

Daniel F. Caruso Chairman August 2, 2010

# 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

Thomas F. Flynn III Site Development Project Manager Maxton Technology Inc. 1296 Blue Hills Avenue Bloomfield, CT 06002

RE: **EM-CLEARWIRE-077-100715** - Clearwire Corporation notice of intent to modify an existing telecommunications facility located at 266 Center Street, Manchester, 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.

The proposed modifications are to be implemented as specified here and in your notice dated July 12, 2010, 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.

Affirmative Action / Equal Opportunity Employer

Thank you for your attention and cooperation.

Executive Director

SDP/CDM/laf

c: The Honorable Louis A. Spadaccini, Mayor, Town of Manchester Scott A. Shanley, General Manager, Town of Manchester James Davis. Zoning Enforcement Officer, Town of Manchester American Tower Corporation

# **EM-CLEARWIRE-077-100715**

July 12, 2010

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



Re: Notice of Exempt Modification

Clearwire Corporation Notice to make an Exempt Modification to an Existing

Facility at 266 Center Street, Manchester, CT

**Clearwire Site Number CT-HFD0124** 

Dear Mr. Phelps,

Pursuant to Conn. Agency Regulations Sections 16-50j-73 and 16-50j-72(b), Clearwire Corporation (Clearwire) hereby gives notice to the Connecticut Siting Council (Council) and the City of Hartford, CT. of Clearwire's intent to make an exempt modification to an existing monopole tower (tower) located at 266 Center Street (AKA 1 Elm StreetExt.), Manchester, CT. Specifically, Clearwire plans to add three (3) antennas to the tower, three (3) per sector and to add three (3) microwave dishes, one (1) per sector for backhaul at the 110' AGL. Pursuant to the Council's regulations, (Conn. Agency Regulations Section 16-50j-72(b)), Clearwire's plans do not constitute a modification subject to the Council's review because Clearwire will not change the height of the tower, will not extend the boundaries of the compound, will not increase the noise levels at the site and will not increase the total radio frequency electromagnetic radiation power density at the site to levels above applicable standards. A copy of this notice has been sent to the Town Manager, Manchester, CT.

Clearwire is currently developing a 4G wireless broadband network to provide high-speed wireless data and VoIP service within the State of Connecticut. Clearwire's 4G service leverages the WiMAX technology to enable enhanced wireless data communications. In order to accomplish the upgrade at this site, Clearwire plans to add three (3) WiMAX antennas, three (3) dishes and to install additional WiMAX related electronic equipment at the base of the tower.

The tower is a 115' monopole tower located at 266 Center Street, Manchester, Connecticut (Latitude 41 46 19 N Longitude 72 31 52 W). The tower is owned by Crown Castle USA. Currently, Verizon and XM Radio are located on the tower, as well as a number of other public service antennas. Presently, Clearwire is not located at the site. Clearwire's base station equipment will be located on the ground next to the pole. A site plan with the tower elevations and site plan specifications is attached.

Clearwire will add three (3) antennas, one (1) to each sector, and mount three (3) microwave dishes, one (1) above each of those antennas. The center line for the microwave dishes will be 110'. Nine coaxial cables will be added to the structure, 2 per antenna and one per microwave dish. These cables will be inside the tower and bundled. To confirm that the tower

can support these changes, Clearwire commissioned GPD Associates to perform a structural analysis of the tower and the proposed changes. According to that structural dated June 11, 2010 and attached hereto, the structure is sufficient to support the proposed loading and will not need to be modified. The tower, with the additions and the modifications will be at less than 56.8% of its capacity.

Within the existing compound, Clearwire will install one (1) WiMAX radio and power cabinet on the existing pad at the site. The new equipment will be adjacent to the existing tower. Excluding brief, construction related noise during the addition of this equipment, the proposed changes to the tower will not increase noise levels at the site.

The addition of new WiMAX antennas and microwave dishes will not adversely impact the health and safety of the surrounding community or the people working on the tower. The total radio frequency exposure measured around the base of the tower will be well below the National Council on Radiation Protection and Measurements' (NCRP) standard adopted by the Federal Communications Commission (FCC). The worst case power density analysis for the WiMAX antennas and dishes, measured at the base of the tower, indicates that the WiMAX antennas and dishes will emit .0036% of the NCRP's standard for maximum permissible exposure. The cumulative power density analysis indicates that all the antennas on the structure will emit 36.5630% of the NRCP's standard for maximum permissible exposure. Therefore, the power density levels will be well below the FCC mandated radio frequency exposure limits in all locations around the base of the tower. The power density analysis is attached.

In conclusion, Clearwire's proposed plan to add three (3) WiMAX antennas, three (3) microwave dishes and the associated base station equipment does not constitute a modification subject to the Council's jurisdiction because Clearwire will not increase the height of the tower, will not extend the boundaries of the compound at the site, will not increase the noise levels at the site and the radio frequency electromagnetic radiation power density will stay within all applicable standards.

Respectfully Submitted

Thomas F. Flynn III

Site Development Project Manager

Maxton Technology Inc. 1296 Blue Hills Avenue

Bloomfield, CT 06002

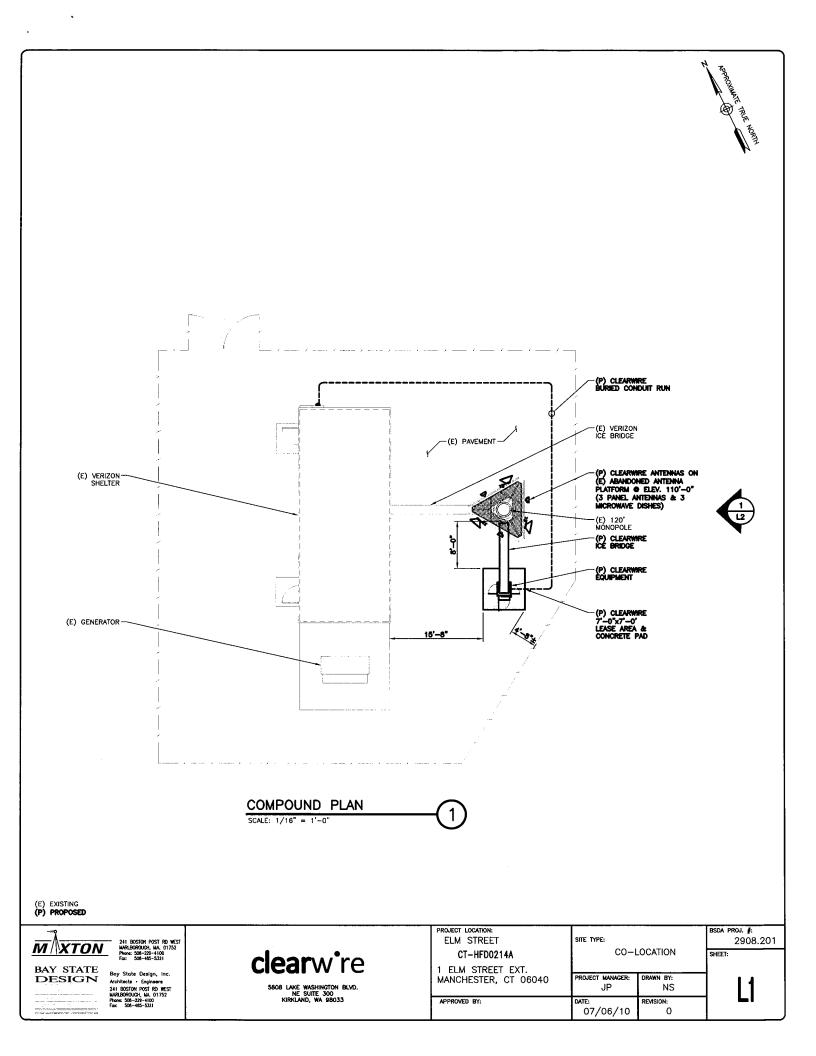
508-821-6974

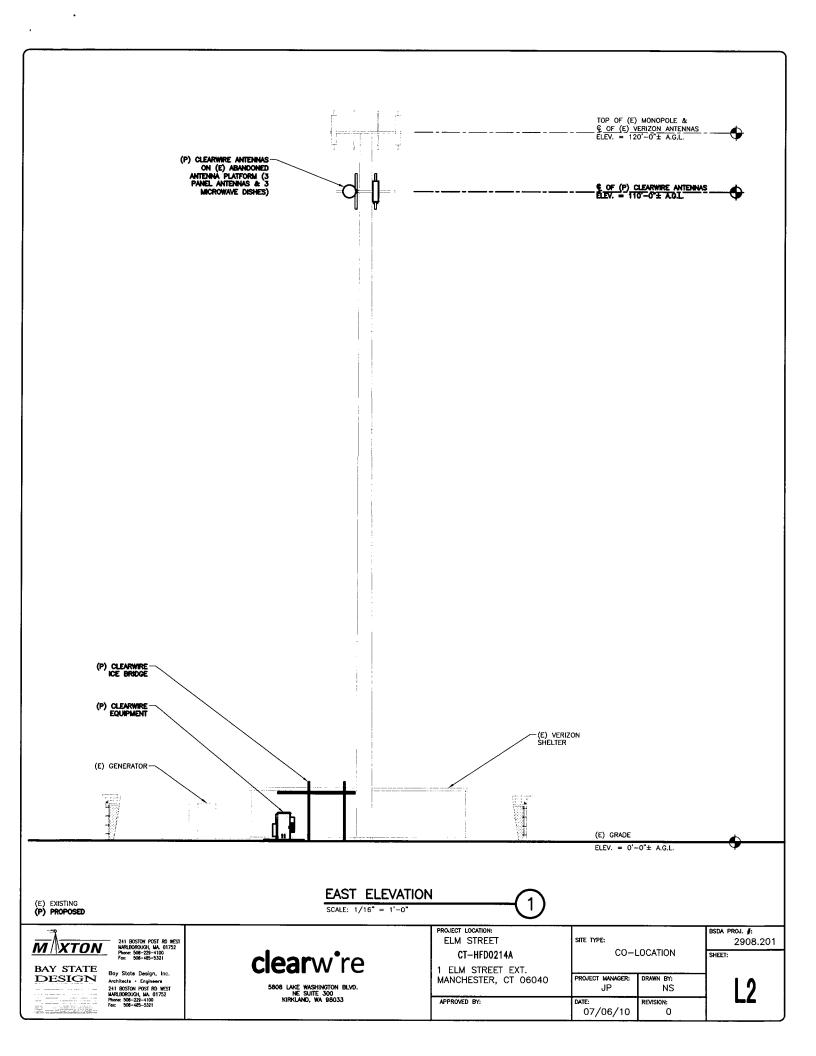
Tom.Flynn@maxtontech.com

Agent for Clearwire Corporation

Cc: Town Manager Scott Shanley

Manchester, CT





Date: June 11, 2010

Steve Tuttle Crown Castle USA Inc. 349 West Commercial St. East Rochester, NY 14445 (585) 899-3445



GPD Associates 520 S. Main St. Suite 2531 Akron, OH 44311 (614) 859-1618 londecker@gpdgroup.com

Subject:

Structural Analysis Report

Carrier Designation:

Clearwire Co-Locate Carrier Site Number:

CT-HFD0214

Crown Castle Designation:

Crown Castle BU Number:

806372

**Crown Castle Site Name:** 

HRT 093 943228 137151

Crown Castle JDE Job Number: Crown Castle Work Order Number:

339938

Engineering Firm Designation:

**GPD Associates Project Number:** 

2010182.54

Site Data:

Center and Pine St., Manchester, CT 06040, Hartford County

Latitude 41° 46' 19", Longitude -72° 31' 48.8"

115 Foot - Valmont Monopole Tower

Dear Steve Tuttle,

*GPD Associates* 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 375885, in accordance with application 102693, revision 3.

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 based upon a wind speed of 80 mph fastest mile.

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

Respectfully submitted by:

David B. Granger P.E. Connecticut #: 17557

# **TABLE OF CONTENTS**

# 1) INTRODUCTION

## 2) ANALYSIS CRITERIA

Table 1 - Proposed Antenna and Cable Information

Table 2 - Existing and Reserved Antenna and Cable Information

Table 3 - Design Antenna and Cable Information

## 3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

## 4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)
Table 6 - Tower Component Stresses vs. Capacity

4.1) Recommendations

Table 7 - Dish Twist/Sway Results for 50 mph Service Wind Speed

# 5) DISCLAIMER OF WARRANTIES

#### 6) APPENDIX A

RISATower Output

## 7) APPENDIX B

Base Level Drawing

## 8) APPENDIX C

**Additional Calculations** 

## 1) INTRODUCTION

The existing 115' monopole has 12 sides and is evenly tapered from 43.85" (flat-flat) at the base to 21.91" (flat-flat) at 115'. It has three major sections connected with two slip joints. The structure is galvanized and has no tower lighting.

The tower was originally designed by Valmont in May of 1990 for a wind speed of 90 mph with 1/2" radial ice per EIA-222-D.

#### 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 80 mph with no ice, 69.3 mph with 0.5 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Flovation	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines		Note	
	108	2	Dragonwave	A-ANT-18G-2-C				
	100	1	Motorola	TIMING 2000	3	1/2 1/4		
105	105	3		Side Arm Mount [SO 701-1]			4	
105		105	2	Dragonwave	Horizon Compact TMA	3	5/8	1
		3	Argus Technologies	LLPX310R	3	5/16		
		3	Samsung	WIMAX DAP HEAD BSTN				

Notes:

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	
		2	Antel	BXA-70063/6CFx4	6	1-5/8	1	
	116	1	Antel	BXA-70063/6CFx6		1-5/6		
115		6	Decibel	DB844G65ZAXY				
		6	Antel	BSA-185090/16CF	12	1-5/8		
	115	1		Platform Mount [LP 713-1]				
99	99	1		Platform Mount [LP 601-1]				

Notes:

See Appendix B for proposed coax layout.

<sup>1)</sup> Reserved equipment.

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)		Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
112	112	4		PD10017		
112	112	1		Platform Mount		
105	105	12		PD1132		
99	99	1		Platform Mount	ĺ	

### 3) ANALYSIS PROCEDURE

**Table 4 - Documents Provided** 

Document	Remarks	Reference	Source
Manufacturer's Drawings	Valmont Industries, Inc., Valmont #: 10665-90, dated 05/01/90	Doc ID#: 262172	Crown DMZ
Geotechnical Report	Testwell Craig Laboratories of CT, Project: Subsurface Investigation Center Street Manchester, CT, dated 4/12/90	Doc ID#: 262174	Crown DMZ
Previous Structural Analysis	GPD Associates Project #: 2010175.29, dated 1/12/10	Doc ID#: 2574895	Crown DMZ

## 3.1) Analysis Method

RISATower (version 5.4.1.8), 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.
- When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
- Mount sizes, weights, and manufacturers are best estimates based on site photos provided and are determined without the benefit of a site visit by GPD.

This analysis may be affected if any assumptions are not valid or have been made in error. GPD Associates 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	115 - 72.3333	Pole	TP30.45x21.91x0.2185	1	-6.42	237.02	51.4	Pass
L2	72.3333 - 29.3333	Pole	TP38.61x29.0789x0.3125	2	-12.54	691.95	55.9	Pass
L3	29.3333 - 0	Pole	TP43.85x36.8519x0.375	3	-19.84	1314.68	56.8	Pass
							Summary	
						Pole (L3)	56.8	Pass
						Rating =	56.8	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC1

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods		51.9%	Pass
1	Base Plate		33.2%	Pass
2	Base Foundation		56.5%	Pass

Structure Rating (max from all components) =	No.	56.8%
	*	

Notes:

## 4.1) Recommendations

The design of the existing tower and its foundation is sufficient for the proposed loading and does not require modification.

Table 7 - Dish Tilt/Sway Results for 50 mph Service Wind Speed

Elevation (ft)	Dish Model	Diameter (ft)	Tilt-Sway Limit (deg)	Calculated Tilt-Sway (deg)
105	A-ANT-18G-2-C	2.175	1.6	1.1527

Notes:

See additional documentation in "Appendix C -- Additional Calculations" for calculations supporting the % capacity consumed.

<sup>2)</sup> Foundation capacity determined by comparing analysis reactions to original design reactions.

<sup>1)</sup> Twist-Sway Limit calculated per Annex C of TIA/EIA-222-F.

June 11, 2010 CCI BU No 806372 Page 6

#### 5) DISCLAIMER OF WARRANTIES

GPD ASSOCIATES has not performed a site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD ASSOCIATES in connection with this Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. All tower components have been assumed to only resist dead loads when no other loads are applied. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

GPD ASSOCIATES does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD ASSOCIATES provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the feasibility of adding appurtenances usually accompanied by transmission lines to the structure.

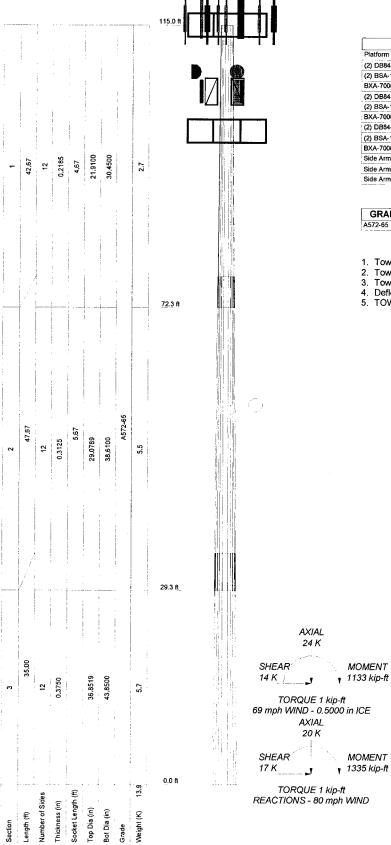
It is the owner's responsibility to determine the amount of ice accumulation, if any, that should be considered in the structural analysis.

The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD ASSOCIATES, but are beyond the scope of this report.

Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

GPD ASSOCIATES makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD ASSOCIATES will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD ASSOCIATES pursuant to this report will be limited to the total fee received for preparation of this report.

# APPENDIX A RISA TOWER OUTPUT



#### **DESIGNED APPURTENANCE LOADING**

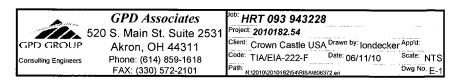
TYPE	ELEVATION	TYPE	ELEVATION
Platform Mount [LP 713-1]	115	LLPX310R w/ Mount Pipe	105
(2) DB844G65ZAXY w/Mount Pipe	115	LLPX310R w/ Mount Pipe	105
(2) BSA-185090/16CF w/Mount Pipe	115	LLPX310R w/ Mount Pipe	105
BXA-70063/6CFx4 w/ Mount Pipe	115	TIMING 2000	105
(2) DB844G65ZAXY w/Mount Pipe	115	WIMAX DAP HEAD	105
(2) BSA-185090/16CF w/Mount Pipe	. 115	WIMAX DAP HEAD	105
BXA-70063/6CFx4 w/ Mount Pipe	115	WIMAX DAP HEAD	105
(2) DB844G65ZAXY w/Mount Pipe	115	Horizon Compact	105
(2) BSA-185090/16CF w/Mount Pipe	115	Horizon Compact	105
BXA-70063/6CFx6 w/ Mount Pipe	115	A-ANT-18G-2-C	105
Side Arm Mount [SO 701-1]	105	A-ANT-18G-2-C	105
Side Arm Mount [SO 701-1]	105	Platform Mount [LP 601-1]	99
Side Arm Mount (SO 701-1)	: 105	1	

**MATERIAL STRENGTH** 

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

## **TOWER DESIGN NOTES**

- 1. Tower is located in Hartford County, Connecticut.
- 2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
- Tower is also designed for a 69 mph basic wind with 0.50 in ice.
   Deflections are based upon a 50 mph wind.
   TOWER RATING: 56.8%





To: Maxton

From: Frantz Pierre – Radio Frequency Engineer

Cc: Micah Hawthorne

Subject: Power Density Report for CT-HFD0214

Date: July 14, 2010

#### 1. Introduction:

This report is the result of Electromagnetic Field Intensities (EMF – Power Densities) study for the Clearwire broadband antenna installation on a steel monopole at 266 Center Street (AKA 1 Elm Street Ext) Manchester, 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 Clearwire transmitters are in the (2496 2960) Frequency Band
- 2) The emissions from the Clearwire Microwave dishes are in the 18 GHz Frequency Band
- 3) The model number for Clearwire Antenna is Argus LLPX310R
- 4) The model number for the Microwave dish is Andrew VHLP2.5 with 36" Diameter.
- 5) The Clearwire Panel antenna centerline is 110 feet.
- 6) The Clearwire Microwave dish centerline is 110 feet.
- 7) The Maximum Transmit power from any Clearwire panel antenna is 251 Watts Effective Isotropic Radiated Power (EiRP) assuming 2 channels per sector.
- 8) The Maximum Transmit power from any Clearwire Microwave Dish is 346 Watts Effective Isotropic Radiated Power (EiRP) assuming 1 channel per dish.
- 9) All antennas are simultaneously transmitting and receiving 24 hours per day.
- 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 used with the above information to perform the calculations.

#### 3: Conclusion:

Based on the above worst case assumptions, the power density calculation from the Clearwire antenna installation on a monopole at 266 Center Street, Manchester, CT. is 0.00003583 mW/cm<sup>2</sup>. This value represents 0.0036% of the Maximum Permissible Exposure (MPE) standard of 1 milliwatt per square centimeter (mW/cm<sup>2</sup>) set forth in the FCC/ANSI/IEEE C95-1-1991. Furthermore, the proposed antenna location for Clearwire 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 all other carriers is 36.56%. The combined Power Density for this site is 36.5636% of the M.P.E. standard.