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

Internet: ct.gov/csc

Daniel F. Caruso
Chairman

April 3, 2009

Mark R. Richard
UMTS Project Manager
T-Mobile USA, Inc.
35 Griffin Road South
Bloomfield, CT 06002

RE: **EM-T-MOBILE-107-090305** - Omnipoint Communications, as subsidiary of T-Mobile USA, Inc., notice of intent to modify an existing telecommunications facility located at Ogg Meadow Road, Orange, Connecticut.

Dear Mr. Richard:

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 3, 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

S. Derek Phelps
Executive Director

SDP/MP/laf

c: The Honorable James M. Zeoli, First Selectman, Town of Orange
Paul Dinice, Zoning Enforcement Officer, Town of Orange
Carrie L. Larson, Esq., Pullman & Comley, LLC
Crown Castle USA, Inc.

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 10, 2009

The Honorable James M. Zeoli
First Selectman
Town of Orange
Town Hall
617 Orange Center Road
Orange, CT 06477-2423

RE: **EM-T-MOBILE-107-090305** - Omnipoint Communications, as subsidiary of T-Mobile USA, Inc., notice of intent to modify an existing telecommunications facility located at Ogg Meadow Road, Orange, Connecticut.

Dear Mr. Zeoli:

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: Paul Dinice, Zoning Enforcement Officer, Town of Orange

CSC
CONNECTICUT SITING COUNCIL

T-Mobile®

March 3, 2009

EM-T-MOBILE-107-090305

Via Federal Express

ORIGINAL

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

RECEIVED
MAR - 5 2009
CONNECTICUT
SITING COUNCIL

Re: Notice of Exempt Modification
Crown Castle Telecommunications Facility
Ogg Meadow Road, Orange, Connecticut
T-Mobile Site CT11084B

Dear Mr. Phelps:

Omnipoint Communications, a subsidiary of T-Mobile USA, Inc. ("T-Mobile"), intends to install antennas, appurtenant equipment and an equipment pad at the existing 160-foot monopole facility owned by Crown Castle, USA, Inc. and located off of the north end of Ogg Meadow Road, Orange, Connecticut ("Facility"). T-Mobile 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 James Zeoli, First Selectman of Orange.

The existing Facility consists of a 160-foot self-supporting monopole tower capable of supporting multiple carriers within a fenced compound. The coordinates for the Facility are **Lat: 41°-18'-28" and Long: 73°– 01'-56".** The tower is located off the north end of Ogg Meadow Road, a few hundred feet east of the Wilbur Cross (Merritt) Parkway, just north of it's intersection with Route 34. The Facility is in the northern portion of Orange, roughly 1,700 feet from the Woodbridge line (see Site Map, attached as Exhibit A). The tower currently supports Nextel antennas at the one hundred twenty two foot (122') level centerline AGL (above ground level), Sprint antennas at the one hundred thirty nine foot level (139') AT&T antennas at the one hundred forty nine foot level (149') AGL, Verizon antennas at the one hundred fifty nine foot level (159') and AGL, Verizon antennas in pipe mast extension configuration off the top of the tower at the one hundred sixty nine foot level (centerline) (169') AGL. Pocket has a proposal before the Council to install three flush mount antennas on the tower at the one hundred foot centerline (100') AGL. T-Mobile currently has antennas on the tower at the one hundred twenty eight foot level (128') AGL. The current T-Mobile antenna configuration is two per sector, for a total of six antennas. T-Mobile proposes to swap three existing GSM antennas to new UMTS antennas. Three other existing GSM antennas will remain (two per sector), for a total of six antennas at their current elevation on the tower. T-Mobile proposes to install three RFS APXV18-206516 antennas on existing mounts at the same elevation, (128') level centerline AGL. T-Mobile also intends to add a UMTS 3106 BTS equipment cabinet to its current

T-Mobile USA, Inc.
Office: (860) 692-7100
Fax: (860) 692-7159
35 Griffin Rd S
Bloomfield, CT 06002

configuration of one existing S12000 equipment cabinet. The two cabinets will both be mounted on T-Mobile's existing equipment pad contained within T-Mobile's existing lease area. T-Mobile intends to run new coaxial cable on its existing ice bridge from its current equipment pad to the existing tower. Utilities will be run via a proposed underground conduit from existing utility sources at the Facility (See Design Drawings and Equipment Specifications, attached as Exhibits B and C respectively).

For the following reasons, the proposed modifications to the Ogg Meadow 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 T-Mobile's antennas will be installed at a center line height of approximately 128 feet.

2. The installation of T-Mobile'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 T-Mobile
5. antennas would be 33.392% 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, T-Mobile respectfully submits that the proposed antenna installation and equipment at the Orange Facility constitutes an exempt modification under R.C.S.A. Section 16-50j-72(b)(2)

Respectfully Submitted,

Mark R. Richard
UMTS Project Manager
Agent for T-Mobile

cc: James Zeoli, First Selectman, Town of Orange.
South Central CT Regional Water Authority, underlying property owner.

35 Griffin Rd S
Bloomfield, CT 06002

Exhibit A

Site Map

T-Mobile Site CT11084B

800 Ogg Meadow Road

Orange, Connecticut

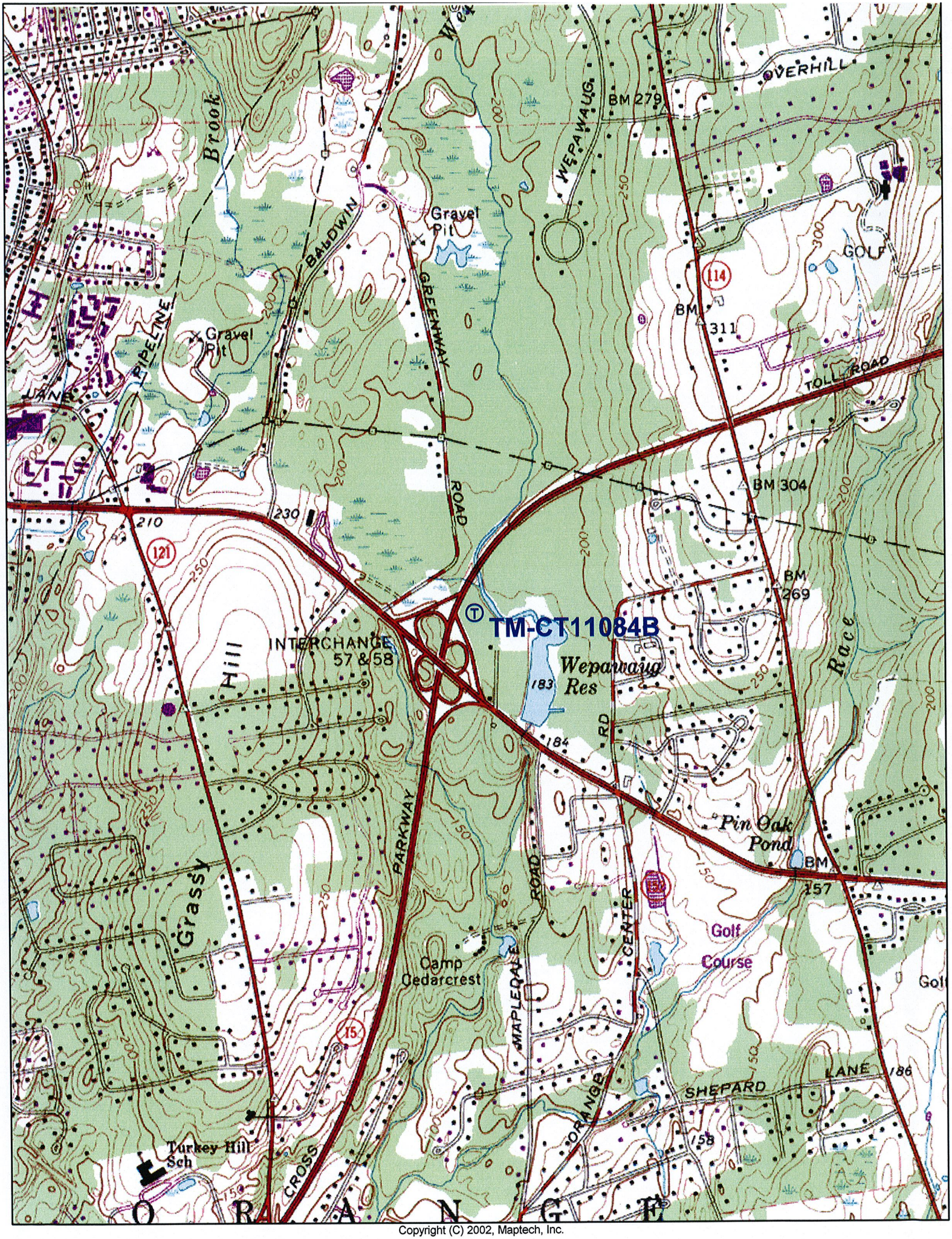


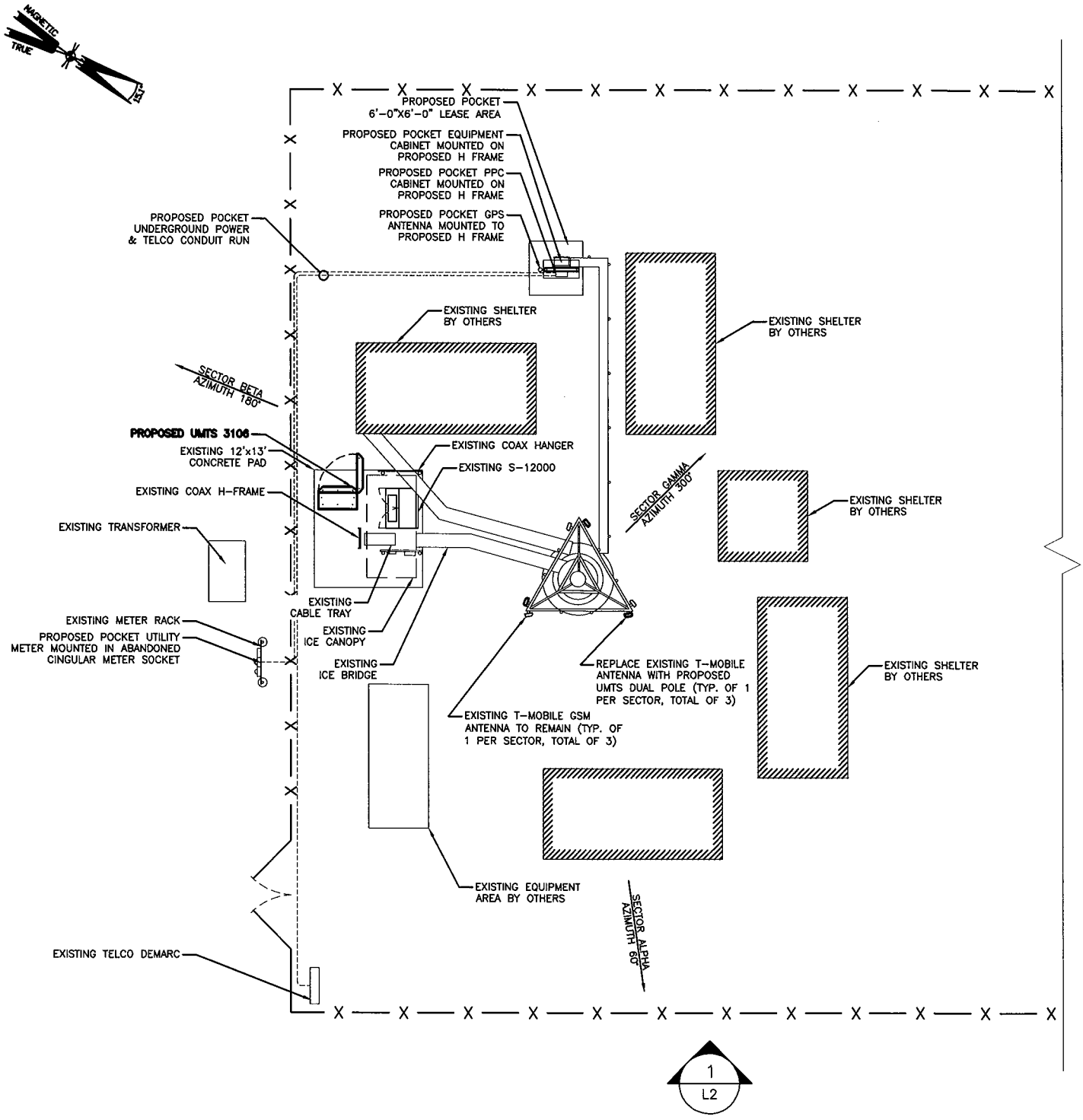
Exhibit B

Design Drawings

T-Mobile Site CT11084B

800 Ogg Meadow Road

Orange, Connecticut

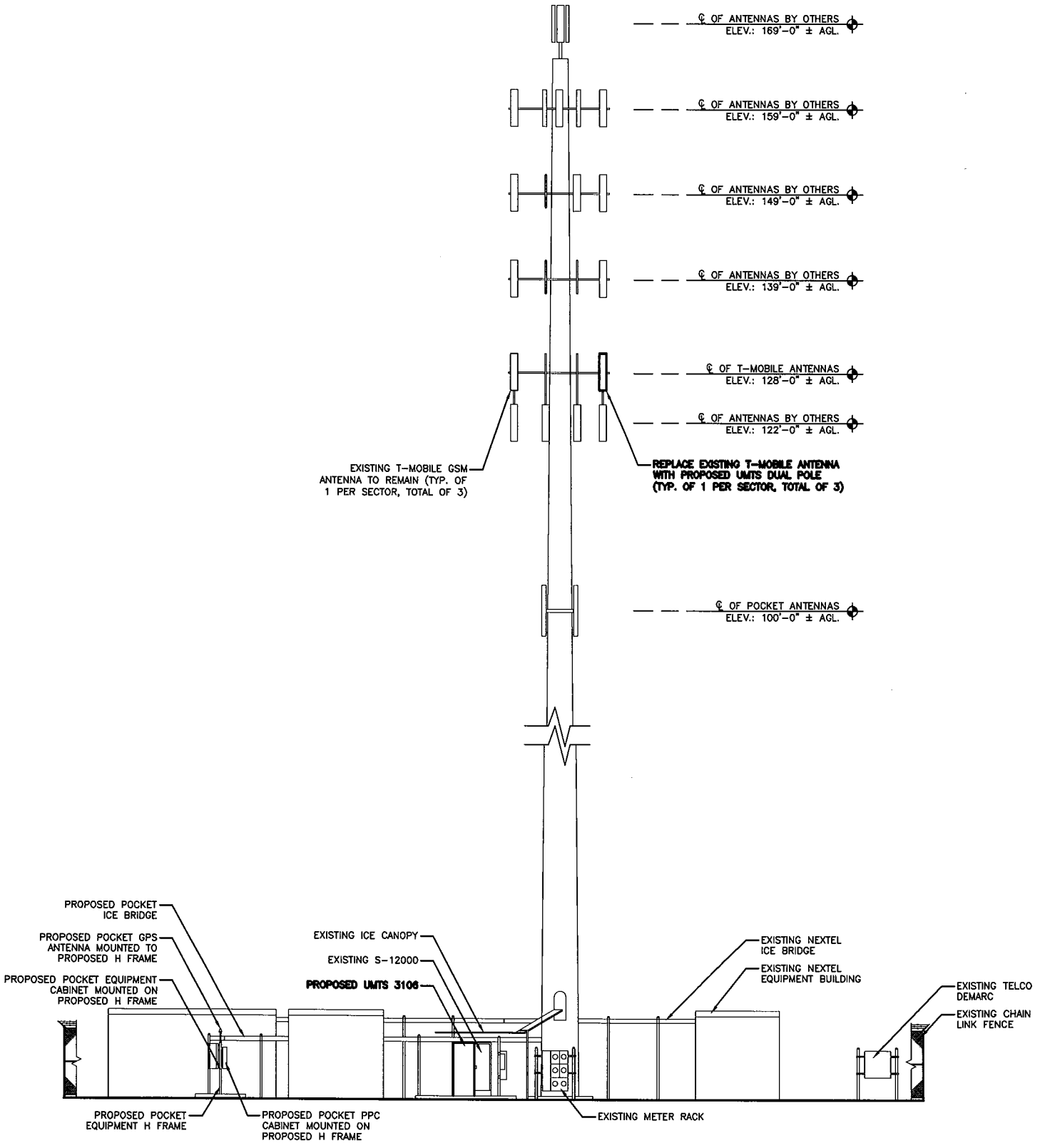


COMPOUND LAYOUT PLAN

1

SCALE: NTS

T··Mobile· 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002	MAXTON 50 Eastman St. South Easton, MA 02375 Phone: (508) 936-6393 Fax: (508) 936-6395	PROJECT LOCATION: ORANGE/MP X56-57 CT11084B 800 OGG MEADOW ROAD ORANGE, CT	PROJECT MANAGER: KB	DRAWN BY: JRK	BSDA PROJ. #: 2898.236
				COMPOUND LAYOUT PLAN	SHEET: L1
		APPROVED BY:	02/13/09 02/03/09 01/15/09		



ELEVATION

SCALE: N.T.S.

1

T··Mobile·
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

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

PROJECT LOCATION:
ORANGE/MP X56-57
CT11084B
800 OGG MEADOW ROAD
ORANGE, CT

APPROVED BY:

PROJECT MANAGER:	DRAWN BY:	BSDA PROJ. #:
KB	JRK	2898.236

02/13/09
02/03/09
01/15/09

ELEVATION

SHEET: L2

Exhibit C

Equipment Specifications

T-Mobile Site CT11084B

800 Ogg Meadow Road

Orange, Connecticut

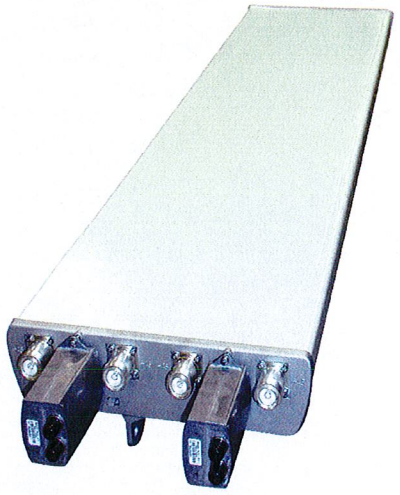
Technical Data Sheet APX16DWV-16DWV-S-E-ACU

Optimizer® Panel Dual Polarized Antenna equipped with (2) ACU motors

Product Description

Gathering two X-Polarized antennas in a single radome this pair of variable tilt antenna provides exceptional suppression of all upper sidelobes at all downtilt angles. It also features a wide downtilt range with optional remote tilt.

This antenna is optimized for performance across the entire AWS frequency band (1710-2170 MHz). The antenna comes pre-connected with the antenna control unit (ACU).



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).**
- **Gain difference between UL and DL <1dB.**
- **Two X-Polarised panels in a single radome.**
- **Azimuth horizontal beamwidth difference <7deg between UL and DL (1710-1755 & 2110-2155).**
- **Low profile for low visual impact.**
- **Dual polarization; Broadband design.**

Technical Features

Frequency Band	3G/UMTS
Horizontal Pattern	Directional
Antenna Type	Panel Dual Polarized
Electrical Down Tilt Option	Variable
Gain, dBi (dBd)	18.0 (16.0) Avg. across band
Frequency Range, MHz	1710-2170

Optimizer® Panel Dual Polarized Antenna equipped with (2) ACU motors

Connector Type	(4) 7-16 DIN Female
Connector Location	Bottom
Mount Type	Downtilt Kit w/Scissor Kit
Electrical Downtilt, deg	0-10 , 0-10
Horizontal Beamwidth, deg	65 ±5 (65.9 average across band)
Mounting Hardware	APM40-2 + APM40-E2
Rated Wind Speed, km/h (mph)	160 (100)
VSWR	< 1.4:1
Vertical Beamwidth, deg	5.8 to 7.8 across band
1st Upper Sidelobe Suppression, dB	> 18 (typically > 20)
Upper Sidelobe Suppression, dB	> 18 all (typically > 20)
Polarization	Dual pol +/-45°
Front-To-Back Ratio, dB	>28
Maximum Power Input, W	300
Isolation between Ports, dB	> 30
Lightning protection	Direct Ground
3rd Order IMP @ 2 x 43 dBm, dBc	> 150 (155 Typical)
Overall Length, m (ft)	1.35 (4.42)
Dimensions - HxWxD, mm (in)	1349 x 330 x 80 (53 x 13 x 3.15)
Radiating Element Material	Brass
Radome Material	Fiberglass
Reflector Material	Aluminum
Max Wind Loading Area, m² (ft²)	0.64 (6.6)
Survival Wind Speed, km/h (mph)	200 (125)
Maximum Thrust @ Rated Wind, N (lbf)	787 (177)
Front Thrust @ Rated Wind, N (lbf)	787 (177)
Shipping Weight, kg (lb)	24.1 (52.7)
Packing Dimensions, HxWxD, mm (in)	1550 x 420 x 210 (61 x 16.5 x 8.3)
Weight w/o Mtg Hardware, kg (lb)	18.0 (39.6)

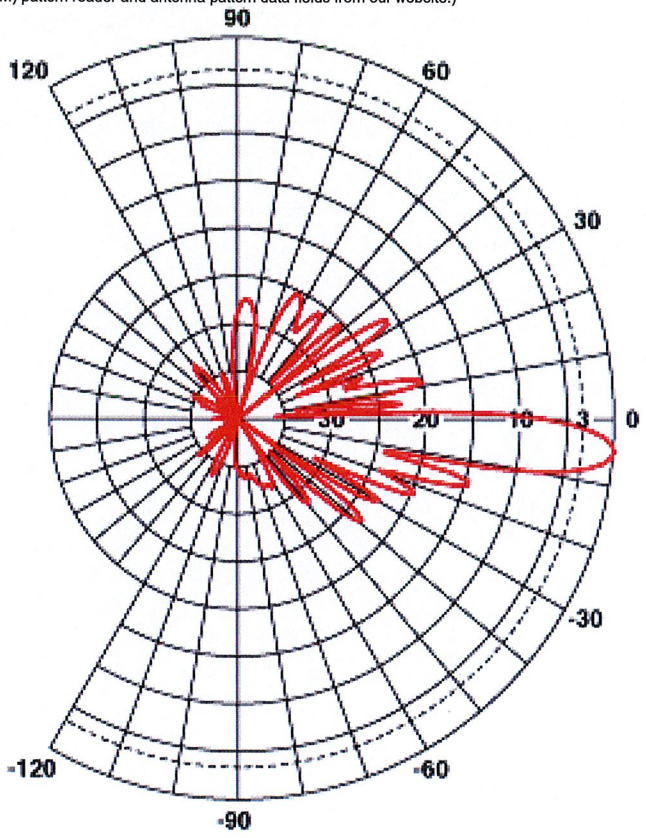
Note

This data is provisional and subject to change.

Optimizer® Panel Dual Polarized Antenna equipped with (2) ACU motors

Vertical Pattern

(This is a general representation of the antenna family pattern. For the latest detailed pattern contact Applications Engineering.
You may also download the CELplot(TM) pattern reader and antenna pattern data fields from our website.)



Optimizer® Panel Dual Polarized Antenna equipped with (2) ACU motors

Horizontal Pattern

(This is a general representation of the antenna family pattern. For the latest detailed pattern contact Applications Engineering. You may also download the CELplot(TM) pattern reader and antenna pattern data fields from our website.)

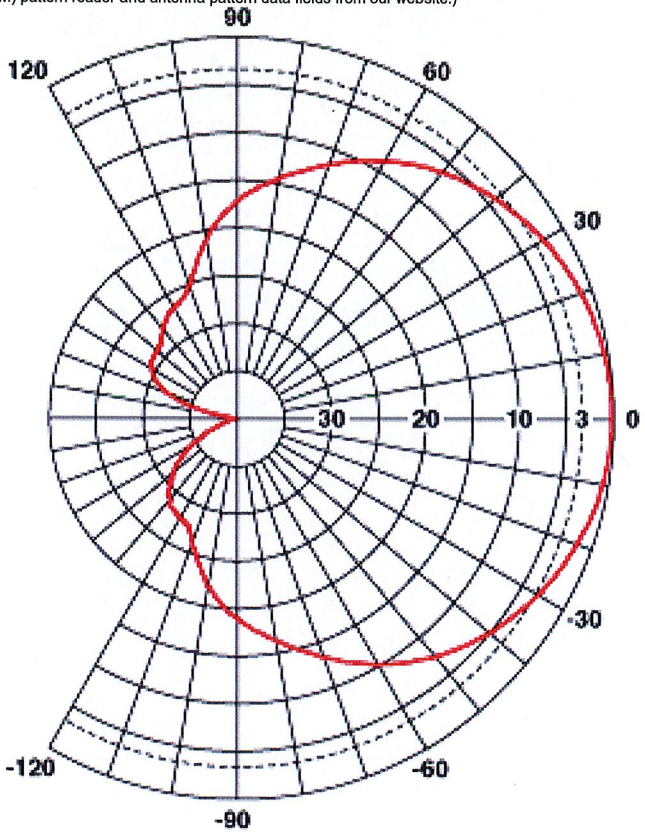


Exhibit D

Power Density Calculations

T-Mobile Site CT11084B

800 Ogg Meadow Road

Orange, Connecticut

T-Mobile USA Inc.
35 Griffin Rd South, Bloomfield, CT 06002-1853
Phone: (860) 692-7100
Fax: (860) 692-7159

Technical Memo

To: Maxton
From: Farid Marbouh - Radio Frequency Engineer
cc: Jason Overbey
Subject: Power Density Report for CT11084B
Date: February 12, 2009

1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the T-Mobile PCS antenna installation on a Monopole at 800 Ogg Meadow Rd., Orange, CT. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from locations surrounding the transmitting location.

2. Discussion:

The following assumptions were used in the calculations:

1) The emissions from T-Mobile transmitters are in the (1935-1944.8), (1980.2-1984.8), (2140-2145), (2110-2120)MHz frequency Band.
2) The antenna array consists of three sectors, with 2 antennas per sector.
3) The model number for GSM antenna is RR90-17-02DP.
3) The model number for UMTS antenna is APXV18-206516S.
4) GSM antenna center line height is 128 ft.
4) UMTS antenna center line height is 128 ft.
5) The maximum transmit power from any GSM sector is 1698.71 Watts Effective Radiated Power (EiRP) assuming 8 channels per sector.
5) The maximum transmit power from any UMTS sector is 2183.18 Watts Effective Radiated Power (EiRP) assuming 2 channels per sector.
6) All the antennas are simultaneously transmitting and receiving, 24 hours a day.
7) Power levels emitting from the antennas are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
8) The average ground level of the studied area does not change significantly with respect to the transmitting location

Equations given in "FCC OET Bulletin 65, Edition 97-01" were then used with the above information to perform the calculations.

3. Conclusion:

Based on the above worst case assumptions, the power density calculation from the T-Mobile PCS antenna installation on a Monopole at 800 Ogg Meadow Rd., Orange, CT, is 0.05722 mW/cm^2. This value represents 5.722% of the Maximum Permissible Exposure (MPE) standard of 1 milliwatt per square centimeter (mW/cm^2) set forth in the FCC/ANSI/IEEE C95.1-1991. Furthermore, the proposed antenna location for T-Mobile will not interfere with existing public safety communications, AM or FM radio broadcasts, TV, Police Communications, HAM Radio communications or any other signals in the area.
The combined Power Density from other carriers is 27.67%. The combined Power Density for the site is 33.392% of the M.P.E. standard.

Connecticut Market

T-Mobile

Worst Case Power Density

Site:	**CT11084B**
Site Address:	**800 Ogg Meadow Rd.**
Town:	**Orange**
Tower Height:	**160 ft.**
Tower Style:	**Monopole**

GSM Data		UMTS Data	
Base Station TX output	20 W	Base Station TX output	40 W
Number of channels	8	Number of channels	2
Antenna Model	RR90-17-02DP	Antenna Model	APXV18-206516S
Cable Size	1 5/8 in.	Cable Size	1 5/8 in.
Cable Length	150 ft.	Cable Length	150 ft.
Antenna Height	128.0 ft.	Antenna Height	128.0 ft.
Ground Reflection	1.6	Ground Reflection	1.6
Frequency	1945.0 MHz	Frequency	2.1 GHz
Jumper & Connector loss	4.50 dB	Jumper & Connector loss	1.50 dB
Antenna Gain	16.5 dBi	Antenna Gain	17.6 dBi
Cable Loss per foot	0.0116 dB	Cable Loss per foot	0.0116 dB
Total Cable Loss	1.7400 dB	Total Cable Loss	1.7400 dB
Total Attenuation	6.2400 dB	Total Attenuation	3.2400 dB
Total EIRP per Channel	53.27 dBm	Total EIRP per Channel	60.38 dBm
(In Watts)	212.34 W	(In Watts)	1091.59 W
Total EIRP per Sector	62.30 dBm	Total EIRP per Sector	63.39 dBm
(In Watts)	1698.71 W	(In Watts)	2183.18 W
nsg	10.2600	nsg	14.3600
Power Density (S) =	0.025039 mW/cm^2	Power Density (S) =	0.032180 mW/cm^2
T-Mobile Worst Case % MPE =		5.7220%	

Equation Used :

$$S = \frac{(1000)(grf)^2 (Power) * 10^{(nsg/10)}}{4\pi (R)^2}$$

Office of Engineering and Technology (OET) Bulletin 65, Edition 97-01, August 1997

Co-Location Total

Carrier	% of Standard
Verizon	5.4400 %
Cingular	4.3500 %
Sprint	4.3000 %
AT&T Wireless	
Nextel	4.1700 %
Pocket	6.8100 %
Other Antenna Systems	2.6000 %
Total Excluding T-Mobile	**27.6700 %**
T-Mobile	5.7220
Total % MPE for Site	**33.3920%**

Exhibit E

Structural Analysis

T-Mobile Site CT11084B

800 Ogg Meadow Road

Orange, Connecticut

Date: **February 10, 2009**

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

Crown Castle USA, Inc.
2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

Subject: **Structural Analysis Report**

Carrier Designation:	***T-MOBILE* Co-Locate** **Carrier Site Number:**	 CT11084B
Crown Castle Designation:	**Crown Castle BU Number:** **Crown Castle Site Name:** **Crown Castle JDE Job Number:** **Crown Castle Work Order Number:**	806939 NHV 2071 143137 114313 251825
Engineering Firm Designation:	**Crown Castle USA, Inc. Project Number:**	251825
Site Data:	**OFF OGG MEADOW ROAD, ORANGE, New Haven County, CT** **Latitude *41° 18' 28.36"*, Longitude *-73° 1' 56.22"*** **160 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 251825, in accordance with application 73389, revision 0.

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

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 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.

Structural analysis prepared by: Jose Arroyo Monroy, Engineer I

Respectfully submitted by:

Douglas K. Pineo

Douglas K. Pineo, P.E.
Manager Structural Design

STATE OF CONNECTICUT
DOUGLAS K. PINEO
No. 21110
LICENSED PROFESSIONAL ENGINEER

RISA Tower Report - version 5.3.1.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 160 ft Monopole tower designed by Valmont in September of 1999. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 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
130	129	3	rfs celwave	APXV18-206516S-C-A20 w/ Mount Pipe	-	-	1
		3	rfs celwave	ATMAA1412D-1A20			
		3	rfs celwave	ATMPP1412D-1CWA			

Notes:
1) Proposed Equipment

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
170	170	3	ems wireless	RR90-17-00DP w/ Mount Pipe	6	1-5/8	3
		4	nokia	CS72993.07			
		1	tower mounts	10'6"x4" Pipe Mount			
161	161	6	decibel	DB844H90	1 12	1/2 1-5/8	1
		6	decibel	DB948F85T2E-M			
		1	gps	GPS			
		1	tower mounts	Platform Mount [LP 702-1]			
		1	tower mounts	Platform Mount [LP 705-1]			
150	152	6	powerwave technologies	LGP13519	-	-	1
		6	adc	DUAL BAND 800/1900 FULL BAND MASTHEAD	-	-	2
		6	css	DUO1417-8686	12	1-1/4	1
		3	powerwave technologies	7770.00			
	150	1	tower mounts	Platform Mount [LP 702-1]			
		1	tower mounts	Platform Mount [LP 705-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
140	140	6	decibel	DB980H90E-M	6	1-5/8	1
		3	decibel	DB980H90E-M	3	1-5/8	2
		1	tower mounts	Platform Mount [LP 702-1]	-	-	1
		1	tower mounts	Platform Mount [LP 705-1]			
130	130	1	tower mounts	Platform Mount [LP 702-1]	-	-	1
		1	tower mounts	Platform Mount [LP 705-1]			
	129	3	ems wireless	RR90-17-02DP w/ Mount Pipe	12 12	1-5/8 1-1/4	4
	129	3	ems wireless	RR90-17-02DP w/ Mount Pipe			1
	120	12	swedcom	ALP 9212-N w/ Mount Pipe			
100	100	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1-5/8	2
		1	tower mounts	Side Arm Mount [SO 301-3]			
80	81	1	unknown	GPS	1	1/2	1
	80	2	tower mounts	Side Arm Mount [SO 301-1]			
50	50	1	tower mounts	Side Arm Mount [SO 301-1]	1	1/2	2
		1	unknown	GPS	-	-	
25	25	1	tower mounts	Side Arm Mount [SO 301-1]	1	1/2	1
		1	unknown	GPS			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Abandoned Equipment. Feedlines to be removed
4) Equipment to be replaced by proposed. Feedlines to be reused

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)
166.5	166.5	3	EMS Wireless	RV90-17-XXDP	-	-
157	157	12	Swedcom	ALP 9011	-	-
147	147	12	Swedcom	ALP 110 11-N	-	-
137	137	12	Decibel	DB980H	-	--
127	127	12	Swedcom	ALP 9011	-	-
117	117	12	Swedcom	ALP 9011	-	-
100	100	2	-	GPS	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH ENGINEERING	1257473	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	VALMONT	1060127	CCISITES
4-TOWER MANUFACTURER DRAWINGS	VALMONT	822032	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	160 - 121.333	Pole	TP29.774x21.65x0.25	1	-9.16	1194.53	53.5	Pass
L2	121.333 - 81.333	Pole	TP37.67x28.2935x0.375	2	-17.07	2266.49	80.2	Pass
L3	81.333 - 41.4167	Pole	TP45.297x35.7304x0.5	3	-29.08	3633.82	78.6	Pass
L4	41.4167 - 0	Pole	TP53x42.9154x0.5625	4	-48.30	4937.59	80.6	Pass
							Summary	
						Pole (L4)	80.6	Pass
						Rating =	80.6	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	68.9	Pass
1	Base Plate	0	95.5	Pass
1	Base Foundation	0	98.7	Pass

Structure Rating (max from all components) =	98.7%

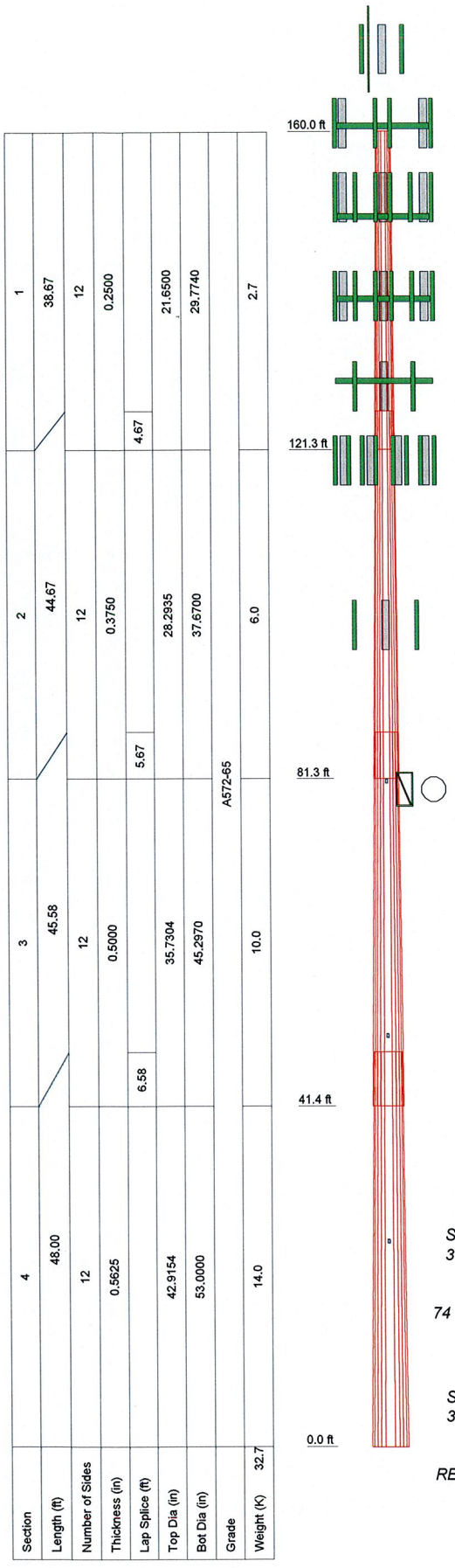
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and foundation are sufficient to carry the existing, reserved and proposed loading. No modifications are required at this time.

APPENDIX A

RISA TOWER OUTPUT



Section	1	2	3	4
Length (ft)	38.67	44.67	45.58	48.00
Number of Sides	12	12	12	12
Thickness (in)	0.2500	0.3750	0.5000	0.5625
Lap Splice (ft)	4.67	5.67	6.58	
Top Dia (in)	21.6500	28.2935	35.7304	42.9154
Bot Dia (in)	29.7740	37.6700	45.2970	53.0000
Grade	A572-65			
Weight (K)	2.7	6.0	10.0	14.0

Total Weight: 32.7

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
RR90-17-00DP w/ Mount Pipe	170	DB980H90E-M	140
(2) CS72993.07	170	(2) DB980H90E-M	140
RR90-17-00DP w/ Mount Pipe	170	DB980H90E-M	140
CS72993.07	170	Platform Mount [LP 702-1]	140
RR90-17-00DP w/ Mount Pipe	170	Platform Mount [LP 705-1]	140
CS72993.07	170	RR90-17-02DP w/ Mount Pipe	130
10'6"x4" Pipe Mount	170	(4) ALP 9212-N w/ Mount Pipe	130
(2) DB844H90	161	APXV18-206516S-C-A20 w/ Mount Pipe	130
(2) DB948F85T2E-M	161	ATMAA1412D-1A20	130
GPS	161	ATMPP1412D-1CWA	130
(2) DB844H90	161	RR90-17-02DP w/ Mount Pipe	130
(2) DB948F85T2E-M	161	(4) ALP 9212-N w/ Mount Pipe	130
(2) DB844H90	161	APXV18-206516S-C-A20 w/ Mount Pipe	130
(2) DB948F85T2E-M	161	ATMAA1412D-1A20	130
Platform Mount [LP 702-1]	161	ATMPP1412D-1CWA	130
Platform Mount [LP 705-1]	161	RR90-17-02DP w/ Mount Pipe	130
(2) DUO1417-8686	150	(4) ALP 9212-N w/ Mount Pipe	130
7770.00	150	APXV18-206516S-C-A20 w/ Mount Pipe	130
(2) LGP13519	150	ATMAA1412D-1A20	130
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	150	ATMPP1412D-1CWA	130
(2) DUO1417-8686	150	Platform Mount [LP 702-1]	130
7770.00	150	Platform Mount [LP 705-1]	130
(2) LGP13519	150	APXV18-206517S-C w/ Mount Pipe	100
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	150	APXV18-206517S-C w/ Mount Pipe	100
(2) DUO1417-8686	150	APXV18-206517S-C w/ Mount Pipe	100
7770.00	150	Side Arm Mount [SO 301-3]	100
(2) LGP13519	150	GPS	80
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	150	Side Arm Mount [SO 301-1]	80
Platform Mount [LP 702-1]	150	Side Arm Mount [SO 301-1]	80
Platform Mount [LP 705-1]	150	GPS	50
(2) DB980H90E-M	140	Side Arm Mount [SO 301-1]	50
DB980H90E-M	140	GPS	25
(2) DB980H90E-M	140	Side Arm Mount [SO 301-1]	25

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: 80.6%

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

Job: ***BU# 806939***			
Project:			
Client: Crown Castle USA, Inc.	Drawn by: jarroyomonroy	App'd:	
Code: TIA/EIA-222-F	Date: 02/10/09	Scale: NTS	
Path: R:\SA Models - Letters\Work Area\JMonroy\806939\806939.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.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check Poles
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	√ Include Shear-Torsion Interaction
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	Always Use Sub-Critical Flow
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Use Top Mounted Sockets
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	
Add IBC .6D+W Combination		

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	160.00-121.33	38.67	4.67	12	21.6500	29.7740	0.2500	1.0000	A572-65 (65 ksi)
L2	121.33-81.33	44.67	5.67	12	28.2935	37.6700	0.3750	1.5000	A572-65 (65 ksi)
L3	81.33-41.42	45.58	6.58	12	35.7304	45.2970	0.5000	2.0000	A572-65 (65 ksi)
L4	41.42-0.00	48.00		12	42.9154	53.0000	0.5625	2.2500	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	22.4137	17.2270	1006.9853	7.6612	11.2147	89.7916	2040.4253	8.4786	5.1322	20.529
	30.8243	23.7668	2644.2799	10.5696	15.4229	171.4512	5358.0279	11.6973	7.3094	29.238
L2	30.3058	33.7115	3353.8781	9.9948	14.6560	228.8398	6795.8664	16.5918	6.5776	17.54
	38.9989	45.0337	7995.1189	13.3516	19.5131	409.7317	16200.2784	22.1642	9.0906	24.241
L3	38.2221	56.7209	8985.9438	12.6125	18.5083	485.5079	18207.9583	27.9163	8.2357	16.471
	46.8949	72.1232	18473.9013	16.0373	23.4638	787.3347	37433.1325	35.4968	10.7996	21.599
L4	45.8612	76.7116	17563.5549	15.1623	22.2302	790.0780	35588.5240	37.7551	9.9938	17.767
	54.8696	94.9774	33334.2189	18.7726	27.4540	1214.1844	67544.1649	46.7450	12.6965	22.572

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 160.00-121.33				1	1	1		
L2 121.33-81.33				1	1	1		
L3 81.33-41.42				1	1	1		
L4 41.42-0.00				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
LDF4-50A(1/2")	C	No	Inside Pole	160.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
LDF7-50A(1-5/8")	C	No	Inside Pole	160.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF6-50A(1-1/4")	B	No	Inside Pole	150.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
LDF7-50A(1-5/8")	B	No	Inside Pole	140.00 - 0.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF7-50A(1-5/8")	B	No	Inside Pole	140.00 - 0.00	3	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF6-50A(1-1/4")	C	No	Inside Pole	130.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
FLC 158-50J(1-5/8")	B	No	Inside Pole	130.00 - 0.00	12	No Ice	0.00	0.92
						1/2" Ice	0.00	0.92
CR 50 1873(1-5/8")	C	No	Inside Pole	100.00 - 0.00	6	No Ice	0.00	0.83
						1/2" Ice	0.00	0.83
LDF4-50A(1/2")	B	No	Inside Pole	80.00 - 50.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
LDF4-50A(1/2")	B	No	Inside Pole	50.00 - 0.00	2	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
LDF4-50A(1/2")	B	No	Inside Pole	25.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15

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	160.00-121.33	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.46
		C	0.000	0.000	0.000	0.000	0.65
L2	121.33-81.33	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	1.05
		C	0.000	0.000	0.000	0.000	1.01
L3	81.33-41.42	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	1.06
		C	0.000	0.000	0.000	0.000	1.11
L4	41.42-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	1.11
		C	0.000	0.000	0.000	0.000	1.15

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	160.00-121.33	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.46
		C		0.000	0.000	0.000	0.000	0.65
L2	121.33-81.33	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	1.05
		C		0.000	0.000	0.000	0.000	1.01
L3	81.33-41.42	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	1.06
		C		0.000	0.000	0.000	0.000	1.11
L4	41.42-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	1.11
		C		0.000	0.000	0.000	0.000	1.15

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	160.00-121.33	0.0000	0.0000	0.0000	0.0000
L2	121.33-81.33	0.0000	0.0000	0.0000	0.0000
L3	81.33-41.42	0.0000	0.0000	0.0000	0.0000
L4	41.42-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RR90-17-00DP w/ Mount Pipe	A	From Leg	2.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.59 5.09	3.32 4.09	0.03 0.07
(2) CS72993.07	A	From Leg	2.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	1.43 1.59	0.42 0.54	0.02 0.03
RR90-17-00DP w/ Mount Pipe	B	From Leg	2.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.59 5.09	3.32 4.09	0.03 0.07
CS72993.07	B	From Leg	2.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	1.43 1.59	0.42 0.54	0.02 0.03
RR90-17-00DP w/ Mount Pipe	C	From Leg	2.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.59 5.09	3.32 4.09	0.03 0.07
CS72993.07	C	From Leg	2.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	1.43 1.59	0.42 0.54	0.02 0.03
10'6"x4" Pipe Mount	C	From Leg	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.72 5.62	4.72 5.62	0.11 0.15
**									
(2) DB844H90	A	From Leg	3.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice	2.87 3.18	3.97 4.34	0.01 0.04
(2) DB948F85T2E-M	A	From Leg	3.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice	1.92 2.22	3.26 3.62	0.01 0.03
GPS	A	From Leg	3.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.00 0.00
(2) DB844H90	B	From Leg	3.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice	2.87 3.18	3.97 4.34	0.01 0.04
(2) DB948F85T2E-M	B	From Leg	3.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice	1.92 2.22	3.26 3.62	0.01 0.03
(2) DB844H90	C	From Leg	3.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice	2.87 3.18	3.97 4.34	0.01 0.04
(2) DB948F85T2E-M	C	From Leg	3.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice	1.92 2.22	3.26 3.62	0.01 0.03
Platform Mount [LP 702-1]	C	None		0.0000	161.00	No Ice 1/2" Ice	24.53 29.94	24.53 29.94	1.34 1.65
Platform Mount [LP 705-1]	C	None		0.0000	161.00	No Ice 1/2" Ice	6.74 9.47	6.74 9.47	0.17 0.28
**									
(2) DUO1417-8686	A	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	6.53 6.94	4.20 4.57	0.02 0.06
7770.00	A	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
(2) LGP13519	A	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	0.00 0.00	0.21 0.28	0.01 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	A	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	1.55 1.72	0.81 0.94	0.03 0.04
(2) DUO1417-8686	B	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	6.53 6.94	4.20 4.57	0.02 0.06
7770.00	B	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
(2) LGP13519	B	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	0.00 0.00	0.21 0.28	0.01 0.01
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	B	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	1.55 1.72	0.81 0.94	0.03 0.04
(2) DUO1417-8686	C	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	6.53 6.94	4.20 4.57	0.02 0.06
7770.00	C	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
(2) LGP13519	C	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	0.00 0.00	0.21 0.28	0.01 0.01
(2) DUAL BAND 800/1900 FULL BAND MASTHEAD	C	From Leg	3.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice	1.55 1.72	0.81 0.94	0.03 0.04
Platform Mount [LP 702-1]	C	None		0.0000	150.00	No Ice 1/2" Ice	24.53 29.94	24.53 29.94	1.34 1.65
Platform Mount [LP 705-1]	C	None		0.0000	150.00	No Ice 1/2" Ice	6.74 9.47	6.74 9.47	0.17 0.28
**									
(2) DB980H90E-M	A	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	3.80 4.18	2.19 2.56	0.01 0.03
DB980H90E-M	A	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	3.80 4.18	2.19 2.56	0.01 0.03
(2) DB980H90E-M	B	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	3.80 4.18	2.19 2.56	0.01 0.03
DB980H90E-M	B	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	3.80 4.18	2.19 2.56	0.01 0.03
(2) DB980H90E-M	C	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	3.80 4.18	2.19 2.56	0.01 0.03
DB980H90E-M	C	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	3.80 4.18	2.19 2.56	0.01 0.03
Platform Mount [LP 702-1]	C	None		0.0000	140.00	No Ice 1/2" Ice	24.53 29.94	24.53 29.94	1.34 1.65
Platform Mount [LP 705-1]	C	None		0.0000	140.00	No Ice 1/2" Ice	6.74 9.47	6.74 9.47	0.17 0.28
**									
RR90-17-02DP w/ Mount Pipe	A	From Leg	3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	4.59 5.09	3.32 4.09	0.03 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(4) ALP 9212-N w/ Mount Pipe	A	From Leg	-1.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	6.02 6.51	7.05 7.83	0.04 0.09
APXV18-206516S-C-A20 w/ Mount Pipe	A	From Leg	-10.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	3.86 4.27	3.30 4.00	0.04 0.07
ATMAA1412D-1A20	A	From Leg	-1.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	1.52 1.68	0.47 0.57	0.01 0.02
ATMPP1412D-1CWA	A	From Leg	-1.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	1.17 1.32	0.42 0.53	0.01 0.02
RR90-17-02DP w/ Mount Pipe	B	From Leg	-1.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	4.59 5.09	3.32 4.09	0.03 0.07
(4) ALP 9212-N w/ Mount Pipe	B	From Leg	-1.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	6.02 6.51	7.05 7.83	0.04 0.09
APXV18-206516S-C-A20 w/ Mount Pipe	B	From Leg	-10.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	3.86 4.27	3.30 4.00	0.04 0.07
ATMAA1412D-1A20	B	From Leg	-1.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	1.52 1.68	0.47 0.57	0.01 0.02
ATMPP1412D-1CWA	B	From Leg	-1.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	1.17 1.32	0.42 0.53	0.01 0.02
RR90-17-02DP w/ Mount Pipe	C	From Leg	-1.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	4.59 5.09	3.32 4.09	0.03 0.07
(4) ALP 9212-N w/ Mount Pipe	C	From Leg	-1.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	6.02 6.51	7.05 7.83	0.04 0.09
APXV18-206516S-C-A20 w/ Mount Pipe	C	From Leg	-10.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	3.86 4.27	3.30 4.00	0.04 0.07
ATMAA1412D-1A20	C	From Leg	-1.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	1.52 1.68	0.47 0.57	0.01 0.02
ATMPP1412D-1CWA	C	From Leg	-1.00 3.00 0.00	0.0000	130.00	No Ice 1/2" Ice	1.17 1.32	0.42 0.53	0.01 0.02
Platform Mount [LP 702-1]	C	None	-1.00	0.0000	130.00	No Ice 1/2" Ice	24.53 29.94	24.53 29.94	1.34 1.65
Platform Mount [LP 705-1]	C	None		0.0000	130.00	No Ice 1/2" Ice	6.74 9.47	6.74 9.47	0.17 0.28
**									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	3.00 0.00	0.0000	100.00	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	0.00 3.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	0.05 0.09
APXV18-206517S-C w/ Mount Pipe	C	From Leg	0.00 3.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	0.05 0.09
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Side Arm Mount [SO 301-3]	C	None		0.0000	100.00	No Ice	2.14	2.14	0.07
						1/2" Ice	3.16	3.16	0.10
**									
GPS	A	From Leg	2.00 0.00 1.00	0.0000	80.00	No Ice 1/2" Ice	0.17 0.24	0.17 0.24	0.00 0.00
Side Arm Mount [SO 301-1]	A	From Leg	1.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	1.00 1.39	0.90 1.42	0.02 0.03
Side Arm Mount [SO 301-1]	B	From Leg	1.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	1.00 1.39	0.90 1.42	0.02 0.03
**									
GPS	A	From Leg	2.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	0.17 0.24	0.17 0.24	0.00 0.00
Side Arm Mount [SO 301-1]	A	From Leg	1.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice	1.00 1.39	0.90 1.42	0.02 0.03
**									
GPS	A	From Leg	2.00 0.00 0.00	0.0000	25.00	No Ice 1/2" Ice	0.17 0.24	0.17 0.24	0.00 0.00
Side Arm Mount [SO 301-1]	A	From Leg	1.00 0.00 0.00	0.0000	25.00	No Ice 1/2" Ice	1.00 1.39	0.90 1.42	0.02 0.03

Load Combinations

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

Comb. No.	Description
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	160 - 121.333	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.19	0.24	-0.07
			Max. Mx	11	-9.17	363.10	-0.04
			Max. My	8	-9.16	0.16	-365.22
			Max. Vy	11	-21.76	363.10	-0.04
			Max. Vx	8	21.81	0.16	-365.22
			Max. Torque	7			-0.45
L2	121.333 - 81.333	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-23.77	0.24	-0.07
			Max. Mx	11	-17.08	1316.13	-0.04
			Max. My	8	-17.08	0.18	-1320.31
			Max. Vy	11	-27.38	1316.13	-0.04
			Max. Vx	2	-27.44	0.18	1320.21
			Max. Torque	7			-0.45
L3	81.333 - 41.4167	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-36.22	0.17	0.08
			Max. Mx	11	-29.09	2485.48	0.11
			Max. My	2	-29.08	0.19	2491.83
			Max. Vy	11	-32.46	2485.48	0.11
			Max. Vx	2	-32.52	0.19	2491.83
			Max. Torque	7			-0.45
L4	41.4167 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-55.94	0.17	0.19
			Max. Mx	11	-48.28	4176.68	0.26
			Max. My	2	-48.28	0.28	4185.92
			Max. Vy	11	-37.92	4176.68	0.26
			Max. Vx	2	-37.98	0.28	4185.92
			Max. Torque	3			0.36

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	21	55.94	0.00	-31.17
	Max. H_x	11	48.31	37.89	0.00
	Max. H_z	2	48.31	0.00	37.95
	Max. M_x	2	4185.92	0.00	37.95
	Max. M_z	5	4176.40	-37.89	-0.00
	Max. Torsion	3	0.36	-18.94	32.86
	Min. Vert	1	48.31	0.00	0.00
	Min. H_x	5	48.31	-37.89	-0.00
	Min. H_z	8	48.31	-0.00	-37.95
	Min. M_x	8	-4185.69	-0.00	-37.95
	Min. M_z	11	-4176.68	37.89	0.00
	Min. Torsion	8	-0.32	-0.00	-37.95

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	48.31	0.00	0.00	-0.12	0.13	0.00
Dead+Wind 0 deg - No Ice	48.31	-0.00	-37.95	-4185.92	0.28	-0.32
Dead+Wind 30 deg - No Ice	48.31	18.94	-32.86	-3625.07	-2088.00	-0.36
Dead+Wind 60 deg - No Ice	48.31	32.81	-18.97	-2092.91	-3616.78	-0.29
Dead+Wind 90 deg - No Ice	48.31	37.89	0.00	0.02	-4176.40	-0.12
Dead+Wind 120 deg - No Ice	48.31	32.81	18.98	2092.92	-3616.92	0.07
Dead+Wind 150 deg - No Ice	48.31	18.95	32.87	3624.98	-2088.25	0.24
Dead+Wind 180 deg - No Ice	48.31	0.00	37.95	4185.69	-0.00	0.32
Dead+Wind 210 deg - No Ice	48.31	-18.94	32.86	3624.84	2088.28	0.32
Dead+Wind 240 deg - No Ice	48.31	-32.81	18.97	2092.68	3617.06	0.25
Dead+Wind 270 deg - No Ice	48.31	-37.89	-0.00	-0.26	4176.68	0.12
Dead+Wind 300 deg - No Ice	48.31	-32.81	-18.98	-2093.16	3617.20	-0.04
Dead+Wind 330 deg - No Ice	48.31	-18.95	-32.87	-3625.21	2088.52	-0.20
Dead+Ice+Temp	55.94	0.00	0.00	-0.19	0.17	0.00
Dead+Wind 0 deg+Ice+Temp	55.94	0.00	-31.17	-3540.37	0.15	-0.27
Dead+Wind 30 deg+Ice+Temp	55.94	15.57	-26.99	-3066.09	-1766.46	-0.34
Dead+Wind 60 deg+Ice+Temp	55.94	26.96	-15.59	-1770.31	-3059.70	-0.31
Dead+Wind 90 deg+Ice+Temp	55.94	31.13	-0.00	-0.22	-3533.05	-0.18
Dead+Wind 120 deg+Ice+Temp	55.94	26.96	15.58	1769.88	-3059.67	-0.01
Dead+Wind 150 deg+Ice+Temp	55.94	15.57	26.99	3065.69	-1766.40	0.15
Dead+Wind 180 deg+Ice+Temp	55.94	-0.00	31.17	3540.00	0.22	0.27
Dead+Wind 210 deg+Ice+Temp	55.94	-15.57	26.99	3065.72	1766.83	0.31
Dead+Wind 240 deg+Ice+Temp	55.94	-26.96	15.59	1769.94	3060.07	0.28
Dead+Wind 270 deg+Ice+Temp	55.94	-31.13	0.00	-0.15	3533.43	0.18
Dead+Wind 300 deg+Ice+Temp	55.94	-26.96	-15.58	-1770.26	3060.04	0.04
Dead+Wind 330 deg+Ice+Temp	55.94	-15.57	-26.99	-3066.06	1766.77	-0.13
Dead+Wind 0 deg - Service	48.31	-0.00	-13.13	-1450.20	0.19	-0.11
Dead+Wind 30 deg - Service	48.31	6.55	-11.37	-1255.91	-723.25	-0.12
Dead+Wind 60 deg - Service	48.31	11.35	-6.57	-725.12	-1252.86	-0.10
Dead+Wind 90 deg - Service	48.31	13.11	0.00	-0.07	-1446.73	-0.04
Dead+Wind 120 deg - Service	48.31	11.35	6.57	724.97	-1252.91	0.02
Dead+Wind 150 deg - Service	48.31	6.56	11.37	1255.72	-723.34	0.08
Dead+Wind 180 deg - Service	48.31	0.00	13.13	1449.97	0.09	0.11
Dead+Wind 210 deg - Service	48.31	-6.55	11.37	1255.67	723.53	0.12
Dead+Wind 240 deg - Service	48.31	-11.35	6.57	724.88	1253.14	0.09
Dead+Wind 270 deg - Service	48.31	-13.11	-0.00	-0.17	1447.01	0.04

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 300 deg - Service	48.31	-11.35	-6.57	-725.20	1253.19	-0.02
Dead+Wind 330 deg - Service	48.31	-6.56	-11.37	-1255.95	723.62	-0.07

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-48.31	0.00	0.00	48.31	0.00	0.000%
2	-0.00	-48.31	-37.95	0.00	48.31	37.95	0.000%
3	18.94	-48.31	-32.86	-18.94	48.31	32.86	0.000%
4	32.81	-48.31	-18.97	-32.81	48.31	18.97	0.000%
5	37.89	-48.31	0.00	-37.89	48.31	-0.00	0.000%
6	32.81	-48.31	18.98	-32.81	48.31	-18.98	0.000%
7	18.95	-48.31	32.87	-18.95	48.31	-32.87	0.000%
8	0.00	-48.31	37.95	-0.00	48.31	-37.95	0.000%
9	-18.94	-48.31	32.86	18.94	48.31	-32.86	0.000%
10	-32.81	-48.31	18.97	32.81	48.31	-18.97	0.000%
11	-37.89	-48.31	-0.00	37.89	48.31	0.00	0.000%
12	-32.81	-48.31	-18.98	32.81	48.31	18.98	0.000%
13	-18.95	-48.31	-32.87	18.95	48.31	32.87	0.000%
14	0.00	-55.94	0.00	0.00	55.94	0.00	0.000%
15	0.00	-55.94	-31.17	-0.00	55.94	31.17	0.000%
16	15.57	-55.94	-26.99	-15.57	55.94	26.99	0.000%
17	26.96	-55.94	-15.59	-26.96	55.94	15.59	0.000%
18	31.13	-55.94	-0.00	-31.13	55.94	0.00	0.000%
19	26.96	-55.94	15.58	-26.96	55.94	-15.58	0.000%
20	15.57	-55.94	26.99	-15.57	55.94	-26.99	0.000%
21	-0.00	-55.94	31.17	0.00	55.94	-31.17	0.000%
22	-15.57	-55.94	26.99	15.57	55.94	-26.99	0.000%
23	-26.96	-55.94	15.59	26.96	55.94	-15.59	0.000%
24	-31.13	-55.94	0.00	31.13	55.94	-0.00	0.000%
25	-26.96	-55.94	-15.58	26.96	55.94	15.58	0.000%
26	-15.57	-55.94	-26.99	15.57	55.94	26.99	0.000%
27	-0.00	-48.31	-13.13	0.00	48.31	13.13	0.000%
28	6.55	-48.31	-11.37	-6.55	48.31	11.37	0.000%
29	11.35	-48.31	-6.57	-11.35	48.31	6.57	0.000%
30	13.11	-48.31	0.00	-13.11	48.31	-0.00	0.000%
31	11.35	-48.31	6.57	-11.35	48.31	-6.57	0.000%
32	6.56	-48.31	11.37	-6.56	48.31	-11.37	0.000%
33	0.00	-48.31	13.13	-0.00	48.31	-13.13	0.000%
34	-6.55	-48.31	11.37	6.55	48.31	-11.37	0.000%
35	-11.35	-48.31	6.57	11.35	48.31	-6.57	0.000%
36	-13.11	-48.31	-0.00	13.11	48.31	0.00	0.000%
37	-11.35	-48.31	-6.57	11.35	48.31	6.57	0.000%
38	-6.56	-48.31	-11.37	6.56	48.31	11.37	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	0.00018044

3	Yes	5	0.00000001	0.00043612
4	Yes	5	0.00000001	0.00043866
5	Yes	4	0.00000001	0.00011862
6	Yes	5	0.00000001	0.00043996
7	Yes	5	0.00000001	0.00043545
8	Yes	4	0.00000001	0.00018021
9	Yes	5	0.00000001	0.00044030
10	Yes	5	0.00000001	0.00043739
11	Yes	4	0.00000001	0.00011824
12	Yes	5	0.00000001	0.00043617
13	Yes	5	0.00000001	0.00044106
14	Yes	4	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00019579
16	Yes	5	0.00000001	0.00081648
17	Yes	5	0.00000001	0.00082012
18	Yes	5	0.00000001	0.00019532
19	Yes	5	0.00000001	0.00082152
20	Yes	5	0.00000001	0.00081573
21	Yes	5	0.00000001	0.00019579
22	Yes	5	0.00000001	0.00082257
23	Yes	5	0.00000001	0.00081835
24	Yes	5	0.00000001	0.00019537
25	Yes	5	0.00000001	0.00081697
26	Yes	5	0.00000001	0.00082334
27	Yes	4	0.00000001	0.00005375
28	Yes	4	0.00000001	0.00089052
29	Yes	4	0.00000001	0.00090142
30	Yes	4	0.00000001	0.00004742
31	Yes	4	0.00000001	0.00090734
32	Yes	4	0.00000001	0.00088763
33	Yes	4	0.00000001	0.00005371
34	Yes	4	0.00000001	0.00090962
35	Yes	4	0.00000001	0.00089634
36	Yes	4	0.00000001	0.00004744
37	Yes	4	0.00000001	0.00089091
38	Yes	4	0.00000001	0.00091300

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 121.333	35.553	33	1.9934	0.0018
L2	126 - 81.333	22.090	27	1.7071	0.0006
L3	87 - 41.4167	10.246	27	1.1288	0.0002
L4	48 - 0	3.096	27	0.5901	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
170.00	RR90-17-00DP w/ Mount Pipe	33	35.553	1.9934	0.0018	27379
161.00	(2) DB844H90	33	35.553	1.9934	0.0018	27379
150.00	(2) DUO1417-8686	33	31.438	1.9226	0.0014	13689
140.00	(2) DB980H90E-M	33	27.412	1.8442	0.0010	6844

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
130.00	RR90-17-02DP w/ Mount Pipe	27	23.561	1.7505	0.0007	4563
100.00	APXV18-206517S-C w/ Mount Pipe	27	13.686	1.3425	0.0003	3986
80.00	GPS	27	8.607	1.0120	0.0002	3876
50.00	GPS	27	3.341	0.6064	0.0001	3545
25.00	GPS	27	1.114	0.5202	0.0001	6736

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 121.333	102.444	8	5.7458	0.0050
L2	126 - 81.333	63.684	2	4.9219	0.0017
L3	87 - 41.4167	29.557	2	3.2560	0.0006
L4	48 - 0	8.933	2	1.7028	0.0002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
170.00	RR90-17-00DP w/ Mount Pipe	8	102.444	5.7458	0.0051	9668
161.00	(2) DB844H90	8	102.444	5.7458	0.0051	9668
150.00	(2) DUO1417-8686	8	90.601	5.5453	0.0039	4833
140.00	(2) DB980H90E-M	8	79.009	5.3210	0.0029	2414
130.00	RR90-17-02DP w/ Mount Pipe	2	67.921	5.0492	0.0020	1608
100.00	APXV18-206517S-C w/ Mount Pipe	2	39.472	3.8551	0.0007	1395
80.00	GPS	2	24.829	2.9416	0.0005	1352
50.00	GPS	2	9.640	1.7673	0.0002	1231
25.00	GPS	2	3.214	1.0918	0.0001	2336

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	160 - 121.333 (1)	TP29.774x21.65x0.25	38.67	0.00	0.0	39.000	22.9775	-9.16	896.12	0.010
L2	121.333 - 81.333 (2)	TP37.67x28.2935x0.375	44.67	0.00	0.0	39.000	43.5972	-17.07	1700.29	0.010
L3	81.333 - 41.4167 (3)	TP45.297x35.7304x0.5	45.58	0.00	0.0	39.000	69.8987	-29.08	2726.05	0.011
L4	41.4167 - 0 (4)	TP53x42.9154x0.5625	48.00	0.00	0.0	39.000	94.9774	-48.28	3704.12	0.013

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 $\frac{P}{P_a}$

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	160 - 121.333 (1)	TP29.774x21.65x0.25	365.22	27.356	39.000	0.701	0.00	0.000	39.000	0.000
L2	121.333 - 81.333 (2)	TP37.67x28.2935x0.375	1320.31	41.272	39.000	1.058	0.00	0.000	39.000	0.000
L3	81.333 - 41.4167 (3)	TP45.297x35.7304x0.5	2491.83	40.449	39.000	1.037	0.00	0.000	39.000	0.000
L4	41.4167 - 0 (4)	TP53x42.9154x0.5625	4185.93	41.370	39.000	1.061	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	160 - 121.333 (1)	TP29.774x21.65x0.25	21.81	0.949	26.000	0.074	0.40	0.014	26.000	0.001
L2	121.333 - 81.333 (2)	TP37.67x28.2935x0.375	27.44	0.629	26.000	0.049	0.40	0.006	26.000	0.000
L3	81.333 - 41.4167 (3)	TP45.297x35.7304x0.5	32.52	0.465	26.000	0.036	0.32	0.002	26.000	0.000
L4	41.4167 - 0 (4)	TP53x42.9154x0.5625	37.98	0.400	26.000	0.031	0.32	0.002	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	160 - 121.333 (1)	0.010	0.701	0.000	0.074	0.001	0.713 ✔	1.333	H1-3+VT ✔
L2	121.333 - 81.333 (2)	0.010	1.058	0.000	0.049	0.000	1.069 ✔	1.333	H1-3+VT ✔
L3	81.333 - 41.4167 (3)	0.011	1.037	0.000	0.036	0.000	1.048 ✔	1.333	H1-3+VT ✔
L4	41.4167 - 0 (4)	0.013	1.061	0.000	0.031	0.000	1.074 ✔	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	160 - 121.333	Pole	TP29.774x21.65x0.25	1	-9.16	1194.53	53.5	Pass
L2	121.333 - 81.333	Pole	TP37.67x28.2935x0.375	2	-17.07	2266.49	80.2	Pass
L3	81.333 - 41.4167	Pole	TP45.297x35.7304x0.5	3	-29.08	3633.82	78.6	Pass
L4	41.4167 - 0	Pole	TP53x42.9154x0.5625	4	-48.28	4937.59	80.6	Pass
							Summary	
						Pole (L4)	80.6	Pass
						RATING =	**80.6**	**Pass**

APPENDIX B

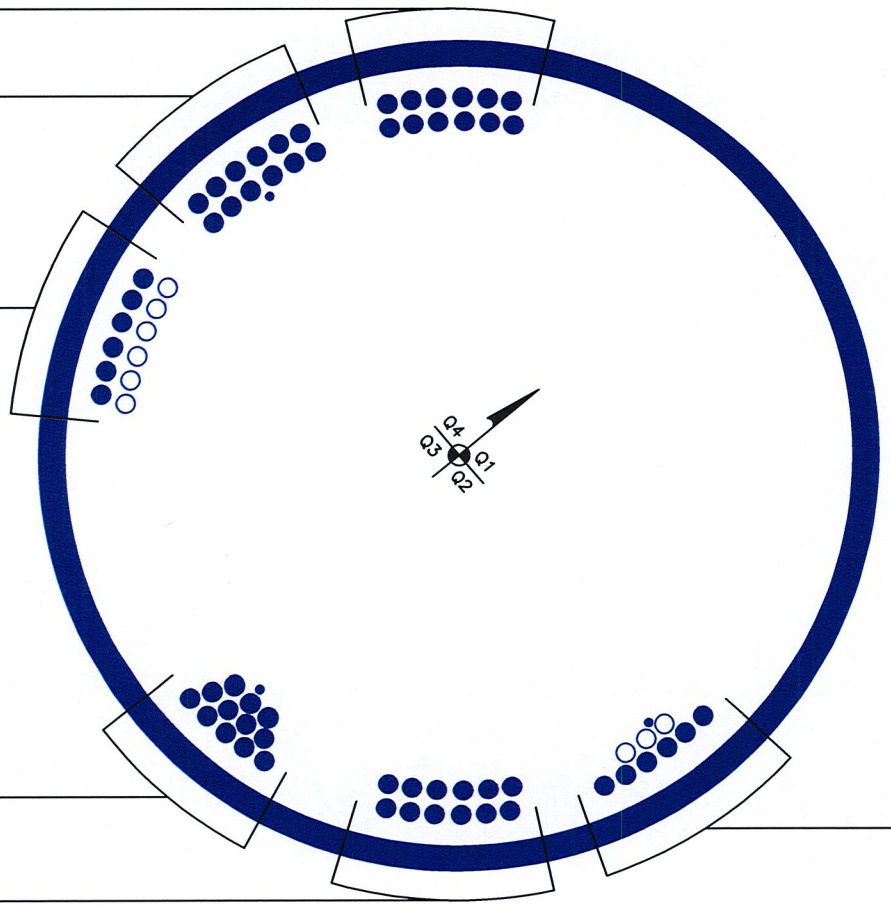
BASE LEVEL DRAWING

(INSTALLED)
(12) 1-1/4" TO 130 FT LEVEL

(INSTALLED)
(12) 1-5/8" TO 161 FT LEVEL
(1) 1/2" TO 161 FT LEVEL (GPS)

(RESERVED)
(6) 1-5/8" TO 100 FT LEVEL

(ABANDONED-TO BE REMOVED)
(6) 1-5/8" TO 170 FT LEVEL



(INSTALLED)
(12) 1-1/4" TO 150 FT LEVEL
(1) 1/2" TO 25 FT LEVEL (GPS)

(INSTALLED)
(12) 1-5/8" TO 130 FT LEVEL

(SLA)
(1) 1/2" TO 50 FT LEVEL
(RESERVED)
(3) 1-5/8" TO 140 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 140 FT LEVEL
(1) 1/2" TO 80 FT LEVEL (GPS)

BUSINESS UNIT: 806939 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

Site Data

BU#: *806939*
Site Name: *NHV 2071 143137*
App #: *73389*

Reactions		
Moment:	4186	ft-kips
Axial:	48	kips
Shear:	38	kips

Connection Type: *Butt*

Anchor Rod Data		
Qty:	24	
Diam:	2.25	in
Rod Material:	A615-J	
Grade(Fy):	75	ksi
Circle:	61.37	in

Plate Data		
Diam:	67.38	in
Thick:	2.5	in
Grade:	60	ksi
Eff. Width:	7.10	in

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.375	in
Width:	6	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	53	in
Thick:	0.5625	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

Maximum Rod Tension:	134.4 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	68.9% **Pass**

Base Plate Results Flexural Check

Base Plate Stress:	57.3 ksi
Allowable Plate Stress:	60.0 ksi
Base Plate Stress Ratio:	95.5% **Pass**

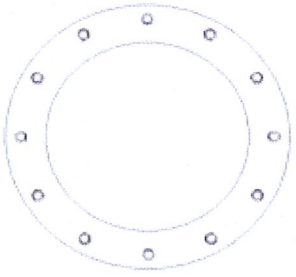
n/a

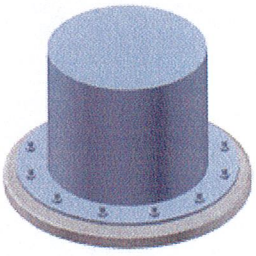
Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check:	n/a





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

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

FOUNDATION REACTION COMPARISON

BU# 806939
WO# 251825

REACTIONS	DESIGN REACTIONS	CURRENT REACTIONS	% CAPACITY
MOMENT (kip-ft)	4240.1	4186.0	98.7%
SHEAR (kips)	38.1	38.0	99.8%

Design loads from: Valmont, Order# 19126-69, 9/16/1999

Although the shear capacity is at 99.8%, the moment reaction is the governing criteria for a monopole drilled pier foundation. Therefore, the overall capacity for this foundation is 98.7%.