



STATE OF CONNECTICUT  
CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

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

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

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

September 16, 2009

Thomas F. Flynn III  
UMTS Project Manager  
T-Mobile USA, Inc.  
35 Griffin Rd. S  
Bloomfield, CT 06002

RE: **EM-T-MOBILE-085-090817** - T-Mobile USA, Inc. notice of intent to modify an existing telecommunications facility located at 500 Moose Hill Road, Monroe, Connecticut.

Dear Mr. Flynn:

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

- The proposed coax shall be installed inside the pole's shaft;
- The proposed tower mounted amplifiers shall be installed behind the panel antennas; and
- Not more than 45 days after completion of construction, the Council shall be notified in writing that the coax and tower mounted amplifiers were installed as specified.

The proposed modifications are to be implemented as specified here and in your notice dated August 13, 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.

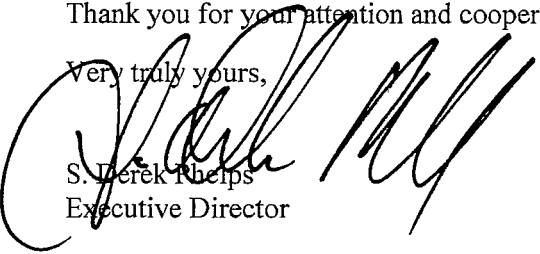
This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies 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/MP/laf

c: The Honorable Tom Buzi, First Selectman, Town of Monroe  
Daniel A. Tuba, Planning Administrator, Town of Monroe  
SBA Network Services, Inc.

**Perrone, Michael**

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**From:** Tom Flynn [Tom.Flynn@maxtontech.com]  
**Sent:** Tuesday, August 25, 2009 1:53 PM  
**To:** Perrone, Michael  
**Subject:** RE: EM-T-MOBILE-085-090817 500 Moose Hill Road, Monroe, CT

Mike,

The correct configuration for this site is that the existing 3 EMSRR90-17-02DP antennas will be removed and replaced with 3 new RFS APX16DWV-16DWVS A20 antennas and 3 new RFS TMAs will be added.

This conforms to the structural submitted. Sorry for any confusion.

Tom Flynn  
508-821-6974

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**From:** Perrone, Michael [mailto:Michael.Perrone@ct.gov]  
**Sent:** Monday, August 24, 2009 4:11 PM  
**To:** Tom Flynn  
**Subject:** EM-T-MOBILE-085-090817 500 Moose Hill Road, Monroe, CT

Hi Tom.

I was wondering if you could clarify what is being proposed in terms of antenna and TMA installations/replacements.

The text description seems to suggest that all nine existing antennas would be replaced with nine new APX16DWV-16DWVS-A20 RFS and one additional RFS antenna.

The tower elevation drawing suggests that three existing antennas would be replaced with three new APX16DWV-16DWVS-A20 RFS and three new Twin AWS TMAs and add one additional new Twin AWS TMA.

The structural analysis suggests that three existing EMS RR90-17-02DP antennas would be removed and replaced with three new RFS APX16DWV-16DWVS-A20 antennas and three new RFS TMAs would be added.

Please let me know what the correct configuration is.

Thanks for your help.

Mike Perrone  
Siting Analyst  
Connecticut Siting Council  
10 Franklin Square  
New Britain, CT 06051  
Phone: 860-827-2943  
Fax: 860-827-2950  
Email: [michael.perrone@ct.gov](mailto:michael.perrone@ct.gov)

8/28/2009



STATE OF CONNECTICUT  
CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

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

E-Mail: [siting.council@ct.gov](mailto:siting.council@ct.gov)  
[www.ct.gov/csc](http://www.ct.gov/csc)

August 17, 2009

The Honorable Tom Buzi  
First Selectman  
Town of Monroe  
Town Hall  
7 Fan Hill Road  
Monroe, CT 06468-1800

RE: **EM-T-MOBILE-085-090817** – T-Mobile USA, Inc. notice of intent to modify an existing telecommunications facility located at 500 Moose Hill Road, Monroe, Connecticut.

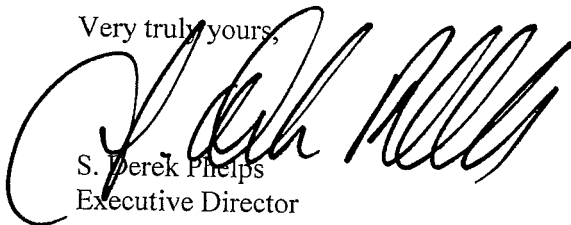
Dear Mr. Buzi:

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 August 31, 2009.

Thank you for your cooperation and consideration.

Very truly yours,



S. Derek Phelps  
Executive Director

SDP/laf

Enclosure: Notice of Intent

c: Daniel A. Tuba, Planning Administrator, Town of Monroe

August 13, 2009

**Via Federal Express**

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

ORIGINAL

**Re: Notice of Exempt Modification**  
**SBA Network Services, Inc. Telecommunications Facility**  
**500 Moose Hill Road, Monroe, Connecticut**  
**T-Mobile Site CT11664C**

RECEIVED  
AUG 17 2009  
CONNECTICUT  
SITING COUNCIL

Dear Mr. Phelps:

Omnipoint Communications, a subsidiary of T-Mobile USA, Inc. ("T-Mobile"), intends to replace existing antennas with new antennas, add additional antennas and supplement existing ground equipment at a 150-foot self-supporting monopole facility owned by **SBA Network Services, Inc.** and located at **500 Moose Hill Road, Monroe, 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 Tom Buzi, First Selectman, Town of Monroe.

The existing Facility consists of a 150-foot self-supporting monopole capable of supporting multiple carriers within a fenced compound. The coordinates for the Facility are approximately **Lat: 41°-19'-06"** and **Long: 73°-12'-03"**. The Facility is located in the southeastern section of Monroe in the St. John's Cemetery. The Facility is approximately 1200 feet east of Moose Hill Road, approximately 800 feet north of Cross Hill Road and roughly 2000 feet west of the Monroe/Shelton town line (see Site Map, attached as Exhibit A). The monopole currently supports Verizon antennas at the ninety-nine foot (99') level centerline AGL (above ground level), Nextel antennas at the one hundred nine (109') level centerline AGL, Cingular antennas at the one hundred thirty-nine foot (139') level centerline AGL (above ground level), Sprint antennas at the one hundred forty-seven (147') level centerline AGL, and Town of Monroe has antennas at the one hundred fifty foot (150') level centerline AGL.. The current T-Mobile antenna configuration is three antenna per sector for a total of nine antennas at the one hundred seventeen foot level (117') AGL. T-Mobile proposes to replace the existing antennas with new APX16DWV-16DWVS-A20 RFS Antennas and add one new RFS Antenna. T-Mobile also intends to add a UMTS 3106 BTS equipment cabinet to its current configuration of one existing S8000 equipment cabinet. The two cabinets will be mounted on an existing concrete

pad, located within the compound. T-Mobile's equipment will be contained within its existing lease area. T-Mobile intends to reuse existing coaxial cable on its existing ice bridges from its current equipment pad to the existing tower. Utilities will be run from existing utility sources at the Facility (See Design Drawings and Equipment Specifications, attached as Exhibits B and C respectively).

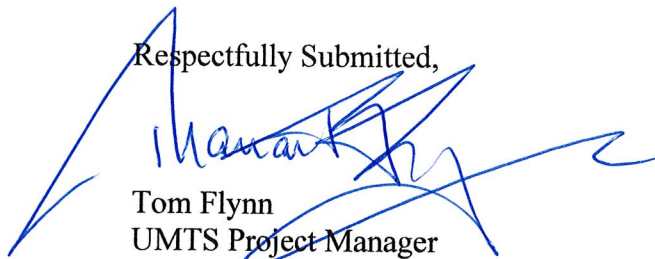
For the following reasons, the proposed modifications to the Moose Hill Road Facility meet the exempt modification criteria set forth in R.C.S.A. Section 16-50j-72(b)(2):

1. The proposed modification will not increase the height of the tower as T-Mobile seeks to install new antennas to replace existing ones, at center line height of approximately 117 feet.
2. The installation and replacement of T-Mobile's antennas and ground equipment 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 antennas would be 52.8652% 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 Monroe Facility constitutes an exempt modification under R.C.S.A. Section 16-50j-72(b)(2).

Respectfully Submitted,



Tom Flynn  
UMTS Project Manager  
Agent for T-Mobile

cc: Tom Buzi, First Selectman, Town of Monroe  
St. John's Cemetery, underlying property owners

Hartford/72800.20/JTP/384815v1

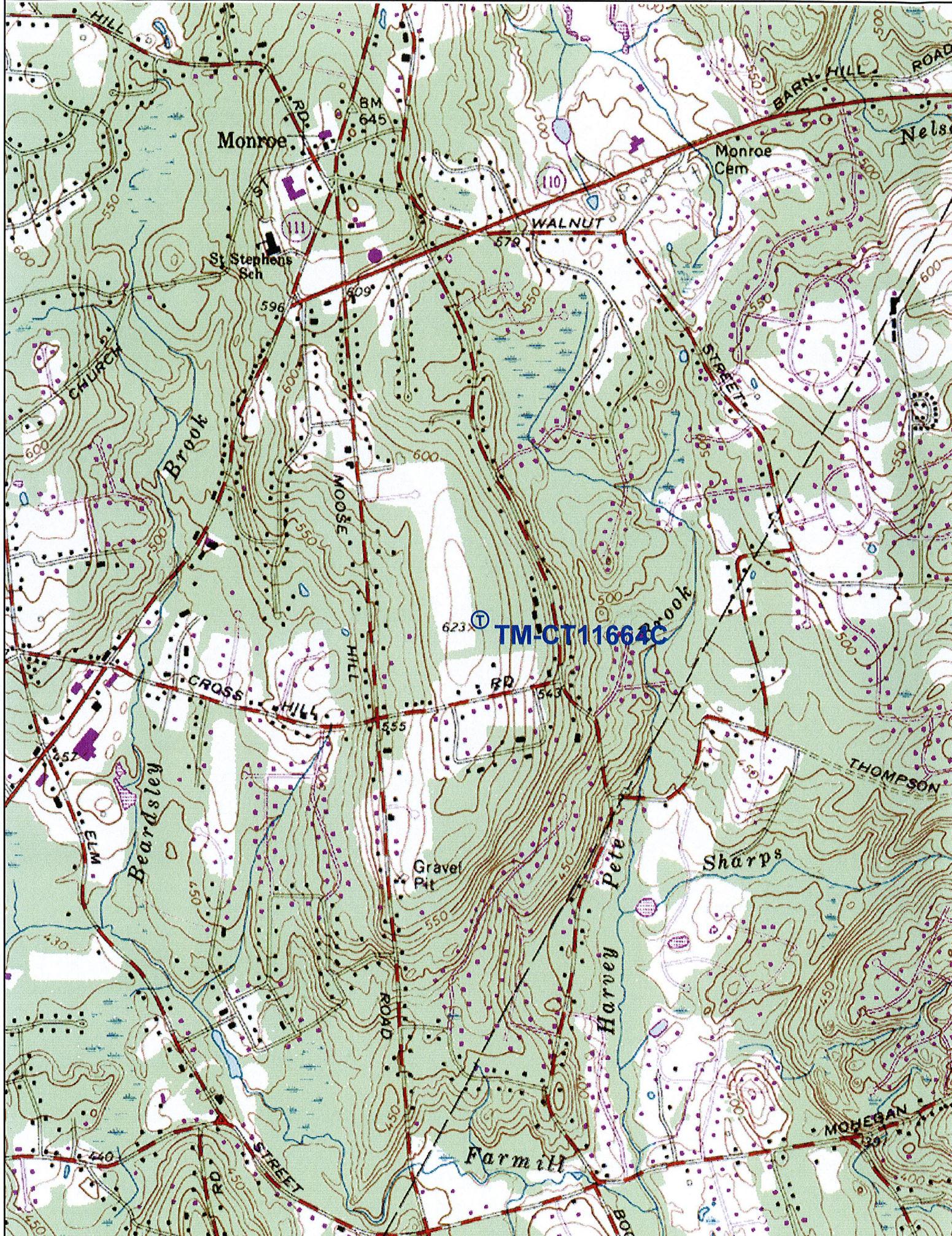
# **Exhibit A**

## **Site Map**

**T-Mobile Site CT11664C**

**500 Moose Hill Road**

**Monroe, Connecticut**





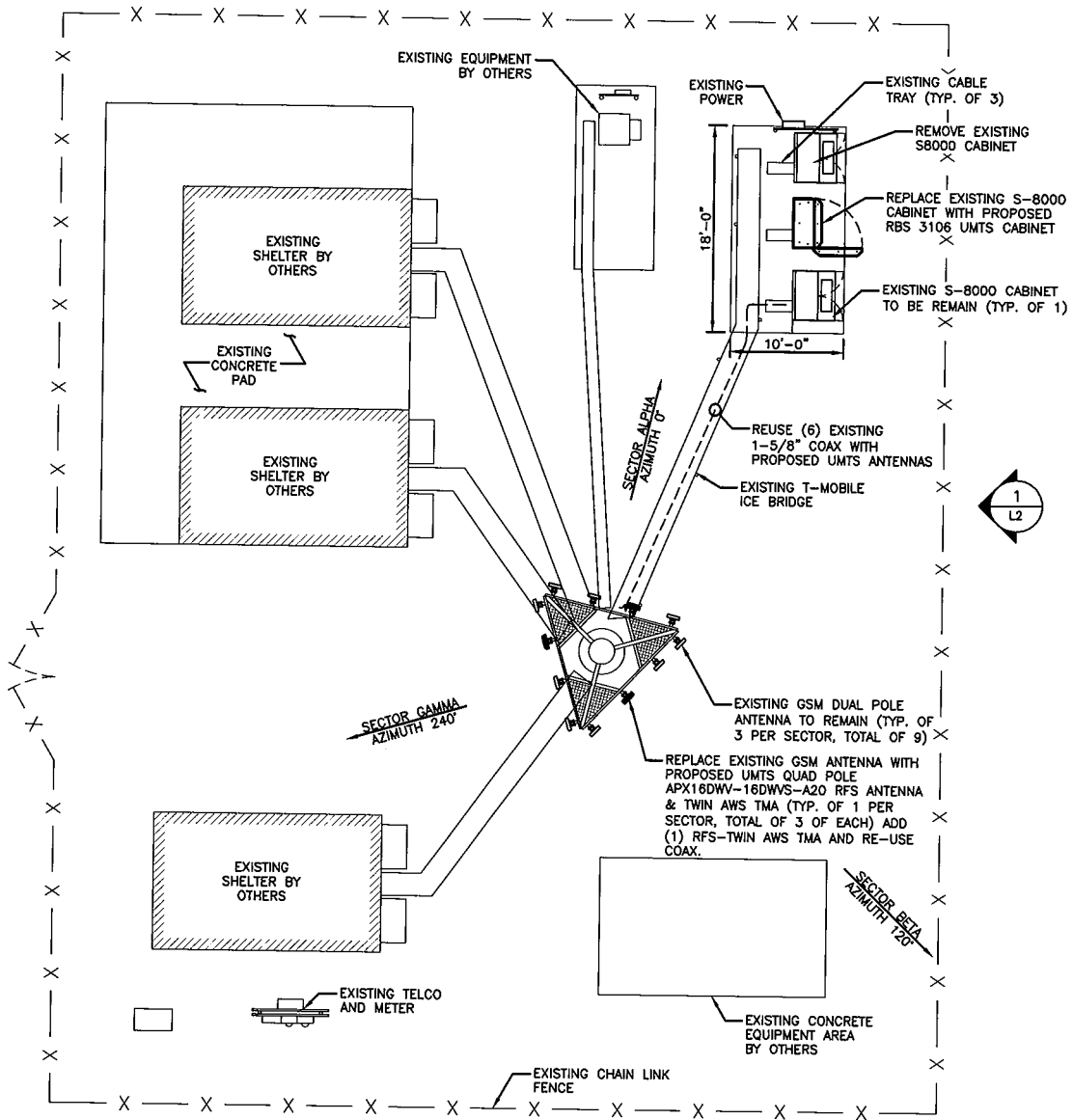
# **Exhibit B**

## **Design Drawings**

**T-Mobile Site CT11664C**

**500 Moose Hill Road**

**Monroe, Connecticut**



# COMPOUND LAYOUT PLAN

SCALE: NTS

1

**T-Mobile**  
35 GRIFFIN ROAD SOUTH  
BLDGFIELD, CT 06002



50 Eastman St.  
South Easton, MA 02375  
Phone: (508) 936-6363  
Fax: (508) 936-6366

PROJECT LOCATION:  
ST. JOHN'S CEMETERY  
CT11664C  
500 MOOSE HILL ROAD  
MONROE, CT 06468

PROJECT MANAGER:  
KB

DRAWN BY:  
JRK

BSDA PROJ. #:  
2898.418

APPROVED BY:

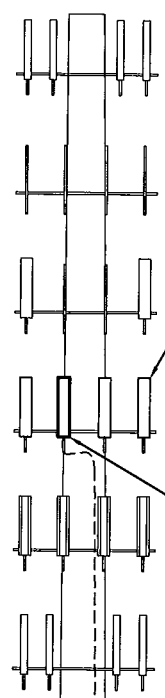
05/29/09  
05/14/09

**COMPOUND  
LAYOUT  
PLAN**

SHEET:

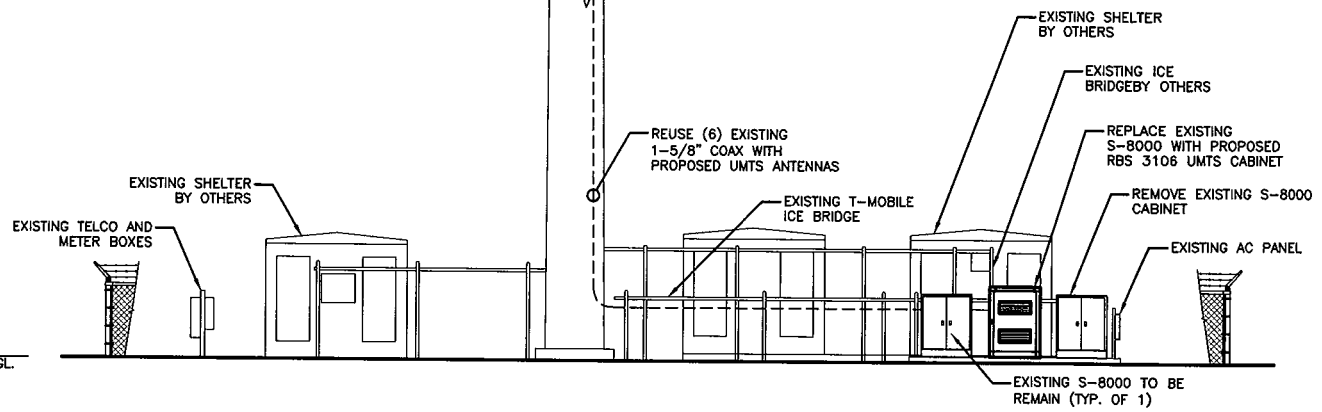
L1

- ◆ TOP OF MONOPOLE  
ELEV.: 150'-0" ± AGL.
- ◆ ◊ OF ANTENNAS BY OTHERS  
ELEV.: 147'-0" ± AGL.
- ◆ ◊ OF ANTENNA ARRAY BY OTHERS  
ELEV.: 137'-0" ± AGL.
- ◆ ◊ OF ANTENNAS BY OTHERS  
ELEV.: 127'-0" ± AGL.
- ◆ ◊ OF T-MOBILE ANTENNAS  
ELEV.: 117'-0" ± AGL.
- ◆ ◊ OF ANTENNAS BY OTHERS  
ELEV.: 107'-0" ± AGL.
- ◆ ◊ OF ANTENNAS BY OTHERS  
ELEV.: 97'-0" ± AGL.



EXISTING GSM DUAL POLE ANTENNA TO REMAIN (TYP. OF 3 PER SECTOR, TOTAL OF 9)

REPLACE EXISTING GSM ANTENNA WITH PROPOSED UMTS QUAD POLE APX16DWV-16DWVS-A20 RFS ANTENNA & TWIN AWS TMA (TYP. OF 1 PER SECTOR, TOTAL OF 3 OF EACH) ADD (1) RFS-TWIN AWS TMA AND RE-USE COAX.



◆ GRADE  
ELEV.: 0'-0" ± AGL.

**ELEVATION**

SCALE: N.T.S.

1

**T-Mobile**  
35 GRIFFIN ROAD SOUTH  
BLOOMFIELD, CT 06002

**MXTON**  
50 Eastman St.  
South Easton, MA 02375  
Phone: (508) 936-6363  
Fax: (508) 936-6395

PROJECT LOCATION:  
ST. JOHN'S CEMETERY  
**CT11664C**  
500 MOOSE HILL ROAD  
MONROE, CT 06468

PROJECT MANAGER:  
KB

DRAWN BY:  
JRK

BSDA PROJ. #:  
2898.418

APPROVED BY:  
05/29/09  
05/14/09

**ELEVATION**

SHEET:  
**L2**

# **Exhibit C**

## **Equipment Specifications**

**T-Mobile Site CT11664C**

**500 Moose Hill Road**

**Monroe, Connecticut**

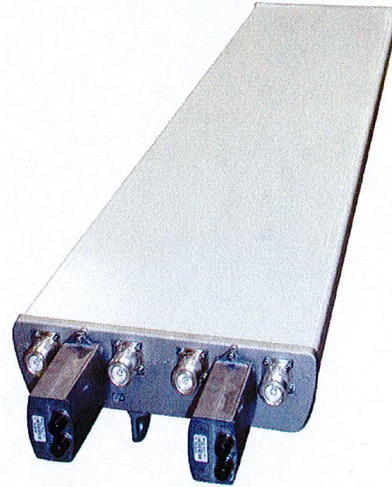


**Optimizer® Panel Dual Polarized Antenna equipped with (2) ACU motors**

**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

All information contained in the present datasheet is subject to confirmation at time of ordering.



**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, m <sup>2</sup> (ft <sup>2</sup> )	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**

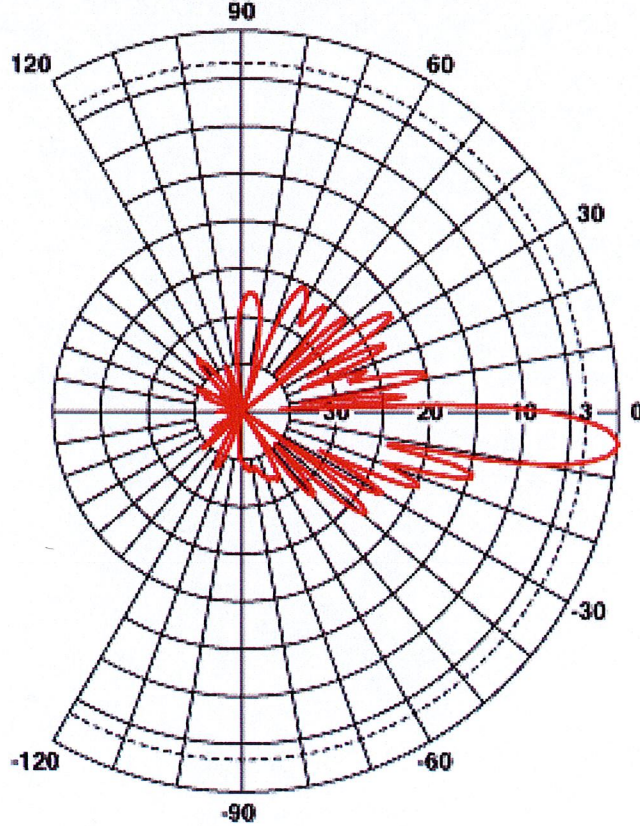
**This data is provisional and subject to change.**

All information contained in the present datasheet is subject to confirmation at time of ordering.



### 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.)

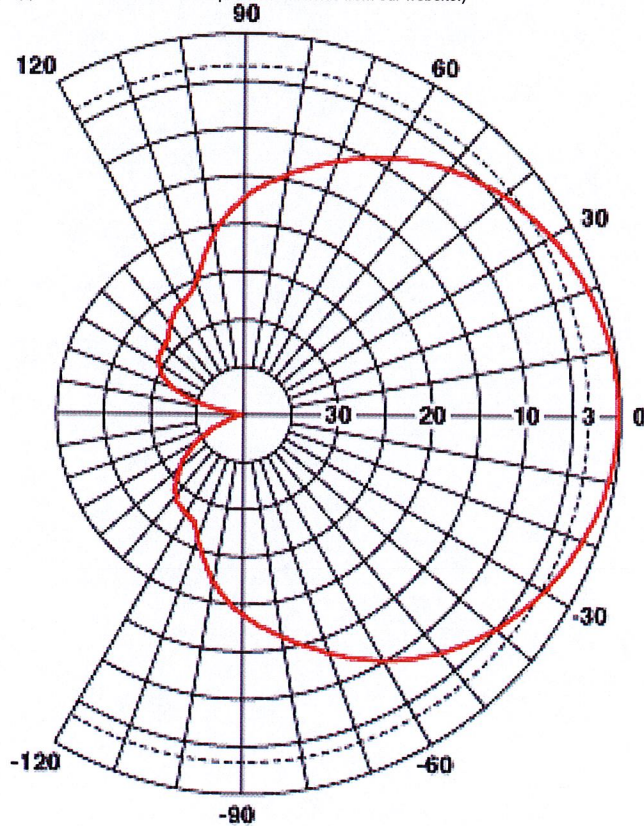


All information contained in the present datasheet is subject to confirmation at time of ordering.



### 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.)



All information contained in the present datasheet is subject to confirmation at time of ordering.



## 2 Product Overview

The RBS 3106 is an outdoor macro RBS, based on the RBS 3000 R3 hardware, and a member of the RBS 3000 family.

The figure below shows the RBS.

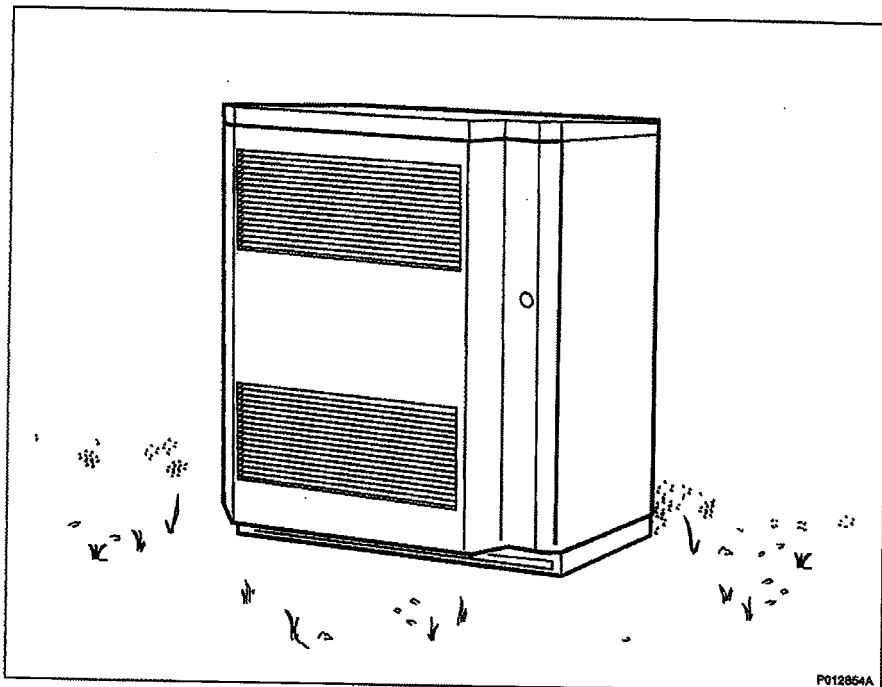


Figure 1 RBS 3106

### 2.1 Main Features

Not all features are supported by all RBS configurations. For current RBS configurations, see Section 6 on page 21.

The main features of RBS 3106 are the following:

- A complete RBS in a four-subrack cabinet with a standard footprint
- Can be equipped with various Radio Units (RU)
- Can be equipped with transport network interface boards, which support E1, T1, J1, E3, T3, STM-1/OC-3c, STM-1/OC-3, or Ethernet 10/100/1000 Mbps

- Ethernet (optical or electrical) can be used along with the other transmission types in Dual Stack configurations
- Can perform antenna sharing with Global System for Mobile Communications (GSM) and Time-Division Multiple Access (TDMA) systems
- Variable baseband capacity of up to 1536 Channel Elements (CE) uplink and downlink
- Supports High-Speed Downlink Packet Access (HSDPA)–enhanced uplink, up to 180 HS codes
- Power supply: 100 to 250 V AC or –40.0 to –57.6 V DC
- Two-way RX diversity, two-way TX diversity (optional), and four-way RX diversity (optional)
- Can be equipped and configured to support multiple frequency bands
- Can be configured for 1 – 6 sectors, with up to four carriers per sector
- Supports external alarm equipment
- Supports the Global Positioning System (GPS) as a synchronization source
- Supports Ethernet-based site Local Area Networks (LAN) (optional)
- Supports GSM or WCDMA Tower-Mounted Amplifiers (TMA) and Remote Electrical Tilt Units (RETU)

## 2.2 Optional Equipment

The following equipment is optional and can be ordered separately. It is not necessary for basic RBS functions.

The optional equipment presented in this section is located outside the RBS. Optional equipment located inside the RBS is described in Section 7.2 on page 30.

### **RBS Base Frame and Battery Base Unit (BBU)**

The RBS 3106 is mounted on its installation frame and the frame can be installed to either the ground, an RBS base frame, or a battery base unit.

### **ASC, TMA, RETU, and RIU**

The GSM or WCDMA TMA, the Antenna System Controller (ASC), the RETU, and the RET Interface Unit (RIU), are mast-mounted units placed close to the antenna.

The TMA and the ASC are uplink amplifiers and improve the RX sensitivity.

The RETU enables remote tilt of the antenna system. An ASC or a RIU is required to enable the RBS to communicate with the RETU.

There also exist 3GPP/AISG defined components as ATMA and ARET. These components are supported for P6.

#### **External Battery Backup**

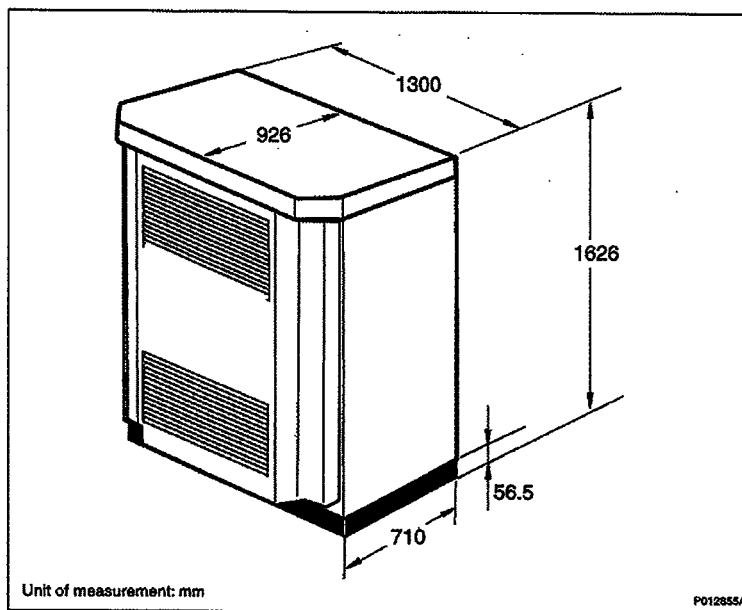
Battery backup can be achieved with an external battery cabinet. The external batteries are connected to an optional DC filter (DCF) inside the RBS.

### 3 Dimensions

This section describes the physical characteristics of the RBS, that is, dimensions, weight, and color.

*Table 1 RBS 3106 Dimensions*

Unit	Dimensions (mm)
Height (including installation frame)	1626
Width	1300
Depth	710
Depth including door	926



*Figure 2 RBS 3106 Dimensions*

The various weights of the RBS 3106 are shown in the table below.

*Table 2 RBS 3106 Weights*

Unit	Type	Weight (kg)
RBS fully equipped excluding batteries	AC-powered	560
RBS fully equipped including batteries	AC-powered	850

<b>Unit</b>	<b>Type</b>	<b>Weight (kg)</b>
RBS fully equipped including batteries and future expansion of hardware (not yet available)	AC-powered	875
RBS fully equipped	DC-powered	510
Installation frame	AC- and DC-powered	12

The color of RBS 3106 is shown in the table below.

*Table 3 RBS 3106 Color*

<b>Color</b>	<b>Color Standard</b>
Gray	RAL 7035
Green	NCS 8010-G 10 Y

# **Exhibit D**

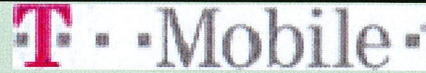
## **Power Density Calculations**

**T-Mobile Site CT11664C**

**500 Moose Hill Road**

**Monroe, Connecticut**

## Connecticut Market



### Worst Case Power Density

**Site:** CT11664C  
**Site Address:** 500 Moose Hill Road  
**Town:** Monroe  
**Tower Height:** 130 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	APX16DWV-16DWV
Cable Size	1 5/8 in.	Cable Size	1 5/8 in.
Cable Length	120 ft.	Cable Length	120 ft.
Antenna Height	117.0 ft.	Antenna Height	117.0 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	18.0 dBi
Cable Loss per foot	0.0116 dB	Cable Loss per foot	0.0116 dB
Total Cable Loss	1.3920 dB	Total Cable Loss	1.3920 dB
Total Attenuation	5.8920 dB	Total Attenuation	2.8920 dB
Total EIRP per Channel (In Watts)	53.62 dBm 230.05 W	Total EIRP per Channel (In Watts)	61.13 dBm 1296.76 W
Total EIRP per Sector (In Watts)	62.65 dBm 1840.43 W	Total EIRP per Sector (In Watts)	64.14 dBm 2593.52 W
nsg	10.6080	nsg	15.1080
Power Density (S) = 0.032771 mW/cm <sup>2</sup>		Power Density (S) = 0.046181 mW/cm <sup>2</sup>	
T-Mobile Worst Case % MPE =		7.8952%	

Equation Used :

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

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

### Co-Location Total

Carrier	% of Standard
Verizon	14.0400 %
Cingular	3.5200 %
Sprint	20.8300 %
AT&T Wireless	
Pocket	
MetroPCS	
Nextel	6.5800 %
Other Antenna Systems	
<b>Total Excluding T-Mobile</b>	<b>44.9700 %</b>
T-Mobile	7.8952
<b>Total % MPE for Site</b>	<b>52.8652%</b>

## Technical Memo

To: Maxton  
From: Farid Marbough - Radio Frequency Engineer  
cc: Jason Overbey  
Subject: Power Density Report for CT11664C  
Date: August 7, 2009

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### 1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the T-Mobile antenna installation on a Monopole at 500 Moose Hill Road, Monroe, 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 (1940-1949.8), (2140-2145), (2110-2120)MHz frequency Band.
- 2) The antenna array consists of three sectors, with 4 antennas per sector.
- 3) The model number for GSM antenna is RR90-17-02DP.
- 3) The model number for UMTS antenna is APX16DWV-16DWV.
- 4) GSM antenna center line height is 117 ft.
- 4) UMTS antenna center line height is 117 ft.
- 5) The maximum transmit power from any GSM sector is 1840.43 Watts Effective Radiated Power (EiRP) assuming 8 channels per sector.
- 5) The maximum transmit power from any UMTS sector is 2593.52 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 antenna installation on a Monopole at 500 Moose Hill Road, Monroe, CT, is  $0.07895 \text{ mW/cm}^2$ . This value represents 7.895% of the Maximum Permissible Exposure (MPE) standard of 1 milliwatt per square centimeter ( $\text{mW/cm}^2$ ) 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 44.97%. The combined Power Density for the site is 52.865% of the M.P.E. standard.



# **Exhibit E**

## **Structural Analysis**

**T-Mobile Site CT11664C**

**500 Moose Hill Road**

**Monroe, Connecticut**



**Structural Analysis for  
SBA Network Services, Inc.**

**149' Monopole**

**Site Name: Moosehill  
Site ID: CT13056-A**

FDH Project Number 09-07095E S1

Prepared By:

J. Scott Hilgoe  
Project Engineer

Reviewed By:

Christopher M. Murphy, PE  
Vice President  
CT PE License No. 25842

**FDH Engineering, Inc.**

2730 Rowland Rd.  
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July 27, 2009



*Prepared pursuant to TIA/EIA-222-F June 1996 Structural Standard for Steel Antenna Towers and Antenna Supporting Structures*

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    Conclusions  
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## EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the monopole located in Monroe, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads, pursuant to the *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, TIA/EIA-222-F*. Information pertaining to the existing/proposed antenna loading, current tower geometry, member sizes, and soil parameters was obtained from:

- Sabre Communications Corporation (Job No. 02-03107 Revision A) Structural Design Report dated April 3, 2002
- URS Corporation (Job No. F300002258.01) Independent Structural Analysis dated April 3, 2002
- FDH, Inc. (Project No. 08-07121T Revised) TIA Inspection Report dated November 10, 2008
- SBA Network Services, Inc.

The *basic design wind speed* per *TIA/EIA-222-F* standards is 85 MPH without ice and 74 MPH with 1/2" radial ice.

## Conclusions

With the existing and proposed antennas from T-Mobile in place at 121 ft., the tower meets the requirements of the *TIA/EIA-222-F* standards provided the listed **Recommendations** are satisfied. Furthermore, provided the foundation was designed and constructed to support original design reactions (see Sabre, Inc. Job No. 02-03107 Revision A), the foundation should have the necessary capacity to support the existing and proposed loading. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Engineering, Inc. is accurate (i.e., the steel data, tower layout, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

## Recommendations

To ensure the requirements of the *TIA/EIA-222-F* standards are met with the existing and proposed loading in place, we have the following recommendations:

1. The proposed coax should be installed inside the pole's shaft.
2. The proposed TMAs should be installed directly behind the existing panel antennas.

## APPURTENANCE LISTING

The proposed and existing antennas with their corresponding cables/coax lines are shown in **Table 1**. If the actual layout determined in the field deviates from this layout, FDH Engineering, Inc. should be contacted to perform a revised analysis.

**Table 1 – Appurtenance Loading**

### Existing Loading:

No.	Centerline Elevation (ft) <sup>1</sup>	Coax and Lines <sup>2</sup>	Carrier	Mount Type	Description
1	152.5	(1) 7/8"	Town of Monroe	(1) Pipe Mount	(1) Decibel DB404-B Dipole
2-7	147 <sup>3</sup>	(12) 1-5/8"	Sprint	(1) 12.5' Low Profile Platform	(6) Decibel 948F85T2E-M
8-13	139	(12) 1-1/4"	Cingular	(1) 13' Low Profile Platform	(6) Powerwave 7770.00 (6) Powerwave LGP13514 TMAs (6) Powerwave LGP21401 Diplexers
---	128	---	---	(1) 12.5' Low Profile Platform	---
14-25	121 <sup>4</sup>	(24) 1-5/8"	T-Mobile	(1) 13' Low Profile Platform	(12) EMS RR90-17-02DP (6) Powerwave LGP13901 TMAs
26-37	109	(12) 7/8"	Nextel	(1) 14' Low Profile Platform	(12) Andrew DB844H90E-XY
38-49	99 <sup>5</sup>	(12) 1-5/8"	Verizon	(1) 12.5' Low Profile Platform	(6) Antel LPA80090/4CF (6) Antel LPA185090/8CF
50	64 <sup>6</sup>	(1) 1/2"	Sprint	(1) 3' Standoff	(1) Decibel 26OB GPS

<sup>1</sup> Omni and dipole elevations listed at base of antennas.

<sup>2</sup> Coax is installed inside the pole's shaft, unless otherwise noted.

<sup>3</sup> Sprint has (6) 1-5/8" coax to 147' installed outside the monopole's shaft in a single row.

<sup>4</sup> The loading for T-Mobile at 121' will be altered. See the proposed loading below.

<sup>5</sup> The coax for Verizon to 99' are installed double stacked outside the monopole's shaft.

<sup>6</sup> The coax for Sprint to 64' is installed outside the monopole's shaft.

### Proposed Loading:

No.	Centerline Elevation (ft)	Coax and Lines	Carrier	Mount Type	Description
1-12	121 <sup>1</sup>	(24) 1-5/8"	T-Mobile	(1) 13' Low Profile Platform	(9) EMS RR90-17-02DP (3) RFS APX16DWV-16DWVS-A20 (6) Powerwave LGP13901 TMAs (3) RFS ATMAA1412D-1A20 TMAs

<sup>1</sup> This represents the final configuration at 121 ft. According to the information provided by SBA, T-Mobile will remove (3) EMS RR90-17-02DP antennas and add (3) RFS APX16DWV-16DWVS-A20 antennas and (3) RFS ATMAA1412D-1A20 TMAs to the existing loading at 121 ft for a total loading of (12) antennas, (9) TMAs and (24) coax at 121 ft.

## RESULTS

Based on information obtained from the original design drawings, the yield strength of steel for individual members was as follows:

**Table 2 - Material Strength**

Member Type	Yield Strength
Tower Shaft Sections	65 ksi
Base Plate	60 ksi
Anchor Bolts	75 ksi
Flange Plate	60 ksi
Flange Bolts	Fu = 120 ksi

**Table 3** displays the ratio (as a percentage) of force in the member to their capacities. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. **Table 4** displays the maximum foundation reactions.

If the assumptions outlined in this report differ from actual field conditions, FDH Engineering, Inc. should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the existing or proposed appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information.

**Table 3 – Summary of Working Percentage of Structural Components**

Section No.	Elevation ft	Component Type	Size	% Capacity	Pass Fail
L1	149 - 129	Pole	TP28.82x24x0.1875	19.5	Pass
L2	129 - 96	Pole	TP36.9x28.82x0.25	48.0	Pass
L3	96 - 47.25	Pole	TP48.15x35.237x0.3125	73.2	Pass
L4	47.25 - 0	Pole	TP58.91x46.0758x0.375	76.5	Pass
		Flange Bolts	(8) 1" $\phi$ , 32.50" $\phi$ BC	37.6	Pass
		Flange Plate	36.25" $\phi$ x 1" thk	41.2	Pass
		Anchor Bolts	(16) 2.25" $\phi$ , 66" $\phi$ BC	73.4	Pass
		Base Plate	64" Square x 3" thk	58.9	Pass

**Table 4 – Maximum Base Reactions**

Base Reactions	Current Analysis (TIA/EIA-222-F)	Original Design (TIA/EIA-222-F)
Axial	44 k	45 k
Shear	32 k	39 k
Moment	3,210 k-ft	4,184 k-ft

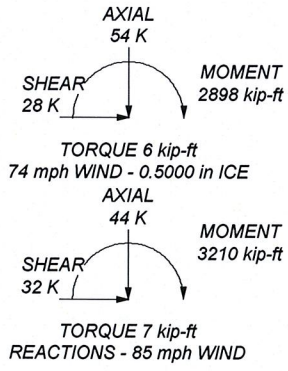
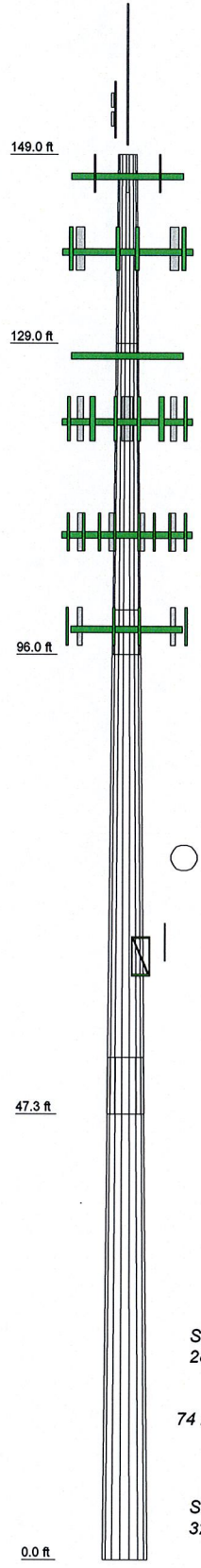
### GENERAL COMMENTS

This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Engineering, Inc. should be notified immediately to perform a revised analysis.

### LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Engineering, Inc.

Section	1	2	3	4
Length (ft)	20.00	33.00	53.50	53.25
Number of Sides	18	18	18	18
Thickness (in)	0.1875	0.2500	0.3125	0.3750
Lap Splice (ft)			4.75	6.00
Top Dia (in)	24.0000	28.8200	35.2370	46.0768
Bot Dia (in)	28.8200	36.9000	48.1500	58.9100
Grade			A572-65	
Weight (K)	1.1	2.9	7.5	11.2



### DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 1/2"x4' on 15' Pole	150	(3) RR90-17-02DP w/Mount Pipe (T-Mobile)	121
Pipe Mount	150	(3) RR90-17-02DP w/Mount Pipe (T-Mobile)	121
Decibel - DB404-B Dipole (Town of Monroe)	150	(2) LGP13901 TMAs (T-Mobile)	121
Pipe Mount (Town of Monroe)	150	(2) LGP13901 TMAs (T-Mobile)	121
(2) Decibel - 948F85T2E-M w/ mount pipe (Sprint)	147	13' Low Profile Platform (T-Mobile)	121
(2) Decibel - 948F85T2E-M w/ mount pipe (Sprint)	147	RFS - APX16DWW-16DWWVS-A20 w/ mount pipe (T-Mobile)	121
(2) Decibel - 948F85T2E-M w/ mount pipe (Sprint)	147	RFS - APX16DWW-16DWWVS-A20 w/ mount pipe (T-Mobile)	121
Pipe Mount (Sprint)	147	RFS - APX16DWW-16DWWVS-A20 w/ mount pipe (T-Mobile)	121
Pipe Mount (Sprint)	147	RFS - ATMAA1412D-1A20 TMAs (T-Mobile)	121
Pipe Mount (Sprint)	147	RFS - ATMAA1412D-1A20 TMAs (T-Mobile)	121
12.5' Low Profile Platform (Sprint)	147	(4) DB844H90E-XY w/Mount Pipe (Nextel)	109
(2) Powerwave - 7770.00 w/ mount pipe (Cingular)	139	(4) DB844H90E-XY w/Mount Pipe (Nextel)	109
(2) Powerwave - 7770.00 w/ mount pipe (Cingular)	139	(4) DB844H90E-XY w/Mount Pipe (Nextel)	109
(2) Powerwave - 7770.00 w/ mount pipe (Cingular)	139	(4) DB844H90E-XY w/Mount Pipe (Nextel)	109
(2) Powerwave - LGP21401 Diplexers (Cingular)	139	14' Low Profile Platform (Nextel)	109
(2) Powerwave - LGP21401 Diplexers (Cingular)	139	12.5' Low Profile Platform (Verizon)	99
(2) Powerwave - LGP21401 Diplexers (Cingular)	139	(2) LPA-80090/4CF w/Mount Pipe (Verizon)	99
(2) Powerwave - LGP13514 TMAs (Cingular)	139	(2) LPA-185090/8CF w/Mount Pipe (Verizon)	99
(2) Powerwave - LGP13514 TMAs (Cingular)	139	(2) LPA-185090/8CF w/Mount Pipe (Verizon)	99
(2) Pipe Mount (Cingular)	139	(2) LPA-185090/8CF w/Mount Pipe (Verizon)	99
(2) Pipe Mount (Cingular)	139	(2) LPA-80090/4CF w/Mount Pipe (Verizon)	99
(2) Pipe Mount (Cingular)	139	(2) LPA-80090/4CF w/Mount Pipe (Verizon)	99
13' Low Profile Platform (Cingular)	139	Decibel - 28OB GPS	64
(4) Pipe Mount	128	3' Standoff	64
(4) Pipe Mount	128		
(4) Pipe Mount	128		
12.5' Low Profile Platform	128		
(3) RR90-17-02DP w/Mount Pipe (T-Mobile)	121		

### MATERIAL STRENGTH

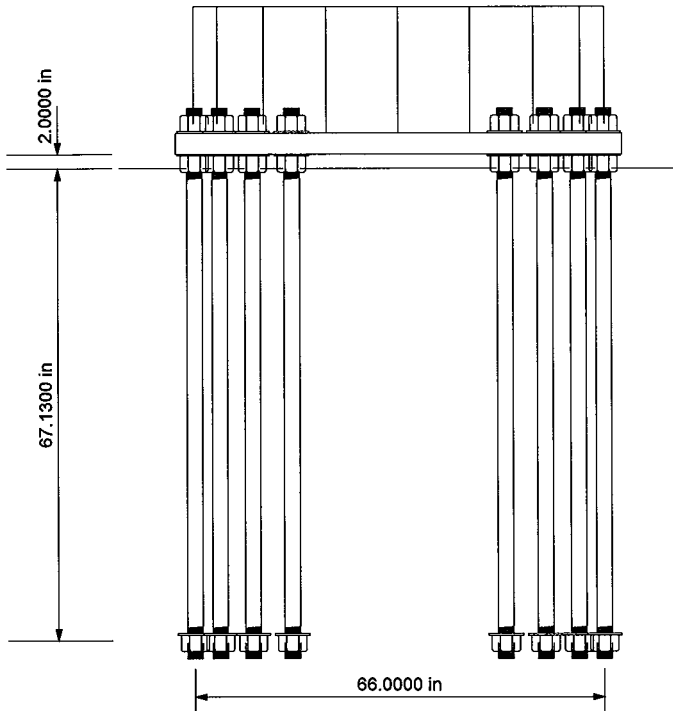
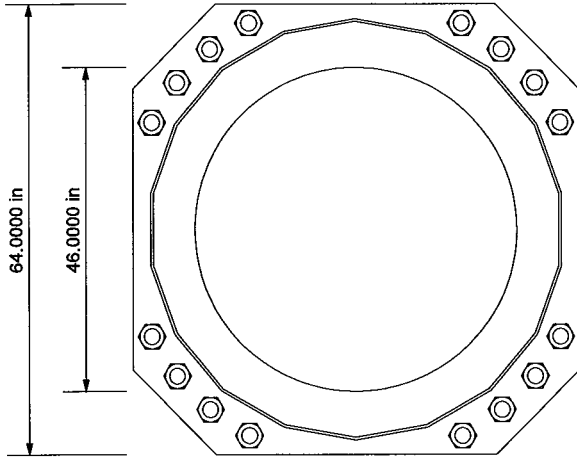
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

### TOWER DESIGN NOTES

1. Tower is located in Fairfield 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.

<b>FDH Engineering, Inc.</b>		Job: <b>Moosehill CT13056-A</b>	
2730 Rowland Road		Project: <b>09-07095E S1</b>	
Raleigh, North Carolina		Client: <b>SBA Network Services, Inc.</b>	Drawn by: <b>Scott Hilgoe</b>
Phone: (919) 755-1012		Code: <b>TIA/EIA-222-F</b>	Date: <b>07/28/09</b>
FAX: (919) 755-1031		Path:	Scale: <b>NTS</b>
			Dwg No. <b>E-1</b>





**FOUNDATION NOTES**

1. Plate thickness is 3.0000 in.
2. Plate grade is A572-60.
3. Anchor bolt grade is A615-75.
4.  $f_c$  is 4 ksi.

<b>FDH Engineering, Inc.</b>		Job: <b>Moosehill CT13056-A</b>	
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Raleigh, North Carolina		Client: SBA Network Services, Inc.	Drawn by: Scott Hilgoe
Phone: (919) 755-1012		Code: TIA/EIA-222-F	Date: 07/28/09
FAX: (919) 755-1031		Path:	Scale: NTS
			Dwg No. F-1