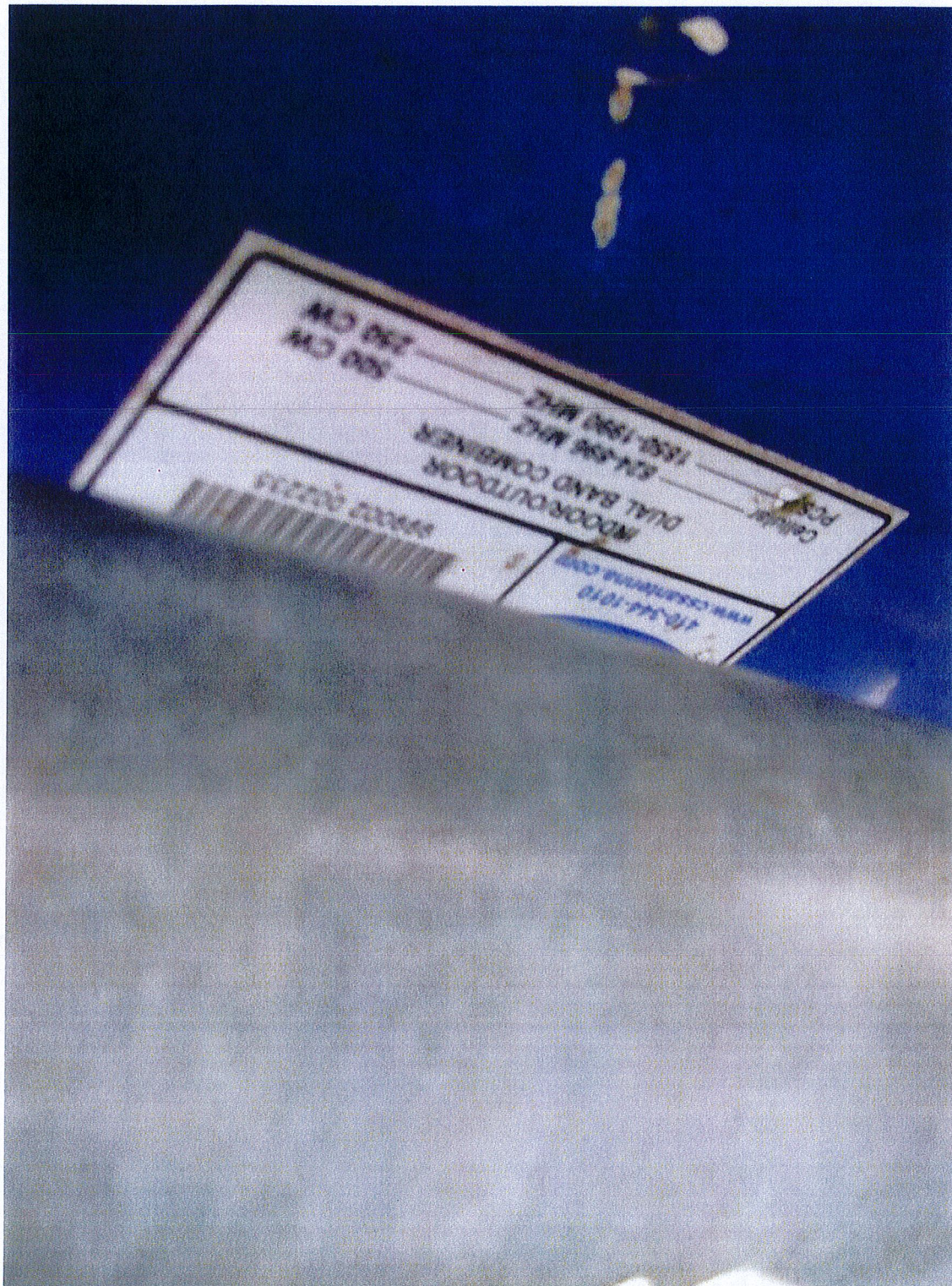
4.4 ATT





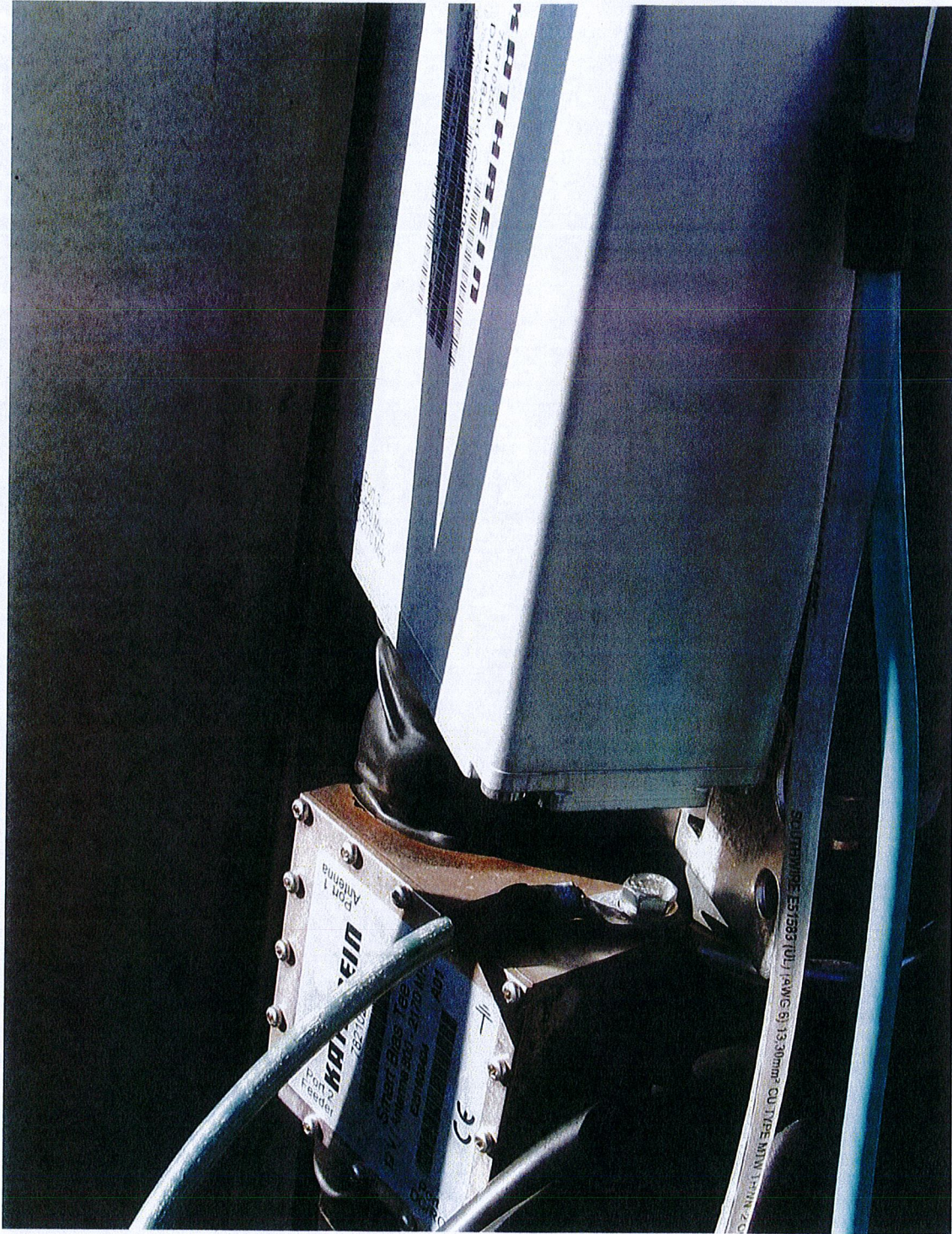
4.5 ATT





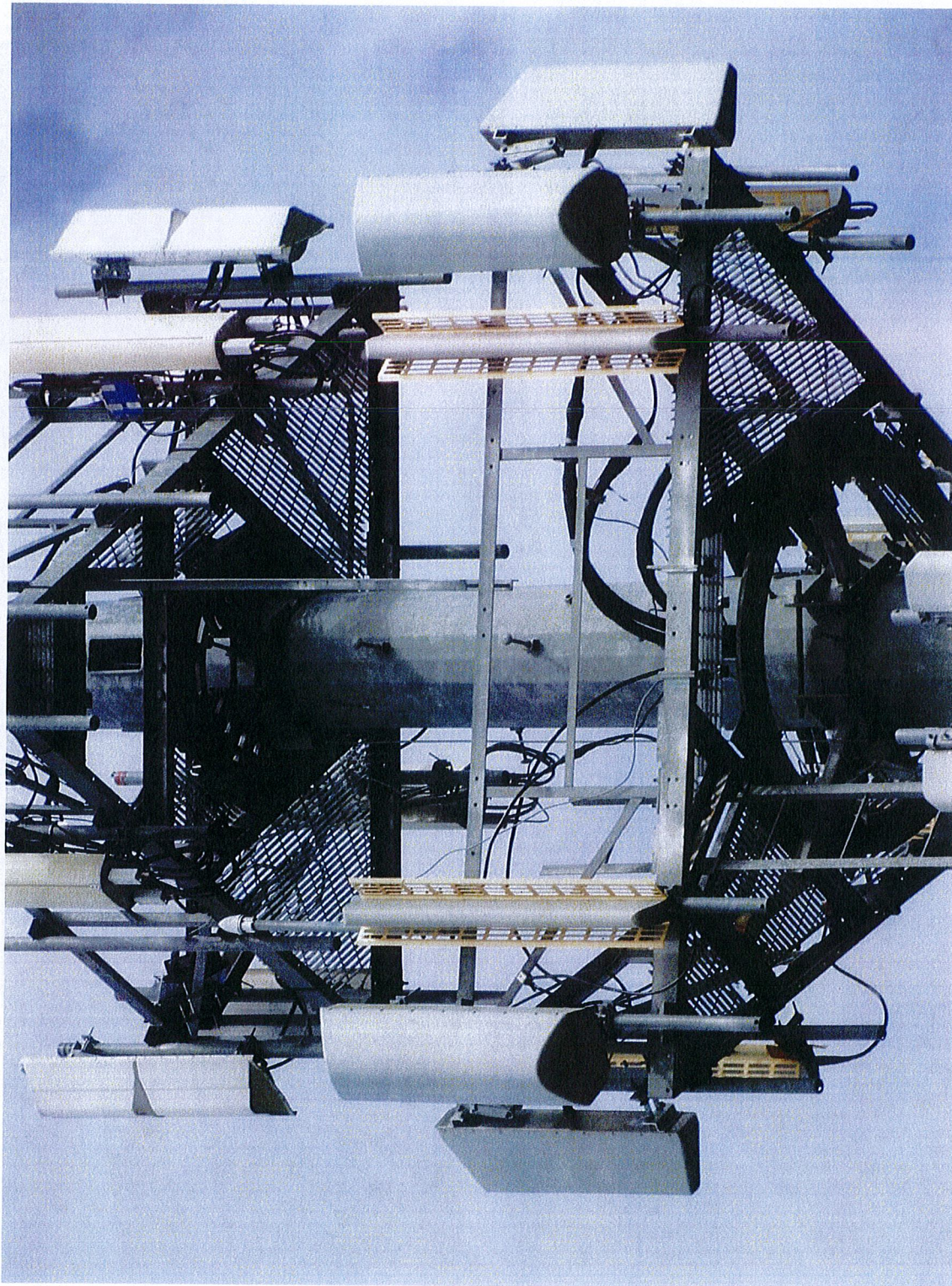
4.6 ATT





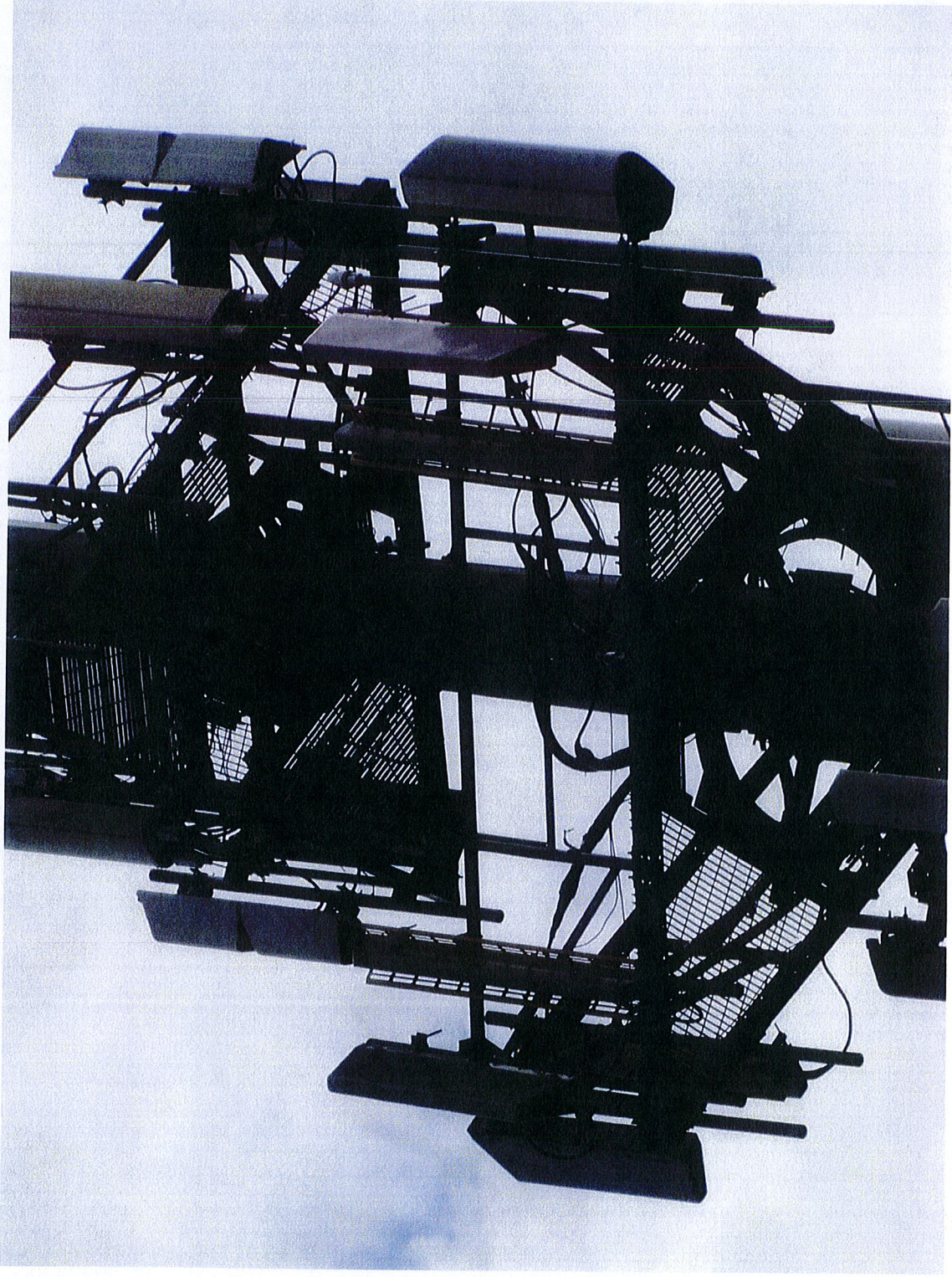
4.7 ATT





5.1 Verizon





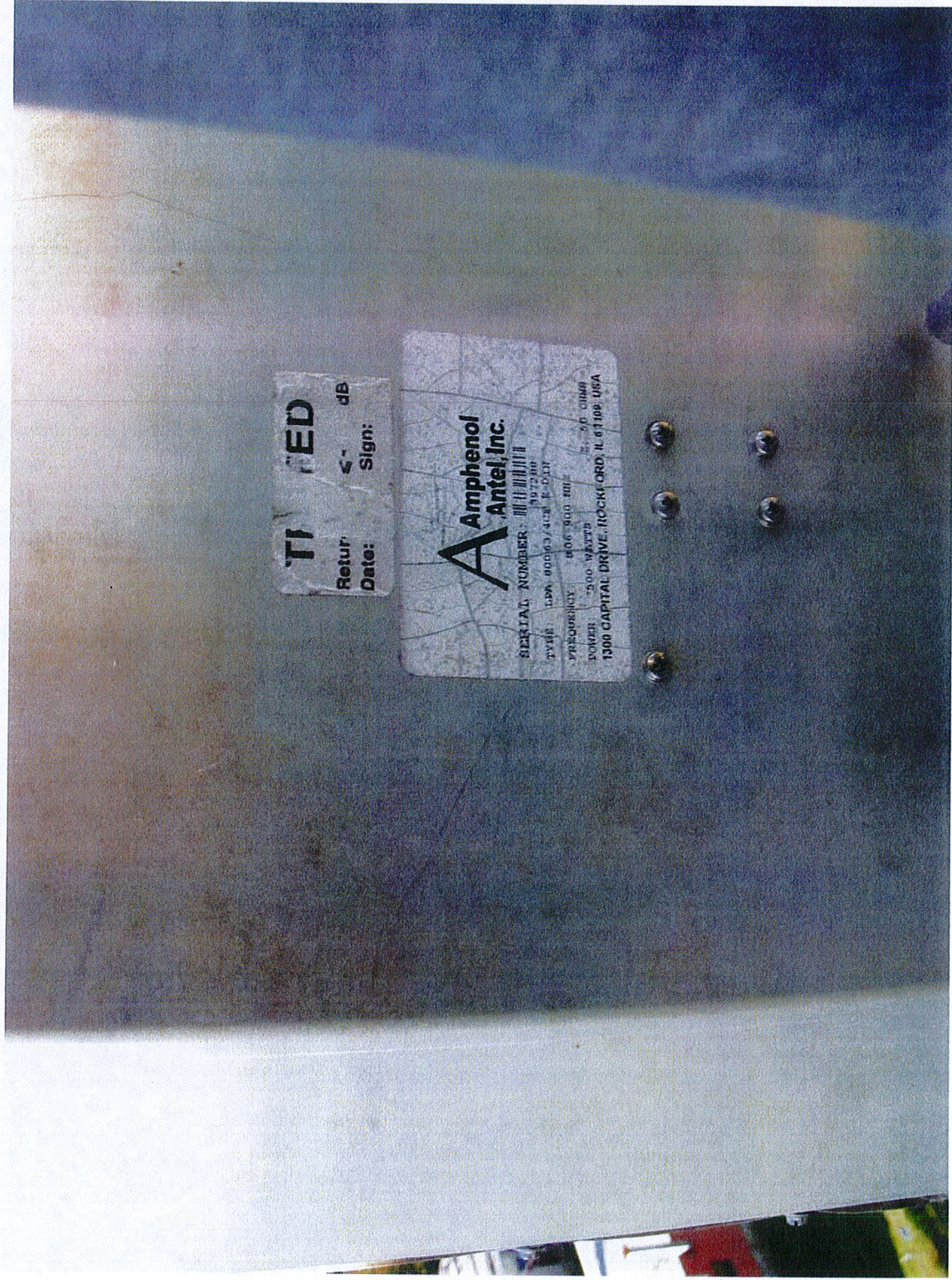
5.2 Verizon





5.3 Verizon





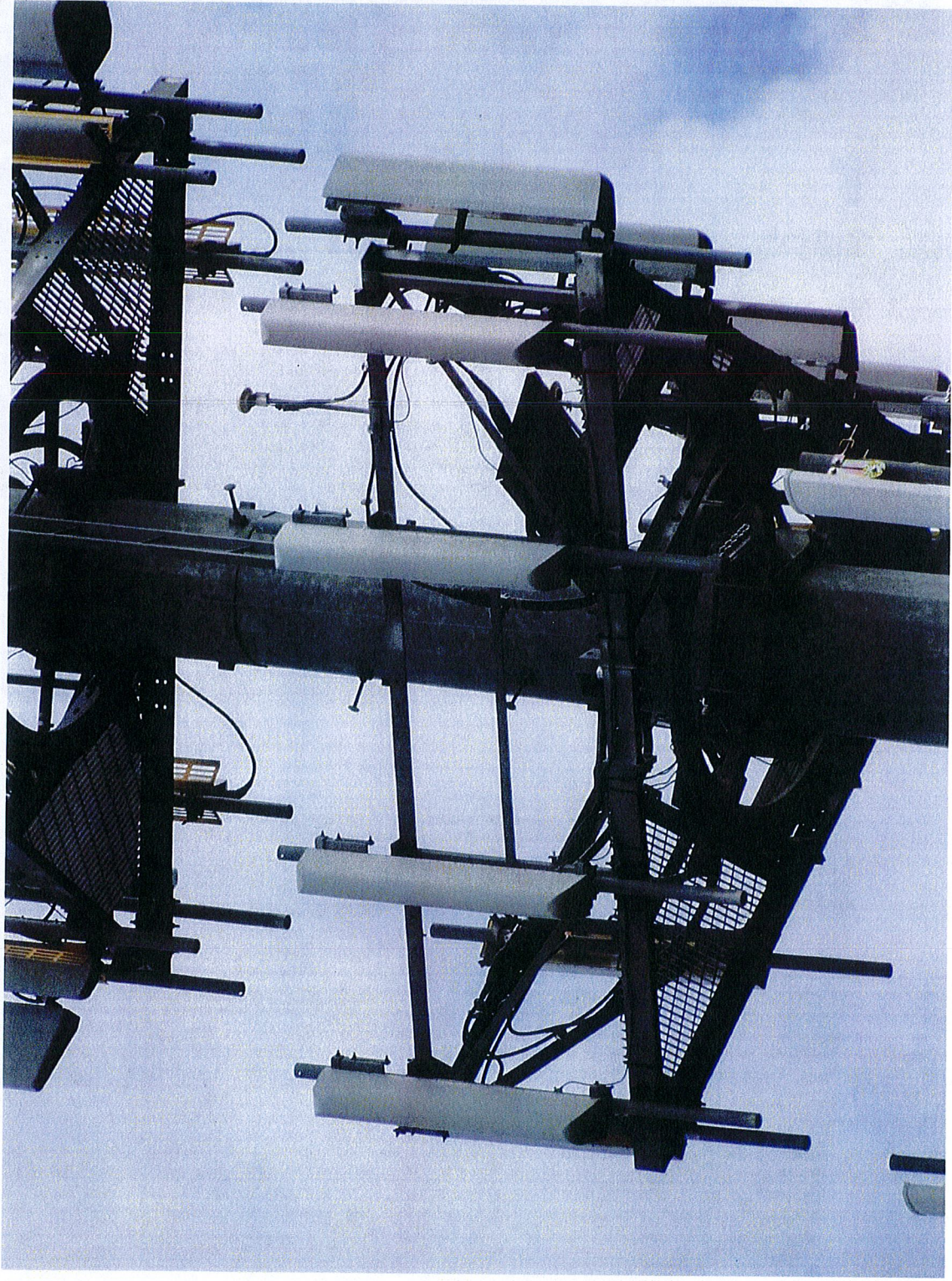
5.4 Verizon





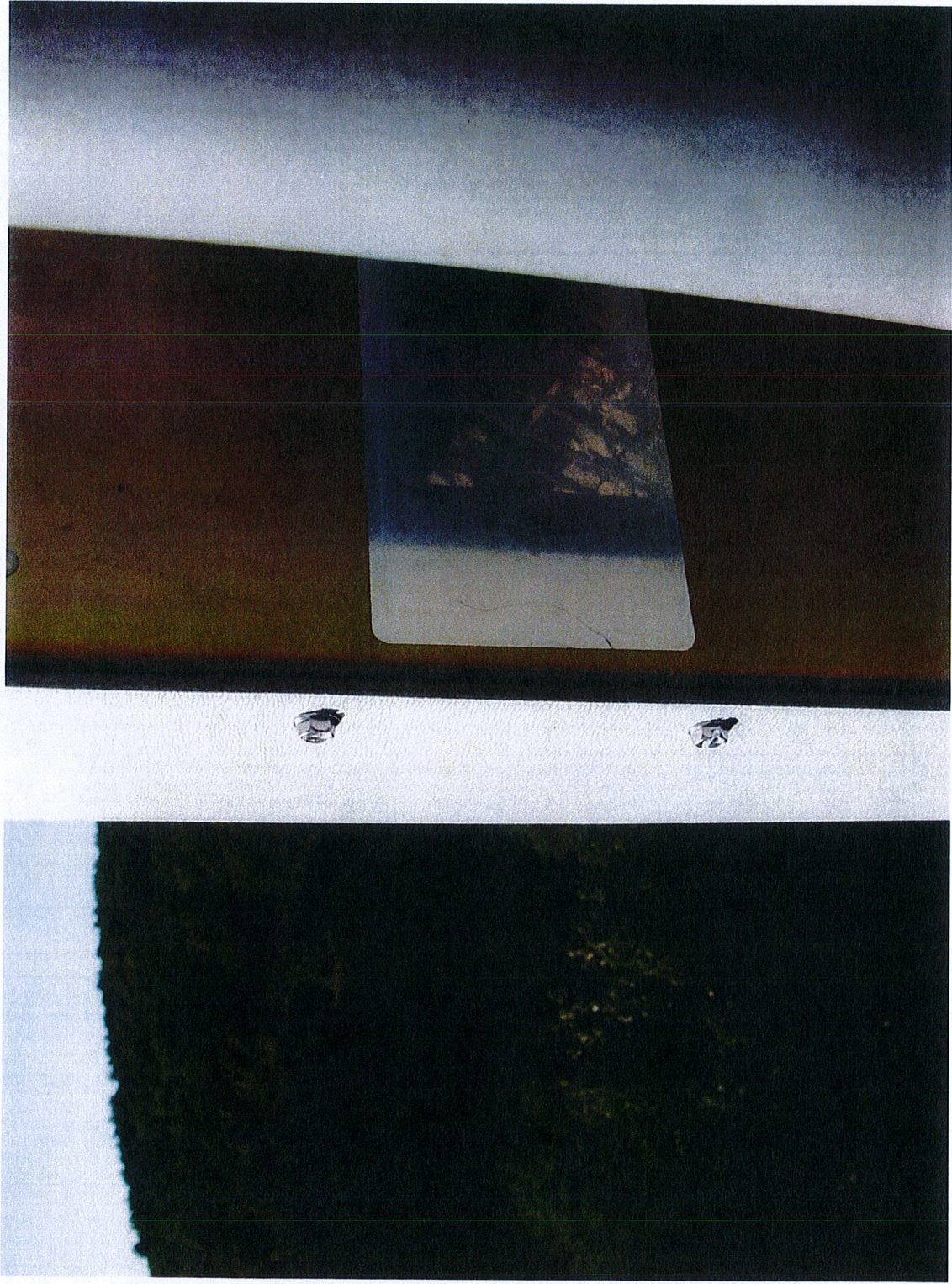
5.5 Verizon





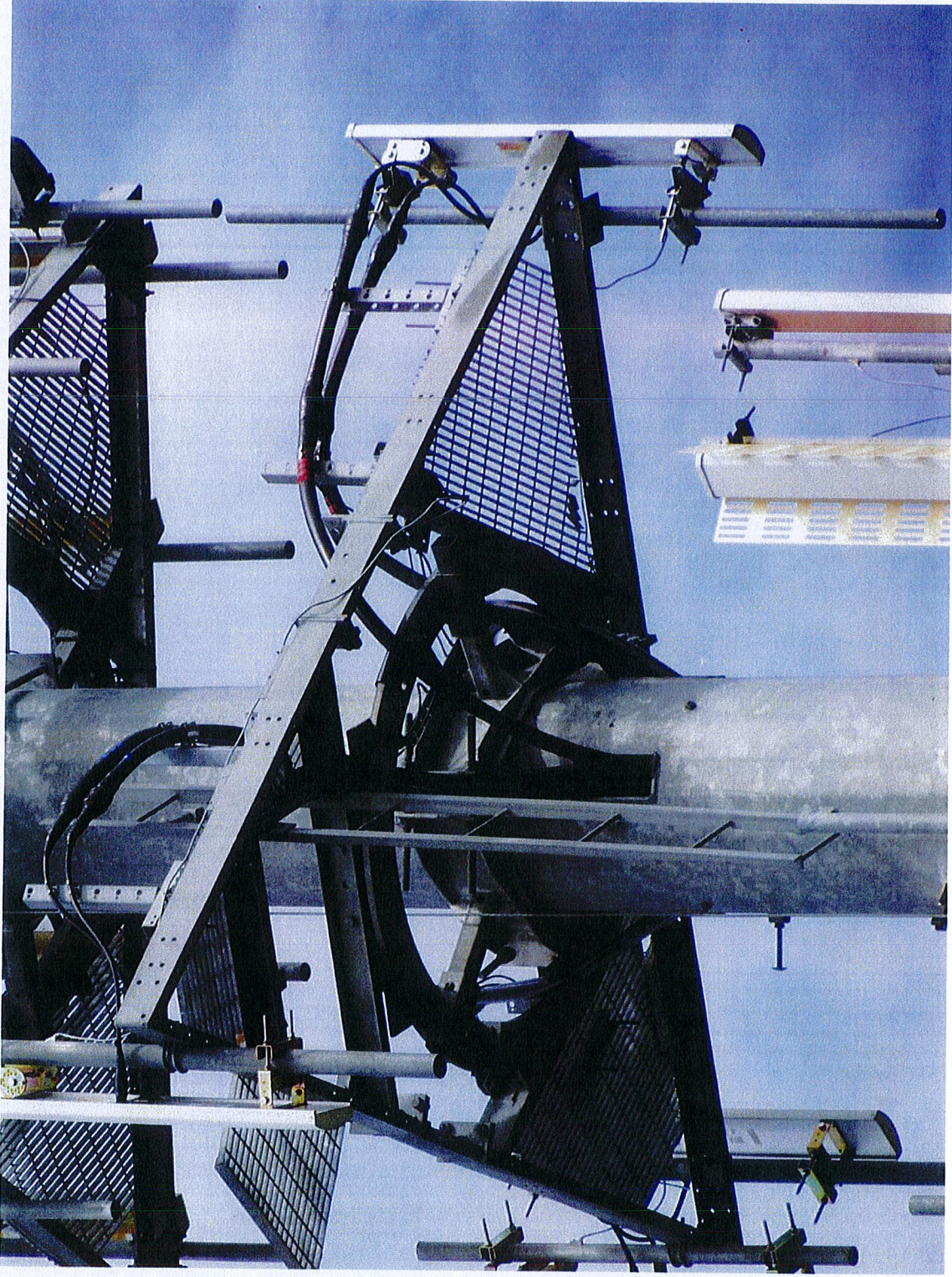
6.1 Sprint Nextel





6.2 Sprint Nextel





7.1 T-Mobile



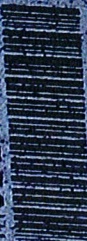
**EMS**<sup>TM</sup>

*Wireless*

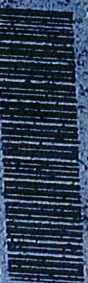
U.S. PATENT NO. 5,757,246  
5844529/6.069590/6.067.053

030616

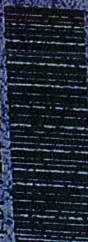
MODEL# RP901702DP



SERIAL# E00063002597

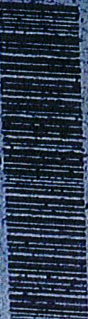


WRC538525



MFG#

601261-R08002D

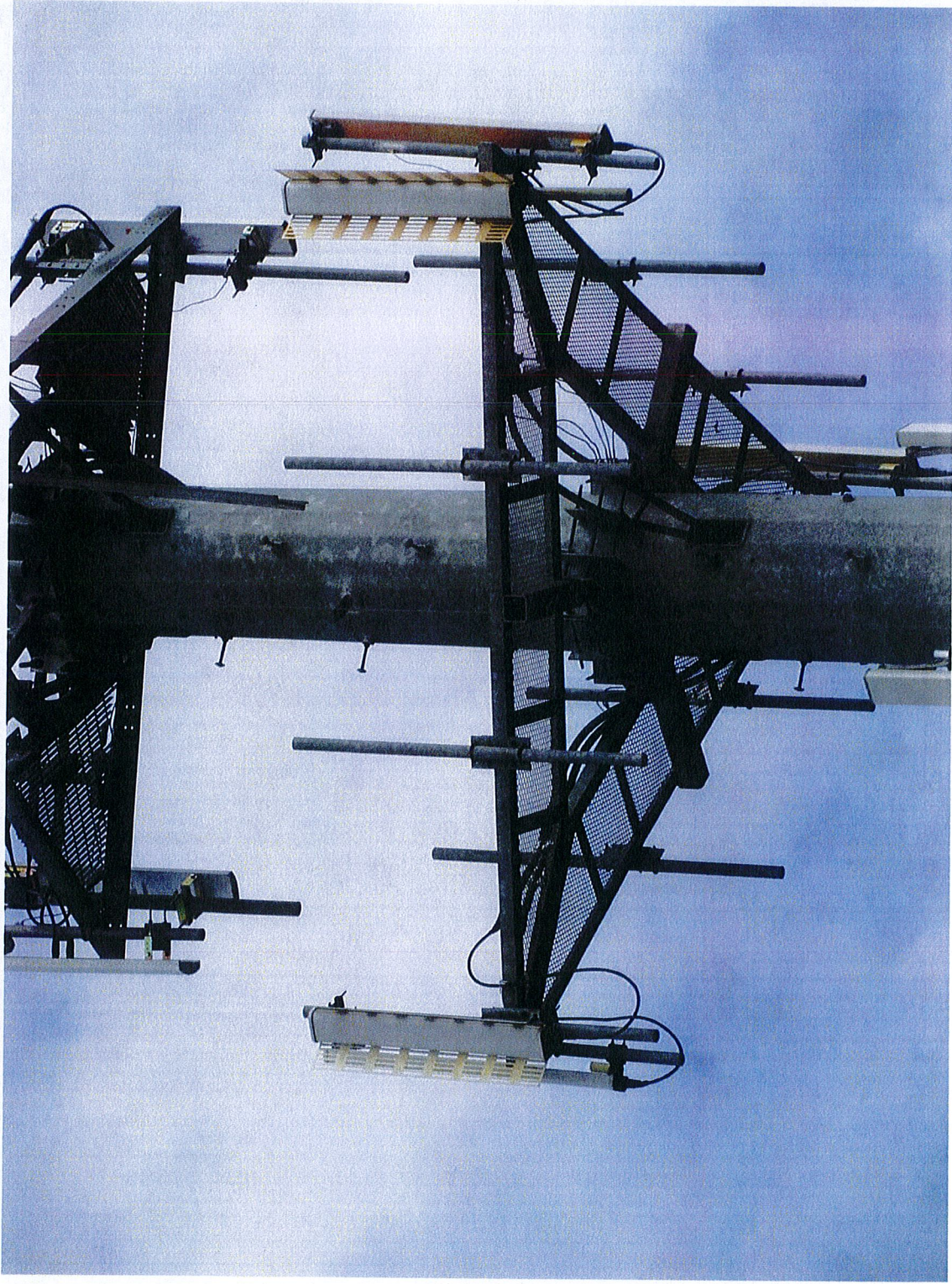


A



7.2 T-Mobile





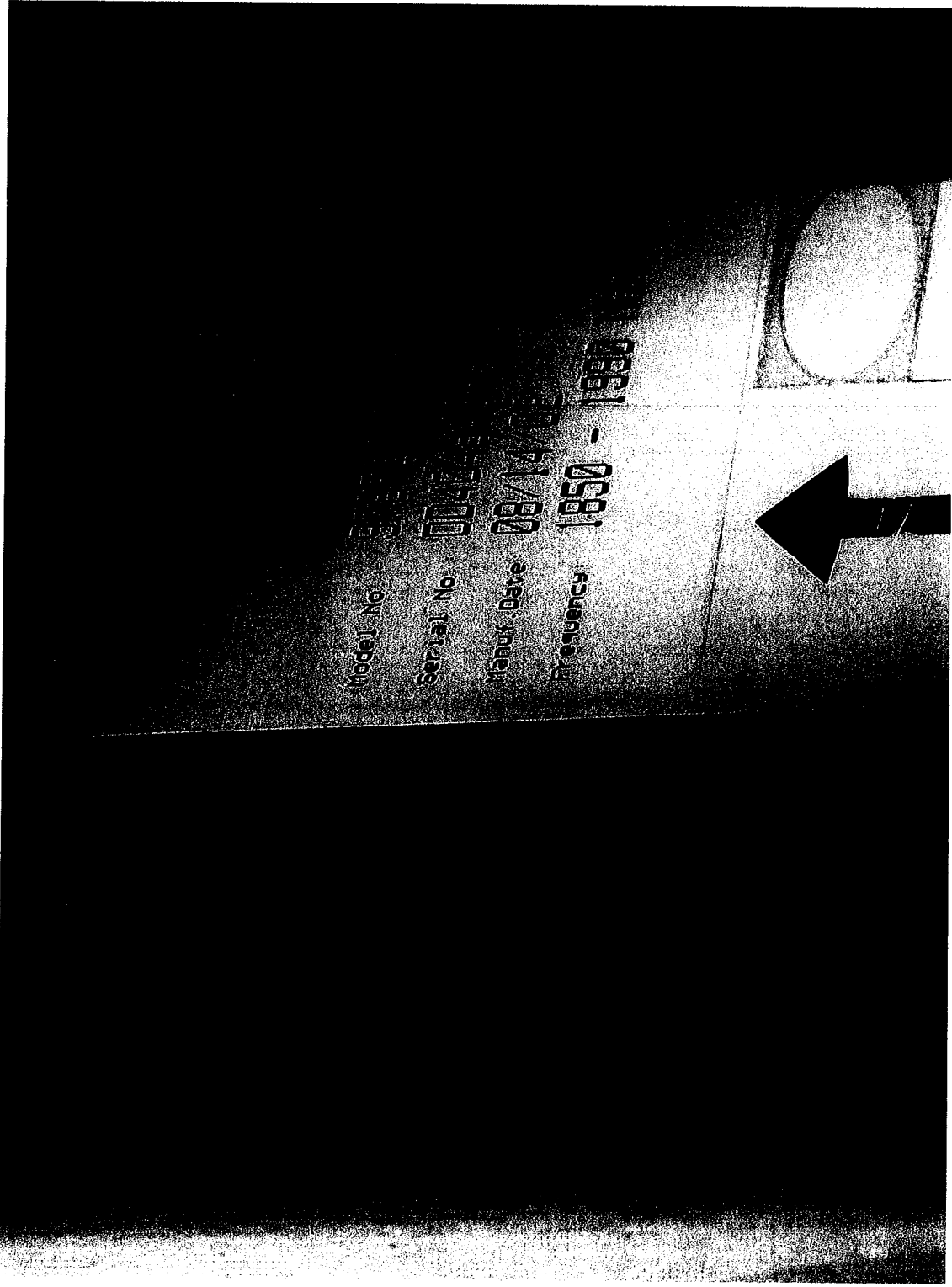
8.1 Sprint





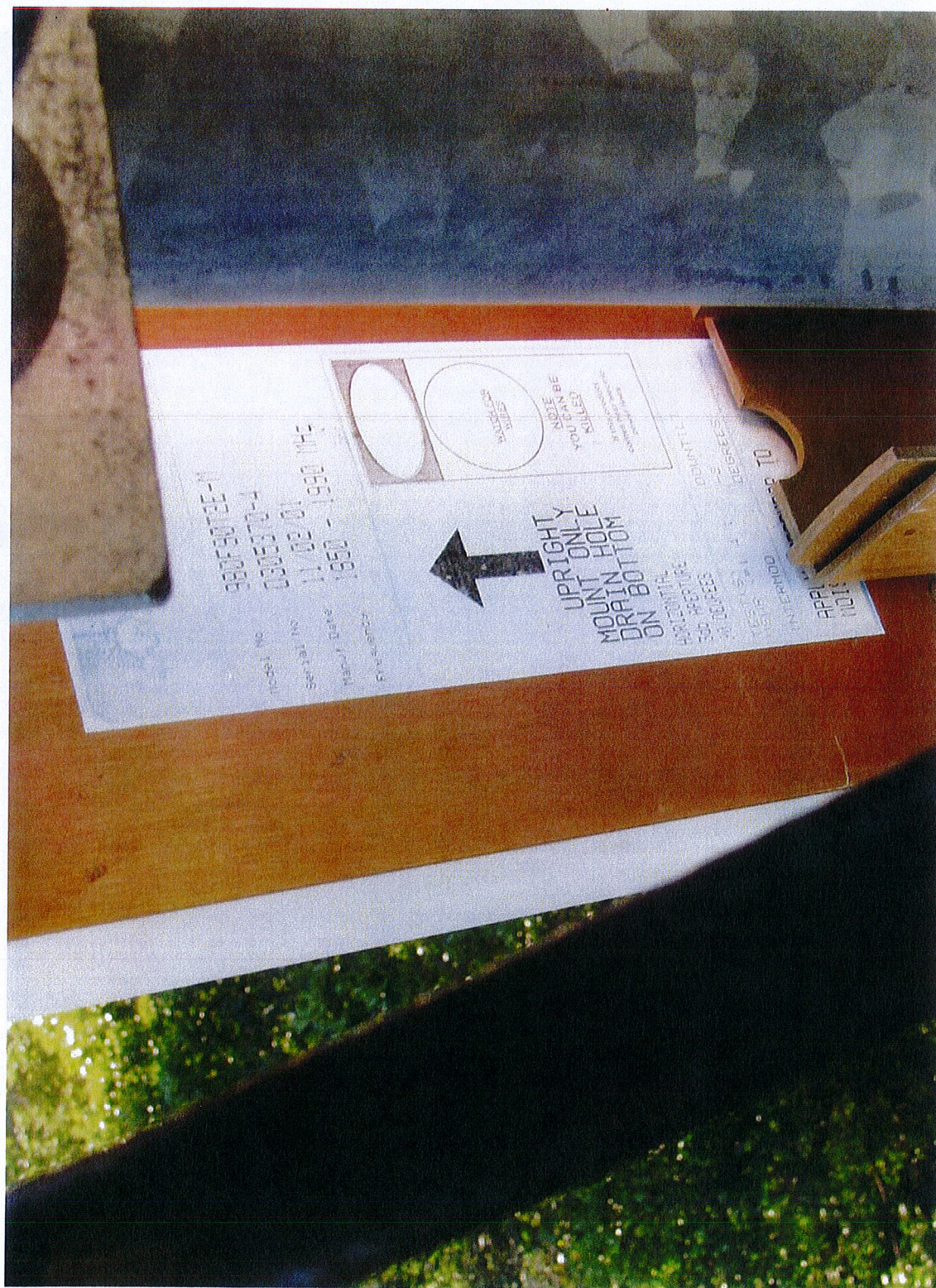
8.2 Sprint





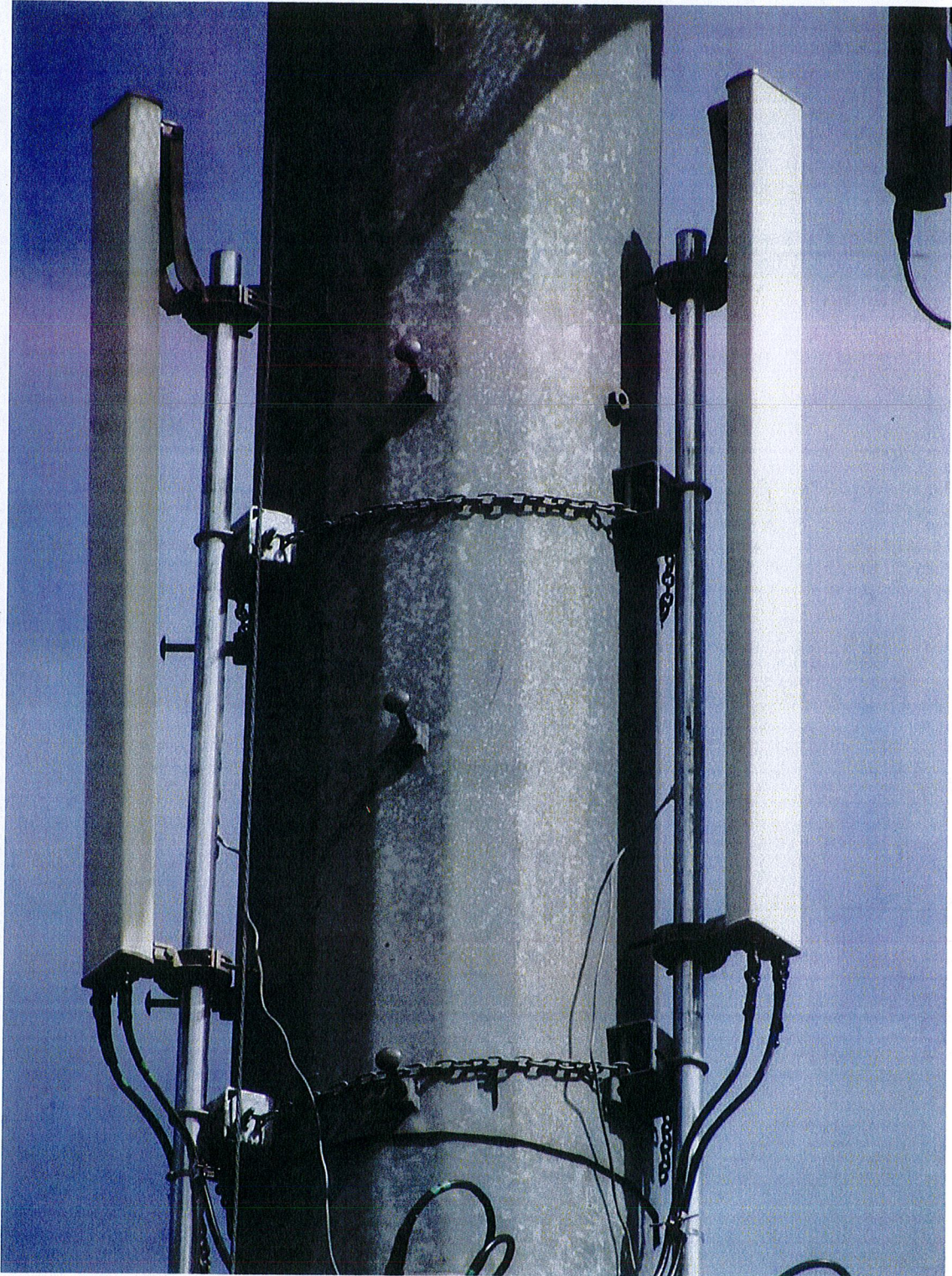
8.3 Sprint





8.4 Sprint





9.1 MetroPCS





9.2 MetroPCS