T-Mobile

EM-T-MOBILE-093-081218B

December 18, 2008

ORIGINAL

Via Federal Express

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

Re: Notice of Exempt Modification
Laydon Construction Company Telecommunications Facility
69 Wheeler Street, New Haven, Connecticut
T-Mobile Site CTNH039A

Dear Mr. Phelps:

Omnipoint Communications, a subsidiary of T-Mobile USA, Inc. ("T-Mobile"), intends to install additional antennas and additional ground equipment at the existing 98-foot self-supporting monopole facility owned by Laydon Construction Company and located at 69 Wheeler Street, New Haven, 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 John DeStefano, Jr., Mayor, City of New Haven and April Capone Almon, Mayor of East Haven.[1]

The existing Facility consists of a 98-foot self-supporting monopole tower capable of supporting multiple carriers within a fenced compound. The coordinates for the Facility are approximately **Lat: 41°-17'-45" and Long: 72°-53-52".** The tower is located in the eastern portion of New Haven, roughly 100 feet west of Wheeler Street and roughly 350 feet east of Interstate 95 (see Site Map, attached as Exhibit A). The tower currently supports AT&T antennas at the sixty eight foot (68') level centerline AGL (above ground level), Nextel antennas at the seventy eight foot level (78') AGL, and AT&T antennas at the eighty eight foot level (88') AGL. T-Mobile currently has antennas on the tower at the ninety eight foot (98') level centerline AGL (above ground level) The current T-Mobile antenna configuration is one per

[1] The Siting Council database and information provided by the tower owner indicate that this facility is located in the City of New Haven. However, the facility is in close proximity to the New Haven/East Haven line. Therefore, copies of the application are being sent to the chief elected officials of both municipalities.

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

per sector), for a total of six antennas at their current elevation on the tower. T-Mobile proposes to install three RFS APX16PV-16PVL-C antennas on existing pipe mounts at the same elevation, (98') level centerline AGL. T-Mobile also intends to add a UMTS 3106 equipment cabinet to its current configuration of one existing S12000 equipment cabinet on an existing concrete pad. 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 Wheeler Street 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 replace its existing antennas and install new antennas at a center line height of approximately 98 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 Pocket antennas would be 62.157% of the FCC standard (see general power density calculations table, attached as Exhibit D).

Also attached, Exhibit E, is a structural assessment confirming that the tower can support the existing and proposed antennas and associated equipment. Of note, because all antennas are internally mounted in the flagpole, the additional three antennas will not increase the ice and winding loading for the tower.

For the foregoing reasons, T-Mobile respectfully submits that the proposed antenna installation and equipment at the New Haven 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: DeStefano, Jr., Mayor, City of New Haven
April Capone Almon, Mayor of East Haven
Laydon Construction Company
Carrie Larson

Exhibit A

Site Map

T-Mobile Site CTNH039A

69 Wheeler Street

New Haven, Connecticut

Google Maps

Address **69 Wheeler St**
East Haven, CT 06512

Exhibit B

Design Drawings

T-Mobile Site CTNH039A

69 Wheeler Street

New Haven, Connecticut

Exhibit C

Equipment Specifications

T-Mobile Site CTNH039A

69 Wheeler Street

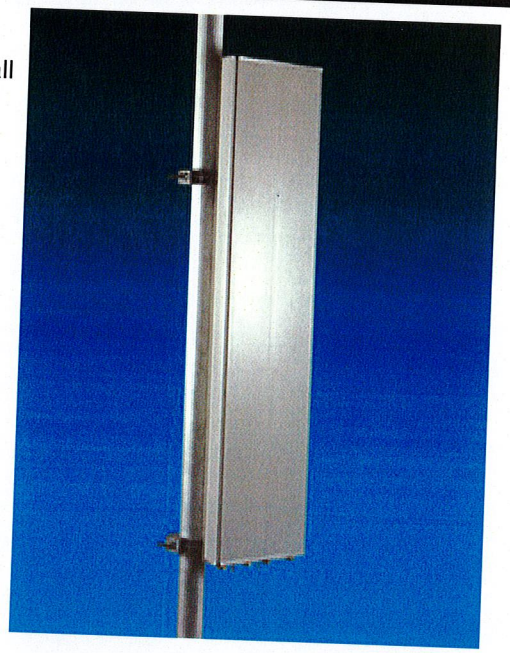
New Haven, Connecticut

Technical Data Sheet APX16PV-16PVL-C

Optimizer® Panel Dual Polarized Antenna

Product Description

Gathering two X-Polarised antennas in a sigle 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.



Features/Benefits

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

Technical Features

Frequency Band	PCS 1900 (1850-1990 MHz)
Horizontal Pattern	Directional
Antenna Type	Panel Dual Polarized
Electrical Down Tilt Option	Variable
Gain, dBi (dBd)	17.8 (15.8) , 17.8 (15.8)
Frequency Range, MHz	1850-1990 , 1850-1990

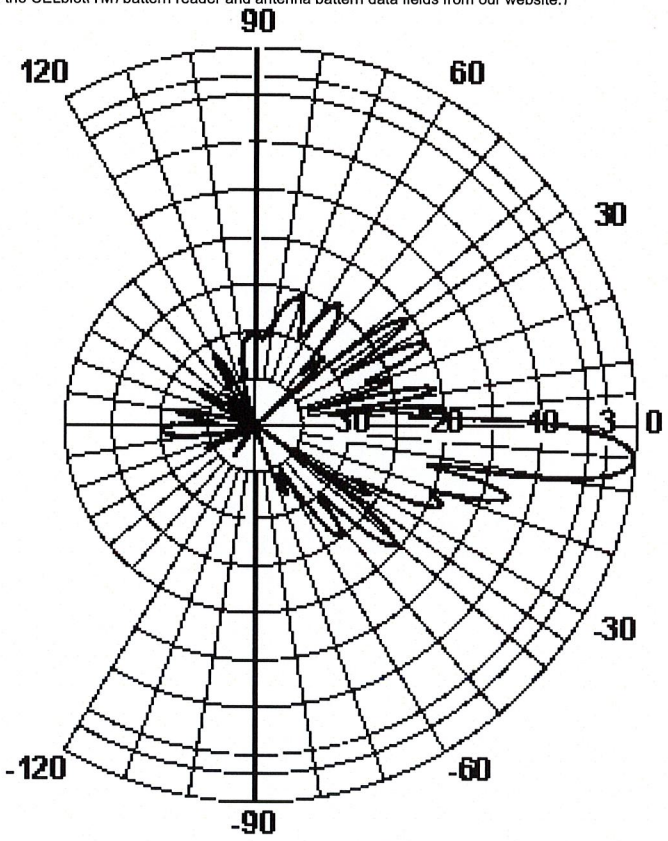
Optimizer® Panel Dual Polarized Antenna

Connector Type	(4) 7-16 DIN Female
Connector Location	Bottom
Mount Type	Downtilt
Electrical Downtilt, deg	0-10 , 0-10
Horizontal Beamwidth, deg	66 , 66
Mounting Hardware	APM40-2
Rated Wind Speed, km/h (mph)	160 (100)
VSWR	< 1.5:1
Vertical Beamwidth, deg	6.6
1st Upper Sidelobe Suppression, dB	> 17 (typically > 20)
Upper Sidelobe Suppression, dB	> 18 all (typically > 20)
Polarization	Dual pol +/-45°
Front-To-Back Ratio, dB	> 25
Maximum Power Input, W	300
Isolation between Ports, dB	> 30
Lightning protection	Direct Ground
3rd Order IMP @ 2 x 38 dBm, dBc	> 160
Overall Length, m (ft)	1.35 (4.42)
Dimensions - HxWxD, mm (in)	1349 x 330 x 80 (53 x 12.9 x 3.1)
Weight w/o Mtg. Hardware, kg (lb)	18.0 (39.6)
Radiating Element Material	Brass
Radome Material	Fiberglass
Reflector Material	Aluminum
Max Wind Loading Area, m^2 (ft^2)	0.64 (6.6)
Maximum Thrust @ Rated Wind, N (lbf)	787 (177)
Shipping Weight, kg (lb)	23.8 (52)
Packing Dimensions, HxWxD, mm (in)	1550 x 420 x 210 (61 x 16.5 x 8.3)
Survival Wind Speed, km/h (mph)	200 (125)

Optimizer® Panel Dual Polarized Antenna

Vertical Pattern

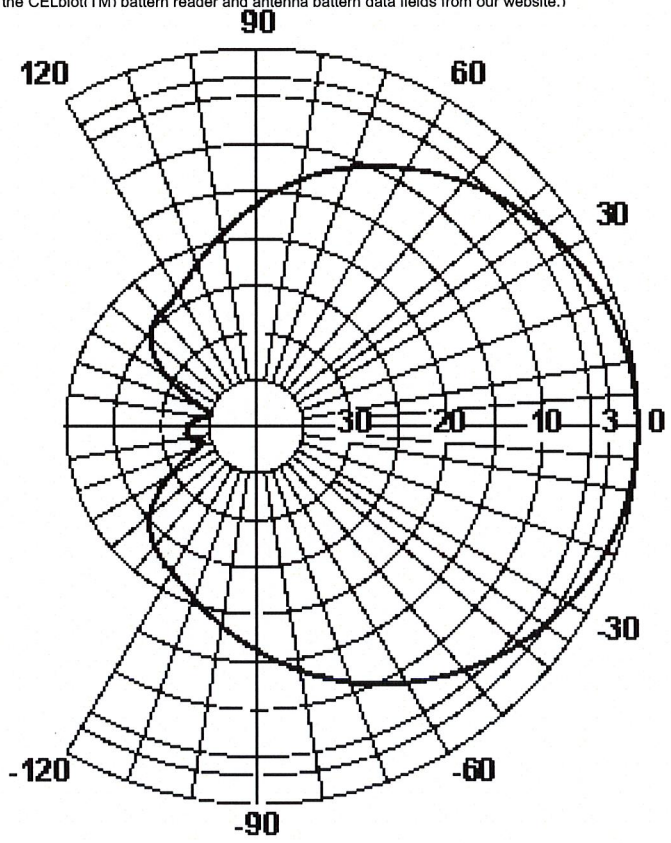
(This is a general representation of the antenna family pattern. For the latest detailed pattern contact Applications Engineering. You may also download the CELplot(TM) pattern reader and antenna pattern data fields from our website.)



Optimizer® Panel Dual Polarized Antenna

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.)



The Outdoor Cabinet

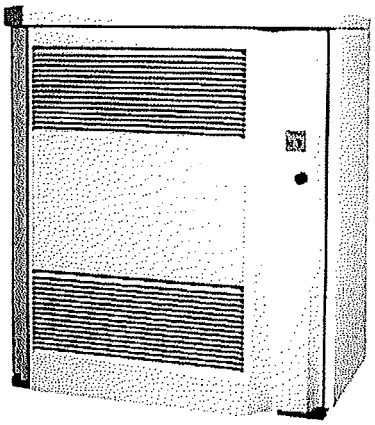


Figure 2 RBS 3106 Cabinet

- Specified for outdoor environment
- Can be configured for both 6 and 9 radio units.
- The cabinet fulfils seismic requirements
- Vandal protected
- Forced convection and heat exchanger (Eco-Cooling)

The RBS 3106 cabinet has the same footprint as the GSM RBS 2106 and the WCDMA RBS 3101.

The RBS 3106 cabinet is a weatherproof outdoor cabinet for outdoor sites with primarily high capacity and high coverage requirements. The RBS 3106 houses integrated power supply with optional backup batteries, space for transmission equipment and a climate package for ensuring an indoor climate for all units inside, including the batteries.

2 Descriptions

The RBS HW is modularly structured into several subsystems for easy expansion and evolution purposes. From a physical viewpoint the subsystem are located together on shelves in the cabinet. The shelves are basically identical between the cabinets.

Product/Service Bulletin

Nortel Networks

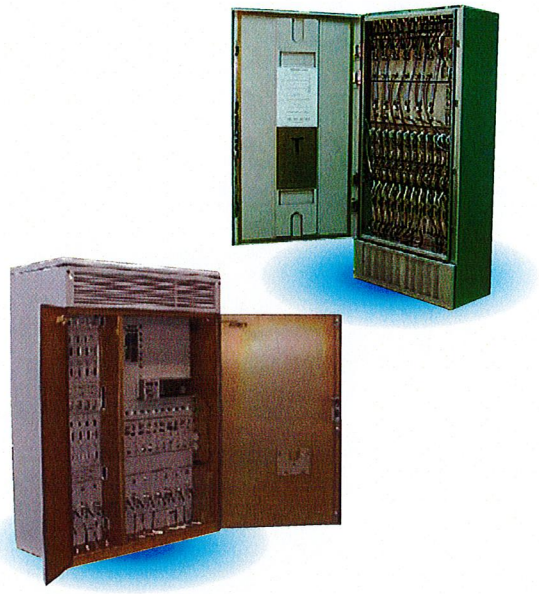
Univity GSM S12000 BTS

Indoor & Outdoor versions

As the GSM industry moves into the world of data, pressure has increased on capacity and so network enhancement and development costs are rising. The Univity GSM S12000 BTS – Indoor and Outdoor versions – is a product that meets the needs of a mature GSM market by increasing site capacity and at the same time lowering the risks and the costs of introduction.

The Univity GSM S12000 BTS – Indoor and Outdoor versions – is built on an existing field proven platform, the Univity GSM S8000 BTS, which is known for its quality and robustness. The reuse of a considerable amount of technology lowers the risk and cost for the operators when introducing this new product into their network.

The Univity GSM S12000 BTS – Indoor version is designed for protected sites while the Outdoor version is a fully integrated BTS site with AC power supply and extended temperature range.



In this document the term "the S12000 BTS" stands for "the Univity GSM S12000 BTS - Indoor and Outdoor version" except where mentioned.

The high capacity cell site

Nortel Networks addresses the growing needs of GSM capacity by introducing the S12000 BTS, which is an innovative development of the S8000 BTS. This innovative approach to network expansion and development is aimed at providing high capacity sites installed with low risk, reduced network impact and a lower cost of ownership.

The S12000 BTS is a key component to the delivery of more capacity within a GSM/GPRS network while driving down network costs. The S12000 BTS offers nearly double the capacity of the S8000 BTS, thereby offering a more compact site and improved operational efficiency.

Finally the S12000 BTS supports more users and offers higher speed data access and quality then increasing opportunities of revenues.

Lowering the cost of ownership and network introduction

It is not just the introduction of the evolution of a field proven and reliable technology that reduces the cost of ownership but also the reduced spares holding and training requirements. By the design of the S12000 BTS, Nortel Networks has aimed to reduce the cost of introducing the S12000 BTS into a GSM network. The S12000 BTS brings considerable savings in CAPEX and OPEX to the operator since main modules and skills are usable within both the S8000 BTS and S12000 BTS. The operator does not have to change the network Engineering and Operational procedures on the existing S8000 BTS. Moreover, via the high capacity and the high RF performance of the S12000 BTS, fewer sites are required. Low introduction costs are invaluable when facing the financial pressures of network enhancements such as GPRS or new services such as UMTS. The use of the S12000 BTS puts the operator in a position to make efficient use of all resources and reduce network complexity relieving pressure on investment.

NORTEL NETWORKS™

Modular and flexible

The S12000 BTS supports twelve TRX per cabinet and offers cost effective configurations from 1 to 16 TRX per cell in a tri-sector configuration. A dual band configuration of 6 + 6 TRX can be supported in a single cabinet for all coupling configurations.

The modular design of the S12000 BTS and the possibility to choose between multiple RF-combining options allows the operator to deploy the S12000 BTS solution in a number of different scenarios such as high-capacity solution in cities or alternatively enabling to provide wide coverage with a minimum number of sites in rural area.

High Performance

The Nortel Networks family of BTS holds a high market position for reliability, operability and service quality. The S12000 BTS provides high data services and voice quality, high coverage and building penetration and smooth call handovers. It possesses many advanced RF features to improve spectral usage and optimisation and so increase available capacity. The AMR and EDGE solutions will further enhance spectrum efficiency. These high performance qualities are extremely important with the introduction of GPRS services.

In addition, as for the S8000 BTS, the S12000 BTS supports UMTS co-sitting thanks to specific combiners, allowing a smooth UMTS introduction.

The high radio performance and advanced digital processing of the S12000 BTS provide one of the highest receive sensitivity in the market today, offering –115 dBm guaranteed and without the need for masthead amplifiers (-117dBm typical). The high radio performance enhances the resistance to interference, improving voice quality, data throughput, cell coverage and service availability.

Nortel Networks experience in frequency hopping, fractional re-use, cell tiering and multi-layer management algorithms provide high spectrum efficiency which releases more capacity for a fixed allocation of spectrum.

Growing the business and ensuring success

The Univity GSM S12000 BTS is future ready. The high capacity and flexibility of the S12000 BTS, the introduction of AMR and EDGE, put the operator in a best position to meet the challenges and opportunities of GSM/GPRS. These advantages enable the operator to capture new revenues, improve profitability and gain a better return on investment as the network develops and moves forward.

Technical Specifications:		Indoor	Outdoor
Frequency range		900 MHz GSM / 900 MHZ Extended GSM 1800 MHz GSM and Dual Band GSM 900 / 1800 850 MHZ GSM 1900 MHz GSM and Dual Band GSM 850 / 1900	
Receive sensitivity	w/o diversity	-110 dBm garanteed (w/o TMA)	
	with diversity	-115 dBm garanteed (w/o TMA)	
Dimensions	Height	1950 mm	1910 mm
	Width	910 mm	1350 mm
	Depth	450 mm	650 mm
Weight	Empty cabinet	170 kg	200 kg
	Fully equipped	415 kg	570 kg
Capacity	Standard	12 TRX per radio cabinet Up to 3 radio cabinets	
	Future option	Up to 4 radio cabinets	
Configuration	Monoband Trisectorial	Up to S16-16-16 (4 radio cabinets)	
	Dual Band Trisectorial	S222_222 (1 radio cabinet) Mono-BCCH dual band cells	
	Cell Splitting	Cell splitting across radio cabinets	
Amplifier output power	Standard	30W (+/- 0.5 dB) GMSK 30W (+/- 0.5 dB) 8-PSK EDGE	
	Optional	60W (+/- 0.5 dB) GMSK* 45W (+/- 0.5 dB) 8-PSK	
Transmission coupling		All coupling configurations From Duplexers to 4 Ways Hybrid Coupling (H4D)	
Power control	Static	6 steps of 2 dB	
	Dynamic	15 steps of 2 dB	
Space for customer Equipment		NA	6U
Frequency Hopping		RF Synthetised	
Supported vocoders		Full Rate (FR) Enhanced Full Rate (EFR) Adaptive Multi-Rate - Full Rate (AMR FR) Adaptive Multi-Rate - Half Rate (AMR HR)	
Encryption algorithms		A5/1 & A5/2	
Power supply	Nominal	DC -48 V	Single, single-split or tri-phase 230V (50/60Hz) AC Integrated battery backup Optional ancillary battery cabinet
Operational temperature range		-5°C to +45°C	-40°C to +50°C
Max acoustic noise		65 dB(A)	
Backhaul	Standard	6 E1 / T1 links	
	Future option	8 E1 / T1 links	

** Frequency dependant*

In North america, the Caribbean, and Latin America :
Tel : 1-800-4-Nortel
or 1-506-674-5470

In Europe, Middle East, and Africa :
Tel : 00-800-8008-9009*
or +44 (0)20 8920 4618

In Asia :
Tel : 65-287-2877

for more information contact your Nortel Networks account representative, or visit :
www.nortelnetworks.com/contact

* call are not from all European Countries.

www.nortelnetworks.com

NN101082-0702

NORTEL NETWORKS™

Exhibit D

Power Density Calculations

T-Mobile Site CTNH039A

69 Wheeler Street

New Haven, 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 CTNH039A
Date: December 9, 2008

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 69 Wheeler Street, New Haven, 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 3 antennas per sector.
3) The model number for GSM antenna is APX16PV-16PVL.
3) The model number for UMTS antenna is APX16DWV-16DWV.
4) GSM antenna center line height is 98 ft.
4) UMTS antenna center line height is 98 ft.
5) The maximum transmit power from any GSM sector is 2157.35 Watts Effective Radiated Power (EiRP) assuming 8 channels per sector.
5) The maximum transmit power from any UMTS sector is 2525.17 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 69 Wheeler Street, New Haven, CT, is 0.12137 mW/cm^2. This value represents 12.137% 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 50.02%. The combined Power Density for the site is 62.157% of the M.P.E. standard.

Connecticut Market

T-Mobile

Worst Case Power Density

Site:	**CTNH039A**
Site Address:	**69 Wheeler Street**
Town:	**New Haven**
Tower Height:	**90 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	APX16PV-16PVL	Antenna Model	APX16DWV-16DWV
Cable Size	1 1/4 in.	Cable Size	1 1/4 in.
Cable Length	130 ft.	Cable Length	130 ft.
Antenna Height	98.0 ft.	Antenna Height	98.0 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	17.8 dBi	Antenna Gain	18.0 dBi
Cable Loss per foot	0.0154 dB	Cable Loss per foot	0.0116 dB
Total Cable Loss	2.0020 dB	Total Cable Loss	1.5080 dB
Total Attenuation	6.5020 dB	Total Attenuation	3.0080 dB
Total EIRP per Channel	54.31 dBm	Total EIRP per Channel	61.01 dBm
(In Watts)	269.67 W	(In Watts)	1262.58 W
Total EIRP per Sector	63.34 dBm	Total EIRP per Sector	64.02 dBm
(In Watts)	2157.35 W	(In Watts)	2525.17 W
nsg	11.2980	nsg	14.9920
Power Density (S) =	0.055920 mW/cm^2	Power Density (S) =	0.065454 mW/cm^2

T-Mobile Worst Case % MPE = 12.1373%

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	
Cingular	
Sprint	
AT&T Wireless	5.8700 %
Nextel	23.7700 %
Other Antenna Systems	20.3800 %
Total Excluding T-Mobile	**50.0200 %**
T-Mobile	12.1373
Total % MPE for Site	**62.1573%**

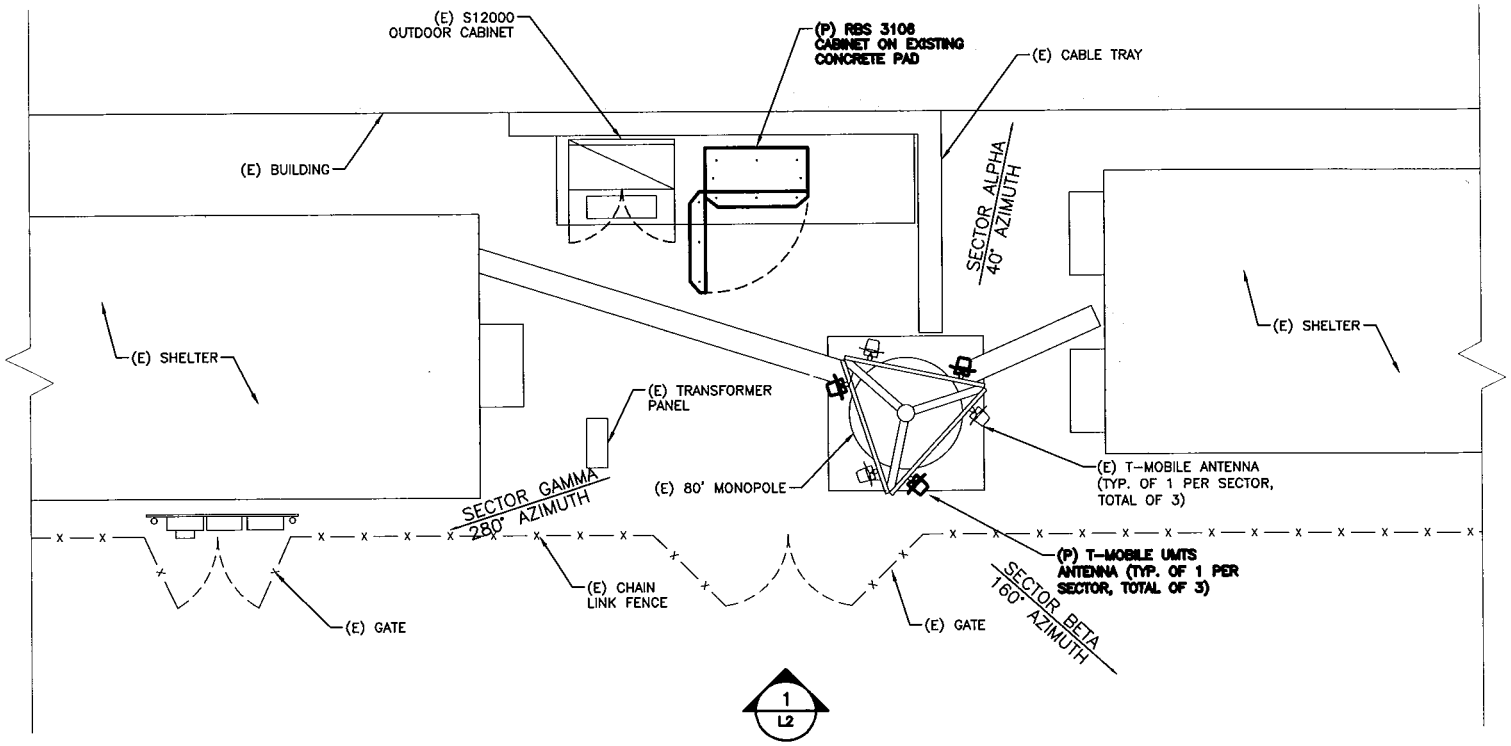
Exhibit E

Structural Analysis

T-Mobile Site CTNH039A

69 Wheeler Street

New Haven, Connecticut



COMPOUND LAYOUT PLAN 1

SCALE: NTS

T··Mobile· 15 COMMERCE WAY NORTON, MA 02766	MAXTON 50 Eastman St. South Easton, MA 02375 Phone: (508) 936-6393 Fax: (508) 936-6395	PROJECT LOCATION: NH039 / LAYDON CONSTRUCTION CTNH039A 69 WHEELER STREET, NEW HAVEN, CT 06512	PROJECT MANAGER: KB	DRAWN BY: DM	BSDA PROJ. #: 2889.124
		APPROVED BY:	12/10/08 11/18/08 11/10/08 10/14/08	COMPOUND LAYOUT PLAN	SHEET: L1

BAY STATE
DESIGN

December 15, 2008

Mr. Hans Fiedler
UMTS Development Project Manager
TMobile, USA
35 Griffin Road South
Bloomfield, CT 06002

Ref: TMobile Site ID CTNH039A
69 Wheeler Street, New Haven, CT

Dear Mr. Fiedler:

As requested a structural analysis was performed for the replacement of existing panel type antennas with a total of six new APX16 panel antennas at elevation 98' on the subject 98' high monopole structure. The analysis was conducted in accordance with Tia/EIA-222F and included an 85 mph wind speed and ½ radial ice loadings. Tower geometry and appurtenance loadings were obtained from a previous structural analysis conducted by All Points Technology Corporation, PC, dated March 10, 2006. The geometry of the monopole and existing appurtenances are assumed to be correct and in good condition. If the existing conditions differ from what was assumed in the analysis, contact the undersigned immediately.

Proposed Appurtenance Configuration (Bolt indicates new equipment):

- Three APX16PV-16PVL (one per sector) at elevation 98'
- **Three APX16DWV-16DWVS-A20 (one per sector) at elevation 98'**
- Nine DUO1417 panel antennas (three per sector) at elevation 90'
- One 2"x8' Omni antenna at elevation 90'
- Twelve DB844G45ZAXY panel antennas (four per sector) at elevation 80'
- Six RR90-17-02DPL2 panel antennas (two per sector) at elevation 70'
- Three ALP 7262 panel antennas (one per sector) at elevation 70'

The analysis shows that the existing foundation, anchor bolts and base plates are adequate to support the above load configuration in accordance with the TIA/EIA-222F specifications. Additionally, the main pole shaft has a calculated overstress of approximately 2% which is considered to be acceptable. The peak stress ratios were found to be as follows:

Component	**Ratio**
Pole	1.02% OK
Base Plate	81% OK
Anchor Bolts	85.6% OK

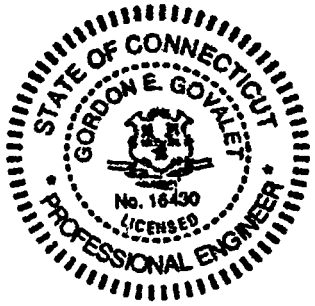
Foundation	3.18 Factor of Safety vs. Overturning OK

The proposed antenna configuration is therefore structurally acceptable.

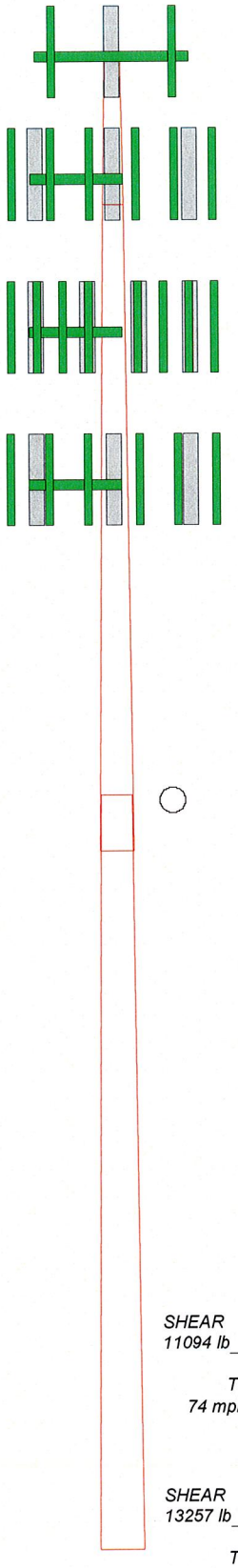
Sincerely yours,

Bay State Design, Inc.

Gordon Govalet, P.E.
Vice President
Bay State Design, Inc.



Section	Length (ft)	Number of Sides	Thickness (in)	Lap Splice (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	10.00	1	0.3750		12.7500	16.5000	A572-50	571.0
2	42.33	18	0.1875	3.67	16.5000	25.1600	A572-50	1769.5
3	49.34	18	0.2500		24.0342	34.0000	A572-65	3832.5
								6172.9



DESIGNED APPURTENANCE LOADING

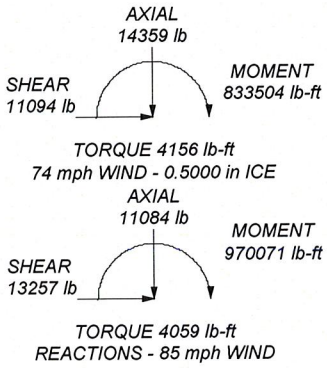
TYPE	ELEVATION	TYPE	ELEVATION
Pirod 10' PCS Frame (1)	98	Pirod 12' T-Frame Sector Mount (1)	80
APX16PV-16PVL	98	(4) DB844G45ZAXY	80
APX16PV-16PVL	98	(4) DB844G45ZAXY	80
APX16PV-16PVL	98	(4) DB844G45ZAXY	80
APX16DWV-16DWVS	98	Pirod 12' T-Frame Sector Mount (1)	70
APX16DWV-16DWVS	98	(2) RR90-17-DP	70
APX16DWV-16DWVS	98	7262.xx	70
2"x8' omni	90	7262.xx	70
Pirod 12' T-Frame Sector Mount (1)	90	(2) RR90-17-DP	70
(3) DUO1417-8670	90	(2) RR90-17-DP	70
(3) DUO1417-8670	90	7262.xx	70
(3) DUO1417-8670	90		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	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 60 mph wind.
5. Weld together tower sections have flange connections.
6. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
7. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
8. Welds are fabricated with ER-70S-6 electrodes.



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Job: **69 Wheeler Street, NewHaven, CT**			
Project: ***CTNH039A***			
Client: TMobile	Drawn by: Frank Lagodimos		App'd:
Code: TIA/EIA-222-F	Date: 12/15/08		Scale: NTS
Path: C:\Documents and Settings\Owner\Desktop\telecom\STS-Skyline\2008\CT\CTNH039A\CTNH039A.er			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 60 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	98.00-88.00	10.00	0.00	Round	12.7500	16.5000	0.3750		A572-50 (50 ksi)
L2	88.00-45.67	42.33	3.67	18	16.5000	25.1600	0.1875	0.7500	A572-65 (65 ksi)
L3	45.67-0.00	49.34		18	24.0342	34.0000	0.2500	1.0000	A572-65

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
									(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	12.7500	14.5716	279.2926	4.3807	6.3750	43.8106	557.8243	7.2851	0.0000	0
	16.5000	18.9872	617.9068	5.7082	8.2500	74.8978	1234.1303	9.4927	0.0000	0
L2	16.7545	9.7080	326.3677	5.7909	8.3820	38.9367	653.1649	4.8549	2.5740	13.728
	25.5481	14.8618	1170.9321	8.8652	12.7813	91.6131	2343.4049	7.4323	4.0982	21.857
L3	25.1577	18.8727	1348.8043	8.4434	12.2094	110.4729	2699.3833	9.4382	3.7900	15.16
	34.5245	26.7806	3853.9468	11.9812	17.2720	223.1326	7712.9647	13.3929	5.5440	22.176

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 98.00-88.00				1	1	1		
L2 88.00-45.67				1	1	1		
L3 45.67-0.00				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
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	98.00 - 6.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	90.00 - 6.00	9	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
VXL6-50 (1-1/4 FOAM)	C	No	Inside Pole	80.00 - 6.00	12	No Ice	0.00	0.50
						1/2" Ice	0.00	0.50
VXL6-50 (1-1/4 FOAM)	C	No	Inside Pole	70.00 - 6.00	15	No Ice	0.00	0.50
						1/2" Ice	0.00	0.50
LDF5-50A (7/8 FOAM)	C	No	Inside Pole	90.00 - 6.00	1	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33

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 lb
L1	98.00-88.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	113.82
L2	88.00-45.67	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1131.35

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 lb
L3	45.67-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1231.75

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 lb
L1	98.00-88.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	113.82
L2	88.00-45.67	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	1131.35
L3	45.67-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	1231.75

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 lb
Pirod 10' PCS Frame (1)	C	None		0.0000	98.00	No Ice	9.00	9.00	250.00
						1/2" Ice	13.20	13.20	350.00
Pirod 12' T-Frame Sector Mount (1)	C	From Leg	2.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	465.00 600.00
Pirod 12' T-Frame Sector Mount (1)	C	From Leg	2.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	465.00 600.00
Pirod 12' T-Frame Sector Mount (1)	C	From Leg	2.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	465.00 600.00
(4) DB844G45ZAXY	C	From Leg	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	7.00 7.41	3.97 4.34	21.00 64.04
(4) DB844G45ZAXY	B	From Leg	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	7.00 7.41	3.97 4.34	21.00 64.04
(4) DB844G45ZAXY	A	From Leg	4.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	7.00 7.41	3.97 4.34	21.00 64.04
(2) RR90-17-DP	C	From Leg	4.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	18.00 40.42
(2) RR90-17-DP	B	From Leg	4.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	18.00 40.42

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Offsets: ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(2) RR90-17-DP	A	From Leg	4.00	0.00	0.00	0.0000	70.00	No Ice	4.36	1.97	18.00
								1/2" Ice	4.77	2.31	40.42
7262.xx	C	From Leg	4.00	0.00	0.00	0.0000	70.00	No Ice	2.68	1.93	12.00
								1/2" Ice	3.00	2.25	28.08
7262.xx	B	From Leg	4.00	0.00	0.00	0.0000	70.00	No Ice	2.68	1.93	12.00
								1/2" Ice	3.00	2.25	28.08
7262.xx	A	From Leg	4.00	0.00	0.00	0.0000	70.00	No Ice	2.68	1.93	12.00
								1/2" Ice	3.00	2.25	28.08
2"x8' omni	A	From Leg	5.00	0.00	0.00	0.0000	90.00	No Ice	1.60	1.60	30.00
								1/2" Ice	2.42	2.42	42.45
APX16PV-16PVL	C	From Leg	4.00	0.00	0.00	0.0000	98.00	No Ice	6.65	1.98	40.00
								1/2" Ice	7.08	2.30	71.05
APX16PV-16PVL	B	From Leg	4.00	0.00	0.00	0.0000	98.00	No Ice	6.65	1.98	40.00
								1/2" Ice	7.08	2.30	71.05
APX16PV-16PVL	A	From Leg	4.00	0.00	0.00	0.0000	98.00	No Ice	6.65	1.98	40.00
								1/2" Ice	7.08	2.30	71.05
(3) DUO1417-8670	C	From Leg	4.00	0.00	0.00	0.0000	90.00	No Ice	6.53	4.20	20.30
								1/2" Ice	6.94	4.57	62.49
(3) DUO1417-8670	B	From Leg	4.00	0.00	0.00	0.0000	90.00	No Ice	6.53	4.20	20.30
								1/2" Ice	6.94	4.57	62.49
(3) DUO1417-8670	A	From Leg	4.00	0.00	0.00	0.0000	90.00	No Ice	6.53	4.20	20.30
								1/2" Ice	6.94	4.57	62.49
APX16DWV-16DWVS	C	From Leg	4.00	0.00	0.00	0.0000	98.00	No Ice	6.70	2.00	20.00
								1/2" Ice	7.13	2.33	51.34
APX16DWV-16DWVS	B	From Leg	4.00	0.00	0.00	0.0000	98.00	No Ice	6.70	2.00	20.00
								1/2" Ice	7.13	2.33	51.34
APX16DWV-16DWVS	A	From Leg	4.00	0.00	0.00	0.0000	98.00	No Ice	6.70	2.00	20.00
								1/2" Ice	7.13	2.33	51.34

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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L1	98 - 88 (1)	TP16.5x12.75x0.375	10.00	98.00	206.0	3.518	18.9872	-2319.28	66804.10	0.035
L2	88 - 45.67 (2)	TP25.16x16.5x0.1875 H1-3 (1.36 CR) - 2	42.33	98.00	136.8	7.984	14.4149	-5014.81	115084.00	0.044
L3	45.67 - 0 (3)	TP34x24.0342x0.25 H1-3 (1.36 CR) - 3	49.34	98.00	98.2	15.500	26.7806	-11063.40	415108.00	0.027

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	98 - 88 (1)	TP16.5x12.75x0.375	20749.67	-3.324	33.000	0.101	0.00	0.000	33.000	0.000
L2	88 - 45.67 (2)	TP25.16x16.5x0.1875	367717.50	-51.210	39.000	1.313	0.00	0.000	39.000	0.000
L3	45.67 - 0 (3)	TP34x24.0342x0.25	970075.00	-52.170	39.000	1.338	0.00	0.000	39.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	98 - 88 (1)	TP16.5x12.75x0.375	0.035	0.101	0.000	0.135 ✓	1.333	H1-3 ✓
L2	88 - 45.67 (2)	TP25.16x16.5x0.1875	0.044	1.313	0.000	1.357 ✗	1.333	H1-3 ✗
L3	45.67 - 0 (3)	TP34x24.0342x0.25	0.027	1.338	0.000	1.364 ✗	1.333	H1-3 ✗

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	98 - 88	Pole	TP16.5x12.75x0.375	1	-2319.28	89049.86	10.2	Pass
L2	88 - 45.67	Pole	TP25.16x16.5x0.1875	2	-5014.81	153406.97	101.8	Fail ✗
L3	45.67 - 0	Pole	TP34x24.0342x0.25	3	-11063.40	553338.94	102.4	Fail ✗
							Summary	
						Pole (L3)	102.4	Fail ✗
						RATING =	**102.4**	**Fail** ✗

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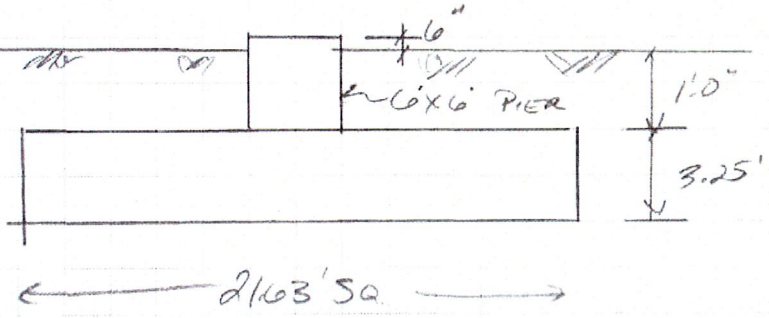
JOB CTHH039A
SHEET NO. 1 OF
CALCULATED BY FGL DATE 12/15/08
CHECKED BY DATE
SCALE

CHECK FOUNDATION FOR MONOPOLE REACTIONS

MAXIMUM OVERTURNING MOMENT = 970.07 ft-k
AXIAL LOAD = 11.08 k

FOUNDATION INFORMATION (BASE UPON PREVIOUS ANALYSIS BY ALL POINTS TECHNOLOGY CORP., dated 3/10/06)



RESISTING OVERTURNING MOMENT:

COMPONENT	WT (k)	ARM (ft)	MOMENT (ft-k)
FOUNDATION	$21.63^2(3.25)(0.15\text{kcf}) = 222.4^k$	10.815'	2405 ft-k
PIER	$1.5'(6)^2(0.15) =$ 8.1k	10.815	87.6
OVER BURDEN	$(21.63^2 \times 1' - 6^2 \times 1')(0.1) = 43.2$	10.815	467.1
AXIAL LD	11.08	10.80	119.8

$\Sigma = 3{,}080$ ft-k

FACTOR of SAFETY $= \frac{3080}{970.07} = 3.18 > 1.5$ okay

FOUNDATION IS ADEQUATE

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JOB CTNH039A
SHEET NO. 2 OF
CALCULATED BY Fiel DATE 12/15/08
CHECKED BY DATE
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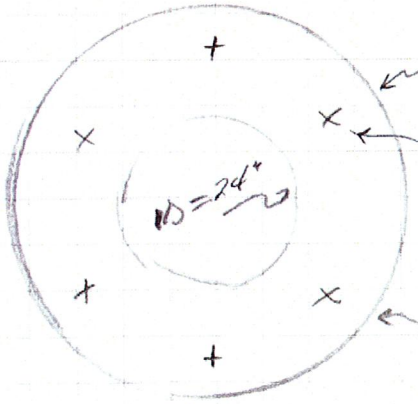
REFERENCE: "CIRCULAR BASE PL'S W/ LARGE ECCENTRIC LOADS" by Dajin Liu
CALCULATE STRESSES IN ANCHOR BOLT & BASE PLATE



F_y = 60ksi
F_b = 0.75(60)(1.33) = 59.85ksi
$F_{y\,BOLT}$ = 75ksi
f'_c = 3,000psi

$A_2 = \frac{48^2\pi}{4} = 1809in^2$ $A_1 = 72^2 = 5184$

CALCULATE MAXIMUM CONCRETE BRG. STRESS = $0.35 f'_c \sqrt{A_1/A_2}$
$= 0.35(3ksi)\sqrt{\frac{5184}{1809}} = 1.78ksi$ $\frac{A_1}{A_2} = 2.867$

$A' = \frac{1(21) + 2(14.85)}{3} = 16.9"$

BOTTOM of EQ.7 = $1 + \frac{2}{21}(14.85) = 2.414$

BASED UPON SPREADSHEET CALCULATIONS

MIN. BASE PL THICKNESS = 1.330" < (PROVIDED = 1.5") ok

BASE PL IS ADEQUATE

MAXIMUM ANCHOR BOLT TENSION = 149.41 k

ALLOWABLE ANCHOR BOLT TENSION = 131.2 k

$\frac{149.41}{131.2} = 1.14$ 1.33 ok

ANCHOR RODS ARE ADEQUATE

Desing of Circular Base Plates

Design Based Upon "Circular Base Plates with Large Eccentric Loads" by Dajin Liu

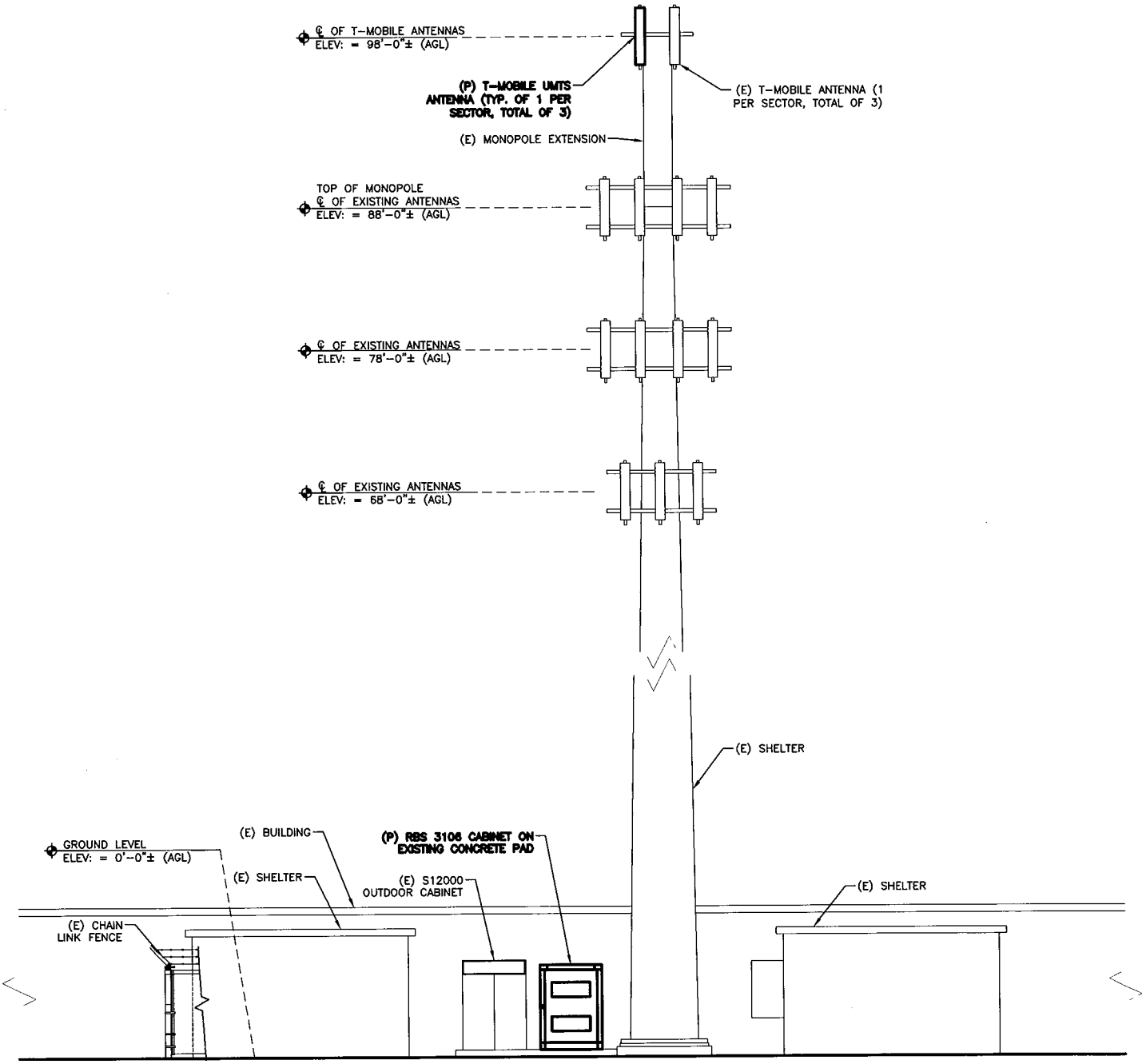
Loading Information		
Axial	11.08	kips
Moment	11641	in*kips
Plate Information		
OD of Pipe	34	in
OD of Plate	48	in
Fy for Plate	60	ksi
No. Bolts	6	
Bolt Circle	42	in
A1/A2	2.867	
f'c	3	ksi
Is Plate Stiffened?	**yes**	
Crital Section	17	inches
Calculations:		
Max. Concrete Brg. Stress	1.78	ksi
eccentricity	1050.632	inches
Center of Tensile Bolt Group		
A'	16.9	
	15.5	**Assumed Bearing Length of Plate (in.)**
Alpha	1.209	radians
	69.26	degrees
Beta	44.89	inches
Area of Compressive Segment	505	In.^2
Area Center if Gravity	6.41	inches
Iterative Calculations		
Right side of Eq 2	11828.25	in*kips
Left side of Eq 2	11826.02	in*kips
% Error	1.000189	
Total Tension In Bolts	360.67	kips
Max. Bolt Tension Calculation		
Bottom of Eq 7	**2.414**	
Max. Bolt Tension	149.41	

Calculate Moment in Base Plate

Alpha 1	0.7837	radians
	44.90	degrees
Beta 1	33.88	inches
Area of Compressive Segment	163.4	in.^2
Area Center if Gravity	2.84	inches
Moment in Plate	17.80	in*kips

Minimum Req'd Thickness of Plate

tp	1.336	inches



ELEVATION 1

SCALE: N.T.S.

T-Mobile
15 COMMERCE WAY
NORTON, MA 02766

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

PROJECT LOCATION: NH039 / LAYDON CONSTRUCTION CTNH039A 69 WHEELER STREET, NEW HAVEN, CT 06512	PROJECT MANAGER: KB	DRAWN BY: DM	BSDA PROJ. #: 2889.124
APPROVED BY:	12/10/08 11/18/08 11/10/08 10/14/08	ELEVATION	SHEET: L2