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
www.ct.gov/csc

March 24, 2009

Carrie L. Larson, Esq.
Pullman & Comley, LLC
90 State House Square
Hartford, CT 06103-3702

RE: **EM-POCKET-060-090306** – Youghiogheny Communications-Northeast, LLC d/b/a Pocket Communications notice of intent to modify an existing telecommunications facility located at 1919 Boston Post Road, Guilford, Connecticut.

Dear Attorney Larson:

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.

The proposed modifications are to be implemented as specified here and in your notice dated March 5, 2009, including the placement of all necessary equipment and shelters within the tower compound. 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. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/CDM/laf

c: The Honorable Carl A. Balestracci, Jr., First Selectman, Town of Guilford
Regina Reid, Zoning Enforcement Officer, Town of Guilford
Crown Castle USA, Inc.

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CONNECTICUT SITING COUNCIL

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Ten Franklin Square, New Britain, CT 06051
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www.ct.gov/csc

March 10, 2009

The Honorable Carl A. Balestracci, Jr.
First Selectman
Town of Guilford
Town Hall
31 Park Street
Guilford, CT 06437

RE: **EM-POCKET-060-090306** – Youghiogheny Communications-Northeast, LLC d/b/a Pocket Communications notice of intent to modify an existing telecommunications facility located at 1919 Boston Post Road, Guilford, Connecticut.

Dear Mr. Balestracci:

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 March 24, 2009.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/jb

Enclosure: Notice of Intent

c: Regina Reid, Zoning Enforcement Officer, Town of Guilford

PULLMAN & COMLEY, LLC
ATTORNEYS AT LAW

CARRIE L. LARSON
90 State House Square
Hartford, CT 06103-3702
p (860) 424-4312
f (860) 424-4370

www.pullcom.com

EM-POCKET-060-090306

March 5, 2009

Via Federal Express

ORIGINAL

S. Derek Phelps, Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

Re: Notice of Exempt Modification
Crown Castle USA, Inc. Telecommunications Facility
1919 Boston Post Road, Guilford, Connecticut

Dear Mr. Phelps:

Youghiogheny Communications-Northeast, LLC, doing business as Pocket Communications ("Pocket"), intends to install antennas and appurtenant equipment at the existing 150-foot monopole facility owned by Crown Castle USA, Inc. and located at 1919 Boston Post Road, Guilford, Connecticut ("Facility"). Pocket Communications provides prepaid, flat rate wireless voice and data services to more than a quarter of a million subscribers. Pocket is licensed by the Federal Communications Commission (FCC) to provide PCS wireless telecommunications service in the State of Connecticut, which includes the area to be served by the proposed installation. This installation constitutes an exempt modification pursuant to the Public Utility Environmental Standards Act, Connecticut General Statutes Section 16-50g et. seq. (PUESA), and Section 16-50j-72(b)(2) of the Regulations of the Connecticut State Agencies adopted pursuant to PUESA. In accordance with R.C.S.A. Section 16-50j-73, a copy of this notice has been sent to Carl A. Balestracci, First Selectman, Town of Guilford.

The existing Facility consists of a 150-foot self-supporting monopole tower capable of supporting multiple carriers within a fenced compound. The coordinates for the Facility are **Lat: 41°-18'-01" and Long: 72°–42'-27".** The tower is located in the southern portion of Guilford, approximately 300 feet east of Boston Post Road (Route 1) and roughly 800 feet north of Interstate 95 (see Site Map, attached as Exhibit A). The tower currently supports AT&T antennas at the one hundred thirteen foot (113') level centerline AGL (above ground level), Verizon antennas at the one hundred twenty five foot level (125') AGL, Sprint antennas at the one hundred thirty three foot level (133') AGL, Nextel antennas at the one hundred forty one foot level (141') AGL, and T-Mobile antennas at the one hundred forty nine foot level (149') AGL. Pocket proposes to install three RFS APXV18-206517S-C flush mount antennas on the tower at the one hundred three foot centerline (103') AGL, and a Nortel CDMA Micro BTS 3231 cabinet, mounted on an "H-Frame," contained within a three foot by three foot (3'-0" x 3'-

0") lease area. A small GPS antenna will be mounted to the H-Frame. An ice bridge will run from the lease area to the tower. Utilities will be run via a proposed underground conduit from an existing utility backboard, within the compound (See Design Drawings and Equipment Specifications, attached as Exhibits B and C respectively).

For the following reasons, the proposed modifications to the Boston Post Road Facility meet the exempt modification criteria set forth in R.C.S.A. Section 16-50j-72(b)(2):

1. The proposed modification will not increase the height of the tower as Pocket's antennas will be installed at a center line height of approximately 103 feet.

2. The installation of Pocket's equipment and shelter will not require an extension of the site boundaries.

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

4. The operation of the additional antennas will not increase the total radio frequency (RF) power density, measured at the site boundary, to a level at or above the standard adopted by the Connecticut Department of Environmental Protection as set forth in Section 22a-162 of the Connecticut General Statutes and MPE limits established by the Federal Communications Commission. The worst-case RF power density calculations for the proposed Pocket antennas would be 41.04% of the FCC standard (see general power density calculations table, attached as Exhibit D).

Also attached, Exhibit E, is a structural analysis confirming that the tower can support the existing and proposed antennas and associated equipment.

For the foregoing reasons, Pocket respectfully submits that the proposed antenna installation and equipment at the Guilford Facility constitutes an exempt modification under R.C.S.A. Section 16-50j-72(b)(2)

Respectfully Submitted,

Carrie L. Larson

cc: Carl A. Balestracci, First Selectman, Town of Guilford First Selectman
Roger Stone, Guilford Self Storage, underlying property owner
Developers Diversified Realty Corporation, underlying property owner

Exhibit A

Site Map

Pocket Site NHCT0215A

1919 Boston Post Road

Guilford, Connecticut

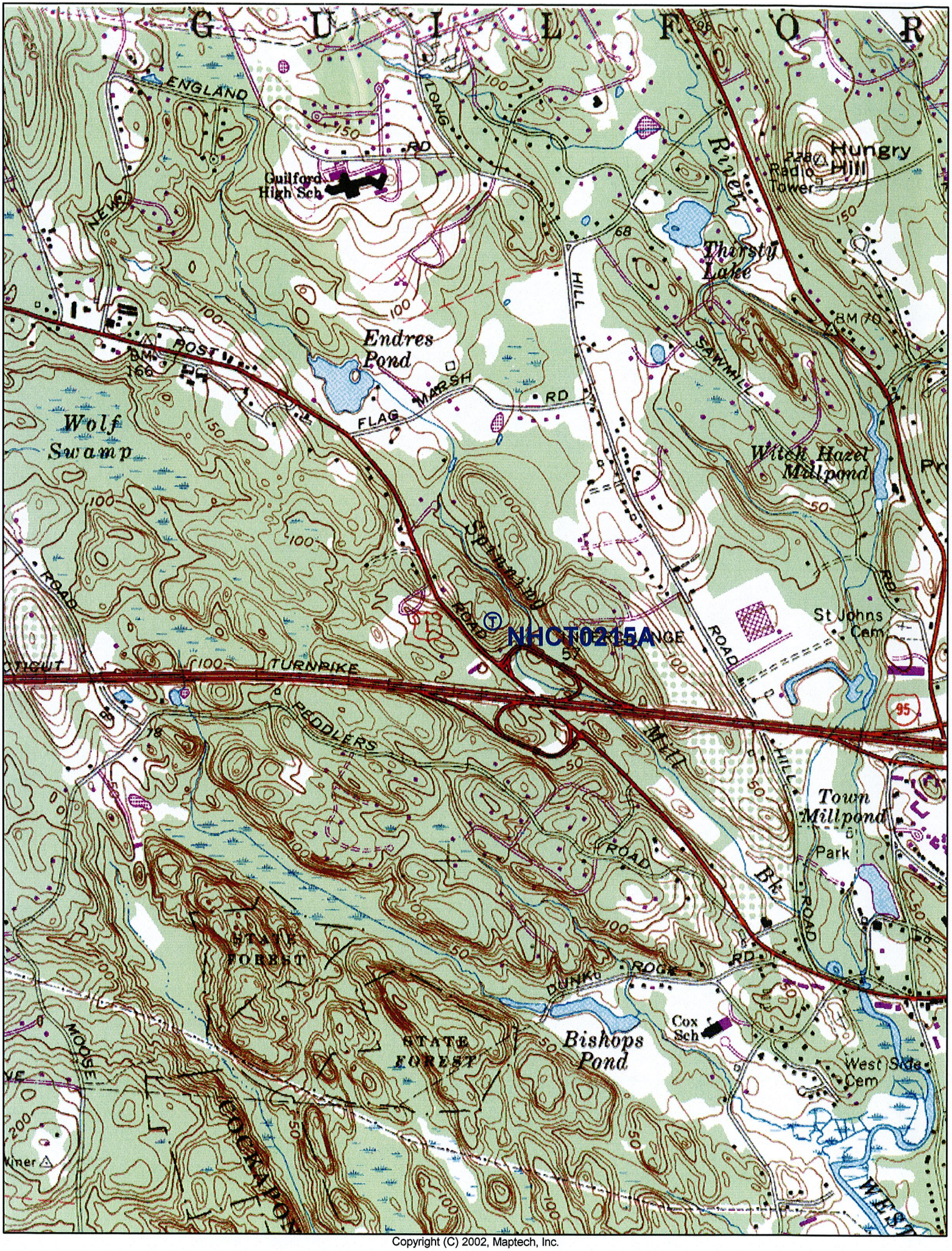


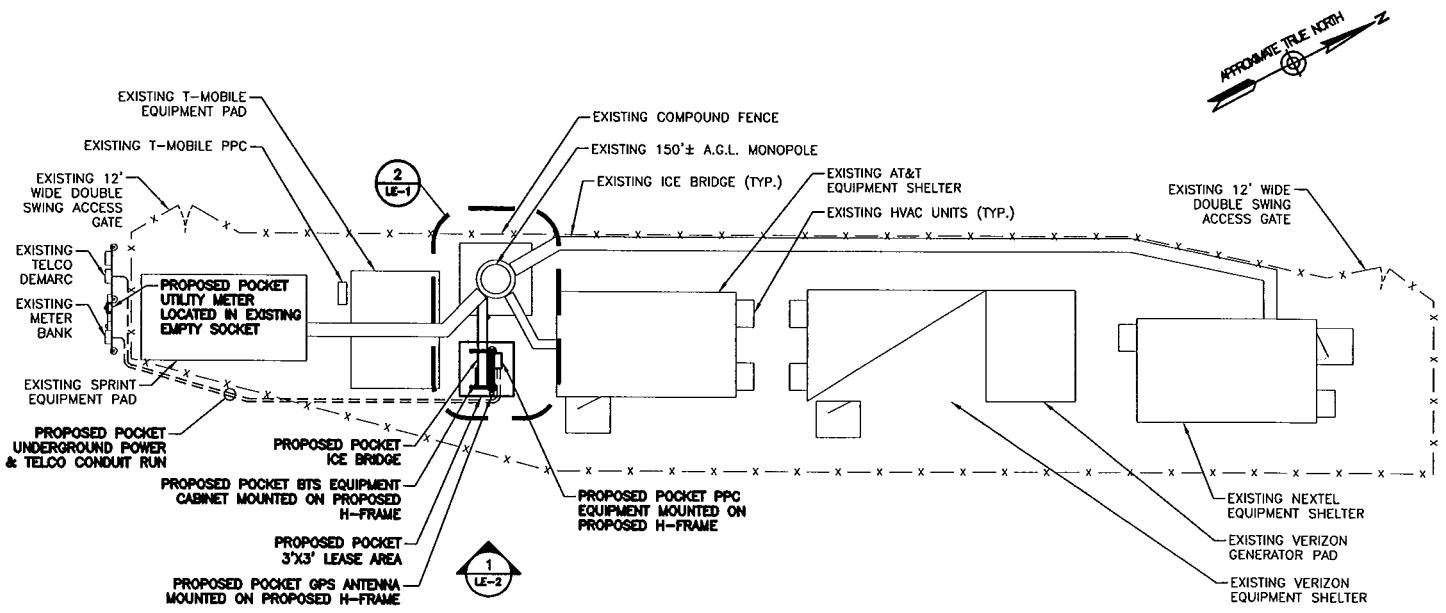
Exhibit B

Design Drawings

Pocket Site NHCT0215A

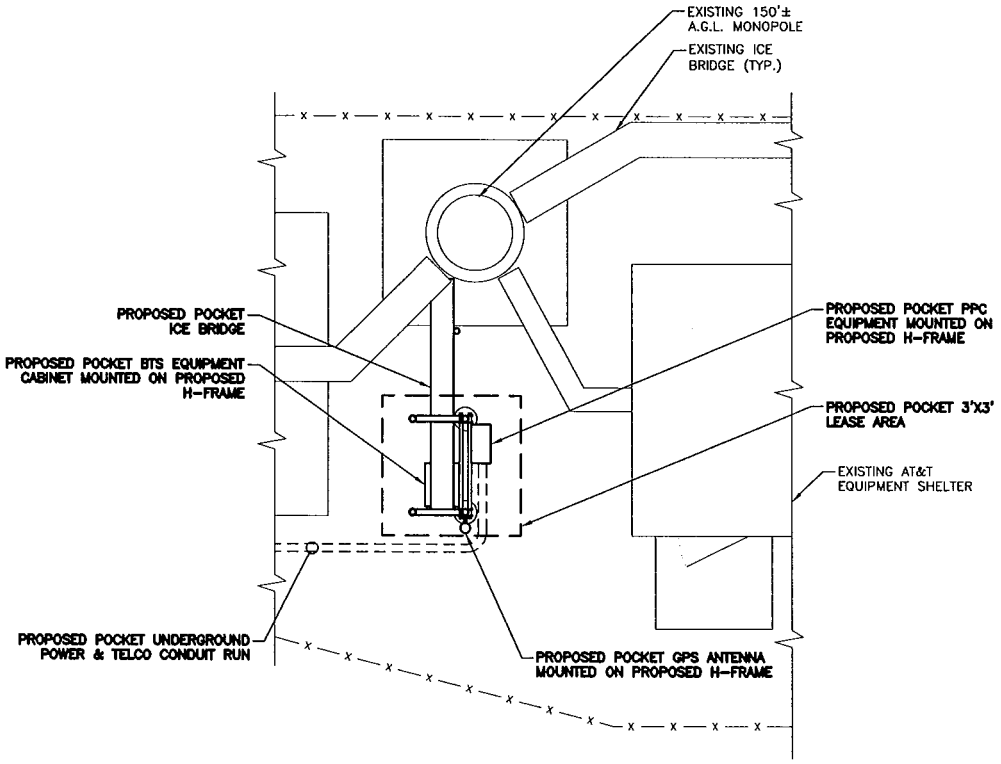
1919 Boston Post Road

Guilford, Connecticut



COMPOUND PLAN 1

SCALE: N.T.S.



EQUIPMENT LAYOUT PLAN 2

SCALE: N.T.S.

APPROX. COAX RUN
130'

APPROVALS

SITE OWNER	DATE
CONSTRUCTION MANAGER	DATE
R.F ENGINEER	DATE
SITE ACQUISITION	DATE

THE ABOVE PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL CONSTRUCTION DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND ANY CHANGES OR MODIFICATIONS THEY MAY IMPOSE.

MAXTON
50 Eastman St.
South Easton, MA 02375
Phone: (508) 936-6393
Fax: (508) 936-6395

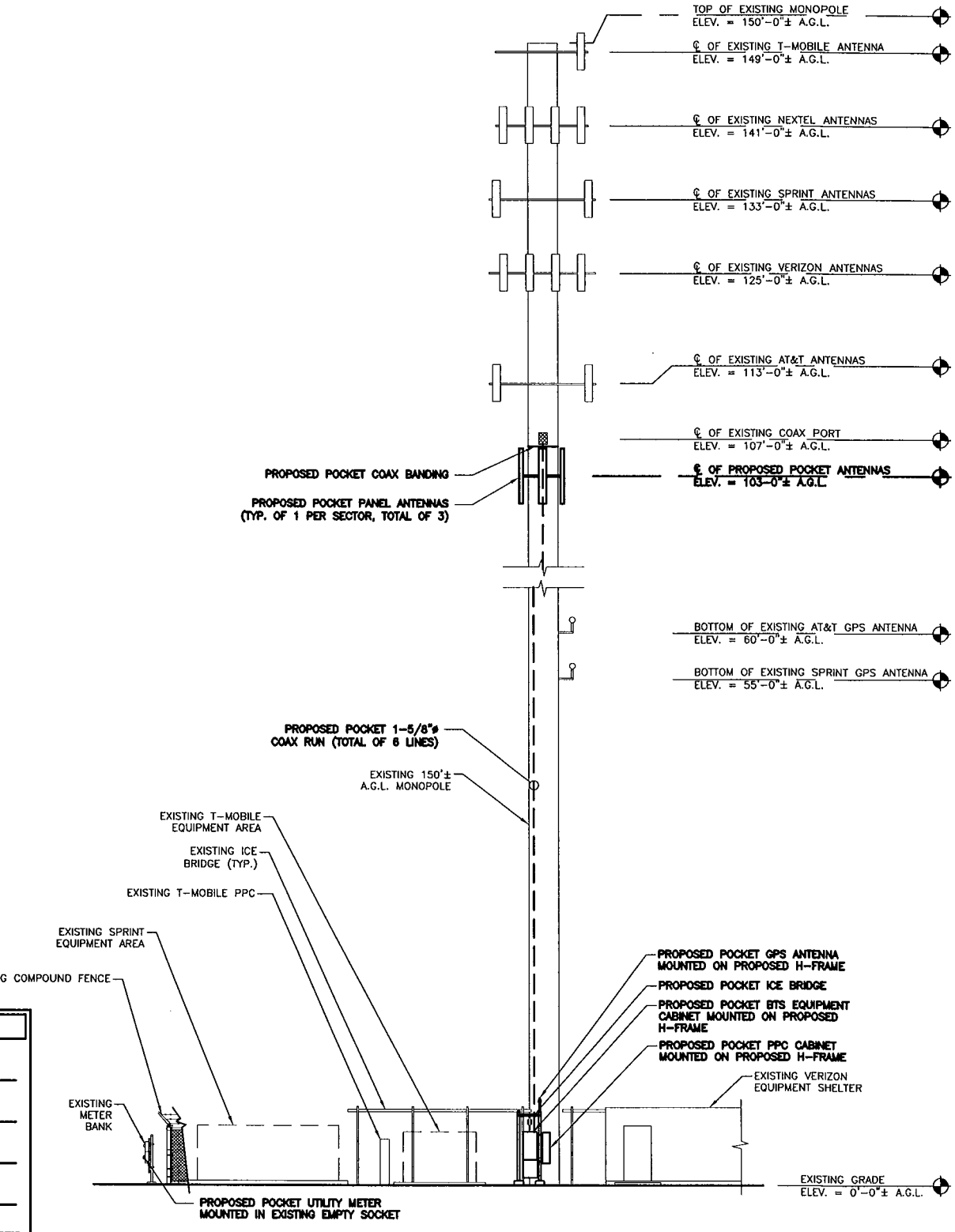
BAY STATE DESIGN
Bay State Design Associates, Inc.
Architects • Engineers
70 Tower Office Park
Woburn, MA 01801
Phone: 781-932-2467
Fax: 781-932-9771

PREPARED FOR:

pocket SMART WIRELESS

Pocket Communications
P.O. Box 5936
San Antonio, TX 78201

SITE NUMBER: NHCT0215B		DRAWN BY: PN	PROJECT NUMBER: 2882.040
SITE NAME: NHCT0215B GUILFORD, CT		CHECKED BY: JP	SHEET: LE-1
SITE ADDRESS: 1919 BOSTON POST ROAD GUILFORD, CT 06437		DATE: 03/04/09	



ELEVATION 1

SCALE: N.T.S.

APPROVALS

SITE OWNER	DATE
CONSTRUCTION MANAGER	DATE
R.F ENGINEER	DATE
SITE ACQUISITION	DATE

THE ABOVE PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL CONSTRUCTION DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND ANY CHANGES OR MODIFICATIONS THEY MAY IMPOSE.

MAXTON
50 Eastman St.
South Easton, MA 02375
Phone: (508) 936-6363
Fax: (508) 936-6365

BAY STATE DESIGN
Bay State Design Associates, Inc.
Architects • Engineers
70 Tower Office Park
Woburn, MA 01801
Phone: 781-932-2467
Fax: 781-932-9771

PREPARED FOR:

pocket SMART WIRELESS

Pocket Communications
P.O. Box 5936
San Antonio, TX 78201

SITE NUMBER: NHCT0215B		DRAWN BY: PN	PROJECT NUMBER: 2882.040
SITE NAME: NHCT0215B GUILFORD, CT		CHECKED BY: JP	SHEET: LE-2
SITE ADDRESS: 1919 BOSTON POST ROAD GUILFORD, CT 06437		DATE: 03/04/09	

Exhibit C

Equipment Specifications

Pocket Site NHCT0215A

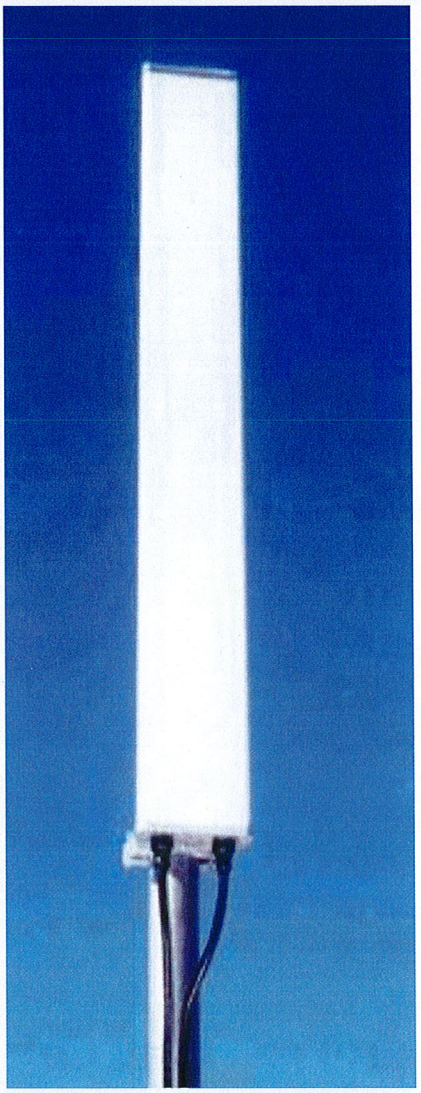
1919 Boston Post Road

Guilford, Connecticut

Technical Data Sheet | APXV18-206517S-C

Product Description

This variable tilt antenna provides exceptional suppression of all upper sidelobes at all downtilt angles. It also features null fill and a wide downtilt range with optional remote tilt.



Features/Benefits

- Variable electrical downtilt - provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.
- High Suppression of all Upper Sidelobes (Typically <-20dB).
- Optional remote tilt - can be retrofitted.
- Broadband design.
- Dual polarization.
- Low profile for low visual impact.

Technical Features

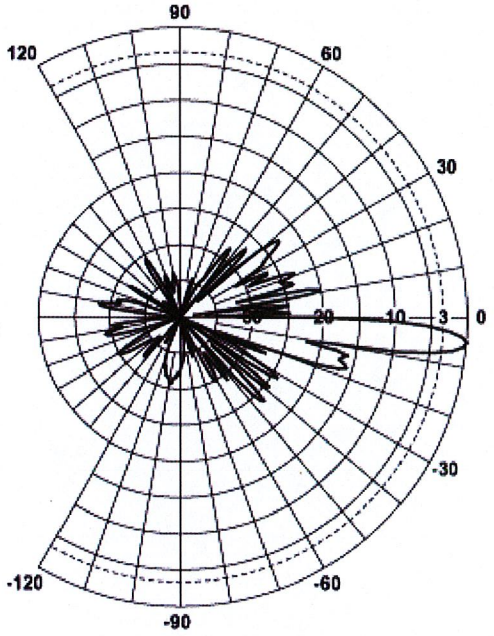
Frequency Band	3G/UMTS (Single, Broad, Dual and Triple-Band)
Horizontal Pattern	Directional
Antenna Type	Panel Dual Polarized
Electrical Down Tilt Option	Variable

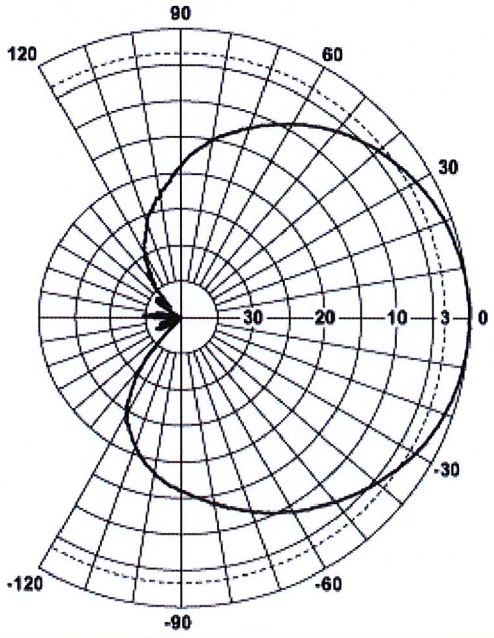
Technical Data Sheet APXV18-206517S-C

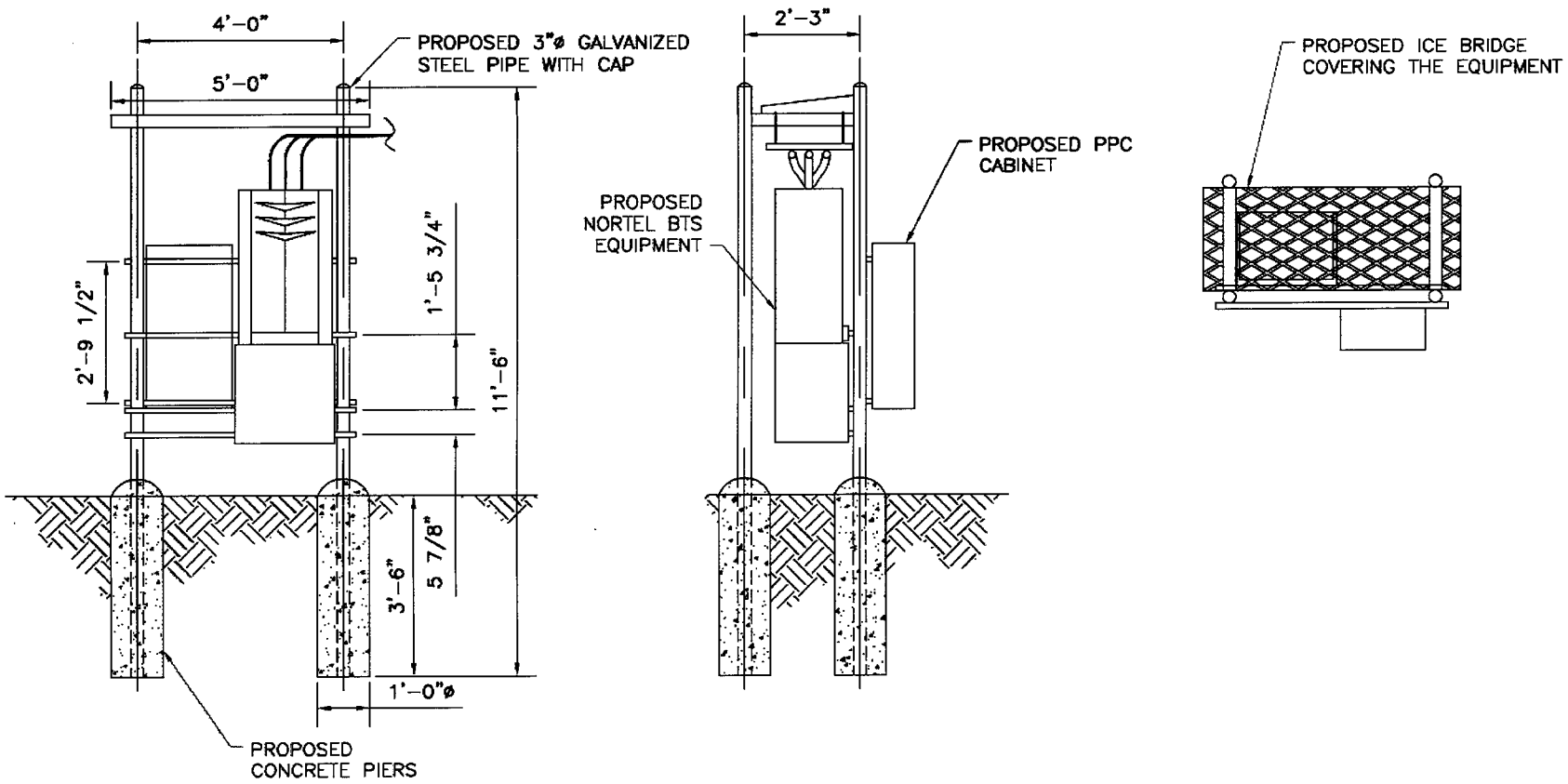
Gain, dBi (dBd)	18.8 (16.7) , 19.0 (16.9)
Frequency Range, MHz	1710-1900, 1900-2170
Connector Type	(2) 7-16 DIN Female
Connector Location	Bottom
Mount Type	Downtilt
Electrical Downtilt, deg	0-10
Horizontal Beamwidth, deg	67 , 63
Mounting Hardware	APM40-2
Rated Wind Speed, km/h (mph)	160 (100)
VSWR	< 1.5:1
Vertical Beamwidth, deg	5.0 , 4.6
Upper Sidelobe Suppression, dB	>17 , >18 all (Typically >20)
Polarization	Dual pol +/-45°
Front-To-Back Ratio, dB	>30
Maximum Power Input, W	300
Isolation between Ports, dB	>30
Lightning Protection	Direct Ground
3rd Order IMP @ 2 x 43 dBm, dBc	>150
7th Order IMP @ 2x46 dBm, dBc	>170
Impedance, Ohms	50
Overall Length, m (ft)	1.85 (6.06)
Mounting Hardware Weight, kg (lb)	3.4 (7.5)
Dimensions - HxWxD, mm (in)	1850 x 175 x 80 (72.0 x 6.8 x 3.15)
Weight w/o Mtg Hardware, kg (lb)	12 (26.4)
Weight w/ Mtg Hardware, kg (lb)	14.8 (32.5)
Radiating Element Material	Brass
Radome Color	Light Grey RAL7035
Radome Material	Fiberglass
Mounting Hardware Material	Diecasted Aluminum
Reflector Material	Aluminum
Max Wind Loading Area, m^2 (ft^2)	0.31 (3.3)
Survival Wind Speed, km/h (mph)	200 (125)
Maximum Thrust @ Rated Wind, N (lbf)	558 (125)
Front Thrust @ Rated Wind, N (lbf)	558 (125)
Shipping Weight, kg (lb)	18.3 (39.8)
Packing Dimensions, HxWxD, mm (in)	2021 x 260 x 200 (79.5 x 10.2 x 7.8)
Packing Dimensions - HxWxD, m (ft)	2.0 x 0.26 x 0.2 (6.6 x 0.85 x 0.65)

Notes

For additional mounting information please click "External Document Link" below.







Pocket/Youghiogheny Communications – Northeast, LLC
Rack Detail

>BUSINESS MADE **SIMPLE**

NORTEL

CDMA BTS 3231 AWS 1.7/2.1 GHz (Outdoor/Indoor)

CDMA BTS 3231

Industry's Highest Capacity AWS Micro BTS

The CDMA BTS 3231 is the latest extension to Nortel Networks BTS (Base Transceiver Station) portfolio providing the ideal solution for urban, sub-urban and rural deployments. The CDMA BTS 3231 is a 3-carrier, 3-sector outdoor/indoor BTS operating at the AWS band of 1.7/2.1 GHz supporting IS-95, 1XRTT and 1xEV-DO simultaneously. BTS 3231 provides flexible deployments solutions including floor, rack, and wall mount options. The power consumption of BTS3231 is industry leading consuming only 630W for 3C3S. The BTS 3231 is also very light at 240lbs making it easy to transport to hard to reach locations such as the top of a high rise building.

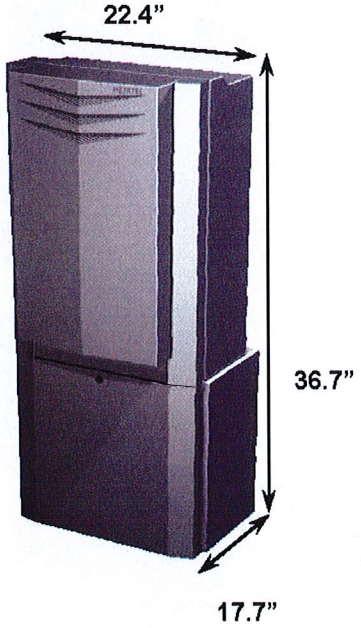


Exhibit D

Power Density Calculations

Pocket Site NHCT0215A

1919 Boston Post Road

Guilford, Connecticut

C Squared Systems, LLC
920 Candia Road
Manchester, NH 03109
Phone: (603) 657 9702
E-mail:
support@csquaredsystems.com

Calculated Radio Frequency Emissions

NHCT0215A

1919 Boston Post Road, Guilford, CT

Table of Contents

List of Tables

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed Pocket antennas to be installed on the existing tower at 1919 Boston Post Road, Guilford, CT.

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are much more conservative (higher) than the actual signal levels will be from the finished installation.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter (mW/ cm^2). The number of mW/cm^2 emitted is called the power density. The general population exposure limit for the cellular band is 0.567-0.593 mW/ cm^2, and the general population exposure limit for the PCS/AWS band is 1.0 mW/ cm^2. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

The FCC general population / uncontrolled limits set the maximum exposure to which most people may be subjected. General population / uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Higher exposure limits are permitted under the occupational / controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure (through training), and they must be able to exercise control over their exposure. General population / uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals."

The FCC describes exposure to radio frequency (RF) energy in terms of percentage of maximum permissible exposure (MPE) with 100% being the maximum allowed. Rather than the FCC presenting the user specification in terms of complex power density figures over a specified surface area, this MPE measure is particularly useful, and even more so when considering that power density limits actually vary by frequency because of the different absorptive properties of the human body at different frequencies.

MPE limits are specified as time-averaged exposure limits. This means that exposure can be averaged over 30 minutes for general population / uncontrolled exposure (or 6 minutes for occupational / controlled exposure). However, for the case of exposure of the general public, time averaging is usually not applied because of uncertainties over exact exposure conditions and difficulty in controlling time of exposure. Therefore, the typical conservative approach is to assume that any RF exposure to the general public will be continuous.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population / uncontrolled exposure and for occupational / controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include limits for Maximum Permissible Exposure (MPE) for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP), the exposure limits developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit. As shown in these excerpts, each frequency band has different exposure limits, requiring power density to be reported as a percent of Maximum Permissible Exposure (MPE) when dealing with carriers transmitting in different frequency bands.

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{0.64 \times EIRP}{\pi \times R^2} \right)$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna

V = Vertical Distance from bottom of antenna

0.64 is the ground reflection factor

4. Calculation Results

Table 1 below outlines the power density information for the site. All information for carriers other than Pocket was obtained from current CSC database, except where otherwise noted.

Carrier	Number of Trans.	Effective Radiated Power (ERP) Per Transmitter (Watts)	Antenna Height (Feet)	Operating Frequency (MHz)	Total ERP (Watts)	Power Density (mw/cm^2)	Limit	%MPE
T-Mobile	--	--	150	1930	--	0.0405	1.0000	4.05%
Nextel	9	100	140	851	900	0.0165	0.5673	2.91%
Sprint	11	122	130	1957.5	1342	0.0286	1.0000	2.86%
Verizon	9	200	122	880	1800	0.0435	0.5867	7.41%
Verizon	3	200	122	1900	600	0.0145	1.0000	1.45%
AT&T GSM	--	--	112	1900	--	0.0254	1.0000	2.54%
AT&T GSM	--	--	112	880	--	0.0651	0.5867	11.10%
AT&T UMTS	1	500	110	1935	500	0.0149	1.0000	1.49%
Pocket	3	631	103	2130-2133.75	1893	0.0723	1.0000	7.23%
							Total	41.04%

Table 1: Proposed Carrier Information

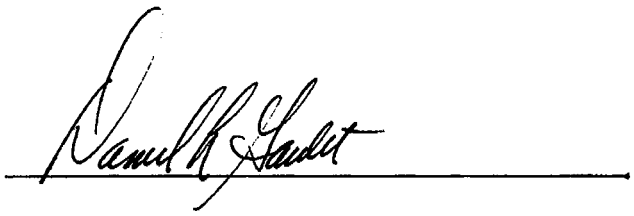
5. Conclusion

The above analysis verifies that emissions from the proposed site will be well below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed transmit antennas at the existing facility is well below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at the base of the tower is 41.04% of the FCC limit.

As noted in the introduction, obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the finished installation.

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.



February 11, 2009
Date

Daniel l. Goulet
C Squared Systems, LLC

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure

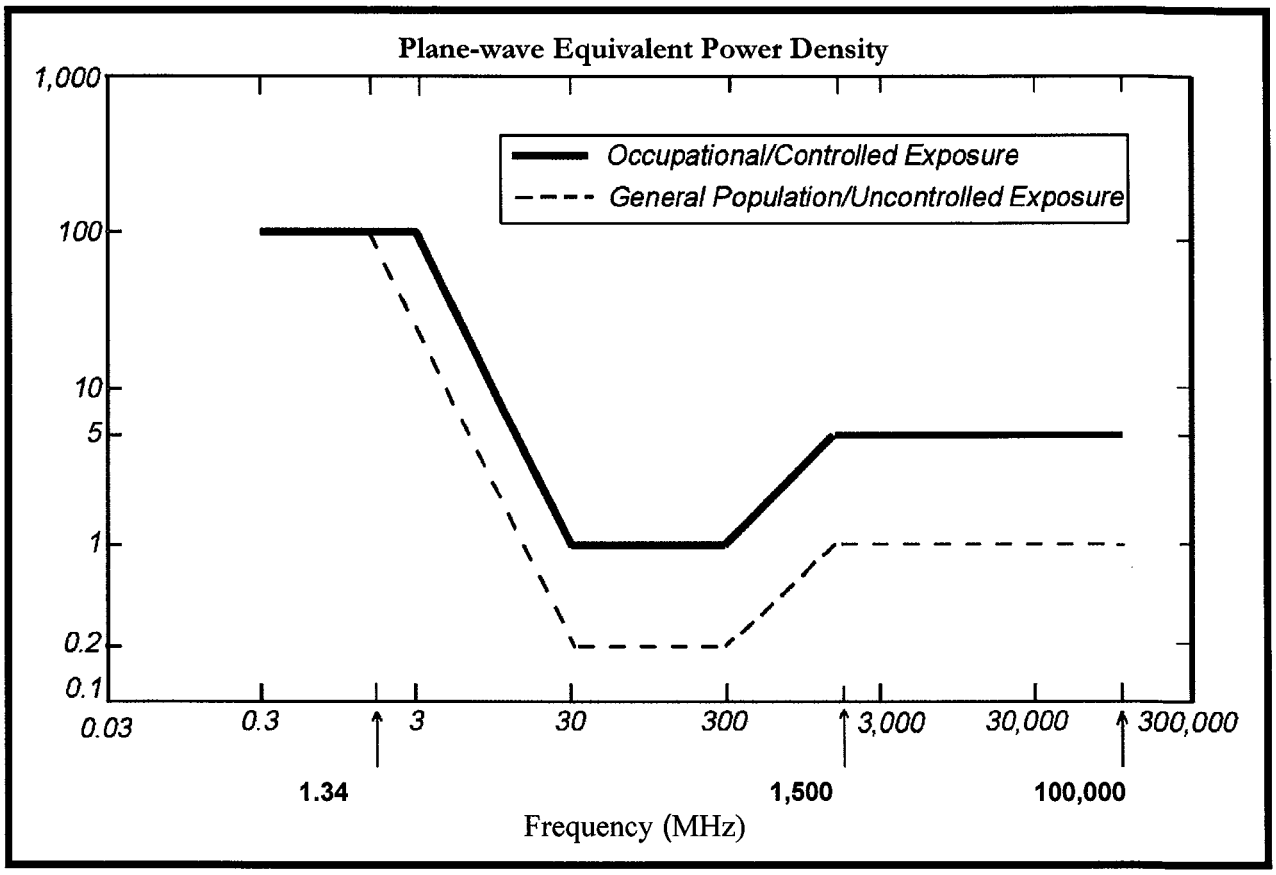
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

NOTE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.



• FCC Limits for Maximum Permissible Exposure (MPE)

Exhibit E

Structural Analysis

Pocket Site NHCT0215A

1919 Boston Post Road

Guilford, Connecticut

Date: **January 07, 2009**

Veronica Harris
Crown Castle USA Inc.
1200 McArthur Blvd
Mahwah, NJ 07430

Crown Castle USA Inc.
2000 Corporate Drive
Canonsburgh, Pa 15317
(724)416-2000

Subject: **Structural Analysis Report**

Carrier Designation:	***YOUGHIOGHENY COMMUNICATIONS-TX* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	NHCT0215A
Crown Castle Designation:	**Crown Castle BU Number:**	876343
	Crown Castle Site Name:	GUILFORD WEST STONE PROPERTY
	Crown Castle JDE Job Number:	113585
	Crown Castle Work Order Number:	247471
Engineering Firm Designation:	**Crown Castle USA Inc. Project Number:**	247471
Site Data:	**1919 Boston Post Rd., GUILFORD, New Haven County, CT**	
	Latitude *41° 18' 1.27"*, Longitude *-72° 42' 29.13"*	
	149 Foot - Monopole Tower	

Dear Veronica Harris,

Crown Castle USA Inc. is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 72436, in accordance with application 72436, revision 1.

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

LC1: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and local code requirements based upon a wind speed of 85 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

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

Respectfully submitted by:

Aaron C Poot, P.E.
Engineering Supervisor

STATE OF CONNECTICUT
AARON C. POOT
No. 25050
LICENSED PROFESSIONAL ENGINEER
1/7/09

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 149 ft Monopole tower designed by EEI in June of 2008. The tower was originally designed for a wind speed of 115 mph per TIA-222-G.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 73.6 mph with 0.5 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
103	103	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1 5/8	-
		-	tower mounts	Pipe Mount [PM 502-3]			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
149	149	3	ems wireless	RR90-17-02DP w/Mount Pipe	6	1 5/8	1
		6	ericsson	KRY 112 71/1			
		-	tower mounts	Pipe Mount [PM 502-3]			
141	142	12	decibel	DB844H90 w/Mount Pipe	12	1 1/4	1
	141	-	tower mounts	Platform Mount [LP 303-1]			
133	134	6	decibel	DB980H90E-M w/Mount Pipe	6	1 5/8	1
		9	mla	MLA_ANTENNA w/Mount Pipe	9	1 5/8	2
	133	-	tower mounts	Sector Mount [SM 301-3]	-	-	1
125	129	1	maxrad	GPS-TMG-26NMS	12 1	1 1/4 1/2	1
	127	6	allgon	7130.16.05.00 w/Mount Pipe			
		6	antel	LPD-7905/4 w/Mount Pipe			
	125	-	tower mounts	Sector Mount [SM 301-3]			
	125	-	-	-	12	1 5/8	3
113	115	6	powerwave technologies	7200.40 w/Mount Pipe	12	7/8	1
		9	powerwave technologies	7770.00 w/Mount Pipe	12	1 5/8	3
		12	powerwave technologies	LGP 21403	-	-	1
		12	powerwave technologies	LGP 21403			3
	113	-	tower mounts	Sector Mount [SM 301-3]			1
60	60	1	kathrein	738 449	2	1/2	3
		1	kathrein	GPS-C			
		-	tower mounts	Pipe Mount [PM 501-2]			
55	57	1	lucent	KS24019-L112A	1	1/2	1
	55	-	tower mounts	Pipe Mount [PM 501-1]			

Notes:
1) Existing Equipment
2) MLA Equipment Controlling: Was considered in the analysis
3) SLA equipment controlling: Was considered in the analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
150	150	12	Generic	72" x 12" Panel	-	-
140	140	12	Generic	72" x 12" Panel	-	-
130	130	12	Generic	72" x 12" Panel	-	-
120	120	12	Generic	72" x 12" Panel	-	-

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
110	110	12	Generic	72" x 12" Panel	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Reports	Terracon, Project #J2085178	Doc.2302346	CCISites
Foundation Design Drawings	EEI, Job# 15475-E01	Doc. 2302348	CCISites
Manufacturer Design Drawings	EEI, Job# 15475-E01	Doc. 2302343	CCISites

3.1) Analysis Method

RISATower (version 5.3.1.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle USA Inc. should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	149 - 135.039	Pole	TP26.77x22x0.1875	1	-2.46	781.03	6.6	Pass
L2	135.039 - 92.1667	Pole	TP40.91x25.0568x0.25	2	-12.60	1575.67	57.5	Pass
L3	92.1667 - 45.2031	Pole	TP56.31x38.49x0.3125	3	-22.73	2590.42	69.4	Pass
L4	45.2031 - 0	Pole	TP71x53.1456x0.375	4	-39.97	3890.11	67.8	Pass
							Summary	
						Pole (L3)	69.4	Pass
						Rating =	69.4	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	41.3	Pass
1	Base Plate	0	47.8	Pass
1	Base Foundation Soil Interaction	0	88.3	Pass

Structure Rating (max from all components) =	88.3%

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

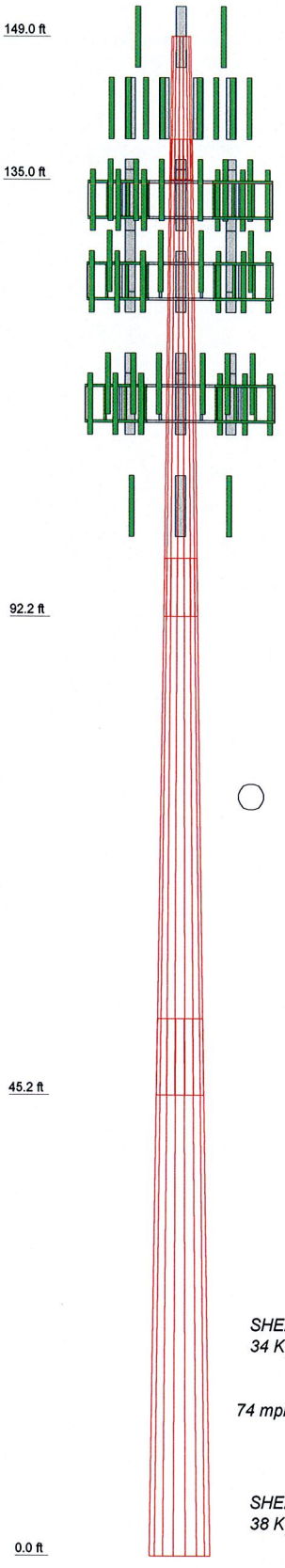
4.1) Recommendations

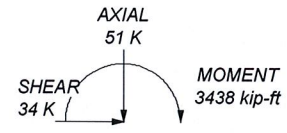
The structure and its foundation are capable of supporting the existing, reserved and proposed loading.

APPENDIX A

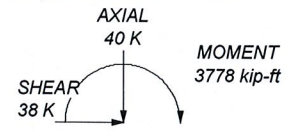
RISA TOWER OUTPUT

Section	4	3	2	1
Length (ft)	52'8-13/32"	52'7-9/16"	46'9-15/32"	13'11-17/32"
Number of Sides	18	18	18	18
Thickness (in)	0.3750	0.3125	0.2500	0.1875
Lap Splice (ft)		7'6"	5'8-1/32"	3'11-1/32"
Top Dia (in)	53.1456	38.4900	25.0568	22.0000
Bot Dia (in)	71.0000	56.3100	40.9100	26.7700
Grade	A572-65			
Weight (K) 26.4	13.2	8.4	4.1	0.7





TORQUE 1 kip-ft
74 mph WIND - 0.5000 in ICE



TORQUE 1 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
RR90-17-02DP w/Mount Pipe	149	(2) 7130.16.05.00 w/Mount Pipe	125
RR90-17-02DP w/Mount Pipe	149	(2) LPD-7905/4 w/Mount Pipe	125
RR90-17-02DP w/Mount Pipe	149	Sector Mount [SM 301-3]	125
Pipe Mount [PM 502-3]	149	(3) 7770.00 w/Mount Pipe	113
(2) KRY 112 71/1	149	(3) 7770.00 w/Mount Pipe	113
(2) KRY 112 71/1	149	(3) 7770.00 w/Mount Pipe	113
(2) KRY 112 71/1	149	(4) LGP 21403	113
(4) DB844H90 w/Mount Pipe	141	(4) LGP 21403	113
(4) DB844H90 w/Mount Pipe	141	(4) LGP 21403	113
(4) DB844H90 w/Mount Pipe	141	Sector Mount [SM 301-3]	113
Platform Mount [LP 303-1]	141	APXV18-206517S-C w/ Mount Pipe	103
(3) MLA_ANTENNA w/Mount Pipe	133	APXV18-206517S-C w/ Mount Pipe	103
(3) MLA_ANTENNA w/Mount Pipe	133	APXV18-206517S-C w/ Mount Pipe	103
(3) MLA_ANTENNA w/Mount Pipe	133	Pipe Mount [PM 502-3]	103
Sector Mount [SM 301-3]	133	GPS-C	60
GPS-TMG-26NMS	125	738 449	60
(2) 7130.16.05.00 w/Mount Pipe	125	Pipe Mount [PM 501-1]	60
(2) LPD-7905/4 w/Mount Pipe	125	Pipe Mount [PM 501-1]	60
(2) 7130.16.05.00 w/Mount Pipe	125	KS24019-L112A	55
(2) LPD-7905/4 w/Mount Pipe	125	Pipe Mount [PM 501-1]	55

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 69.4%

CROWN CASTLE
Shaping the Wireless World
Crown Castle USA Inc.
2000 Corporate Drive
Canonsburgh, Pa 15317
Phone: (724)416-2000
FAX: (724)416-2254

Job: BU#876343			
Project: WO# 247471			
Client: Crown Castle USA, Inc	Drawn by: vpierrissaint	App'd:	
Code: TIA/EIA-222-F	Date: 01/07/09	Scale: NTS	
Path: R:\SA Models - Letters\Work Area\Vpierrissaint\876343 WO247471\876343.eri		Dwg No. E-1	

Tower Input Data

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

Tower is located in New Haven County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	149'-135'15/32"	13'11-17/32"	3'11-1/32"	18	22.0000	26.7700	0.1875	0.7500	A572-65 (65 ksi)
L2	135'15/32"-92'2-1/32"	46'9-15/32"	5'8-1/32"	18	25.0568	40.9100	0.2500	1.0000	A572-65 (65 ksi)
L3	92'2-1/32"-45'2-13/32"	52'7-9/16"	7'6"	18	38.4900	56.3100	0.3125	1.2500	A572-65 (65 ksi)
L4	45'2-13/32"-0'	52'8-13/32"		18	53.1456	71.0000	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.3394	12.9812	780.3007	7.7434	11.1760	69.8193	1561.6281	6.4918	3.5420	18.891
	27.1830	15.8199	1412.3200	9.4368	13.5992	103.8535	2826.4984	7.9115	4.3815	23.368
L2	26.7909	19.6842	1530.3710	8.8064	12.7289	120.2285	3062.7556	9.8440	3.9700	15.88
	41.5411	32.2637	6738.8611	14.4343	20.7823	324.2600	13486.5893	16.1349	6.7602	27.041
L3	41.0320	37.8673	6972.9573	13.5530	19.5529	356.6197	13955.0898	18.9373	6.2242	19.918
	57.1787	55.5425	22003.9328	19.8791	28.6055	769.2209	44036.8189	27.7765	9.3606	29.954
L4	56.5454	62.8102	22097.9178	18.7336	26.9980	818.5033	44224.9127	31.4111	8.6936	23.183
	72.0953	84.0614	52972.5675	25.0719	36.0680	1468.6860	106014.837	42.0387	11.8360	31.563

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 149'-135'15/32'				1	1	1		
L2 135'15/32"-92' 2-1/32"				1	1	1		
L3 92'2-1/32"-45'2 -13/32"				1	1	1		
L4 45'2-13/32"-0'				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A (1-5/8 FOAM)	A	No	CaAa (Out Of Face)	149' - 7'	3	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
LDF6-50A (1-1/4 FOAM)	A	No	Inside Pole	141' - 7'	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	133' - 7'	9	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	125' - 7'	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF4-50A (1/2 FOAM)	C	No	Inside Pole	125' - 7'	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
LDF7-50A (1-5/8 FOAM)	A	No	Inside Pole	113' - 7'	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF4P-50A (1/2 FOAM)	A	No	Inside Pole	60' - 7'	2	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
LDF4-50A (1/2 FOAM)	C	No	Inside Pole	55' - 7'	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
LDF7-50A (1-5/8 FOAM)	A	No	CaAa (Out Of Face)	149' - 7'	3	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
LDF7-50A (1-5/8 FOAM)	C	No	CaAa (Out Of Face)	103' - 7'	3	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
LDF7-50A (1-5/8 FOAM)	C	No	CaAa (Out Of Face)	103' - 7'	3	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
LDF4-50A (1/2 FOAM)	C	No	CaAa (Out Of Face)	149' - 7'	1	No Ice	0.06	0.15
						1/2" Ice	0.16	0.84

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	149'-135'15/32"	A	0.000	0.000	0.000	8.293	0.12
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.880	0.00
L2	135'15/32"-92'2-1/32"	A	0.000	0.000	0.000	25.466	0.76
		B	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	0.000	9.136	0.69
L3	92'2-1/32"-45'2-13/32"	A	0.000	0.000	0.000	27.896	1.07
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	30.855	1.06
L4	45'2-13/32"-0'	A	0.000	0.000	0.000	22.693	0.88
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	25.099	0.86

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	149'-135'15/32"	A	0.500	0.000	0.000	0.000	12.481	0.24
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.276	0.01
L2	135'15/32"-92'2-1/32"	A	0.500	0.000	0.000	0.000	38.327	1.15
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	16.673	0.82
L3	92'2-1/32"-45'2-13/32"	A	0.500	0.000	0.000	0.000	41.985	1.50
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	49.640	1.51
L4	45'2-13/32"-0'	A	0.500	0.000	0.000	0.000	34.153	1.23
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	40.380	1.24

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	149'-135'15/32"	-0.0618	-0.6376	-0.1356	-0.7807
L2	135'15/32"-92'2-1/32"	-0.2394	-0.5537	-0.3715	-0.6872
L3	92'2-1/32"-45'2-13/32"	-0.6513	-0.3039	-0.9125	-0.3643
L4	45'2-13/32"-0'	-0.5897	-0.2752	-0.8574	-0.3423

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RR90-17-02DP w/Mount Pipe	A	From Leg	4.00 0'	0.0000	149'	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0'						
RR90-17-02DP w/Mount Pipe	B	From Leg	4.00 0' 0'	0.0000	149'	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08
RR90-17-02DP w/Mount Pipe	C	From Leg	4.00 0' 0'	0.0000	149'	No Ice 1/2" Ice	4.91 5.57	3.64 4.70	0.04 0.08
Pipe Mount [PM 502-3]	C	None		0.0000	149'	No Ice 1/2" Ice	6.43 10.25	6.43 10.25	0.30 0.33
(2) KRY 112 71/1	A	From Leg	4.00 0' 0'	0.0000	149'	No Ice 1/2" Ice	0.68 0.80	0.45 0.56	0.01 0.02
(2) KRY 112 71/1	B	From Leg	4.00 0' 0'	0.0000	149'	No Ice 1/2" Ice	0.68 0.80	0.45 0.56	0.01 0.02
(2) KRY 112 71/1	C	From Leg	4.00 0' 0'	0.0000	149'	No Ice 1/2" Ice	0.68 0.80	0.45 0.56	0.01 0.02
**									
(4) DB844H90 w/Mount Pipe	A	From Leg	4.00 0' 1'	0.0000	141'	No Ice 1/2" Ice	3.58 4.20	5.63 6.73	0.04 0.08
(4) DB844H90 w/Mount Pipe	B	From Leg	4.00 0' 1'	0.0000	141'	No Ice 1/2" Ice	3.58 4.20	5.63 6.73	0.04 0.08
(4) DB844H90 w/Mount Pipe	C	From Leg	4.00 0' 1'	0.0000	141'	No Ice 1/2" Ice	3.58 4.20	5.63 6.73	0.04 0.08
Platform Mount [LP 303-1]	C	None		0.0000	141'	No Ice 1/2" Ice	14.66 18.87	14.66 18.87	1.25 1.48
**									
(3) MLA_ANTENNA w/Mount Pipe	A	From Leg	4.00 0' 1'	0.0000	133'	No Ice 1/2" Ice	8.44 9.00	6.75 7.74	0.04 0.11
(3) MLA_ANTENNA w/Mount Pipe	B	From Leg	4.00 0' 1'	0.0000	133'	No Ice 1/2" Ice	8.44 9.00	6.75 7.74	0.04 0.11
(3) MLA_ANTENNA w/Mount Pipe	C	From Leg	4.00 0' 1'	0.0000	133'	No Ice 1/2" Ice	8.44 9.00	6.75 7.74	0.04 0.11
Sector Mount [SM 301-3]	C	None		0.0000	133'	No Ice 1/2" Ice	29.61 39.80	29.61 39.80	1.30 1.84
**									
GPS-TMG-26NMS	B	From Leg	4.00 0' 4'	0.0000	125'	No Ice 1/2" Ice	0.16 0.21	0.16 0.21	0.00 0.00
(2) 7130.16.05.00 w/Mount Pipe	A	From Leg	4.00 0' 2'	0.0000	125'	No Ice 1/2" Ice	6.40 7.09	7.43 8.57	0.04 0.10
(2) LPD-7905/4 w/Mount Pipe	A	From Leg	4.00 0' 2'	0.0000	125'	No Ice 1/2" Ice	3.19 3.81	6.07 7.17	0.05 0.08
(2) 7130.16.05.00 w/Mount Pipe	B	From Leg	4.00 0' 2'	0.0000	125'	No Ice 1/2" Ice	6.40 7.09	7.43 8.57	0.04 0.10
(2) LPD-7905/4 w/Mount Pipe	B	From Leg	4.00 0'	0.0000	125'	No Ice 1/2" Ice	3.19 3.81	6.07 7.17	0.05 0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft ft ft	°	ft		ft^2	ft^2	K
			2'						
(2) 7130.16.05.00 w/Mount Pipe	C	From Leg	4.00 0' 2'	0.0000	125'	No Ice 1/2" Ice	6.40 7.09	7.43 8.57	0.04 0.10
(2) LPD-7905/4 w/Mount Pipe	C	From Leg	4.00 0' 2'	0.0000	125'	No Ice 1/2" Ice	3.19 3.81	6.07 7.17	0.05 0.08
Sector Mount [SM 301-3]	C	None		0.0000	125'	No Ice 1/2" Ice	29.61 39.80	29.61 39.80	1.30 1.84
**									
(3) 7770.00 w/Mount Pipe	A	From Leg	4.00 0' 2'	0.0000	113'	No Ice 1/2" Ice	5.92 6.36	4.04 4.67	0.05 0.10
(3) 7770.00 w/Mount Pipe	B	From Leg	4.00 0' 2'	0.0000	113'	No Ice 1/2" Ice	5.92 6.36	4.04 4.67	0.05 0.10
(3) 7770.00 w/Mount Pipe	C	From Leg	4.00 0' 2'	0.0000	113'	No Ice 1/2" Ice	5.92 6.36	4.04 4.67	0.05 0.10
(4) LGP 21403	A	From Leg	4.00 0' 2'	0.0000	113'	No Ice 1/2" Ice	1.29 1.45	0.36 0.48	0.01 0.02
(4) LGP 21403	B	From Leg	4.00 0' 2'	0.0000	113'	No Ice 1/2" Ice	1.29 1.45	0.36 0.48	0.01 0.02
(4) LGP 21403	C	From Leg	4.00 0' 2'	0.0000	113'	No Ice 1/2" Ice	1.29 1.45	0.36 0.48	0.01 0.02
Sector Mount [SM 301-3]	C	None		0.0000	113'	No Ice 1/2" Ice	29.61 39.80	29.61 39.80	1.30 1.84
**									
GPS-C	A	From Leg	4.00 0' 0'	0.0000	60'	No Ice 1/2" Ice	0.14 0.20	0.17 0.23	0.00 0.00
738 449	B	From Leg	4.00 0' 0'	0.0000	60'	No Ice 1/2" Ice	0.04 0.09	0.04 0.09	0.00 0.00
Pipe Mount [PM 501-1]	A	From Leg	4.00 0' 0'	0.0000	60'	No Ice 1/2" Ice	3.47 4.45	1.67 2.10	0.05 0.06
Pipe Mount [PM 501-1]	B	From Leg	4.00 0' 0'	0.0000	60'	No Ice 1/2" Ice	3.47 4.45	1.67 2.10	0.05 0.06
**									
KS24019-L112A	A	From Leg	4.00 0' 2'	0.0000	55'	No Ice 1/2" Ice	0.10 0.18	0.10 0.18	0.01 0.01
Pipe Mount [PM 501-1]	A	From Leg	4.00 0' 0'	0.0000	55'	No Ice 1/2" Ice	3.47 4.45	1.67 2.10	0.05 0.06
**********									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	4.00 0' 0'	0.0000	103'	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	0.05 0.09
APXV18-206517S-C w/ Mount Pipe	B	From Leg	4.00 0' 0'	0.0000	103'	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	0.05 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
APXV18-206517S-C w/ Mount Pipe	C	From Leg	4.00 0' 0'	0.0000	103'	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	0.05 0.09
Pipe Mount [PM 502-3]	C	None		0.0000	103'	No Ice 1/2" Ice	6.43 10.25	6.43 10.25	0.30 0.33

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice
15	Dead+Wind 0 deg+Ice
16	Dead+Wind 30 deg+Ice
17	Dead+Wind 60 deg+Ice
18	Dead+Wind 90 deg+Ice
19	Dead+Wind 120 deg+Ice
20	Dead+Wind 150 deg+Ice
21	Dead+Wind 180 deg+Ice
22	Dead+Wind 210 deg+Ice
23	Dead+Wind 240 deg+Ice
24	Dead+Wind 270 deg+Ice
25	Dead+Wind 300 deg+Ice
26	Dead+Wind 330 deg+Ice
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	149 - 135.039	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-3.91	0.01	0.14
			Max. Mx	11	-2.46	25.42	0.05
			Max. My	2	-2.46	0.00	25.47
			Max. Vy	11	-5.47	25.42	0.05
			Max. Vx	2	-5.47	0.00	25.47
			Max. Torque	18			0.05
L2	135.039 - 92.1667	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-19.54	0.22	0.79
			Max. Mx	11	-12.60	711.27	0.29
			Max. My	2	-12.60	0.08	711.50
			Max. Vy	11	-24.30	711.27	0.29
			Max. Vx	2	-24.30	0.08	711.50
			Max. Torque	23			-0.29
L3	92.1667 - 45.2031	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-31.40	0.96	2.01
			Max. Mx	11	-22.74	1951.76	1.26
			Max. My	2	-22.73	0.38	1953.05
			Max. Vy	11	-30.96	1951.76	1.26
			Max. Vx	2	-31.06	0.38	1953.05
			Max. Torque	24			-1.07
L4	45.2031 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-50.94	2.43	2.76
			Max. Mx	11	-39.97	3771.83	3.07
			Max. My	2	-39.97	2.41	3778.04
			Max. Vy	11	-38.08	3771.83	3.07
			Max. Vx	2	-38.17	2.41	3778.04
			Max. Torque	17			1.42

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	15	50.94	0.03	34.23
	Max. H_x	11	39.98	38.06	0.03
	Max. H_z	2	39.98	0.03	38.16
	Max. M_x	2	3778.04	0.03	38.16
	Max. M_z	5	3770.51	-38.06	-0.03
	Max. Torsion	17	1.42	-29.55	17.09
	Min. Vert	1	39.98	0.00	0.00
	Min. H_x	5	39.98	-38.06	-0.03
	Min. H_z	8	39.98	-0.03	-38.16
	Min. M_x	8	-3775.40	-0.03	-38.16
	Min. M_z	11	-3771.83	38.06	0.03
	Min. Torsion	23	-1.42	29.55	-17.09

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	39.98	0.00	0.00	-1.30	0.65	0.00
Dead+Wind 0 deg - No Ice	39.98	-0.03	-38.16	-3778.04	2.41	-0.43
Dead+Wind 30 deg - No Ice	39.98	19.00	-33.03	-3271.18	-1883.41	-0.98
Dead+Wind 60 deg - No Ice	39.98	32.95	-19.05	-1888.16	-3264.39	-1.28
Dead+Wind 90 deg - No Ice	39.98	38.06	0.03	0.43	-3770.51	-1.23
Dead+Wind 120 deg - No Ice	39.98	32.97	19.10	1888.56	-3266.14	-0.85
Dead+Wind 150 deg - No Ice	39.98	19.05	33.06	3270.29	-1886.44	-0.24
Dead+Wind 180 deg - No Ice	39.98	0.03	38.16	3775.40	-1.09	0.43
Dead+Wind 210 deg - No Ice	39.98	-19.00	33.03	3268.54	1884.73	0.98
Dead+Wind 240 deg - No Ice	39.98	-32.95	19.05	1885.53	3265.71	1.28
Dead+Wind 270 deg - No Ice	39.98	-38.06	-0.03	-3.07	3771.83	1.23
Dead+Wind 300 deg - No Ice	39.98	-32.97	-19.10	-1891.19	3267.46	0.85
Dead+Wind 330 deg - No Ice	39.98	-19.05	-33.06	-3272.93	1887.76	0.24
Dead+Ice	50.94	0.00	0.00	-2.76	2.43	0.00
Dead+Wind 0 deg+Ice	50.94	-0.03	-34.23	-3437.19	4.19	-0.66
Dead+Wind 30 deg+Ice	50.94	17.04	-29.63	-2976.22	-1710.49	-1.20
Dead+Wind 60 deg+Ice	50.94	29.55	-17.09	-1718.52	-2966.19	-1.42
Dead+Wind 90 deg+Ice	50.94	34.13	0.03	-1.11	-3426.43	-1.26
Dead+Wind 120 deg+Ice	50.94	29.57	17.14	1715.84	-2967.91	-0.76
Dead+Wind 150 deg+Ice	50.94	17.09	29.66	2972.28	-1713.47	-0.06
Dead+Wind 180 deg+Ice	50.94	0.03	34.23	3431.54	0.76	0.66
Dead+Wind 210 deg+Ice	50.94	-17.04	29.63	2970.57	1715.44	1.20
Dead+Wind 240 deg+Ice	50.94	-29.55	17.09	1712.87	2971.13	1.42
Dead+Wind 270 deg+Ice	50.94	-34.13	-0.03	-4.54	3431.37	1.26
Dead+Wind 300 deg+Ice	50.94	-29.57	-17.14	-1721.50	2972.85	0.76
Dead+Wind 330 deg+Ice	50.94	-17.09	-29.66	-2977.93	1718.41	0.06
Dead+Wind 0 deg - Service	39.98	-0.01	-13.20	-1308.64	1.27	-0.15
Dead+Wind 30 deg - Service	39.98	6.58	-11.43	-1133.19	-651.52	-0.34
Dead+Wind 60 deg - Service	39.98	11.40	-6.59	-654.46	-1129.55	-0.44
Dead+Wind 90 deg - Service	39.98	13.17	0.01	-0.71	-1304.74	-0.43
Dead+Wind 120 deg - Service	39.98	11.41	6.61	652.87	-1130.15	-0.29
Dead+Wind 150 deg - Service	39.98	6.59	11.44	1131.16	-652.56	-0.08
Dead+Wind 180 deg - Service	39.98	0.01	13.20	1306.00	0.06	0.15
Dead+Wind 210 deg - Service	39.98	-6.58	11.43	1130.55	652.84	0.34
Dead+Wind 240 deg - Service	39.98	-11.40	6.59	651.82	1130.87	0.44
Dead+Wind 270 deg - Service	39.98	-13.17	-0.01	-1.92	1306.06	0.43
Dead+Wind 300 deg - Service	39.98	-11.41	-6.61	-655.50	1131.47	0.29
Dead+Wind 330 deg - Service	39.98	-6.59	-11.44	-1133.80	653.89	0.08

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-39.98	0.00	0.00	39.98	0.00	0.000%
2	-0.03	-39.98	-38.16	0.03	39.98	38.16	0.000%
3	19.00	-39.98	-33.03	-19.00	39.98	33.03	0.000%
4	32.95	-39.98	-19.05	-32.95	39.98	19.05	0.000%
5	38.06	-39.98	0.03	-38.06	39.98	-0.03	0.000%
6	32.97	-39.98	19.10	-32.97	39.98	-19.10	0.000%
7	19.05	-39.98	33.06	-19.05	39.98	-33.06	0.000%
8	0.03	-39.98	38.16	-0.03	39.98	-38.16	0.000%
9	-19.00	-39.98	33.03	19.00	39.98	-33.03	0.000%
10	-32.95	-39.98	19.05	32.95	39.98	-19.05	0.000%
11	-38.06	-39.98	-0.03	38.06	39.98	0.03	0.000%
12	-32.97	-39.98	-19.10	32.97	39.98	19.10	0.000%
13	-19.05	-39.98	-33.06	19.05	39.98	33.06	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
14	0.00	-50.94	0.00	0.00	50.94	0.00	0.000%
15	-0.03	-50.94	-34.23	0.03	50.94	34.23	0.000%
16	17.04	-50.94	-29.63	-17.04	50.94	29.63	0.000%
17	29.55	-50.94	-17.09	-29.55	50.94	17.09	0.000%
18	34.13	-50.94	0.03	-34.13	50.94	-0.03	0.000%
19	29.57	-50.94	17.14	-29.57	50.94	-17.14	0.000%
20	17.09	-50.94	29.66	-17.09	50.94	-29.66	0.000%
21	0.03	-50.94	34.23	-0.03	50.94	-34.23	0.000%
22	-17.04	-50.94	29.63	17.04	50.94	-29.63	0.000%
23	-29.55	-50.94	17.09	29.55	50.94	-17.09	0.000%
24	-34.13	-50.94	-0.03	34.13	50.94	0.03	0.000%
25	-29.57	-50.94	-17.14	29.57	50.94	17.14	0.000%
26	-17.09	-50.94	-29.66	17.09	50.94	29.66	0.000%
27	-0.01	-39.98	-13.20	0.01	39.98	13.20	0.000%
28	6.58	-39.98	-11.43	-6.58	39.98	11.43	0.000%
29	11.40	-39.98	-6.59	-11.40	39.98	6.59	0.000%
30	13.17	-39.98	0.01	-13.17	39.98	-0.01	0.000%
31	11.41	-39.98	6.61	-11.41	39.98	-6.61	0.000%
32	6.59	-39.98	11.44	-6.59	39.98	-11.44	0.000%
33	0.01	-39.98	13.20	-0.01	39.98	-13.20	0.000%
34	-6.58	-39.98	11.43	6.58	39.98	-11.43	0.000%
35	-11.40	-39.98	6.59	11.40	39.98	-6.59	0.000%
36	-13.17	-39.98	-0.01	13.17	39.98	0.01	0.000%
37	-11.41	-39.98	-6.61	11.41	39.98	6.61	0.000%
38	-6.59	-39.98	-11.44	6.59	39.98	11.44	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00001896
3	Yes	5	0.00000001	0.00002404
4	Yes	5	0.00000001	0.00002463
5	Yes	4	0.00000001	0.00003589
6	Yes	5	0.00000001	0.00002402
7	Yes	5	0.00000001	0.00002434
8	Yes	4	0.00000001	0.00001834
9	Yes	5	0.00000001	0.00002449
10	Yes	5	0.00000001	0.00002394
11	Yes	4	0.00000001	0.00003711
12	Yes	5	0.00000001	0.00002456
13	Yes	5	0.00000001	0.00002420
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00004563
16	Yes	5	0.00000001	0.00005277
17	Yes	5	0.00000001	0.00005445
18	Yes	4	0.00000001	0.00007090
19	Yes	5	0.00000001	0.00005275
20	Yes	5	0.00000001	0.00005343
21	Yes	4	0.00000001	0.00004436
22	Yes	5	0.00000001	0.00005413
23	Yes	5	0.00000001	0.00005250
24	Yes	4	0.00000001	0.00007278
25	Yes	5	0.00000001	0.00005425
26	Yes	5	0.00000001	0.00005352

27	Yes	4	0.00000001	0.00000899
28	Yes	4	0.00000001	0.00008852
29	Yes	4	0.00000001	0.00009332
30	Yes	4	0.00000001	0.00001069
31	Yes	4	0.00000001	0.00008811
32	Yes	4	0.00000001	0.00009085
33	Yes	4	0.00000001	0.00000895
34	Yes	4	0.00000001	0.00009219
35	Yes	4	0.00000001	0.00008755
36	Yes	4	0.00000001	0.00001075
37	Yes	4	0.00000001	0.00009280
38	Yes	4	0.00000001	0.00008990

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	149 - 135.039	19.248	38	1.1468	0.0006
L2	138.956 - 92.1667	16.840	38	1.1390	0.0006
L3	97.8333 - 45.2031	8.024	38	0.8289	0.0004
L4	52.7031 - 0	2.185	38	0.3849	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149'	RR90-17-02DP w/Mount Pipe	38	19.248	1.1468	0.0006	41666
141'	(4) DB844H90 w/Mount Pipe	38	17.327	1.1424	0.0006	26208
133'	(3) MLA_ANTENNA w/Mount Pipe	38	15.436	1.1208	0.0006	14630
125'	GPS-TMG-26NMS	38	13.597	1.0786	0.0005	10481
113'	(3) 7770.00 w/Mount Pipe	38	10.983	0.9843	0.0005	7353
103'	APXV18-206517S-C w/ Mount Pipe	38	8.981	0.8851	0.0004	5888
60'	GPS-C	38	2.824	0.4338	0.0002	5481
55'	KS24019-L112A	38	2.374	0.3986	0.0002	5514

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	149 - 135.039	55.524	2	3.3085	0.0020
L2	138.956 - 92.1667	48.582	2	3.2861	0.0019
L3	97.8333 - 45.2031	23.155	2	2.3921	0.0012
L4	52.7031 - 0	6.305	13	1.1110	0.0006

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
149'	RR90-17-02DP w/Mount Pipe	2	55.524	3.3085	0.0020	14573
141'	(4) DB844H90 w/Mount Pipe	2	49.987	3.2961	0.0019	9165
133'	(3) MLA_ANTENNA w/Mount Pipe	2	44.533	3.2319	0.0018	5108
125'	GPS-TMG-26NMS	2	39.230	3.1065	0.0017	3655
113'	(3) 7770.00 w/Mount Pipe	2	31.690	2.8309	0.0015	2561
103'	APXV18-206517S-C w/ Mount Pipe	2	25.915	2.5482	0.0013	2049
60'	GPS-C	13	8.152	1.2833	0.0007	1901
55'	KS24019-L112A	13	6.850	1.1627	0.0007	1912

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	149 - 135.039 (1)	TP26.77x22x0.1875	13'11-17/32"	0'	0.0	39.000	15.0235	-2.46	585.92	0.004
L2	135.039 - 92.1667 (2)	TP40.91x25.0568x0.25	46'9-15/32"	0'	0.0	38.453	30.7402	-12.60	1182.05	0.011
L3	92.1667 - 45.2031 (3)	TP56.31x38.49x0.3125	52'7-9/16"	0'	0.0	36.650	53.0237	-22.73	1943.30	0.012
L4	45.2031 - 0 (4)	TP71x53.1456x0.375	52'8-13/32"	0'	0.0	34.716	84.0614	-39.97	2918.31	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	149 - 135.039 (1)	TP26.77x22x0.1875	25.47	3.265	39.000	0.084	0.00	0.000	39.000	0.000
L2	135.039 - 92.1667 (2)	TP40.91x25.0568x0.25	711.50	29.014	38.453	0.755	0.00	0.000	38.453	0.000
L3	92.1667 - 45.2031 (3)	TP56.31x38.49x0.3125	1953.08	33.441	36.650	0.912	0.00	0.000	36.650	0.000
L4	45.2031 - 0 (4)	TP71x53.1456x0.375	3778.32	30.871	34.716	0.889	0.00	0.000	34.716	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	149 - 135.039 (1)	TP26.77x22x0.1875	5.47	0.364	26.000	0.028	0.00	0.000	26.000	0.000
L2	135.039 - 92.1667 (2)	TP40.91x25.0568x0.25	24.30	0.791	26.000	0.061	0.06	0.001	26.000	0.000
L3	92.1667 - 45.2031 (3)	TP56.31x38.49x0.3125	31.06	0.586	26.000	0.045	0.49	0.004	26.000	0.000
L4	45.2031 - 0 (4)	TP71x53.1456x0.375	38.17	0.454	26.000	0.035	0.25	0.001	26.000	0.000

Pole Interaction Design Data

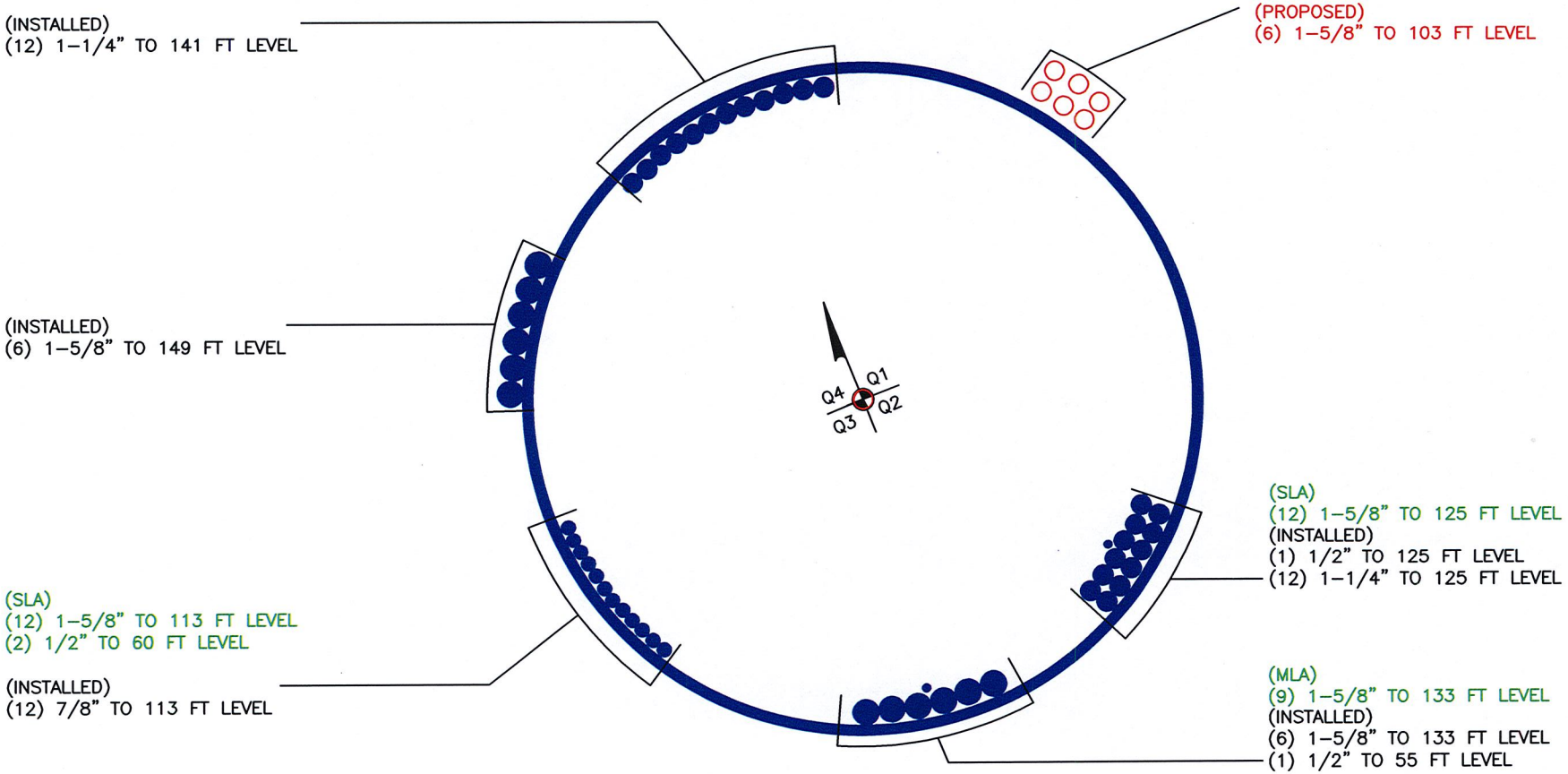
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	149 - 135.039 (1)	0.004	0.084	0.000	0.028	0.000	0.088 ✔	1.333	H1-3+VT ✔
L2	135.039 - 92.1667 (2)	0.011	0.755	0.000	0.061	0.000	0.766 ✔	1.333	H1-3+VT ✔
L3	92.1667 - 45.2031 (3)	0.012	0.912	0.000	0.045	0.000	0.925 ✔	1.333	H1-3+VT ✔
L4	45.2031 - 0 (4)	0.014	0.889	0.000	0.035	0.000	0.903 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	149 - 135.039	Pole	TP26.77x22x0.1875	1	-2.46	781.03	6.6	Pass
L2	135.039 - 92.1667	Pole	TP40.91x25.0568x0.25	2	-12.60	1575.67	57.5	Pass
L3	92.1667 - 45.2031	Pole	TP56.31x38.49x0.3125	3	-22.73	2590.42	69.4	Pass
L4	45.2031 - 0	Pole	TP71x53.1456x0.375	4	-39.97	3890.11	67.8	Pass
							Summary	
						Pole (L3)	69.4	Pass
						RATING =	**69.4**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876343 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Monopole Pier and Pad Foundation

BU # : 876343
Site Name:
App. Number: 72436

Design Reactions		
Shear, **S**:	38	kips
Moment, **M**:	3778	ft-kips
Tower Height, **H**:	149	ft
Tower Weight, **Wt**:	40	kips
Base Diameter, **BD**:	5.91667	ft

Foundation Dimensions		
Depth, **D**:	12	ft
Pad Width, **W**:	30	ft
Neglected Depth, **N**:	3.5	ft
Thickness, **T**:	3.00	ft
Pier Diameter, **Pd**:	8.50	ft
Ext. Above Grade, **E**:	1.00	ft
Clear Cover, **Cc**:	3.0	in

Soil Properties		
Soil Unit Weight, **γ**:	0.120	kcf
Bearing Capacity, **Bc**:	8.5	ksf
Angle of Friction, **Φ**:	30	deg
Cohesion, **Co**:	0.000	ksf
Passive Pressure, **Pp**:	0.000	kcf
Base Friction, **μ**:	0.20	

Material Properties		
Rebar Yield Strength, **Fy**:	60000	psi
Concrete Strength, **F'c**:	4000	psi
Concrete Unit Weight, **δc**:	0.150	kcf
Seismic Zone, **z**:	1	

Rebar Properties		
Pier Rebar Size, **Sp**:	9	
Pier Rebar Quanity, **mp**:	48	41
Pad Rebar Size, **Spad**:	8	
Pad Rebar Quanity, **mpad**:	58	56
Pier Tie Size, **St**:	5	3
Tie Quanity, **mt**:	12	9

Design Checks	Capacity/ Availability	Demand/ Limits	Check
Req'd Pier Diam.(ft)	8.5	7.91667	**OK**
Overturning (ft-kips)	18391.04	4272.00	**OK**
Shear Capacity (kips)	181.64	38.00	**OK**
Bearing (ksf)	8.54	2.97	**OK**
Pad Shear - 1-way (kips)	1477.03	1304.97	**OK**
Pad Shear - 2-way (kips)	2629.46	1740.91	**OK**
Pier Rebar Area (in²)	48.00	40.86	**OK**
Pad Rebar Area (in²)	45.82	43.87	**OK**
Pier Moment Capacity (k-ft)	7482.54	4158.00	**OK**
Pier Bar Spacing (in)	5.16	12 > s > 4.5	**OK**
Pad Bar Spacing (in)	5.19	12 > s > 4.5	**OK**
Pier Development Length (in)	117	35.52	**OK**
Pad Development Length (in)	33	35.52	**OK**
Hook Development Length (in)	177.00	14.98	**OK**
Rebar Hook Length (in)	129.00	19.18	**OK**

Modification Checks	Capacity/ Availability	Demand/ Limits	Check
Sleeve Rebar Area (in2):	15.8	0.00	**Not Used**
Sleeve Moment Capacity (k-ft):	7482.54	4158.00	**Not Run**
Sleeve Rebar Spacing (in):	N/a	12 > s > 4.5	**Not Used**
Sleeve Tie Spacing (in):	N/A	9 > s > 4.5	**Not Used**
Minimum Extra Thickness (in):	0	0	**Not Used**
Pad Rebar Area-short (in2):	0.44	2.65	**Not Used**
Pad Rebar Area-long (in2):	0.44	2.65	**Not Used**
Pad Rebar Spacing-short (in):	117.5	12 > s > 4.5	**Not Used**
Pad Rebar Spacing-long (in):	117.5	12 > s > 4.5	**Not Used**
End Cap Width (ft):	0	0	**Not Used**
End Cap Rebar Area (in2):	3.16	0	**Not Used**
Rebar Spacing (in):	-3.00	12 > s > 4.5	**Not Used**
Tie Spacing (in):	24.79	354 > s > 4.5	**Not Used**
Dowel Area (in2):	2.2	0.00	**Not Used**
Dowel Embedment (in):	9	6	**Not Used**
Cone Shear Strength (kips):	25.15	23.76	**Not Used**
Dowel Edge Dist (in):	12.00	4.78	**Not Used**
Dowel Spacing (in):	84.00	18.00	**Not Used**
Dowel Edge Dist (vert) (in):	18.00	4.78	**Not Used**
Dowel Devel. Length (in):	-3.00	13.32	**Not Used**

Modifications

Pier Sleeve, ds:	0	in	**End Cap Width, Wec**:	0	ft
Revised Pier Diameter, **dx**:	8.5	ft	Revised Width, **Wx**:	30	ft
PS Rebar Size, **Ss**:	8		EC Rebar Size, **Sec**:	8	per side, top & bottom
Rebar Quanity, **ms**:	20	0	Rebar Quanity, **mec**:	4	0
Tie Size, **Sst**:	3		EC Tie Size, **Sect**:	4	per side
Tie Quanity, **mst**:	9	16	Tie Quanity, **mect**:	15	0
Pad Thickness, Te:	0	in	EC Dowel Size, **Secd**:	6	per side
Revised Pier Thickness, **Tx**:	3.00	ft	Dowel Quanity, **mecd**:	5	0
Rebar Size, **Se**:	3		Rows of Dowels, **Nd**:	1	
Rebar Quanity (long), **me**:	4	25	Dowel Depth, **decd**:	9	in
Rebar Quanity (short), **mex**:	4	25	Edge Distance, **eecd**:	12	in
Dowel Size, **Sed**:	3				
Dowel Quanity, **med**:	0	0			

Stiffened or Unstiffened Ungrouted Circular Base Plate - Rev. F (A615-J)

Site Data

BU#: *876343*
Site Name:
App #: *72436*

Reactions		
Moment:	3778	ft-kips
Axial:	40	kips
Shear:	38	kips

Anchor Rod Data		
Qty:	28	
Diam:	2.25	in
Grade(Fy):	75	ksi
Circle:	79	in

Plate Data		
Diam:	85	in
Thick:	2.75	in
Grade:	50	ksi
Eff. Width:	7.97	in

Stiffener Data		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.125	in **
H. Weld:	0.375	in
V. Weld:	0.375	in
Width:	4.5	in
Height:	8	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	71	in
Thick:	0.375	in
Grade:	65	ksi

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

Maximum Rod Tension:	80.6	Kips
Allowable Tension:	195.0	Kips
Anchor Rod Stress Ratio:	41.3%	**Pass**

Base Plate Results

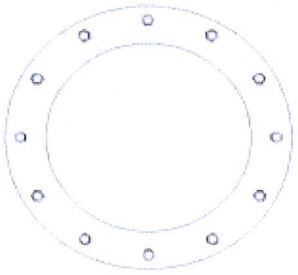
Base Plate Stress:	23.9	ksi
Allowable Plate Stress:	50.0	ksi
Base Plate Stress Ratio:	47.8%	**Pass**

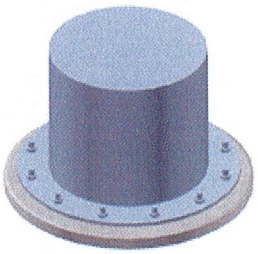
Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Bending:	n/a
Plate Tension:	n/a

Pole Results

Punching Shear:	n/a





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

** note: for complete joint penetration groove welds it is important that the groove depth be exactly 1/2 the stiffener thickness