CLEAR

Carillon Point
d, WA 98033

EM-CLEARWIRE-080-091015

October 15, 2009

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

ORIGINAL

Re: Notice of Exempt Modification
Clearwire Corporation Notice to make an Exempt Modification to an Existing Facility at 651 Paddock Avenue, Meriden, CT
Clearwire Site Number CT-NHN0031

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 Town of Meriden, CT. of Clearwire's intent to make an exempt modification to an existing monopole tower (tower) located at 651 Paddock Avenue, Meriden, CT. Specifically, Clearwire plans to add three (3) antennas to the tower, one (1) per sector and to add three (3) microwave dishes, one (1) per sector for backhaul at the 119' 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 Town Manager Lawrence Kendzior, Meriden, 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 120' monopole located at 651 Paddock Avenue, Meriden, Connecticut (Latitude 41 30 45 N Longitude 72-46-46 W). The tower is owned by SBA. Currently, TMO and Verizon are located on the tower. 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 97'. 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 FDH Inc. to perform a structural analysis of

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4400 Carillon Point
Kirkland, WA 98033

the tower and the proposed changes. According to that structural dated September 28, 2009 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 77.5% 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.

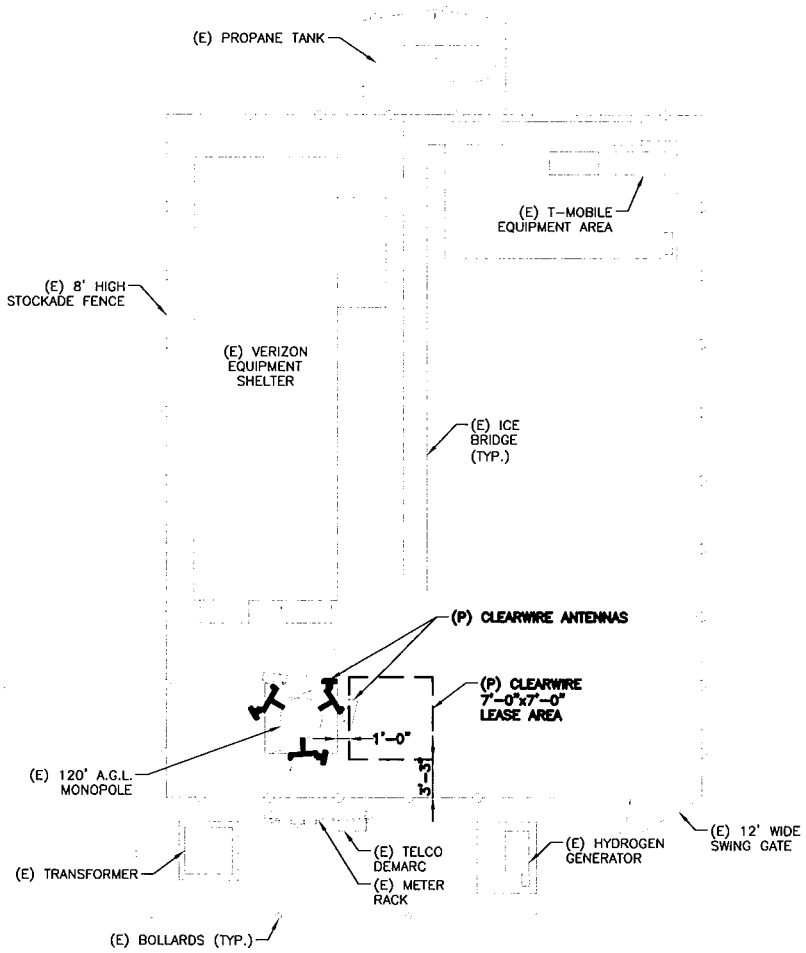
The addition of new WiMAX antennas and microwave dishes will not adversely impact the health and safety of the surrounding community or the people working on the tower. The total radio frequency exposure measured around the base of the tower will be well below the National Council on Radiation Protection 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 .000543% of the NCRP's standard for maximum permissible exposure. The cumulative power density analysis indicates that all the antennas on the structure will emit 22.16% 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 Lawrence Kendzior, City of Meriden



1
L2

COMPOUND PLAN

SCALE: N.T.S

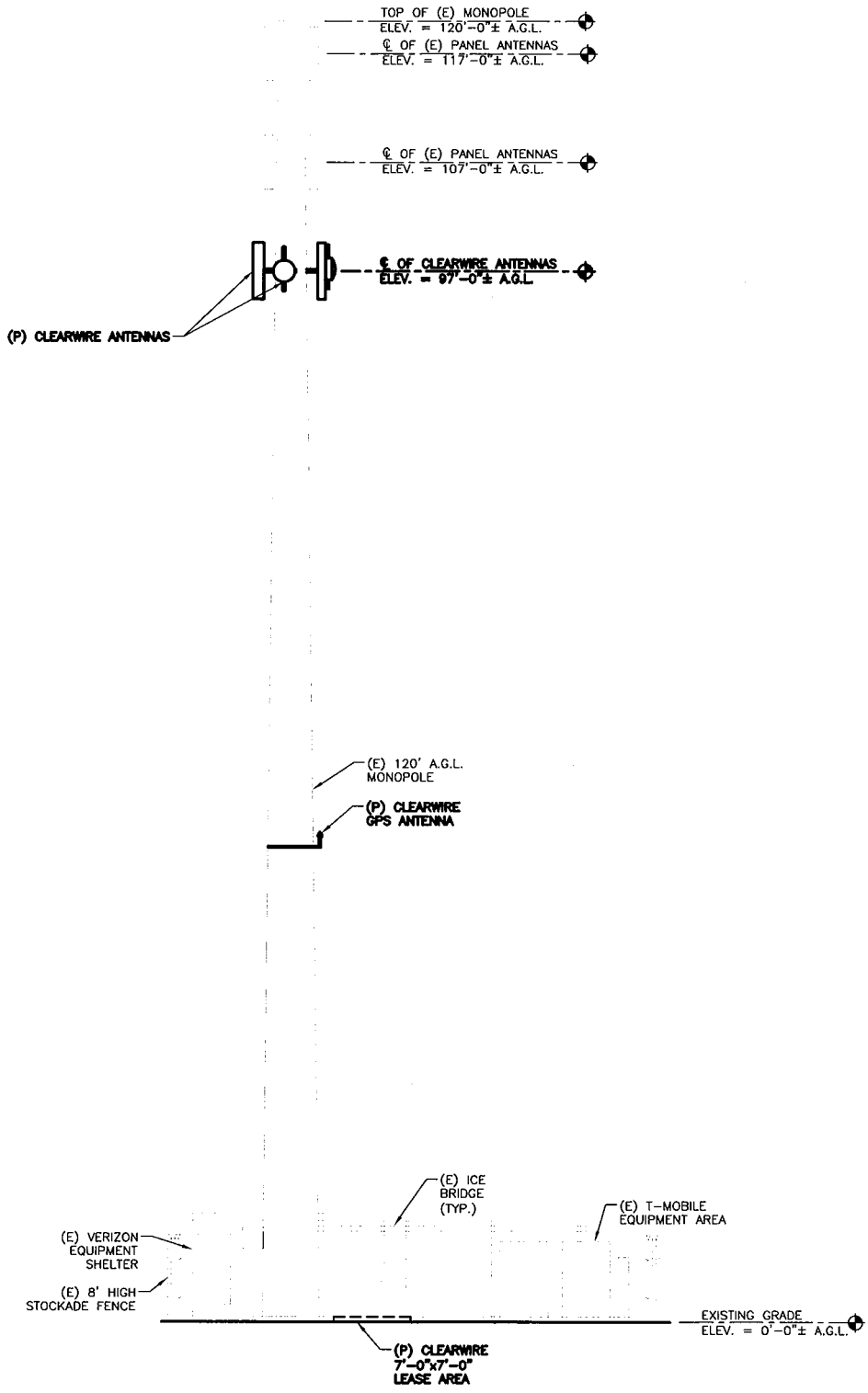
1

(E) EXISTING
(P) PROPOSED

MAXTON
BAY STATE DESIGN
241 BOSTON POST RD WEST
MARLBOROUGH, MA 01752
Phone: 508-229-4100
Fax: 508-485-5321
Bay State Design, Inc.
Architects • Engineers
241 BOSTON POST RD WEST
MARLBOROUGH, MA 01752
Phone: 508-229-4100
Fax: 508-485-5321

clearwire
5808 LAKE WASHINGTON BLVD.
NE SUITE 300
KIRKLAND, WA 98033

PROJECT LOCATION: MERIDEN CT-NHN0031A 651 PADDOCK AVENUE MERIDEN, CT 06450	SITE TYPE: MONOPOLE COLOCATION		BSD PROJ. #: 2908.146
	PROJECT MANAGER: JP	DRAWN BY: KW	SHEET: L1
APPROVED BY:	DATE: 10/15/09	REVISION: 0	



ELEVATION 1

SCALE: N.T.S

(E) EXISTING
(P) PROPOSED

MIXTON BAY STATE DESIGN
241 BOSTON POST RD WEST
MARLBOROUGH, MA. 01752
Phone: 508-229-4100
Fax: 508-485-5321

Bay State Design, Inc.
Architects · Engineers
241 BOSTON POST RD WEST
MARLBOROUGH, MA. 01752
Phone: 508-229-4100
Fax: 508-485-5321

clearwire
5808 LAKE WASHINGTON BLVD.
NE SUITE 300
KIRKLAND, WA 98033

PROJECT LOCATION: MERIDEN CT-NHN0031A 651 PADDOCK AVENUE MERIDEN, CT 06450	SITE TYPE: MONOPOLE COLOCATION		BSD PROJ. #: 2908.146
	PROJECT MANAGER: JP	DRAWN BY: KW	SHEET: L2
APPROVED BY:	DATE: 10/15/09	REVISION: 0	

FDH

Structural Analysis for
SBA Network Services, Inc.

119 ft Monopole

Site Name: Meriden
Site ID: CT13069-A

FDH Project Number 09-03252E S2

Prepared By:

Bradley Newman, EI
Project Engineer

Reviewed By:

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

FDH Engineering, Inc.
2730 Rowland Rd.
Raleigh, NC 27615
(919)-755-1012
info@fdh-inc.com

September 28, 2009

Prepared pursuant to ANSI-TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas

CTAHM-0031

TABLE OF CONTENTS

2730 Rowland Road, Raleigh, NC 27615 Ph: (919) 755-1012 Fax: (919) 755-1031 info@fdh-inc.com

EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the monopole located in Meriden, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads, pursuant to the *Structural Standard for Antenna Supporting Structures and Antennas, ANSI/TIA-222-G.* Information pertaining to the existing/proposed antenna loading, current tower geometry, and member sizes was obtained from the Sabre Communications (Job No. 08-10201) original design drawings dated November 9, 2007, FDH, Inc. (Job No. 08-07134T) TIA Inspection Report dated October 7, 2008, and SBA Network Services, Inc.

The *basic design wind speed* per *ANSI/TIA-222-G* standards is 115 mph without ice and 50 mph with 3/4" of radial ice. Ice is considered to increase in thickness with height.

Conclusions

With the current and proposed antennas from Clearwire in place at 97 ft., the tower meets the requirements of the *ANSI/TIA-222-G* standard provided the **Recommendations** listed below are satisfied. Furthermore, provided the foundation was designed and constructed to support the original foundation reactions (see Sabre Drawing No. 08-10201-F1), the foundation should be adequate to support both the proposed and existing 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, current antenna loading, 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 *ANSI/TIA-222-G* standard are met with the existing and proposed loading in place, we have the following recommendations:

1. The proposed coax should be installed inside the monopole's shaft.
2. The proposed BTSs should be installed behind the existing panel antennas.

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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:

Antenna No.	Centerline Elevation (ft)	Coax and Lines[1]	Carrier	Mount Type	Description
1-3	117[2]	(12) 1-5/8" (1) 1/4"	T-Mobile	(3) 7' x 2.39" Pipe Mounts	(3) RFS APX16PV-16PVL-E (6) OneBase Twin TMAs
4-6	107	(12) 1-5/8"	Verizon	(3) 7' x 2.39" Pipe Mounts	(3) Jaybeam X65-13-04

1 Coax installed inside the pole's shaft unless otherwise noted.

Proposed Loading:

Antenna No.	Centerline Elevation (ft)	Coax and Lines	Carrier	Mount Type	Description
1-5	97	(3) 5/8" (3) 1/4" (3) 5/16" (2) 1/2"	Clearwire	(3) Pipe Mounts	(3) Argus LLPX310R (2) Andrew VHLP2.5-11 Dishes (3) Samsung 2.5 Ghx RRH BTSs

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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

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. *Note: Capacities up to 100% are considered acceptable.* **Table 4** displays the maximum foundation reactions. **Table 5** displays the maximum antenna rotations at service wind speed.

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	119 - 98.75	Pole	TP28.14x24.86x0.1875	7.7	Pass
L2	98.75 - 48.75	Pole	TP35.87x27.1981x0.25	41.0	Pass
L3	48.75 - 0	Pole	TP43.26x34.6406x0.25	77.5	Pass
		Anchor Bolts	(8) 2.25" ø w/ BC = 49.125"	62.1	Pass
		Base Plate	2.25" thick x 47" square	54.0	Pass

Table 4 – Maximum Base Reactions

Base Reactions	Current Analysis Reactions (*ANSI/TIA-222-G*)	Original Design Reactions (*ANSI/TIA-222-G*)
Axial	18 k	19 k
Shear	18 k	27 k
Moment	1,266 k-ft	1,627 k-ft

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Table 5 – Maximum Antenna Rotations at Service Wind Speed (Proposed Antennas Only)

Centerline Elevation (ft)	Antenna	Tilt (deg)*	Twist (deg)*
97	Andrew VHLP2.5-11	0.4483	0.0004
97	Andrew VHLP2.5-11	0.4483	0.0004

*Allowable tilt and twist values to be reviewed by Clearwire.

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.

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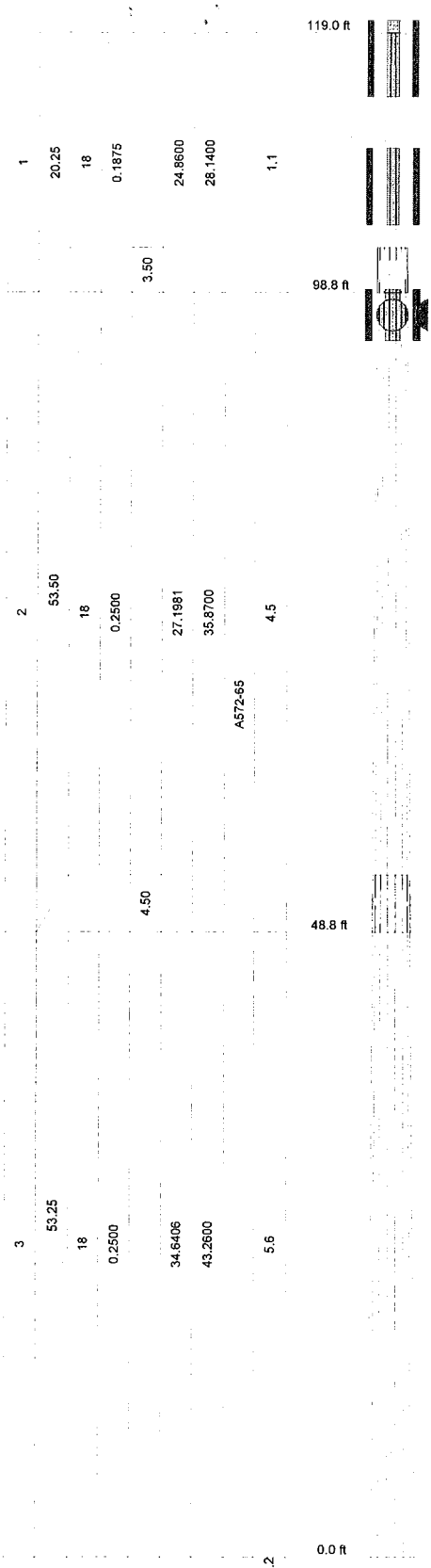

Section	1	2	3
Length (ft)	20.25	53.50	53.25
Number of Sides	18	18	18
Thickness (in)	0.1875	0.2500	0.2500
Lap Splice (ft)	3.50	4.50	
Top Dia (in)	24.8600	27.1981	34.6406
Bot Dia (in)	28.1400	35.8700	43.2600
Grade		A572-65	
Weight (K)	1.1	4.5	5.6

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APX16PV-16PVL-E w/Mount Pipe (T-Mobile)	117	X65-13-04 w/Mount Pipe (Verizon)	107
		X65-13-04 w/Mount Pipe (Verizon)	107
APX16PV-16PVL-E w/Mount Pipe (T-Mobile)	117	LLPX310R w/ Mount Pipe (Clearwire)	97
		LLPX310R w/ Mount Pipe (Clearwire)	97
APX16PV-16PVL-E w/Mount Pipe (T-Mobile)	117	LLPX310R w/ Mount Pipe (Clearwire)	97
(2) OneBase Twin TMA (T-Mobile)	117	2.5 Ghx RRH (Clearwire)	97
(2) OneBase Twin TMA (T-Mobile)	117	2.5 Ghx RRH (Clearwire)	97
(2) OneBase Twin TMA (T-Mobile)	117	2.5 Ghx RRH (Clearwire)	97
X65-13-04 w/Mount Pipe (Verizon)	107	VHLP2.5-11 (Clearwire)	97
		VHLP2.5-11 (Clearwire)	97

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 115 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Anchor Botls: (8) 2.25" diam. on a 49.125" bolt circle
7. Base Plate: 2.25" thick x 47" square
8. TOWER RATING: 77.5%

FDH Engineering, Inc.
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Raleigh, NC 27615
Phone: (919) 755-1012
FAX: (919) 755-1031

Job:	Meriden, CT1306-A
Project:	09-03252E S2
Client:	SBA
Drawn by:	BRN
App'd:	
Code:	TIA-222-G
Date:	09/28/09
Scale:	NTS
Path:	
Dwg No.	E-1

CLEAR

4400 Carillon Point
Kirkland, WA 98033

To: Maxton Technology
From: Mark Brauer – Radio Frequency Engineer
Cc: Cameron Syme
Subject: Power Density Report for CT-NHN0031
Date: October 12, 2009

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1. Introduction:

This report is the result of Electromagnetic Field Intensities (EMF – Power Densities) study for the Clearwire broadband antenna installation on a monopole tower at 651 Paddock Avenue, Meriden, 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 11 GHz Frequency Band
3) The model number for Clearwire Antenna is Argus LLPX310R
4) The model number for the Microwave dish is Andrew VHLP2-23 with 24" Diameter.
5) The Clearwire Panel antenna centerline is 97 feet.
6) The Clearwire Microwave dish centerline is 97 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.
10) 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 Self Support Tower at 651 Paddock Avenue, Meriden, CT is 0.000005 mW/cm^2. This value represents 0.000543% 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 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 22.15 %. The combined Power Density for this site is 22.16% of the M.P.E. standard.