Robinson+Cole

KENNETH C. BALDWIN

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Direct (860) 275-8345

Also admitted in Massachusetts

September 10, 2014

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Request of Cellco Partnership d/b/a Verizon Wireless for an Order to Approve the Shared Use of an Existing Tower at 239 Middle Turnpike East, Manchester, Connecticut**

Dear Ms. Bachman:

Pursuant to Connecticut General Statutes ("C.G.S.") §16-50aa, as amended, Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby requests an order from the Connecticut Siting Council ("Council") to approve the shared use by Cellco of an existing telecommunications tower, owned by the Town of Manchester Police Department ("MPD") at 239 Middle Turnpike East, Manchester, Connecticut (the "Property"). Cellco requests that the Council find that the proposed shared use of the MPD tower satisfies the criteria of C.G.S § 16-50aa and issue an order approving the proposed shared use. A copy of this letter is being sent to Manchester's Mayor, Jay Moran and Scott Shanley, its General Manager. The Town of Manchester is the owner of the Property.

Background

The MPD currently maintains a 185-foot self-supporting monopole tower at its existing public safety complex. The MPD antennas extend off the top of the tower to a height of 202 feet above ground level. The tower is also shared by Metro-PCS with antennas at the 174-foot level; T-Mobile with antennas at the 164-foot level; Sprint with antennas at the 153-foot level; and

AT&T with antennas at the 143-foot level on the tower. Equipment associated with the existing antennas is located on the ground near the base of the tower.

Cellco is licensed by the Federal Communications Commission ("FCC") to provide wireless services throughout the State of Connecticut. Cellco and the MPD have agreed to the proposed shared use of the MPD tower at the Property pursuant to mutually acceptable terms and conditions, and the MPD has authorized Cellco to apply for all necessary permits and approvals that may be required to share the existing tower. (*See* Owner's authorization letter included in Attachment 1).

Cellco proposes to install twelve (12) antennas and nine (9) remote radio heads (RRHs) behind the antennas, on a low-profile antenna platform at a height of 113 feet above ground level. Equipment associated with Cellco's antennas and a natural gas fueled generator will be located inside a new 12' x 24' shelter located to the east of the tower. Included in Attachment 2 are Cellco's project plans showing the location of all proposed site improvements.[1]

C.G.S. § 16-50aa(c)(1) provides that, upon written request for approval of a proposed shared use, "if the council finds that the proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns, the council shall issue an order approving such shared use." Cellco respectfully submits that the shared use of the tower satisfies these criteria.

A. Technical Feasibility. The existing MPD tower is structurally capable of supporting Cellco's antennas. The proposed shared use of this tower is, therefore, technically feasible. A Structural Analysis Report verifying the structural integrity of the tower, and its ability to support Cellco's antennas and related equipment is included in Attachment 3.

B. Legal Feasibility. Under C.G.S. § 16-50aa, the Council has been authorized to issue orders approving the shared use of an existing tower such as the MPD tower. This authority complements the Council's prior-existing authority under C.G.S. § 16-50p to issue orders approving the construction of new towers that are subject to the Council's jurisdiction. In addition, § 16-50x(a) directs the Council to "give such consideration to other state laws and municipal regulations as it shall deem appropriate" in ruling on requests for the shared use of

[1] Cellco received Council approval to share the MPD tower in 2009 (EM-VER-077-090226) but never installed its improvements.

existing tower facilities. Under the statutory authority vested in the Council, an order by the Council approving the requested shared use would permit the Applicant to obtain a building permit for the proposed installations.

C. **Environmental Feasibility.** The proposed shared use of the MPD tower would have a minimal environmental effect, for the following reasons:

1. The proposed installation of twelve (12) antennas and nine (9) remote radio heads behind the antennas at the 113-foot level on the existing 185-foot tower would have an insignificant incremental visual impact on the area around the existing tower. Cellco's shelter would be installed on a concrete pad within the limits of the existing improved tower compound. Cellco's shared use of this tower would therefore, not cause any significant change or alteration in the physical or environmental characteristics of the existing site.

2. Noise associated with the equipment shelter's air conditioning ("A/C") units was evaluated for compliance with State and/or local noise standards. According to the Noise Compliance Study included in Attachment 4 ("Study"), noise from the shelter's A/C units will not exceed State and/or local noise limits. Noise associated with Cellco's emergency back-up generator is exempt from State and local noise standards.

3. Operation of Cellco's antennas at this site would not exceed the RF emissions standards adopted by the Federal Communications Commission ("FCC"). Included in Attachment 5 of this filing are Cellco's Far Field Approximations for its antennas at the 113-foot level which demonstrate that the proposed Cellco antennas will operate well within the FCC RF emissions safety standards.

4. Under ordinary operating conditions, the proposed installation would not require the use of any water or sanitary facilities and would not generate air emissions or discharges to water bodies or sanitary facilities. After construction is complete the proposed installations would not generate any increased traffic to the MPD facility other than periodic (monthly) maintenance visits to the cell site.

The proposed use of the MPD facility would, therefore, have a minimal environmental effect, and is environmentally feasible.

D. Economic Feasibility. As previously mentioned, MPD and Cellco have entered into a lease for the shared use of the existing tower on mutually agreeable terms. The proposed tower sharing is, therefore, economically feasible. (*See* Attachment 1).

E. Public Safety Concerns. As discussed above, the tower is structurally capable of supporting Cellco's full array of twelve (12) antennas, nine (9) remote radio heads and all related equipment. Cellco is not aware of any public safety concerns relative to the proposed sharing of the existing MPD tower. In fact, the provision of new and improved wireless service through shared use of the existing tower is expected to enhance the safety and welfare of area residents and members of the general public traveling through Manchester.

Conclusion

For the reasons discussed above, the proposed shared use of the existing MPD tower at 239 Middle Turnpike East satisfies the criteria stated in C.G.S. § 16-50aa and advances the General Assembly's and the Council's goal of preventing the unnecessary proliferation of towers in Connecticut. The Applicant, therefore, respectfully requests that the Council issue an order approving the proposed shared use.

Thank you for your consideration of this matter.

Very truly yours,

Kenneth C. Baldwin

Enclosures
Copy to:
Jay Moran, Mayor
Scott Shanley, General Manager
Sandy M. Carter

ATTACHMENT 1

Town of Manchester

41 Center Street • P.O. Box 191
Manchester, Connecticut 06045-0191
www.manchesterct.gov

SCOTT SHANLEY, GENERAL MANAGER

JAY MORAN, MAYOR
TIMOTHY M. DEVANNEY, DEPUTY MAYOR
RUDY KISSMANN, SECRETARY

DIRECTORS
STEVE GATES
MARGARET H. HACKETT
SUSAN M. HOLMES
LISA P. O'NEILL
CHERI A. PELLETIER
MARK D. TWEEDIE

September 9, 2014

Sandy Carter
Verizon Wireless
99 East River Drive
East Hartford, CT 06108

RE: Cellco Partnership d/b/a Verizon Wireless
Wireless Telecommunications Facility
239 Middle Turnpike East
Manchester, CT

Dear Ms. Carter:

The Town of Manchester, the owner of the above-referenced property, hereby authorizes Cellco Partnership d/b/a Verizon Wireless and/or its agents to apply for and obtain all necessary permits and approvals from all appropriate Town of Manchester boards, commissions and agencies and the CT Siting Council for its proposed wireless telecommunications facility modifications.

Please contact us should you have any questions.

Sincerely

Greg Simmons
Director of Finance
Town of Manchester

11645304-v1

ATTACHMENT 2

Cellco Partnership

d.b.a. verizon wireless

WIRELESS COMMUNICATIONS FACILITY

MANCHESTER GREEN
239 MIDDLE TURNPIKE EAST
MANCHESTER, CT 06040

SITE DIRECTIONS

FROM: 99 EAST RIVER DRIVE, EAST HARTFORD, CONNECTICUT **TO:** 239 MIDDLE TURNPIKE EAST, MANCHESTER, CT 06040

1. Head northeast on E River Dr	0.9 mi
2. Merge left onto I-84 E toward CT-2 E/Norwich	3.5 mi
3. Keep left to take I-84 toward Boston	1.4 mi
4. Take US-6 exit 60 toward Manchester	0.4 mi
5. Take the first right onto Middle Tpke W. Continue to follow Middle Tpke W	0.5 mi
6. Turn right to stay on Middle Tpke W.	2.5 mi

GENERAL NOTES

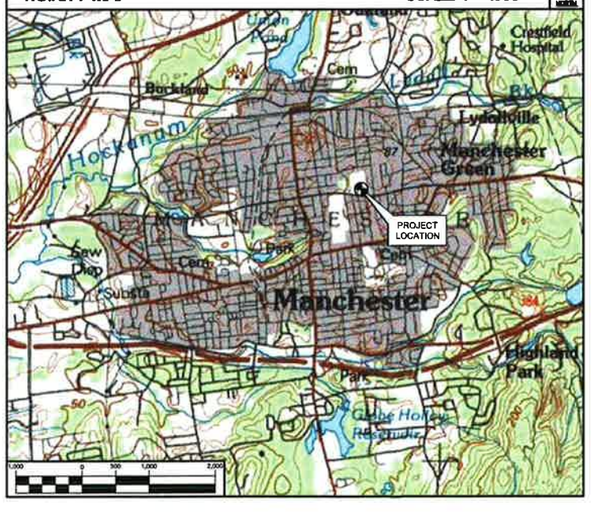
1. PROPOSED ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY CELLCO PARTNERSHIP.

PROJECT SCOPE

1. THE PROPOSED SCOPE OF WORK GENERALLY INCLUDES THE INSTALLATION OF A ±12'x24' PREFABRICATED WIRELESS EQUIPMENT SHELTER HOUSING NATURAL GAS FUELED EMERGENCY POWER BACKUP GENERATOR ON A CONCRETE FOUNDATION.
2. REMOVAL OF PORTION OF EXISTING FENCE AND GATE. PROPOSED 8' TALL CHAINLINK FENCE WITH PRIVACY SLATS TO BE INSTALLED AROUND PROPOSED ±12'x24' EQUIPMENT SHELTER.
3. A TOTAL OF TWELVE (12) DIRECTIONAL PANEL ANTENNAS ARE PROPOSED TO BE MOUNTED ON AN EXISTING ±185' TALL MONOPOLE TOWER AT A CENTERLINE ELEVATION OF 113' A.G.L.
4. ELECTRIC AND TELCO UTILITIES SHALL BE ROUTED UNDERGROUND TO THE PROPOSED EQUIPMENT SHELTER FROM AN EXISTING UTILITY BACKBOARD LOCATED ADJACENT TO FENCED COMPOUND.
5. FINAL DESIGN FOR TOWER AND ANTENNA MOUNTS SHALL BE INCLUDED IN THE D&M PLANS.
6. THE PROPOSED WIRELESS FACILITY INSTALLATION WILL BE DESIGNED IN ACCORDANCE WITH THE 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2009 CONNECTICUT SUPPLEMENT.

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

SITE NAME:	MANCHESTER GREEN
SITE ADDRESS:	239 MIDDLE TURNPIKE EAST MANCHESTER, CT 06404
LESSEE/TENANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 99 EAST RIVER DRIVE EAST HARTFORD, CT 06108
CONTACT PERSON:	SANDY CARTER CELLCO PARTNERSHIP (860) 803-8219
TOWER COORDINATES:	LATITUDE: 41°-47'-3.92"N LONGITUDE: 72°-30'-42.27"W GROUND ELEVATION: ±282'AMSL COORDINATES & GROUND ELEVATION ARE REFERENCED FROM THE HUDSON FAA 2C.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	0
C-1	COMOUND PLAN AND ELEVATION	0

PROFESSIONAL ENGINEER SEAL

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	09/05/14	KAW	DMD	ISSUED FOR CSC
0	09/04/14	KAW	DMD	ISSUED FOR CSC-CLIENT REVIEW

Cellco Partnership d.b.a. Verizon wireless

CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

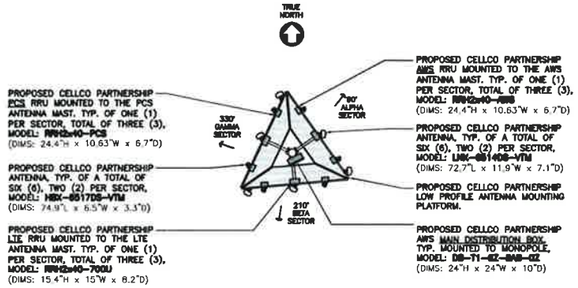
Cellco Partnership d/b/a Verizon Wireless
WIRELESS COMMUNICATIONS FACILITY
MANCHESTER GREEN
239 MIDDLE TURNPIKE EAST
MANCHESTER, CT 06040

DATE: 09/03/14
SCALE: AS NOTED
JOB NO. 14013.000

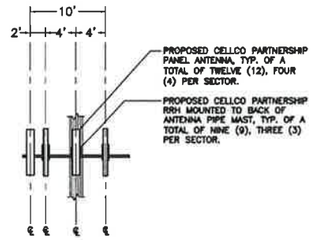
TITLE SHEET

T-1

Sheet No. 1 of 2

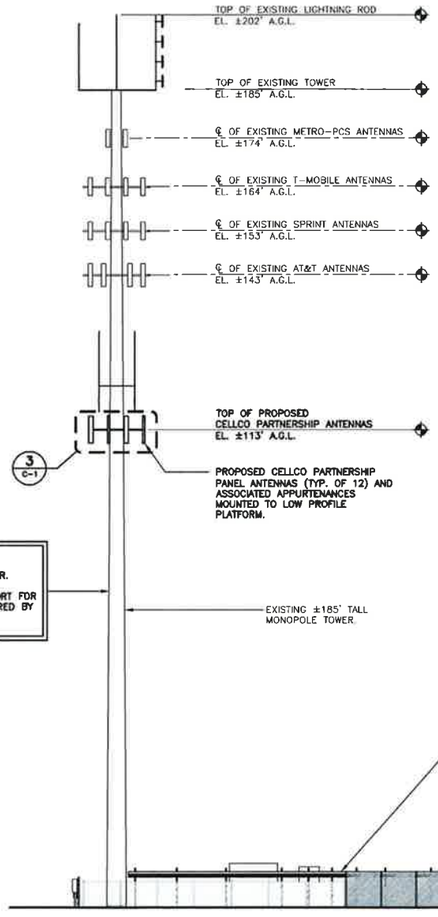


PLAN

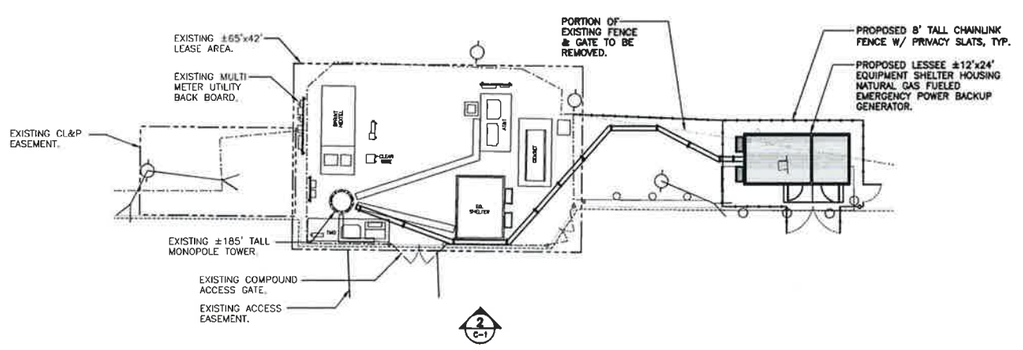


ELEVATION

3 / C-1 **ANTENNA MOUNTING CONFIGURATION**
NOT TO SCALE



TOWER NOTES:
1. EXISTING ±185' TALL MONOPOLE TOWER.
2. REFER TO STRUCTURAL ANALYSIS REPORT FOR MANCHESTER GREEN-RLEST AS PREPARED BY HUDSON DESIGN GROUP LLC., DATED: MAY 2, 2014



1 / C-1 **COMPOUND PLAN** SCALE: 1" = 15'
APPROXIMATE NORTH

GRAPHIC SCALE
15 0 7.5 15 30 60
(IN FEET)
1 inch = 15 ft.

2 / C-1 **SOUTH ELEVATION** SCALE: 1" = 10'

GRAPHIC SCALE
10 0 5 10 20 40
(IN FEET)
1 inch = 10 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	09/05/14	KAW	DMD	ISSUED FOR CSC
0	09/04/14	KAW	DMD	ISSUED FOR CSC-CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

Cellco Partnership d/b/a Verizon Wireless

CENTEK engineering
"Centered on Solutions"
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

Cellco Partnership d/b/a Verizon Wireless
WIRELESS COMMUNICATIONS FACILITY
MANCHESTER GREEN
239 MIDDLE TURNPIKE EAST
MANCHESTER, CT 06040

DATE: 09/03/14
SCALE: AS NOTED
JOB NO. 14013.000

COMPOUND PLAN AND ELEVATION

C-1
Sheet No. 2 of 2

ATTACHMENT 3

STRUCTURAL ANALYSIS REPORT

For

MANCHESTER GREEN - RLEST

239 Middle Turnpike
Manchester, CT 06040

Antennas Mounted to the Monopole

Prepared for:

verizon

400 Friberg Parkway
Westborough, MA 01581

Dated: May 2, 2014

Prepared by:

Hudson Design Group LLC

1600 Osgood Street Bldg. 20N Suite 3090
North Andover, MA 01845
(P) 978.557.5553 (F) 978.336.5586
www.hudsondesigngroupllc.com

STATE OF CONNECTICUT
GI KAI WANG
No. 28220
LICENSED
PROFESSIONAL ENGINEER

5/2/2014

SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by Verizon to conduct a structural evaluation of the 184' monopole supporting the proposed Verizon's antennas located at elevation 113' above the ground level.

This report represents this office's findings, conclusions and recommendations pertaining to the support of Verizon's existing and proposed antennas listed below.

Record drawings of the existing monopole prepared by Engineered Endeavors Inc., dated September 17, 2002, were available for our use. The previous structural analysis report prepared by Ramaker & Associates, Inc., dated November 26, 2012, was also available and obtained for our use.

The previous structural analysis report for Sprint Vision prepared by this office, dated April 17, 2014, was available for our use.

CONCLUSION SUMMARY:

Based on our evaluation, we have determined that the existing monopole and foundation **are in conformance** with the ANSI/TIA-222-F Standard for the loading considered under the criteria listed in this report. The monopole structure is rated at **99.0%** - (Pole section L5 from EL.1' to 43.9' Controlling).

Hudson Design Group LLC

APPURTANENCES CONFIGURATION:

Tenant	Appurtenances	Elev.	Mount
	Lightning Rod	194'	Low Profile Platform
	(2) 20' Dipole	184'	Low Profile Platform
	(3) APXV18-206517S Antennas	174'	Mount Pipe
	(6) APX16DWV-16DWVS-C Antennas	164'	Low Profile Platform
	(3) ATMAP1412D	164'	Low Profile Platform
	(3) ACU-A11-N	164'	Low Profile Platform
Sprint	(3) APXVSPP18 Antennas	153'	Low Profile Platform
Sprint	(3) RRH-800	153'	Low Profile Platform
Sprint	(6) RRH-1900	153'	Low Profile Platform
Sprint	(3) APXVTM14-C-120 Antennas	153'	Low Profile Platform
Sprint	(3) RRH8x20-25	151'	Ring Mount
	(3) 840-10054 Antennas	153'	Low Profile Platform
	(3) 860-10025 RCU	153'	Low Profile Platform
	Panel Antenna	153'	Low Profile Platform
	(2) 2' Dishes	150'	Low Profile Platform
	2.5' Dish	150'	Low Profile Platform
AT&T	(3) 800-10121 Antennas	143'	T-Frame
AT&T	(6) LGP21400 TMA	143'	T-Frame
AT&T	AM-X-CD-16-65 Antenna	143'	T-Frame
AT&T	(2) SBNH-1D6565C Antennas	143'	T-Frame
AT&T	(6)RRUs	143'	T-Frame
AT&T	Surge Arrestor DC6-48-60-18-8F	143'	T-Frame
	(2) 20' Omni	129'	Low Profile Platform
	20' Dipole	126'	Low Profile Platform
	(2) 3' Yagi	126'	Low Profile Platform
VERIZON	***(6) LNX 6514DS-VTM Antennas***	***113'***	***Low Profile Platform***
VERIZON	***(6) HBX 6517DS-VTM Antennas***	***113'***	***Low Profile Platform***
VERIZON	***(3) RRH 2X40-AWS***	***113'***	***Low Profile Platform***
VERIZON	***(3) RRH 2X40-07U***	***113'***	***Low Profile Platform***
VERIZON	***(3) RRH 2X40-PCS***	***113'***	***Low Profile Platform***
VERIZON	***(2) DB-T1-6Z-8AB-0Z***	***113'***	***Low Profile Platform***
	GPS	54'	1' Side Mount Standoff
POLICE	(4) VHLPX2-18 Dish	38.9'	1' Side Mount Standoff

Proposed VERIZON Appurtenances shown in Bold.

Hudson Design Group LLC

ANALYSIS RESULTS SUMMARY:

Component	Max. Stress Ratio	Elev. of Component (ft)	Pass/Fail	Comments
Pole Section-L1	16.9 %	166.5 – 184.0	PASS	
Pole Section-L2	70.0 %	133.1 – 166.5	PASS	
Pole Section-L3	98.5 %	88.0 – 133.1	PASS	
Pole Section-L4	98.9 %	43.9 – 88.0	PASS	
Pole Section-L5	**99.0 %**	1.0 – 43.9	PASS	**Controlling**
Base Plate	94.8 %	1.0	PASS	

Hudson Design Group LLC

DESIGN CRITERIA:

1. EIA/TIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures

   County: Hartford
   Wind Load: 80 mph (fastest mile)
   100 mph (3 second gust)
   Nominal Ice Thickness: 1/2 inch

2. Approximate height above grade to proposed antennas: 113'-0"

***Calculations and referenced documents are attached.**

ASSUMPTIONS:

1. The monopole dimensions, member sizes and strength of material are as indicated in the record drawings prepared by Engineered Endeavors Inc., dated September 17, 2002.

2. The appurtenances configuration is as stated in this report. All antennas, coax cables and waveguide cables are assumed to be properly installed and supported as per the manufacturer requirements.

3. The monopole and foundation are properly constructed and maintained. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities.

4. The support mounts and platforms are not analyzed and are considered adequate to support the loading. The analysis is limited to the primary support structure itself.

5. All prior structural modification, if any, are assumed to be as per the data supplied (if available), and installed properly.

SUPPORT RECOMMENDATIONS:

HDG recommends that the proposed antennas, RRHs and junction boxes be mounted on the proposed steel platform supported by the monopole.

Hudson Design Group LLC

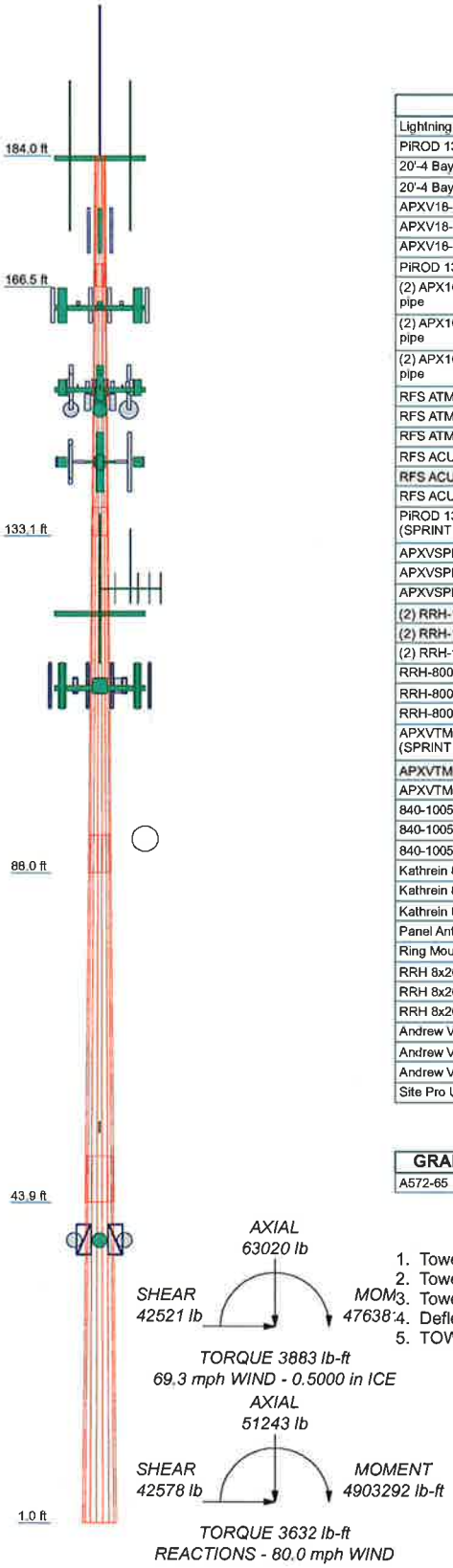
Photo 1: Photo illustrating the Monopole with Appurtenances shown.

Hudson Design Group LLC

CALCULATIONS

Section	1	2	3	4	5
Length (ft)	17.50	36.42	48.92	49.08	49.08
Number of Sides	18	18	18	18	18
Thickness (in)	0.1875	0.2500	0.3750	0.4750	0.5250
Socket Length (ft)	3.00	3.83	5.00	6.17	
Top Dia (in)	15.5000	18.3730	25.0648	34.0246	42.7140
Bot Dia (in)	19.4200	26.4100	35.8800	45.0500	53.6000
Grade	A572-65				
Weight (lb)	612.1	2177.4	5963.3	9835.5	13255.8

31844.1



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 2"x21'	184	Site Pro UDS-NPL T-Arm	143
PiROD 13' Low Profile Platform	184	Site Pro UDS-NPL T-Arm	143
20'-4 Bay Dipole	184	Kathrein 800 10121 w/mount pipe	143
20'-4 Bay Dipole	184	Kathrein 800 10121 w/mount pipe	143
APXV18-206517S-C w/mount pipe	174	Kathrein 800 10121 w/mount pipe	143
APXV18-206517S-C w/mount pipe	174	(2) Powerwave TMA LGP21400	143
APXV18-206517S-C w/mount pipe	174	(2) Powerwave TMA LGP21400	143
PiROD 13' Low Profile Platform	164	(2) Powerwave TMA LGP21400	143
(2) APX16DWV-16DWVS-C w/mount pipe	164	KMW AM-X-CD-16-65-00T-RET w/mount pipe	143
(2) APX16DWV-16DWVS-C w/mount pipe	164	SBNH-1D6565C w/mount pipe	143
		SBNH-1D6565C w/mount pipe	143
(2) APX16DWV-16DWVS-C w/mount pipe	164	(2) Ericsson RRU	143
		(2) Ericsson RRU	143
RFS ATMAP1412D-1A20	164	(2) Ericsson RRU	143
RFS ATMAP1412D-1A20	164	Surge Arrestor (DC6-48-60-18-8F)	143
RFS ATMAP1412D-1A20	164	3' Yagi antenna	123
RFS ACU-A11-N	164	3' Yagi antenna	123
RFS ACU-A11-N	164	20'-4 Bay Dipole	123
RFS ACU-A11-N	164	PiROD 13' Low Profile Platform	123
PiROD 13' Low Profile Platform (SPRINT - existing)	153	Omni 2"x10'	123
		Omni 2"x10'	123
APXVSPP18-C w/mount pipe	153	(2) LNX 6514DS-VTM w/mount pipe	113
APXVSPP18-C w/mount pipe	153	(2) LNX 6514DS-VTM w/mount pipe	113
APXVSPP18-C w/mount pipe	153	(2) LNX 6514DS-VTM w/mount pipe	113
(2) RRH-1900	153	(2) HBX-6517DS-VTM w/mount pipe	113
(2) RRH-1900	153	(2) HBX-6517DS-VTM w/mount pipe	113
(2) RRH-1900	153	(2) HBX-6517DS-VTM w/mount pipe	113
RRH-800	153	RRH 2X40-AWS+RDEM	113
RRH-800	153	RRH 2X40-AWS+RDEM	113
RRH-800	153	RRH 2X40-AWS+RDEM	113
APXVTM14-C-120 w/mount pipe (SPRINT - proposed)	153	RRH 2X40-07U	113
APXVTM14-C-120 w/mount pipe	153	RRH 2X40-07U	113
APXVTM14-C-120 w/mount pipe	153	RRH 2X40-07U	113
840-10054 w/mount pipe	153	RRH 2X40-PCS	113
840-10054 w/mount pipe	153	RRH 2X40-PCS	113
840-10054 w/mount pipe	153	RRH 2X40-PCS	113
Kathrein 860 10025 RCU	153	RFS DB-T1-6Z-8AB-0Z	113
Kathrein 860 10025 RCU	153	RFS DB-T1-6Z-8AB-0Z	113
Kathrein 860 10025 RCU	153	PiROD 13' Low Profile Platform (Verizon - proposed)	113
Panel Antenna 18"X18"	153		
Ring Mount	151	GPS	54
RRH 8x20-25	151	1' Side Mount Standoff	54
RRH 8x20-25	151	1' Side Mount Standoff	38.9
RRH 8x20-25	151	1' Side Mount Standoff	38.9
Andrew VHLP2-11	150	1' Side Mount Standoff	38.9
Andrew VHLPX2.5-11	150	Andrew VHLPX2-18-2WH/B	38.9
Andrew VHLP2-11	150	Andrew VHLPX2-18-2WH/B	38.9
Site Pro UDS-NPL T-Arm (ATI)	143	(2) Andrew VHLPX2-18-2WH/B	38.9

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 80.0 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 69.3 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50.0 mph wind.
5. TOWER RATING: 99%

Hudson Design Group, LLC
1600 Osgood Street, Building 20 North, Suite 3090
North Andover, MA 01845
Phone: (978) 557-5553
FAX: (978) 226-5586

Job: ***MANCHESTER GREEN CT - RLEST***		
Project: ***184 ft monopole***		
Client: VERIZON	Drawn by: kw	App'd:
Code: TIA/EIA-222-F	Date: 05/02/14	Scale: NTS
Path:		Dwg No. E-1

tnxTower	Job	Page
	MANCHESTER GREEN CT - RLEST	1 of 11
Hudson Design Group, LLC 1600 Osgood Street, Building 20 North, Suite 3090 North Andover, MA 01845 Phone: (978) 557-5553 FAX: (978) 226-5586	**Project** 184 ft monopole	**Date** 10:35:30 05/02/14
	Client VERIZON	**Designed by** kw

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 Hartford County, Connecticut.
Basic wind speed of 80.0 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56.0 pcf.
A wind speed of 69.3 mph is used in combination with ice.
Temperature drop of 50.0 °F.
Deflections calculated using a wind speed of 50.0 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

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	184.00-166.50	17.50	3.00	18	15.5000	19.4200	0.1875	0.7500	A572-65 (65 ksi)
L2	166.50-133.08	36.42	3.83	18	18.3730	26.4100	0.2500	1.0000	A572-65 (65 ksi)
L3	133.08-87.99	48.92	5.00	18	25.0648	35.8800	0.3750	1.5000	A572-65 (65 ksi)
L4	87.99-43.91	49.08	6.17	18	34.0246	45.0500	0.4750	1.9000	A572-65 (65 ksi)
L5	43.91-1.00	49.08		18	42.7140	53.6000	0.5250	2.1000	A572-65 (65 ksi)

Monopole Base Plate Data

Base Plate Data	
Base plate is square	
Base plate is grouted	√
Anchor bolt grade	A615-75
Anchor bolt size	2.2500 in
Number of bolts	18
Embedment length	84.0000 in
f'_c	3.0 ksi
Grout space	4.0000 in
Base plate grade	A572-60
Base plate thickness	2.0000 in
Bolt circle diameter	62.0000 in
Outer diameter	68.0000 in
Inner diameter	43.0000 in
Base plate type	Stiffened Plate

Base Plate Data	
Bolts per stiffener	1
Stiffener thickness	0.5000 in
Stiffener height	9.0000 in

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
1 5/8	C	Surface Ar (CaAa)	174.00 - 6.00	6	6	0.000 0.000	1.8000		1.04
3" conduit	A	Surface Ar (CaAa)	153.00 - 6.00	2	2	0.000 0.000	3.5000		3.00
1/2	A	Surface Ar (CaAa)	153.00 - 6.00	3	3	0.000 0.000	0.5800		0.25
3/8	A	Surface Af (CaAa)	153.00 - 6.00	3	3	0.000 0.000	0.5000	1.5708	0.25

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
7/8	B	No	Inside Pole	184.00 - 6.00	4	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
1 5/8	B	No	Inside Pole	164.00 - 6.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 Fiber Cable (SPRINT)	B	No	Inside Pole	153.00 - 6.00	3	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8	B	No	Inside Pole	143.00 - 6.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
FB-L98B-002	B	No	Inside Pole	143.00 - 6.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
WR-VG122ST-BRDA	B	No	Inside Pole	143.00 - 6.00	2	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1/2	B	No	Inside Pole	123.00 - 6.00	5	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1/2	B	No	Inside Pole	54.00 - 6.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1/2	B	No	Inside Pole	38.90 - 6.00	4	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
**********								
1 5/8 Fiber Cable (SPRINT)	B	No	Inside Pole	153.00 - 6.00	3	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 Fiber Cable (VERIZON - proposed)	B	No	Inside Pole	113.00 - 6.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04

Discrete Tower Loads

tnxTower	Job: MANCHESTER GREEN CT - RLEST	Page: 3 of 11
Hudson Design Group, LLC 1600 Osgood Street, Building 20 North, Suite 3090 North Andover, MA 01845 Phone: (978) 557-5553 FAX: (978) 226-5586	Project: 184 ft monopole	Date: 10:35:30 05/02/14
	Client: VERIZON	Designed by: kw

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
Lightning Rod 2"x21'	A	From Leg	1.00 0.00 10.00	0.0000	184.00	No Ice 1/2" Ice	4.20 6.33	4.20 6.33	80.00 112.30
PiROD 13' Low Profile Platform	A	None		0.0000	184.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
20'-4 Bay Dipole	C	From Face	3.50 4.00 0.00	0.0000	184.00	No Ice 1/2" Ice	4.75 6.25	4.75 6.25	50.00 80.00
20'-4 Bay Dipole	C	From Face	3.50 -4.00 0.00	0.0000	184.00	No Ice 1/2" Ice	4.75 6.25	4.75 6.25	50.00 80.00
**********									
APXV18-206517S-C w/mount pipe	A	From Face	1.00 0.00 0.00	0.0000	174.00	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	51.95 97.04
APXV18-206517S-C w/mount pipe	B	From Face	1.00 0.00 0.00	0.0000	174.00	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	51.95 97.04
APXV18-206517S-C w/mount pipe	C	From Face	1.00 0.00 0.00	0.0000	174.00	No Ice 1/2" Ice	5.40 5.96	4.70 5.86	51.95 97.04
**********									
PiROD 13' Low Profile Platform	A	None		0.0000	164.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
(2) APX16DWV-16DWVS-C w/mount pipe	A	From Face	3.50 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice	7.55 8.11	3.60 4.44	62.60 112.14
(2) APX16DWV-16DWVS-C w/mount pipe	B	From Face	3.50 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice	7.55 8.11	3.60 4.44	62.60 112.14
(2) APX16DWV-16DWVS-C w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice	7.55 8.11	3.60 4.44	62.60 112.14
RFS ATMAP1412D-1A20	A	From Face	2.50 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice	1.17 1.31	0.47 0.57	13.00 20.62
RFS ATMAP1412D-1A20	B	From Face	2.50 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice	1.17 1.31	0.47 0.57	13.00 20.62
RFS ATMAP1412D-1A20	C	From Face	2.50 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice	1.17 1.31	0.47 0.57	13.00 20.62
RFS ACU-A11-N	A	From Face	2.50 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice	0.14 0.19	0.08 0.12	1.00 2.28
RFS ACU-A11-N	B	From Face	2.50 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice	0.14 0.19	0.08 0.12	1.00 2.28
RFS ACU-A11-N	C	From Face	2.50 0.00 0.00	0.0000	164.00	No Ice 1/2" Ice	0.14 0.19	0.08 0.12	1.00 2.28
**********									
PiROD 13' Low Profile Platform (SPRINT - existing)	A	None		0.0000	153.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
APXVSPP18-C w/mount pipe	A	From Face	3.50 0.00	0.0000	153.00	No Ice 1/2" Ice	8.55 9.18	7.30 8.32	97.53 168.85

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Hudson Design Group, LLC 1600 Osgood Street, Building 20 North, Suite 3090 North Andover, MA 01845 Phone: (978) 557-5553 FAX: (978) 226-5586	Project: 184 ft monopole	Date: 10:35:30 05/02/14
	Client: VERIZON	Designed by: kw

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00						
APXVSPP18-C w/mount pipe	B	From Face	3.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	8.55 9.18	7.30 8.32	97.53 168.85
APXVSPP18-C w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	8.55 9.18	7.30 8.32	97.53 168.85
(2) RRH-1900	A	From Face	1.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	2.71 2.95	3.66 3.92	60.00 88.32
(2) RRH-1900	B	From Face	1.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	2.71 2.95	3.66 3.92	60.00 88.32
(2) RRH-1900	C	From Face	1.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	2.71 2.95	3.66 3.92	60.00 88.32
RRH-800	A	From Face	1.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	2.49 2.71	3.22 3.46	64.00 91.74
RRH-800	B	From Face	1.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	2.49 2.71	3.22 3.46	64.00 91.74
RRH-800	C	From Face	1.00 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	2.49 2.71	3.22 3.46	64.00 91.74
**********									
APXVTM14-C-120 w/mount pipe (SPRINT - proposed)	A	From Face	3.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	7.21 7.77	5.03 5.89	91.90 147.31
APXVTM14-C-120 w/mount pipe	B	From Face	3.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	7.21 7.77	5.03 5.89	91.90 147.31
APXVTM14-C-120 w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	7.21 7.77	5.03 5.89	91.90 147.31
RRH 8x20-25	A	From Face	1.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice	4.72 5.01	1.70 1.92	70.00 97.14
RRH 8x20-25	B	From Face	1.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice	4.72 5.01	1.70 1.92	70.00 97.14
RRH 8x20-25	C	From Face	1.00 0.00 0.00	0.0000	151.00	No Ice 1/2" Ice	4.72 5.01	1.70 1.92	70.00 97.14
Ring Mount	C	None		0.0000	151.00	No Ice 1/2" Ice	1.40 2.40	1.40 2.40	90.00 130.00
**********									
840-10054 w/mount pipe	A	From Face	3.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	5.41 5.83	2.39 2.92	46.43 82.55
840-10054 w/mount pipe	B	From Face	3.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	5.41 5.83	2.39 2.92	46.43 82.55
840-10054 w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	5.41 5.83	2.39 2.92	46.43 82.55
Kathrein 860 10025 RCU	A	From Face	2.50	0.0000	153.00	No Ice	0.16	0.14	1.20

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
			0.00 0.00			1/2" Ice	0.23	0.20	2.76
Kathrein 860 10025 RCU	B	From Face	2.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	0.16 0.23	0.14 0.20	1.20 2.76
Kathrein 860 10025 RCU	C	From Face	2.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	0.16 0.23	0.14 0.20	1.20 2.76
Panel Antenna 18"X18"	B	From Face	3.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	3.15 3.39	0.53 0.67	15.00 30.30
**********									
PiROD 13' Low Profile Platform	A	None		0.0000	123.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
Omni 2"x10'	B	From Face	3.50 0.00 6.00	0.0000	123.00	No Ice 1/2" Ice	2.00 3.02	2.00 3.02	20.00 35.50
Omni 2"x10'	B	From Face	3.50 0.00 6.00	0.0000	123.00	No Ice 1/2" Ice	2.00 3.02	2.00 3.02	20.00 35.50
20'-4 Bay Dipole	C	From Face	3.50 0.00 3.00	0.0000	123.00	No Ice 1/2" Ice	4.75 6.25	4.75 6.25	50.00 80.00
3' Yagi antenna	B	From Face	3.50 0.00 3.00	0.0000	123.00	No Ice 1/2" Ice	0.70 0.95	0.35 0.48	10.00 36.35
3' Yagi antenna	C	From Face	3.50 0.00 3.00	0.0000	123.00	No Ice 1/2" Ice	0.70 0.95	0.35 0.48	10.00 36.35
**********									
1' Side Mount Standoff	C	From Face	1.00 0.00 0.00	0.0000	54.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	30.00 50.00
GPS	C	From Face	3.00 0.00 0.00	0.0000	54.00	No Ice 1/2" Ice	0.21 0.32	0.21 0.32	5.00 7.52
**********									
Site Pro UDS-NPL T-Arm (AT&T)	A	From Face	2.00 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	1.63 1.97	1.11 1.34	418.00 480.44
Site Pro UDS-NPL T-Arm	B	From Face	2.00 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	1.63 1.97	1.11 1.34	418.00 480.44
Site Pro UDS-NPL T-Arm	C	From Face	2.00 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	1.63 1.97	1.11 1.34	418.00 480.44
Kathrein 800 10121 w/mount pipe	A	From Face	3.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	5.72 6.21	4.81 5.49	78.15 128.24
Kathrein 800 10121 w/mount pipe	B	From Face	3.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	5.72 6.21	4.81 5.49	78.15 128.24
Kathrein 800 10121 w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	5.72 6.21	4.81 5.49	78.15 128.24
(2) Powerwave TMA LGP21400	A	From Face	2.50 0.00	0.0000	143.00	No Ice 1/2" Ice	1.23 1.38	0.41 0.52	14.10 21.29

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	Client: VERIZON	Designed by: kw

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
			0.00						
(2) Powerwave TMA	B	From Face	2.50	0.0000	143.00	No Ice	1.23	0.41	14.10
LGP21400			0.00			1/2" Ice	1.38	0.52	21.29
			0.00						
(2) Powerwave TMA	C	From Face	2.50	0.0000	143.00	No Ice	1.23	0.41	14.10
LGP21400			0.00			1/2" Ice	1.38	0.52	21.29
			0.00						
**********									
KMW	A	From Face	3.50	0.0000	143.00	No Ice	8.50	6.30	74.05
AM-X-CD-16-65-00T-RET			0.00			1/2" Ice	9.15	7.48	139.04
w/mount pipe			0.00						
SBNH-1D6565C w/mount	B	From Face	3.50	0.0000	143.00	No Ice	11.69	10.29	113.11
pipe			0.00			1/2" Ice	12.40	11.81	206.76
			0.00						
SBNH-1D6565C w/mount	C	From Face	3.50	0.0000	143.00	No Ice	11.69	10.29	113.11
pipe			0.00			1/2" Ice	12.40	11.81	206.76
			0.00						
(2) Ericsson RRU	A	From Face	2.50	0.0000	143.00	No Ice	2.07	1.08	44.00
			0.00			1/2" Ice	2.26	1.23	58.64
			0.00						
(2) Ericsson RRU	B	From Face	2.50	0.0000	143.00	No Ice	2.07	1.08	44.00
			0.00			1/2" Ice	2.26	1.23	58.64
			0.00						
(2) Ericsson RRU	C	From Face	2.50	0.0000	143.00	No Ice	2.07	1.08	44.00
			0.00			1/2" Ice	2.26	1.23	58.64
			0.00						
Surge Arrestor	C	From Face	1.00	0.0000	143.00	No Ice	1.27	1.27	20.00
(DC6-48-60-18-8F)			0.00			1/2" Ice	1.46	1.46	35.12
			0.00						
**********									
PiROD 13' Low Profile	C	None		0.0000	113.00	No Ice	15.70	15.70	1300.00
Platform						1/2" Ice	20.10	20.10	1765.00
(Verizon - proposed)									
(2) LNX 6514DS-VTM	A	From Face	3.50	0.0000	113.00	No Ice	8.63	7.07	64.55
w/mount pipe			0.00			1/2" Ice	9.29	8.25	133.55
			0.00						
(2) LNX 6514DS-VTM	B	From Face	3.50	0.0000	113.00	No Ice	8.63	7.07	64.55
w/mount pipe			0.00			1/2" Ice	9.29	8.25	133.55
			0.00						
(2) LNX 6514DS-VTM	C	From Face	3.50	0.0000	113.00	No Ice	8.63	7.07	64.55
w/mount pipe			0.00			1/2" Ice	9.29	8.25	133.55
			0.00						
(2) HBX-6517DS-VTM	A	From Face	3.50	0.0000	113.00	No Ice	5.42	4.96	39.25
w/mount pipe			0.00			1/2" Ice	5.97	6.14	85.00
			0.00						
(2) HBX-6517DS-VTM	B	From Face	3.50	0.0000	113.00	No Ice	5.42	4.96	39.25
w/mount pipe			0.00			1/2" Ice	5.97	6.14	85.00
			0.00						
(2) HBX-6517DS-VTM	C	From Face	3.50	0.0000	113.00	No Ice	5.42	4.96	39.25
w/mount pipe			0.00			1/2" Ice	5.97	6.14	85.00
			0.00						
RRH 2X40-AWS+RDEM	A	From Face	2.50	0.0000	113.00	No Ice	3.77	2.23	47.60
			0.00			1/2" Ice	4.04	2.46	73.79
			0.00						
RRH 2X40-AWS+RDEM	B	From Face	2.50	0.0000	113.00	No Ice	3.77	2.23	47.60
			0.00			1/2" Ice	4.04	2.46	73.79
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
RRH 2X40-AWS+RDEM	C	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	3.77 4.04	2.23 2.46	47.60 73.79
RRH 2X40-07U	A	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	2.29 2.49	1.21 1.36	50.00 66.78
RRH 2X40-07U	B	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	2.29 2.49	1.21 1.36	50.00 66.78
RRH 2X40-07U	C	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	2.29 2.49	1.21 1.36	50.00 66.78
RRH 2X40-PCS	A	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	2.57 2.79	2.02 2.23	55.00 75.41
RRH 2X40-PCS	B	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	2.57 2.79	2.02 2.23	55.00 75.41
RRH 2X40-PCS	C	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	2.57 2.79	2.02 2.23	55.00 75.41
RFS DB-T1-6Z-8AB-0Z	B	From Face	1.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	44.00 80.13
RFS DB-T1-6Z-8AB-0Z	C	From Face	1.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	44.00 80.13
**********									
1' Side Mount Standoff	A	From Face	0.50 0.00 0.00	0.0000	38.90	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	30.00 50.00
1' Side Mount Standoff	B	From Face	0.50 0.00 0.00	0.0000	38.90	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	30.00 50.00
1' Side Mount Standoff	C	From Face	0.50 0.00 0.00	0.0000	38.90	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	30.00 50.00

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
Andrew VHLP2-11	A	Paraboloid w/Radome	From Face	3.50 0.00 0.00	0.0000		150.00	2.00	No Ice 1/2" Ice	3.14 3.41	31.00 41.00
Andrew VHLPX2.5-11	B	Paraboloid w/Shroud (HP)	From Face	3.50 0.00 0.00	0.0000		150.00	2.50	No Ice 1/2" Ice	6.00 6.40	49.00 77.00
Andrew VHLP2-11	C	Paraboloid w/Radome	From Face	3.50 0.00	0.0000		150.00	2.00	No Ice 1/2" Ice	3.14 3.41	31.00 41.00

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
				0.00							
Andrew VHLPX2-18-2WH/B	A	Paraboloid w/Radome	From Face	2.00 0.00 0.00	0.0000		38.90	2.00	No Ice 1/2" Ice	3.14 3.41	25.00 35.00
Andrew VHLPX2-18-2WH/B	B	Paraboloid w/Radome	From Face	2.00 0.00 0.00	0.0000		38.90	2.00	No Ice 1/2" Ice	3.14 3.41	25.00 35.00
(2) Andrew VHLPX2-18-2WH/B	C	Paraboloid w/Radome	From Face	2.00 0.00 0.00	0.0000		38.90	2.00	No Ice 1/2" Ice	3.14 3.41	25.00 35.00

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

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	MANCHESTER GREEN CT - RLEST	9 of 11
Hudson Design Group, LLC 1600 Osgood Street, Building 20 North, Suite 3090 North Andover, MA 01845 Phone: (978) 557-5553 FAX: (978) 226-5586	**Project** 184 ft monopole	**Date** 10:35:30 05/02/14
	Client VERIZON	**Designed by** kw

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	21	63020.38	190.17	-42418.17
	Max. H_x	11	51243.43	42462.76	-154.39
	Max. H_z	2	51243.43	-202.05	42405.47
	Max. M_x	2	4876193.23	-202.05	42405.47
	Max. M_z	5	4886744.84	-42436.22	218.03
	Max. Torsion	24	3882.94	42432.00	-118.23
	Min. Vert	1	51243.43	0.00	-0.00
	Min. H_x	5	51243.43	-42436.22	218.03
	Min. H_z	8	51243.43	243.77	-42447.40
	Min. M_x	8	-4883950.40	243.77	-42447.40
	Min. M_z	11	-4892942.97	42462.76	-154.39
	Min. Torsion	18	-3852.08	-42411.42	170.35

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	51243.43	0.00	0.00	1464.75	1009.20	-0.00
Dead+Wind 0 deg - No Ice	51243.43	202.05	-42405.47	-4876193.23	-28472.93	389.67
Dead+Wind 30 deg - No Ice	51243.43	21415.31	-36779.99	-4228717.49	-2468413.42	2248.23
Dead+Wind 60 deg - No Ice	51243.43	36845.17	-21339.05	-2455083.74	-4242837.65	3378.09
Dead+Wind 90 deg - No Ice	51243.43	42436.22	-218.03	-27691.70	-4886744.84	3593.20
Dead+Wind 120 deg - No Ice	51243.43	36694.04	21003.37	2413900.10	-4226358.95	2961.77
Dead+Wind 150 deg - No Ice	51243.43	21130.28	36664.64	4217189.99	-2431467.52	1541.84
Dead+Wind 180 deg - No Ice	51243.43	-243.77	42447.40	4883950.40	37109.98	-199.33
Dead+Wind 210 deg - No Ice	51243.43	-21381.97	36800.62	4236186.16	2469209.79	-2187.33
Dead+Wind 240 deg - No Ice	51243.43	-36798.47	21296.97	2456101.39	4242508.82	-3350.29
Dead+Wind 270 deg - No Ice	51243.43	-42462.76	154.39	26390.92	4892942.97	-3631.69
Dead+Wind 300 deg - No Ice	51243.43	-36778.66	-21019.17	-2408723.73	4236761.13	-3179.73
Dead+Wind 330 deg - No Ice	51243.43	-21114.14	-36703.22	-4218941.42	2427094.78	-1563.88
Dead+Ice+Temp	63020.37	-0.00	0.00	2820.27	1940.50	0.07
Dead+Wind 0 deg+Ice+Temp	63020.38	157.07	-42384.23	-4738567.69	-21350.30	-1.38
Dead+Wind 30 deg+Ice+Temp	63020.37	21360.01	-36748.16	-4107889.19	-2393313.88	2019.70
Dead+Wind 60 deg+Ice+Temp	63020.37	36802.77	-21297.35	-2381704.86	-4120299.91	3394.48
Dead+Wind 90 deg+Ice+Temp	63020.38	42411.42	-170.35	-20227.01	-4748128.27	3852.08
Dead+Wind 120 deg+Ice+Temp	63020.37	36685.86	21036.17	2352690.67	-4107565.99	3374.15
Dead+Wind 150 deg+Ice+Temp	63020.37	21139.52	36660.76	4102626.90	-2364425.36	1996.62
Dead+Wind 180 deg+Ice+Temp	63020.38	-190.17	42418.17	4748305.76	30671.34	154.07
Dead+Wind 210 deg+Ice+Temp	63020.37	-21332.15	36764.31	4117314.29	2396183.48	-1970.21
Dead+Wind 240 deg+Ice+Temp	63020.37	-36763.94	21262.62	2385803.14	4122219.22	-3371.81
Dead+Wind 270 deg+Ice+Temp	63020.37	-42432.00	118.23	22430.05	4755419.70	-3882.94
Dead+Wind 300 deg+Ice+Temp	63020.37	-36754.16	-21049.70	-2345163.92	4118353.39	-3549.36
Dead+Wind 330 deg+Ice+Temp	63020.37	-21127.08	-36691.78	-4100674.92	2363170.59	-2014.80
Dead+Wind 0 deg - Service	51243.43	78.93	-16564.65	-1907912.24	-10524.00	160.78
Dead+Wind 30 deg - Service	51243.43	8365.36	-14367.18	-1654490.94	-965713.61	897.11
Dead+Wind 60 deg - Service	51243.43	14392.64	-8335.57	-960154.52	-1660373.40	1343.48
Dead+Wind 90 deg - Service	51243.43	16576.65	-85.17	-9876.44	-1912423.30	1426.22
Dead+Wind 120 deg - Service	51243.43	14333.61	8204.44	945926.55	-1653861.88	1172.76
Dead+Wind 150 deg - Service	51243.43	8254.02	14322.12	1651849.69	-951214.49	607.29
Dead+Wind 180 deg - Service	51243.43	-95.22	16581.03	1912869.32	15156.50	-83.73
Dead+Wind 210 deg - Service	51243.43	-8352.33	14375.24	1659343.69	967273.67	-872.65
Dead+Wind 240 deg - Service	51243.43	-14374.40	8319.13	962483.52	1661491.38	-1333.42

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 270 deg - Service	51243.43	-16587.02	60.31	11299.98	1916117.42	-1442.80
Dead+Wind 300 deg - Service	51243.43	-14366.66	-8210.62	-941979.55	1659206.99	-1259.88
Dead+Wind 330 deg - Service	51243.43	-8247.71	-14337.19	-1650623.52	950760.81	-615.13

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-51243.43	0.00	0.00	51243.43	-0.00	0.000%
2	202.05	-51243.43	-42405.47	-202.05	51243.43	42405.47	0.000%
3	21415.31	-51243.43	-36779.99	-21415.31	51243.43	36779.99	0.000%
4	36845.17	-51243.43	-21339.05	-36845.17	51243.43	21339.05	0.000%
5	42436.22	-51243.43	-218.03	-42436.22	51243.43	218.03	0.000%
6	36694.04	-51243.43	21003.37	-36694.04	51243.43	-21003.37	0.000%
7	21130.28	-51243.43	36664.64	-21130.28	51243.43	-36664.64	0.000%
8	-243.77	-51243.43	42447.40	243.77	51243.43	-42447.40	0.000%
9	-21381.97	-51243.43	36800.62	21381.97	51243.43	-36800.62	0.000%
10	-36798.47	-51243.43	21296.97	36798.47	51243.43	-21296.97	0.000%
11	-42462.76	-51243.43	154.39	42462.76	51243.43	-154.39	0.000%
12	-36778.66	-51243.43	-21019.17	36778.66	51243.43	21019.17	0.000%
13	-21114.14	-51243.43	-36703.21	21114.14	51243.43	36703.22	0.000%
14	0.00	-63020.37	0.00	0.00	63020.37	-0.00	0.000%
15	157.07	-63020.37	-42384.11	-157.07	63020.38	42384.23	0.000%
16	21360.00	-63020.37	-36748.15	-21360.01	63020.37	36748.16	0.000%
17	36802.76	-63020.37	-21297.35	-36802.77	63020.37	21297.35	0.000%
18	42411.30	-63020.37	-170.35	-42411.42	63020.38	170.35	0.000%
19	36685.85	-63020.37	21036.16	-36685.86	63020.37	-21036.17	0.000%
20	21139.52	-63020.37	36660.76	-21139.52	63020.37	-36660.76	0.000%
21	-190.17	-63020.37	42418.05	190.17	63020.38	-42418.17	0.000%
22	-21332.14	-63020.37	36764.30	21332.15	63020.37	-36764.31	0.000%
23	-36763.93	-63020.37	21262.62	36763.94	63020.37	-21262.62	0.000%
24	-42431.99	-63020.37	118.23	42432.00	63020.37	-118.23	0.000%
25	-36754.15	-63020.37	-21049.70	36754.16	63020.37	21049.70	0.000%
26	-21127.08	-63020.37	-36691.77	21127.08	63020.37	36691.78	0.000%
27	78.93	-51243.43	-16564.63	-78.93	51243.43	16564.65	0.000%
28	8365.36	-51243.43	-14367.18	-8365.36	51243.43	14367.18	0.000%
29	14392.64	-51243.43	-8335.57	-14392.64	51243.43	8335.57	0.000%
30	16576.65	-51243.43	-85.17	-16576.65	51243.43	85.17	0.000%
31	14333.61	-51243.43	8204.44	-14333.61	51243.43	-8204.44	0.000%
32	8254.02	-51243.43	14322.12	-8254.02	51243.43	-14322.12	0.000%
33	-95.22	-51243.43	16581.01	95.22	51243.43	-16581.03	0.000%
34	-8352.33	-51243.43	14375.24	8352.33	51243.43	-14375.24	0.000%
35	-14374.40	-51243.43	8319.13	14374.40	51243.43	-8319.13	0.000%
36	-16587.02	-51243.43	60.31	16587.02	51243.43	-60.31	0.000%
37	-14366.66	-51243.43	-8210.62	14366.66	51243.43	8210.62	0.000%
38	-8247.71	-51243.43	-14337.19	8247.71	51243.43	14337.19	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	184 - 166.5	69.1805	34	3.3371	0.0224

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Hudson Design Group, LLC 1600 Osgood Street, Building 20 North, Suite 3090 North Andover, MA 01845 Phone: (978) 557-5553 FAX: (978) 226-5586	**Project** 184 ft monopole	**Date** 10:35:30 05/02/14
	Client VERIZON	**Designed by** kw

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L2	169.5 - 133.08	59.1336	34	3.2694	0.0138
L3	136.91 - 87.99	38.0838	34	2.7859	0.0071
L4	92.99 - 43.91	16.7006	34	1.7797	0.0027
L5	50.08 - 1	4.6244	34	0.8726	0.0010

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
184.00	Lightning Rod 2"x21'	34	69.1805	3.3371	0.0227	24693
174.00	APXV18-206517S-C w/mount pipe	34	62.2337	3.2977	0.0164	12346
164.00	PiROD 13' Low Profile Platform	34	55.3840	3.2202	0.0117	6184
153.00	PiROD 13' Low Profile Platform	34	48.0776	3.0771	0.0091	3995
151.00	RRH 8x20-25	34	46.7845	3.0455	0.0088	3752
150.00	Andrew VHLP2-11	34	46.1428	3.0292	0.0087	3641
143.00	Site Pro UDS-NPL T-Arm	34	41.7487	2.9053	0.0078	3017
123.00	PiROD 13' Low Profile Platform	34	30.3437	2.4845	0.0057	2603
113.00	PiROD 13' Low Profile Platform	34	25.3316	2.2521	0.0046	2587
54.00	1' Side Mount Standoff	34	5.3534	0.9486	0.0011	2411
38.90	Andrew VHLPX2-18-2WH/B	34	2.9441	0.6629	0.0008	3103

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	184 - 166.5	Pole	TP19.42x15.5x0.1875	1	-2665.14	574239.05	16.9	Pass
L2	166.5 - 133.08	Pole	TP26.41x18.373x0.25	2	-9790.14	1044278.82	70.0	Pass
L3	133.08 - 87.99	Pole	TP35.88x25.0648x0.375	3	-20826.60	2128560.97	98.5	Pass
L4	87.99 - 43.91	Pole	TP45.05x34.0246x0.475	4	-32929.10	3385073.38	98.9	Pass
L5	43.91 - 1	Pole	TP53.6x42.714x0.525	5	-51205.90	4597810.07	99.0	Pass
							Summary	
						Pole (L5)	99.0	Pass
						Base Plate	94.8	Pass
						RATING =	**99.0**	**Pass**

ATTACHMENT 4

HMB

HMB Acoustics LLC 3 Cherry Tree Lane, Avon, Ct. 06001 860-677-5955

September 4, 2014

Karyn Wyman
Centek Engineering, Inc.
63-2 North Branford Road
Branford, CT 06405

Subject: 14013.000 Manchester Green - Noise Compliance Study

Dear Ms. Wyman:

The noise levels for the V-1; V-2; T-1 and T-2 wall mounted HVAC units were calculated while they were running simultaneously. The combined noise level was then projected to each property line. The resultant noise level was compared to both the Manchester Noise Ordinance and the State of CT Noise Regulations. The Regulation and Ordinance allow a noise level of 55 dBA (daytime) and 45 dBA (nighttime), when measured at a Residential Receptor's property line. I found that the four (4) units meet the conditions for compliance as set forth in the Manchester Noise Ordinance and the State of CT Noise Regulations at all property lines.

Allan Smardin
HMB Acoustics LLC

PROJECT INFORMATION:	Centek Job #:14013.000
Applicant:	Cellco Partnership d.b.a. Verizon Wireless
Applicant Site ID:	Manchester Green
Site Owner:	SBA
Site Address:	239 Middle Turnpike East
Subject Zoning District:	Residential
Abutting Zoning District(s):	All: Residential

APPLICANT EQUIPMENT:

ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West
V-1	Wall Mounted HVAC	Bard / W61A1-105EPXXXJ	14	280	159	431
V-2	Wall Mounted HVAC	Bard / W61A1-105EPXXXJ	21	274	159	431

EXISTING COLOCATORS:

☒ AT&T	☐ Metro PCS	☒ Other: Town
☒ Sprint	☒ T Mobile	☒ Other: Clearwire
☐ Nextel	☐ None	☐ Other:

EXISTING COLOCATOR EQUIPMENT OWNER: Town

ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West
T-1	Wall Mounted HVAC	Bard /UNKNOWN	41	266	209	378
T-2	Wall Mounted HVAC	Bard /UNKNOWN	47	260	209	378

EXISTING COLOCATOR EQUIPMENT OWNER:

ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West

EXISTING COLOCATOR EQUIPMENT OWNER:

ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West

EXISTING COLOCATOR EQUIPMENT OWNER:

ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West

EXISTING COLOCATOR EQUIPMENT OWNER:

ID	Noise Emitter	Make/Model	Prop. Line. Dist. (FT)			
			North	South	East	West

CONCLUSION:

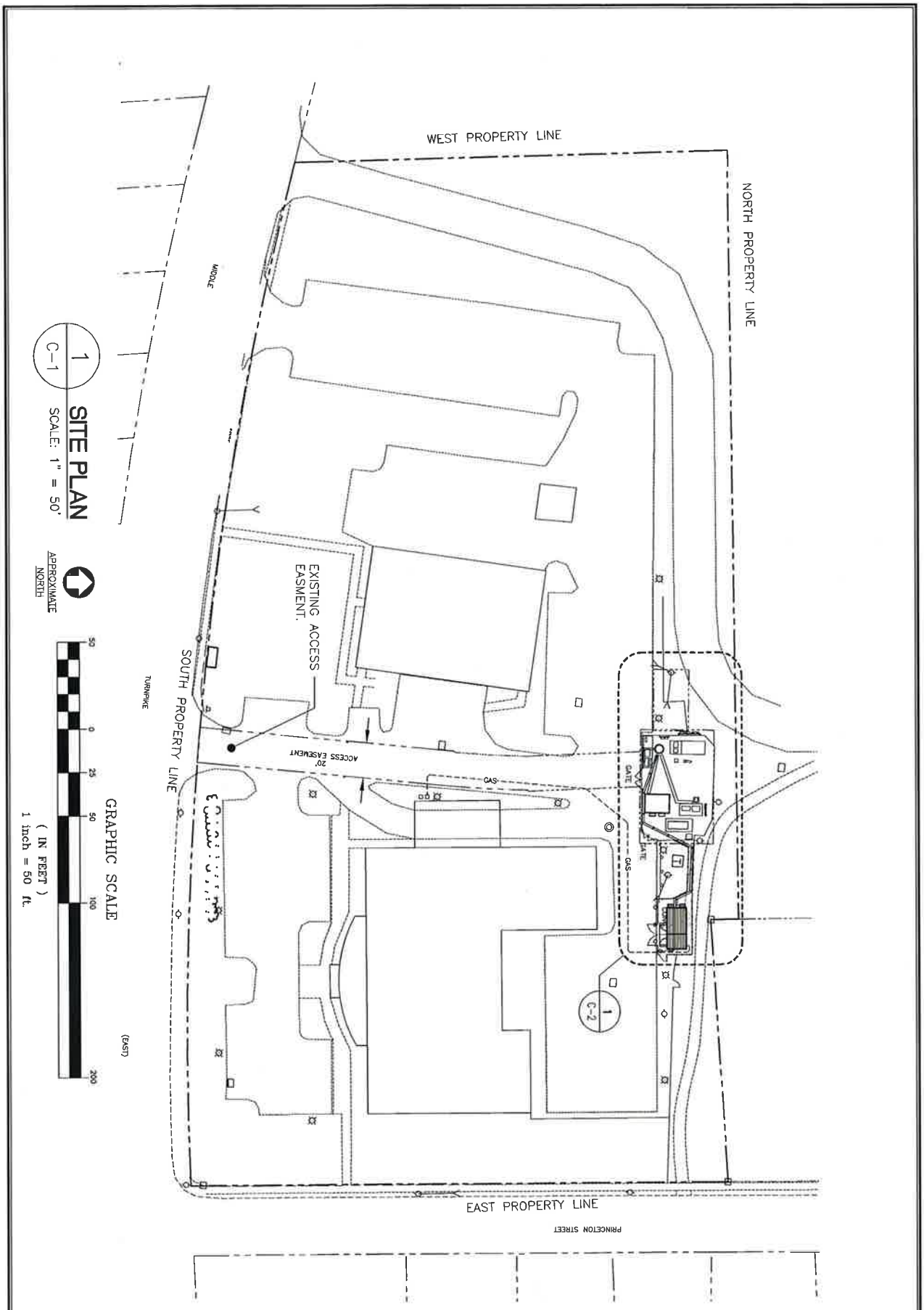
Daytime Regulation:	55 dBA	**Nighttime Regulation:**	45 dBA
Compliance:	☒ Yes ☐ No	**Compliance:**	☒ Yes ☐ No

BASIS OF FINDINGS:

North property line: V-1 = 43 dBA; V-2 = 43 dBA; T-1 = 39 dBA; T-2 = 39 dBA
South property line: V-1 = 34 dBA; V-2 = 34 dBA; T-1 = 46 dBA; T-2 = 46 dBA
East property line: V-1 = 23 dBA; V-2 = 23 dBA; T-1 = 35 dBA; T-2 = 35 dBA
West property line: V-1 = 20 dBA; V-2 = 20 dBA; T-1 = 19 dBA; T-2 = 19 dBA

All 4 HVAC units running simultaneously will result in a 2 dBA increase in all directions (N, S, E, W)
The dBA levels take into the acoustical shielding effect provided by other structures on the property
All other pad mounted equipment is inaudible at a distance of 20 feet.

Prepared By: Alan Smardin, HMB ACOUSTICS LLC Date: 9/4/14



1 C-1 **SITE PLAN**

SCALE: 1" = 50'

APPROXIMATE NORTH

GRAPHIC SCALE

(IN FEET)

1 inch = 50 ft.

50 0 25 50 100 200

SHEET NO. C-1

Cellco Partnership d/b/a Verizon Wireless

MANCHESTER GREEN

239 MIDDLE TURNPIKE EAST
MANCHESTER, CT 06040

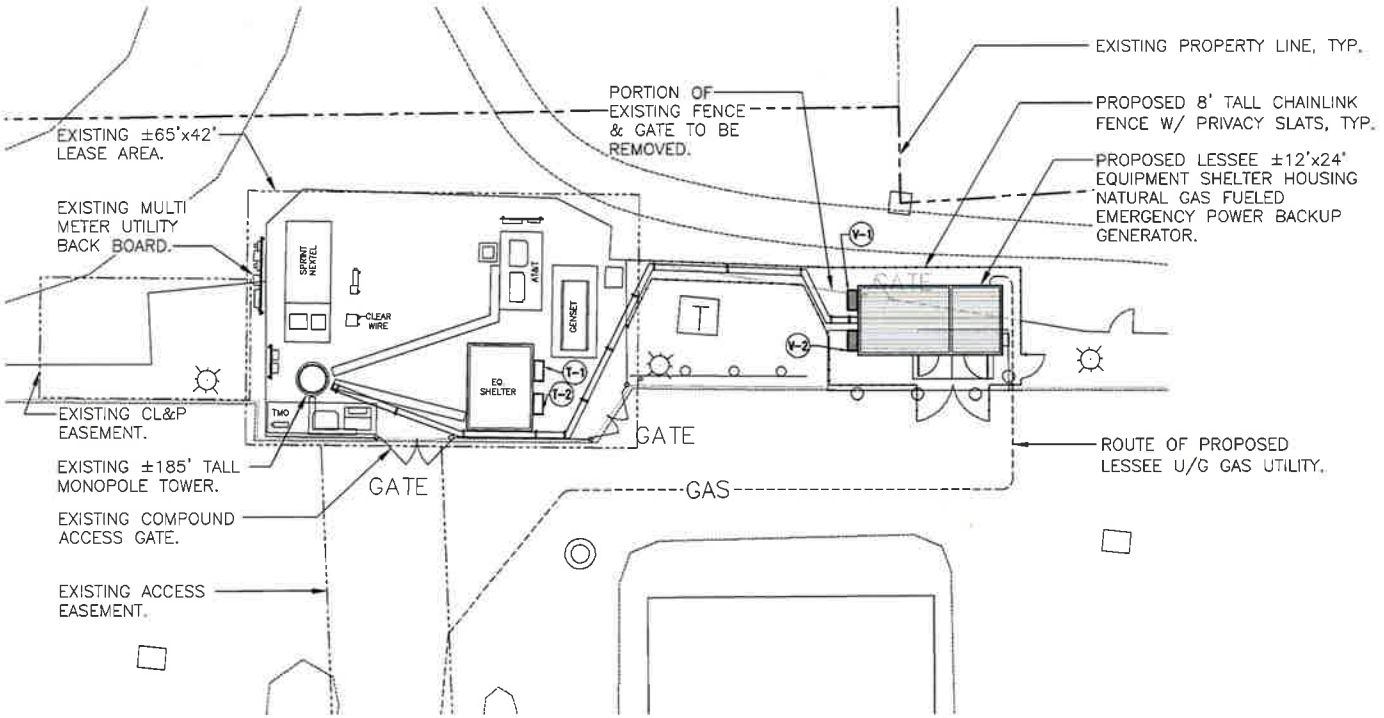
JOB NO. 14013.000 | SCALE AS SHOWN | DATE 09/03/14

CENTEK engineering
Centered on Solutions℠
www.CentekEng.com
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road, Branford, CT 06405

PROFESSIONAL ENGINEER SEAL

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	09/03/14	KAW	DMD	HOUSE EMITTER INFO

NOISE EMMITTER INFORMATION			
V-1	WALL MOUNTED HVAC UNIT, MAKE: BARD,	MODEL: W61A1-A05EPXXXJ	
V-2	WALL MOUNTED HVAC UNIT, MAKE: BARD,	MODEL: W61A1-A05EPXXXJ	
T-1	WALL MOUNTED HVAC UNIT, MAKE: BARD,	MODEL: UNKNOWN	
T-2	WALL MOUNTED HVAC UNIT, MAKE: BARD,	MODEL: UNKNOWN	



1 / C-2 **COMPOUND PLAN**
SCALE: 1" = 10'

APPROXIMATE NORTH

GRAPHIC SCALE
10 0 5 10 20 40
(IN FEET)
1 inch = 10 ft.

NO	DATE	BY	DESCRIPTION
0	09/03/14	AAM	NOISE EMITTER INFO

CENTEK engineering
Centered on Solutions℠
www.CentekEng.com
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road, Branford, CT 06405

Cellco Partnership d/b/a Verizon Wireless
MANCHESTER GREEN
239 MIDDLE TURNPIKE EAST
MANCHESTER, CT 06040

DATE: 09/03/14
SCALE: AS SHOWN
JOB NO. 14013.000

SHEET NO. C-2

ATTACHMENT 5

Far Field Approximation
with downtilt variation

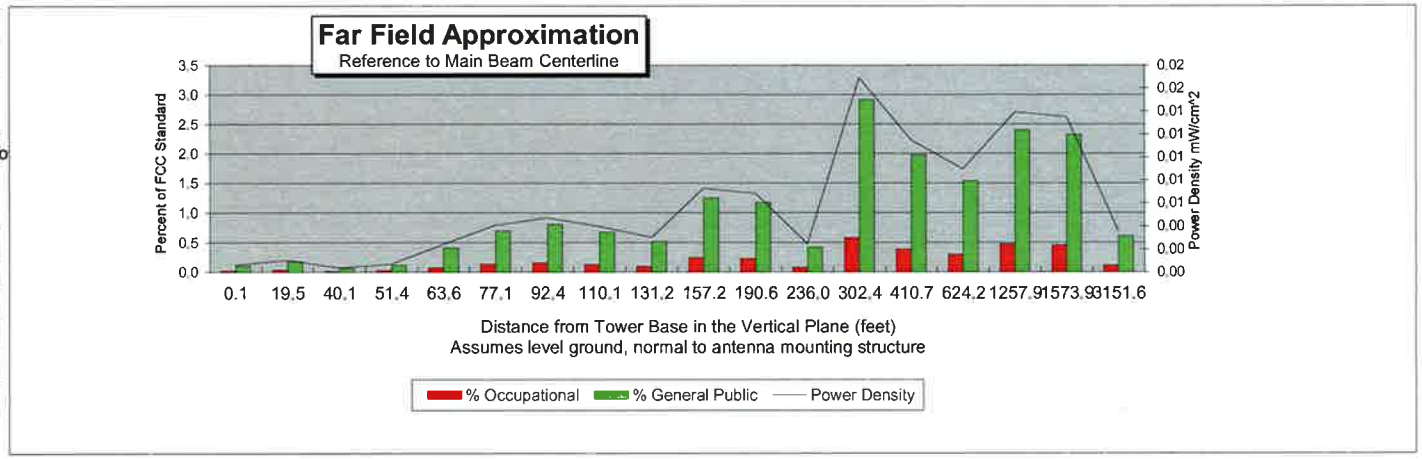
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Manchester Green, CT
Site #:	
Date:	07/28/14
Name:	Mark Brauer
File Name:	Manchester Green, CT - FF Po

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**113.0**
Antenna Gain (dBi):	**16.4**
Antenna Size (in.):	**72.7**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**3668.0**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	110.0	111.7	117.1	121.4	127.1	134.3	143.6	155.6	171.2	191.9	220.1	260.4	321.8	425.2	633.8	1262.7	1577.7	3153.5	
Distance from Antenna Structure Base in Horizontal plane	0.1	19.5	40.1	51.4	63.6	77.1	92.4	110.1	131.2	157.2	190.6	236.0	302.4	410.7	624.2	1257.9	1573.9	3151.6	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.1	0.6	0.4	0.3	0.5	0.5	0.1	
Percent of General Population Standard	0.1	0.2	0.1	0.1	0.4	0.7	0.8	0.7	0.5	1.2	1.2	0.4	2.9	2.0	1.5	2.4	2.3	0.6	

Antenna Type LNX-6517DS
Max% 2.91%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pc
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

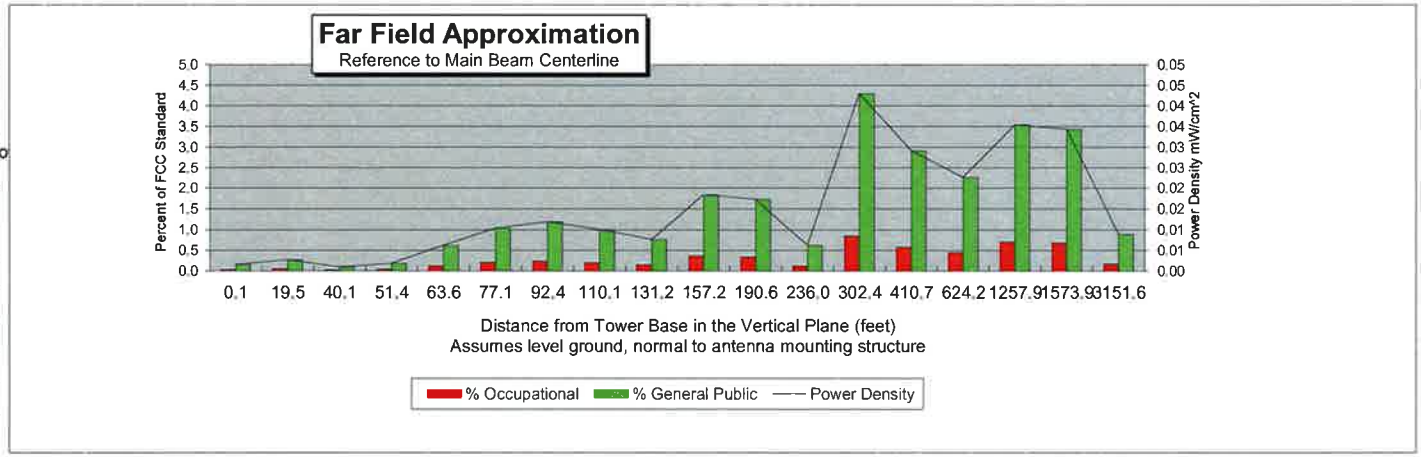
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Manchester Green, CT
Site #:	
Date:	07/28/14
Name:	Mark Brauer
File Name:	Manchester Green, CT - FF Po

Operating Freq. (MHz)	**1970.0**
Antenna Height (ft):	**113.0**
Antenna Gain (dBi):	**19.2**
Antenna Size (in.):	**75.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**4901.0**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	110.0	111.7	117.1	121.4	127.1	134.3	143.6	155.6	171.2	191.9	220.1	260.4	321.8	425.2	633.8	1262.7	1577.7	3153.5	
Distance from Antenna Structure Base in Horizontal plane	0.1	19.5	40.1	51.4	63.6	77.1	92.4	110.1	131.2	157.2	190.6	236.0	302.4	410.7	624.2	1257.9	1573.9	3151.6	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.04	0.03	0.02	0.04	0.03	0.01	
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.4	0.3	0.1	0.9	0.6	0.5	0.7	0.7	0.2	
Percent of General Population Standard	0.2	0.3	0.1	0.2	0.6	1.0	1.2	1.0	0.8	1.8	1.7	0.6	4.3	2.9	2.3	3.5	3.4	0.9	

Antenna Type HBX-6517DS
Max% 4.30%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 P
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

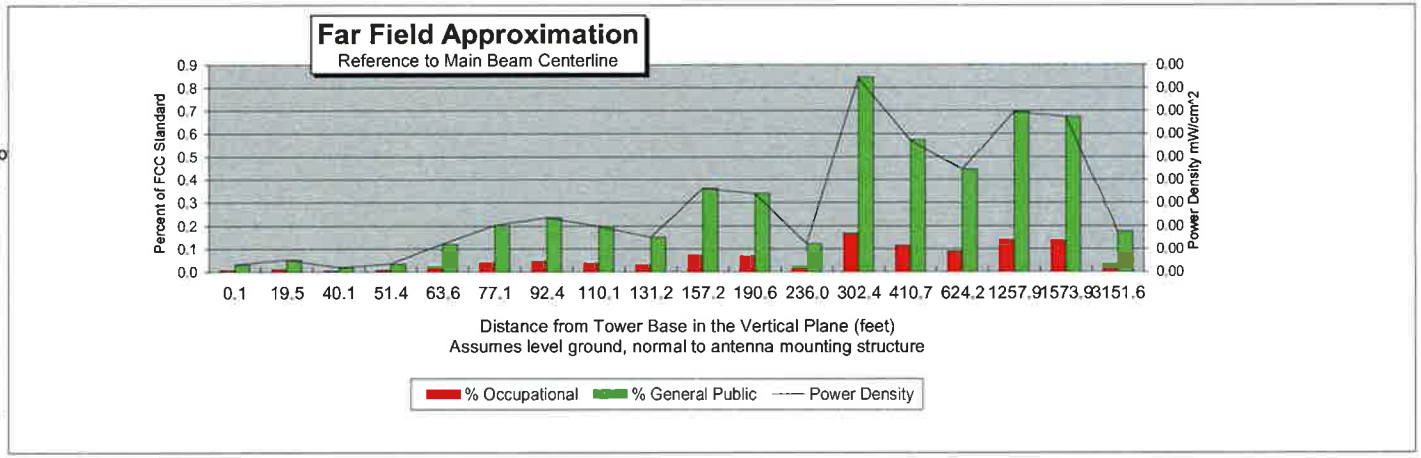
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Manchester Green, CT
Site #:	
Date:	07/28/14
Name:	Mark Brauer
File Name:	Manchester Green, CT - FF Po

Operating Freq. (MHz)	746.0
Antenna Height (ft):	113.0
Antenna Gain (dBi):	15.8
Antenna Size (in.):	72.7
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
Power @ J4 (w):	1050.0



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	110.0	111.7	117.1	121.4	127.1	134.3	143.6	155.6	171.2	191.9	220.1	260.4	321.8	425.2	633.8	1262.7	1577.7	3153.5	
Distance from Antenna Structure Base in Horizontal plane	0.1	19.5	40.1	51.4	63.6	77.1	92.4	110.1	131.2	157.2	190.6	236.0	302.4	410.7	624.2	1257.9	1573.9	3151.6	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.0	
Percent of General Population Standard	0.0	0.1	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.4	0.3	0.1	0.8	0.6	0.4	0.7	0.7	0.2	

Antenna Type LNX-6514DS
Max% 0.85%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pc
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

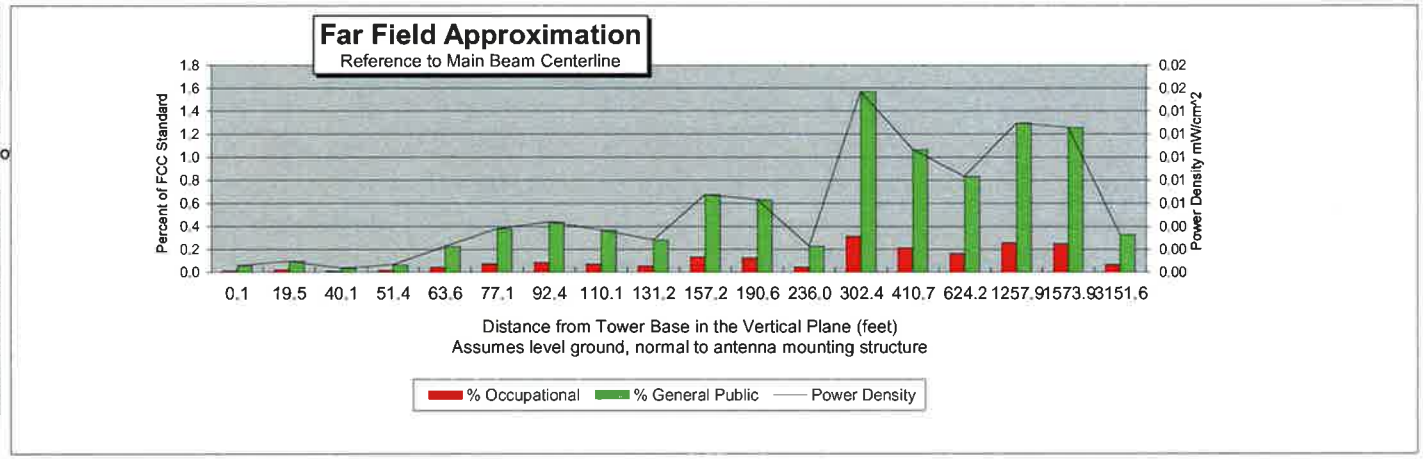
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Manchester Green, CT
Site #:	
Date:	07/28/14
Name:	Mark Brauer
File Name:	Manchester Green, CT - FF Po

Operating Freq. (MHz)	2145.0
Antenna Height (ft):	113.0
Antenna Gain (dBi):	19.3
Antenna Size (in.):	75.0
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
Power @ J4 (w):	1750.0



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	110.0	111.7	117.1	121.4	127.1	134.3	143.6	155.6	171.2	191.9	220.1	260.4	321.8	425.2	633.8	1262.7	1577.7	3153.5	
Distance from Antenna Structure Base in Horizontal plane	0.1	19.5	40.1	51.4	63.6	77.1	92.4	110.1	131.2	157.2	190.6	236.0	302.4	410.7	624.2	1257.9	1573.9	3151.6	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.3	0.2	0.2	0.3	0.3	0.1	
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.2	0.4	0.4	0.4	0.3	0.7	0.6	0.2	1.6	1.1	0.8	1.3	1.3	0.3	

Antenna Type HBX-6517DS
Max% 1.57%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pc
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.