Robinson+Cole

KENNETH C. BALDWIN

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Hartford, CT 06103-3597
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kbaldwin@rc.com
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Also admitted in Massachusetts

September 14, 2016

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

Re: **TS-VER-077-140911– Cellco Partnership d/b/a Verizon Wireless**
239 Middle Turnpike, Manchester, Connecticut

Dear Ms. Bachman:

On October 3, 2014, the Siting Council approved Cellco's application to share the existing Manchester Police Department telecommunications tower at 239 Middle Turnpike in Manchester, Connecticut.

As a condition of that approval, the Council required the submission of a letter stating that Cellco had complied with the recommendations made in a May 2, 2014 Structural Analysis Report prepared by Hudson Design Group LLC (the "Structural Report"). The Structural Report referenced certain modifications to the tower that were to be completed by Sprint. It is now our understanding that the Sprint modifications were never completed. As such, Cellco asked Hudson Design Group LLC to prepare a revised Structural Analysis Report verifying that the existing tower, without the Sprint modifications, could accommodate Cellco's shared use. A copy of the updated April 19, 2016 report is attached. Also attached is a Professional Engineer's Tower Modification Certification letter verifying that the installation of Cellco's antennas and equipment was completed according to the updated Structural Analysis Report.

If you have any questions please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Elizabeth Jamieson

CENTEK engineering

Centered on Solutions℠

September 7, 2016

Mr. Tim Parks
Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

Re: Tower Modification Certification

Project:	**Verizon Manchester Green** 239 Middle Turnpike East, Manchester, CT
Tower Owner:	**Town of Manchester** 41 Center Street, Manchester, CT
Engineer:	**Hudson Design Group** 1600 Osgood Street, Building 20N Suite 3090, North Andover, MA

Centek Project No.: 16003.028

CSC Exempt Mod Reference No.: TS-VER-077-140911

Dear Mr. Parks,

We are providing this "Tower Modification Certification" with regard to the structural components at the above referenced project.

The following are the basis for substantiating compliance with the Structural Analysis document prepared by Hudson Design Group on 04/19/16:

- Review of Hudson Design Group Structural Analysis dated 04/19/16.
- Centek Engineering, Inc. Closeout Package dated 08/01/16.
- Field observations by Centek Engineering personnel on 07/25/16 of the completed modifications which determined all modifications were installed in general compliance with the recommendations of the aforementioned structural analysis report.

The modification design prepared by Hudson Design Group demonstrates the tower will not exceed 100 percent of the post construction structural rating. The work under this Contract has been reviewed and found, to the Engineer's best knowledge, information and belief, to be completed in general compliance with the documents referenced above. This certification is not a review of the adequacy or effectiveness of the modification/reinforcement solution.

Sincerely,

Carlo F. Centore, PE
Principal - Structural

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 15884
LICENSED
PROFESSIONAL ENGINEER

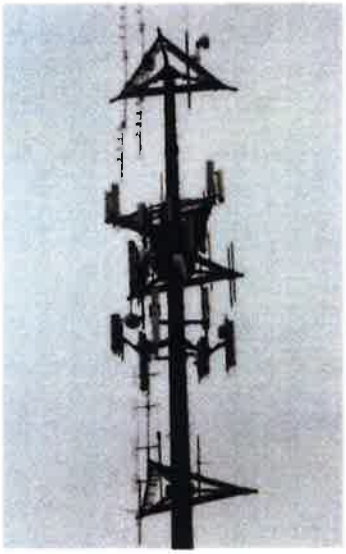
STRUCTURAL ANALYSIS REPORT

For

MANCHESTER GREEN CT

239 Middle Turnpike
Manchester, CT 06040

Antennas Mounted to the Monopole



Prepared for:

verizon

400 Friberg Parkway
Westborough, MA 01581

Dated: April 19, 2016

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. 22020
LICENSED PROFESSIONAL ENGINEER
4/19/2016

SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by VERIZON to conduct a structural evaluation of the 183' 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 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 available and obtained for our use. The previous structural analysis report prepared by Destek Engineering, LLC, dated October 14, 2014, was also available and obtained for our use.

Structural analysis with monopole modification report prepared by this office, dated September 25, 2015, was used for monopole analysis.

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 **99.3%** - (Pole section L5 from EL.43.9' to EL.88.0' Controlling).

Hudson Design Group LLC

APPURTENANCES CONFIGURATION:

Tenant	Appurtenances	Elev.	Mount
	Lighting Rod	194'	Low Profile Platform
	(2) 20' Dipole	184'	Low Profile Platform
T-MOBILE	(3) AIR 21 B2A B4P Antennas	163'	Low Profile Platform
T-MOBILE	(3) AIR 21 B4A B2P Antennas	163'	Low Profile Platform
T-MOBILE	(3) ATMAP1412D TMA	163'	Low Profile Platform
T-MOBILE	(3) LNX-6515DS-VTM Antennas	163'	Low Profile Platform
T-MOBILE	(3) RRUS 11	163'	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'	Low Profile Platform
AT&T	(2) OPA-65R-LCUU-H6 Antennas	143'	Low Profile Platform
AT&T	(4) OPA-65R-LCUU-H8 Antennas	143'	Low Profile Platform
AT&T	(12) RRUs	143'	Low Profile Platform
AT&T	(3) A2 Modules	143'	Low Profile Platform
AT&T	(2) Surge Arrestors	143'	Low Profile Platform
	(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) HBXX 6517DS-VTM Antennas***	***113'***	***Low Profile Platform***
VERIZON	***(3) RRH 2X60 700***	***113'***	***Low Profile Platform***
VERIZON	***(3) RRH 2X60 PCS***	***113'***	***Low Profile Platform***
VERIZON	***(3) RRH 2X60 AWS***	***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

VERIZON EXISTING/PROPOSED COAX CABLES:

Tenant	Coax Cables	Elev.	Mount
VERIZON	***(2) Fiber Cables***	***113'***	Outside Monopole

****Proposed VERIZON Coax Cables shown in Bold.***

ANALYSIS RESULTS SUMMARY:

Component	Max. Stress Ratio	Elev. of Component (ft)	Pass/Fail	Comments
Pole Section-L1	13.9 %	166.5 – 184.0	PASS	
Pole Section-L2	70.8 %	133.1 – 166.5	PASS	
Pole Section-L3	81.5 %	113.0 – 133.1	PASS	
Pole Section-L4	93.3 %	88.0 – 113.0	PASS	
Pole Section-L5	**99.3 %**	43.9 – 88.0	PASS	**Controlling**
Pole Section-L6	95.8 %	1.0 – 43.9	PASS	
Base Plate	91.0 %	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'

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

Hudson Design Group LLC

SUPPORT RECOMMENDATIONS:

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

ONGOING AND PERIODIC INSPECTION AND MAINTENANCE:

After the Contractor has successfully completed the installation and the work has been accepted, the Owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

Hudson Design Group LLC

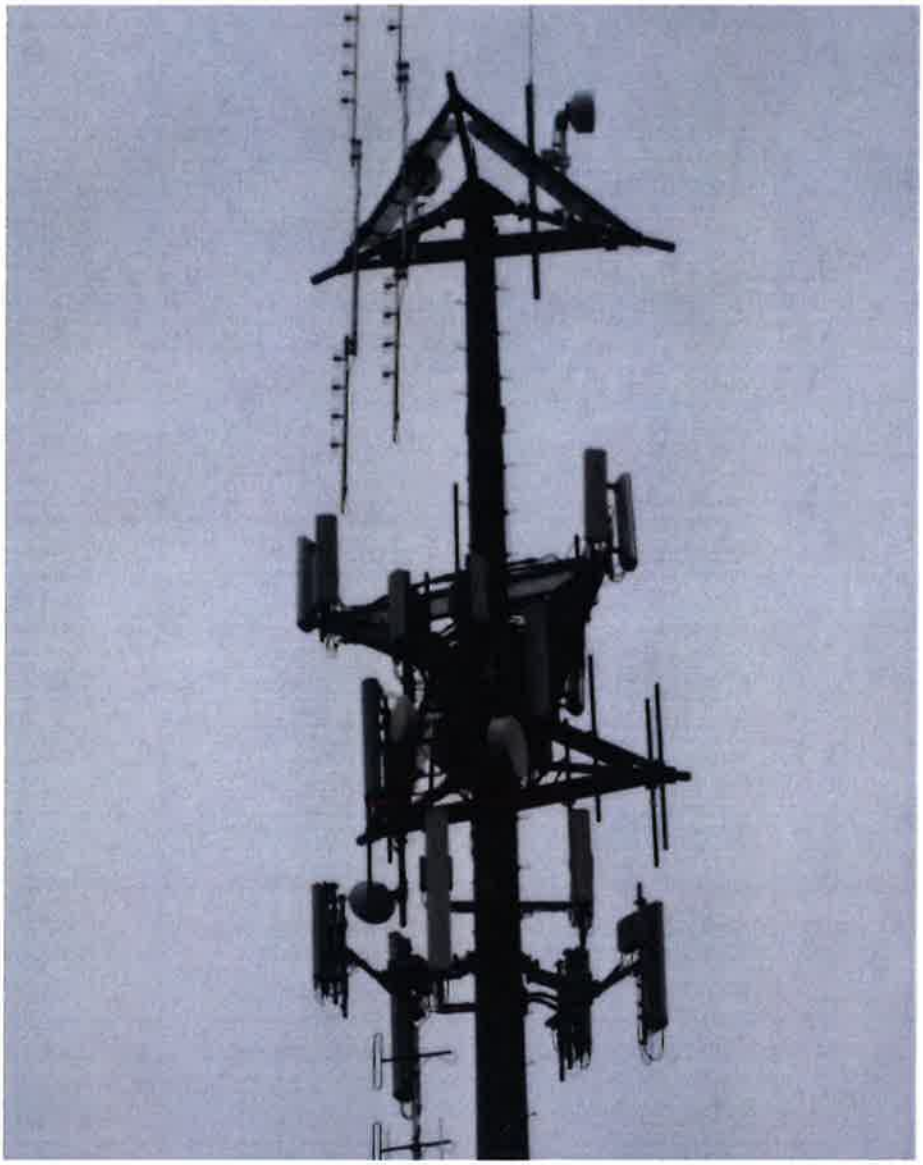


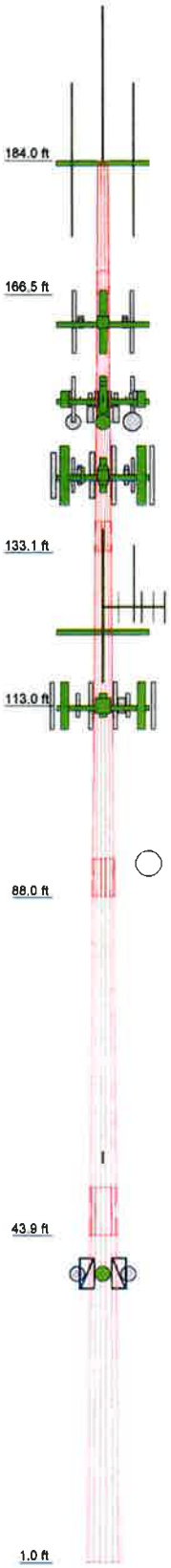
Photo 1: Photo illustrating the Monopole with Appurtenances shown.

Hudson Design Group LLC

CALCULATIONS

Section	1	2	3	4	5	6
Length (ft)	17.50	36.42	23.92	25.00	49.08	49.08
Number of Sides	18	18	18	18	18	18
Thickness (in)	0.1875	0.2500	0.3750	0.4150	0.4850	0.5400
Socket Length (ft)	3.00	3.83		5.00	6.17	
Top Dia (in)	15.5000	18.3556	25.0549	30.2850	33.9406	42.5549
Bot Dia (in)	19.3990	26.4010	30.2850	35.8920	44.9030	53.5000
Grade	A572-65					
Weight (lb)	611.7	2176.1	2644.3	3661.2	10010.3	13593.1

Total Weight (lb): 32696.8



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 2"x21'	184	Kathrein 800 10121 w/mount pipe	143
PiROD 13' Low Profile Platform	184	Ericsson RRUS-11	143
20'-4 Bay Dipole	184	Ericsson RRUS-11	143
20'-4 Bay Dipole	184	Ericsson RRUS-11	143
PiROD 13' Low Profile Platform (T-Mobile - Existing)	163	DC6-48-60-18-8F	143
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	163	(2) OPA-65R-LCUU-H6 w/mount pipe	143
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	163	(2) OPA-65R-LCUU-H8 w/mount pipe	143
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	163	(2) OPA-65R-LCUU-H8 w/mount pipe	143
RFS ATMAP1412D-1A20	163	Ericsson RRUS-12	143
RFS ATMAP1412D-1A20	163	Ericsson RRUS-12	143
RFS ATMAP1412D-1A20	163	Ericsson RRUS-12	143
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	163	Ericsson RRUS-32	143
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	163	Ericsson RRUS-32	143
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	163	Ericsson RRUS-E2	143
LNX-6515DS-VTM w/ Mount Pipe (T-Mobile - Proposed)	163	Ericsson A2 Module	143
LNX-6515DS-VTM w/ Mount Pipe	163	Ericsson A2 Module	143
LNX-6515DS-VTM w/ Mount Pipe	163	Surge Arrestor (DC6-48-60-18-8F)	143
Ericsson RRUS 11	163	20'-4 Bay Dipole	123
Ericsson RRUS 11	163	3' Yagi antenna	123
Ericsson RRUS 11	163	3' Yagi antenna	123
PiROD 13' Low Profile Platform (SPRINT)	153	PiROD 13' Low Profile Platform	123
APXVSPP18-C w/mount pipe	153	Omni 2"x10'	123
APXVSPP18-C w/mount pipe	153	Omni 2"x10'	123
APXVSPP18-C w/mount pipe	153	(2) LNX 6514DS-VTM w/mount pipe	113
(2) RRH-1900	153	(2) LNX 6514DS-VTM w/mount pipe	113
(2) RRH-1900	153	(2) LNX 6514DS-VTM w/mount pipe	113
(2) RRH-1900	153	(2) HBXX-6517DS-VTM w/ Mount Pipe	113
RRH-800	153	(2) HBXX-6517DS-VTM w/ Mount Pipe	113
RRH-800	153	(2) HBXX-6517DS-VTM w/ Mount Pipe	113
RRH-800	153	RRH2x60-700	113
APXVTM14-C-120 w/mount pipe (SPRINT)	153	RRH2x60-700	113
APXVTM14-C-120 w/mount pipe	153	RRH2x60-700	113
APXVTM14-C-120 w/mount pipe	153	RRH2x60 PCS	113
840-10054 w/mount pipe	153	RRH2x60 PCS	113
840-10054 w/mount pipe	153	RRH2x60 PCS	113
840-10054 w/mount pipe	153	RRH2x60-AWS	113
Kathrein 860 10025 RCU	153	RRH2x60-AWS	113
Kathrein 860 10025 RCU	153	RRH2x60-AWS	113
Kathrein 860 10025 RCU	153	RFS DB-T1-6Z-8AB-0Z	113
Panel Antenna 18"X18"	153	RFS DB-T1-6Z-8AB-0Z	113
Ring Mount	151	PiROD 13' Low Profile Platform (Verizon - proposed)	113
RRH 8x20-25	151	GPS	54
RRH 8x20-25	151	1' Side Mount Standoff	54
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	1' Side Mount Standoff	38.9
Andrew VHLP2-11	150	Andrew VHLPX2-18-2WH/B	38.9
PiROD 13' Low Profile Platform (ATI)	143	Andrew VHLPX2-18-2WH/B	38.9
Kathrein 800 10121 w/mount pipe	143	(2) Andrew VHLPX2-18-2WH/B	38.9
Kathrein 800 10121 w/mount pipe	143		

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.

Hudson Design Group LLC
1600 Osgood Street Bldg. 20N Suite 3090
North Andover, MA 01845
Phone: (978) 557-5553
FAX: (978) 336-5586

Job: MANCHESTER GREEN CT			
Project: 183 ft Monopole			
Client: VERIZON	Drawn by: kw	App'd:	
Code: TIA/EIA-222-F	Date: 04/19/16	Scale: NTS	
Path:		Dwg No. E-1	

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Job	Page
MANCHESTER GREEN CT	1 of 12
Project	**Date**
183 ft Monopole	14:11:45 04/19/16
Client	**Designed by**
VERIZON	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* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	184.00-166.50	17.50	3.00	18	15.5000	19.3990	0.1875	0.7500	A572-65 (65 ksi)
L2	166.50-133.08	36.42	3.83	18	18.3556	26.4010	0.2500	1.0000	A572-65 (65 ksi)
L3	133.08-112.99	23.92	0.00	18	25.0549	30.2850	0.3750	1.5000	A572-65 (65 ksi)
L4	112.99-87.99	25.00	5.00	18	30.2850	35.8920	0.4150	1.6600	A572-65 (65 ksi)
L5	87.99-43.91	49.08	6.17	18	33.9406	44.9030	0.4850	1.9400	A572-65 (65 ksi)
L6	43.91-1.00	49.08		18	42.5549	53.5000	0.5400	2.1600	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	4.0 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

Base Plate Data	
Inner diameter	43.0000 in
Base plate type	Stiffened Plate
Bolts per stiffener	1
Stiffener thickness	0.5000 in
Stiffener height	9.0000 in

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
2" Conduit	A	No	CaAa (Out Of Face)	153.00 - 6.00	2	No Ice	0.20	2.80
						1/2" Ice	0.30	4.33
1/2	A	No	CaAa (Out Of Face)	153.00 - 6.00	3	No Ice	0.06	0.25
						1/2" Ice	0.16	0.91
3/8	A	No	Inside Pole	153.00 - 6.00	3	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
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 (T-MOBILE)	B	No	Inside Pole	163.00 - 6.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 Fiber Cable (T-MOBILE)	B	No	Inside Pole	163.00 - 6.00	9	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 Fiber Cable (T-MOBILE - proposed)	B	No	Inside Pole	163.00 - 6.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 1/4 (SPRINT)	B	No	Inside Pole	153.00 - 6.00	3	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
1 5/8 (AT&T)	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 (AT&T)	B	No	Inside Pole	143.00 - 6.00	3	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
WR-VG122ST-BRDA (AT&T)	B	No	Inside Pole	143.00 - 6.00	6	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 (VERIZON)	B	No	CaAa (Out Of Face)	113.00 - 6.00	2	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft 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

Hudson Design Group LLC
1600 Osgood Street Bldg. 20N Suite 3090
North Andover, MA 01845
Phone: (978) 557-5553
FAX: (978) 336-5586

Job	Page
MANCHESTER GREEN CT	3 of 12
Project	**Date**
183 ft Monopole	14:11:45 04/19/16
Client	**Designed by**
VERIZON	kw

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* °	*Placement* *ft*		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* *lb*
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
**********									
PiROD 13' Low Profile Platform (T-Mobile - Existing)	A	None		0.0000	163.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	3.50 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	104.90 162.69
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	3.50 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	104.90 162.69
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	3.50 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	104.90 162.69
RFS ATMAP1412D-1A20	A	From Face	2.50 0.00 0.00	0.0000	163.00	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	163.00	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	163.00	No Ice 1/2" Ice	1.17 1.31	0.47 0.57	13.00 20.62
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Face	3.50 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	104.90 162.69
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Face	3.50 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	104.90 162.69
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Face	3.50 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	6.85 7.41	5.78 6.70	104.90 162.69
**********									
LNX-6515DS-VTM w/ Mount Pipe (T-Mobile - Proposed)	A	From Face	3.50 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	11.67 12.39	9.83 11.35	83.15 172.72
LNX-6515DS-VTM w/ Mount Pipe	B	From Face	3.50 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	11.67 12.39	9.83 11.35	83.15 172.72
LNX-6515DS-VTM w/ Mount Pipe	C	From Face	3.50 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	11.67 12.39	9.83 11.35	83.15 172.72
Ericsson RRUS 11	A	From Face	2.50 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	2.94 3.17	1.25 1.41	55.00 74.32
Ericsson RRUS 11	B	From Face	2.50 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice	2.94 3.17	1.25 1.41	55.00 74.32
Ericsson RRUS 11	C	From Face	2.50 0.00	0.0000	163.00	No Ice 1/2" Ice	2.94 3.17	1.25 1.41	55.00 74.32

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Job	Page
MANCHESTER GREEN CT	4 of 12
Project	**Date**
183 ft Monopole	14:11:45 04/19/16
Client	**Designed by**
VERIZON	kw

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		*C_AA_A Front* ft^2	*C_AA_A Side* ft^2	*Weight* lb
			0.00						
**********									
PiROD 13' Low Profile Platform (SPRINT)	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 0.00	0.0000	153.00	No Ice 1/2" Ice	8.50 9.15	6.95 8.13	82.55 150.56
APXVSPP18-C w/mount pipe	B	From Face	3.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	8.50 9.15	6.95 8.13	82.55 150.56
APXVSPP18-C w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	153.00	No Ice 1/2" Ice	8.50 9.15	6.95 8.13	82.55 150.56
(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)	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

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
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 0.00 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	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
**********									
PiROD 13' Low Profile Platform (AT&T)	A	None		0.0000	143.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
Kathrein 800 10121 w/mount pipe	A	From Face	3.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	5.87 6.41	4.73 5.57	68.20 117.25
Kathrein 800 10121 w/mount pipe	B	From Face	3.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	5.87 6.41	4.73 5.57	68.20 117.25
Kathrein 800 10121 w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	5.87 6.41	4.73 5.57	68.20 117.25
Ericsson RRUS-11	A	From Face	2.50	0.0000	143.00	No Ice	3.26	1.38	50.70

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft 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	3.50	1.56	71.57
Ericsson RRUS-11	B	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	3.26 3.50	1.38 1.56	50.70 71.57
Ericsson RRUS-11	C	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	3.26 3.50	1.38 1.56	50.70 71.57
DC6-48-60-18-8F	C	From Leg	2.00 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	1.27 1.46	1.27 1.46	20.00 35.12
**********									
(2) OPA-65R-LCUU-H6 w/mount pipe	A	From Face	3.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	10.65 11.30	7.53 8.56	112.53 192.76
(2) OPA-65R-LCUU-H8 w/mount pipe	B	From Face	3.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	13.34 14.18	9.83 11.34	140.11 239.33
(2) OPA-65R-LCUU-H8 w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	13.34 14.18	9.83 11.34	140.11 239.33
Ericsson RRUS-12	A	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	3.67 3.93	1.49 1.67	58.00 81.22
Ericsson RRUS-12	B	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	3.67 3.93	1.49 1.67	58.00 81.22
Ericsson RRUS-12	C	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	3.67 3.93	1.49 1.67	58.00 81.22
Ericsson RRUS-32	A	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	3.87 4.15	2.76 3.02	77.00 104.93
Ericsson RRUS-32	B	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	3.87 4.15	2.76 3.02	77.00 104.93
Ericsson RRUS-32	C	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	3.87 4.15	2.76 3.02	77.00 104.93
Ericsson RRUS-E2	A	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	3.87 4.15	2.76 3.02	77.00 104.93
Ericsson RRUS-E2	B	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	3.87 4.15	2.76 3.02	77.00 104.93
Ericsson RRUS-E2	C	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	3.87 4.15	2.76 3.02	77.00 104.93
Ericsson A2 Module	A	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	2.42 2.63	0.54 0.67	22.00 34.73
Ericsson A2 Module	B	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	2.42 2.63	0.54 0.67	22.00 34.73
Ericsson A2 Module	C	From Face	2.50 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	2.42 2.63	0.54 0.67	22.00 34.73

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Job	Page
MANCHESTER GREEN CT	7 of 12
Project	**Date**
183 ft Monopole	14:11:45 04/19/16
Client	**Designed by**
VERIZON	kw

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		*C_AA_A Front* ft^2	*C_AA_A Side* ft^2	*Weight* lb
Surge Arrestor (DC6-48-60-18-8F)	A	From Leg	2.00 0.00 0.00	0.0000	143.00	No Ice 1/2" Ice	1.27 1.46	1.27 1.46	20.00 35.12
**********									
PiROD 13' Low Profile Platform (Verizon - proposed)	C	None		0.0000	113.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
(2) LNX 6514DS-VTM w/mount pipe	A	From Face	3.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	8.63 9.29	7.07 8.25	64.55 133.55
(2) LNX 6514DS-VTM w/mount pipe	B	From Face	3.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	8.63 9.29	7.07 8.25	64.55 133.55
(2) LNX 6514DS-VTM w/mount pipe	C	From Face	3.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	8.63 9.29	7.07 8.25	64.55 133.55
(2) HBXX-6517DS-VTM w/ Mount Pipe	A	From Face	3.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	8.92 9.56	6.91 8.10	68.55 137.54
(2) HBXX-6517DS-VTM w/ Mount Pipe	B	From Face	3.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	8.92 9.56	6.91 8.10	68.55 137.54
(2) HBXX-6517DS-VTM w/ Mount Pipe	C	From Face	3.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	8.92 9.56	6.91 8.10	68.55 137.54
RRH2x60-700	A	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	3.96 4.27	1.82 2.08	60.00 82.72
RRH2x60-700	B	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	3.96 4.27	1.82 2.08	60.00 82.72
RRH2x60-700	C	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	3.96 4.27	1.82 2.08	60.00 82.72
RRH2x60 PCS	A	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	2.51 2.73	1.55 1.74	55.00 72.75
RRH2x60 PCS	B	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	2.51 2.73	1.55 1.74	55.00 72.75
RRH2x60 PCS	C	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	2.51 2.73	1.55 1.74	55.00 72.75
RRH2x60-AWS	A	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	3.96 4.27	2.16 2.44	60.00 84.31
RRH2x60-AWS	B	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	3.96 4.27	2.16 2.44	60.00 84.31
RRH2x60-AWS	C	From Face	2.50 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	3.96 4.27	2.16 2.44	60.00 84.31
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	0.0000	113.00	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	44.00 80.13

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						
**********									
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 0.00	0.0000		150.00	2.00	No Ice 1/2" Ice	3.14 3.41	31.00 41.00
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

Comb. No.	Description
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

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	24	66655.63	34940.79	-135.72
	Max. H_x	11	54739.37	39434.12	-183.14
	Max. H_z	2	54739.37	-230.80	39410.02
	Max. M_x	2	4818303.37	-230.80	39410.02
	Max. M_z	5	4823917.96	-39407.58	246.78
	Max. Torsion	9	2984.04	19892.55	-34220.87
	Min. Vert	1	54739.37	0.00	0.00
	Min. H_x	5	54739.37	-39407.58	246.78
	Min. H_z	8	54739.37	272.52	-39451.96
	Min. M_x	8	-4821939.04	272.52	-39451.96
	Min. M_z	11	-4826086.08	39434.12	-183.14
	Min. Torsion	3	-3045.85	-19925.89	34200.23

Tower Mast Reaction Summary

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 Only	54739.37	0.00	0.00	-520.86	-929.08	-0.00
Dead+Wind 0 deg - No Ice	54739.37	230.80	-39410.02	-4818303.37	-34892.25	2281.19
Dead+Wind 30 deg - No Ice	54739.37	19925.89	-34200.23	-4181019.05	-2441797.28	3045.85
Dead+Wind 60 deg - No Ice	54739.37	34236.66	-19866.23	-2430956.30	-4190860.45	2868.39
Dead+Wind 90 deg - No Ice	54739.37	39407.58	-246.78	-34156.37	-4823917.96	1912.66
Dead+Wind 120 deg - No Ice	54739.37	34056.78	19480.75	2378064.05	-4170064.72	560.34
Dead+Wind 150 deg - No Ice	54739.37	19591.06	34056.13	4161044.55	-2397300.13	-936.62
Dead+Wind 180 deg - No Ice	54739.37	-272.52	39451.96	4821939.04	39519.19	-2089.73
Dead+Wind 210 deg - No Ice	54739.37	-19892.55	34220.87	4184364.59	2438553.80	-2984.04
Dead+Wind 240 deg - No Ice	54739.37	-34189.96	19824.15	2427832.97	4186482.81	-2840.57
Dead+Wind 270 deg - No Ice	54739.37	-39434.12	183.14	28713.14	4826086.08	-1952.08
Dead+Wind 300 deg - No Ice	54739.37	-34141.40	-19496.55	-2377004.23	4176452.60	-779.60
Dead+Wind 330 deg - No Ice	54739.37	-19574.92	-34094.71	-4166943.43	2388865.41	914.44
Dead+Ice+Temp	66655.63	0.00	0.00	-908.41	-1999.29	0.02
Dead+Wind 0 deg+Ice+Temp	66655.63	174.57	-34913.10	-4317765.97	-28271.46	2283.55
Dead+Wind 30 deg+Ice+Temp	66655.63	17629.55	-30286.81	-3745329.55	-2186006.24	2800.91
Dead+Wind 60 deg+Ice+Temp	66655.63	30323.92	-17576.99	-2175613.61	-3755418.39	2463.12
Dead+Wind 90 deg+Ice+Temp	66655.63	34920.09	-187.84	-26872.81	-4324590.22	1457.42
Dead+Wind 120 deg+Ice+Temp	66655.63	30189.52	17285.50	2134075.24	-3739963.42	157.80
Dead+Wind 150 deg+Ice+Temp	66655.63	17378.76	30181.92	3729601.38	-2152367.13	-1179.21
Dead+Wind 180 deg+Ice+Temp	66655.63	-207.66	34947.05	4319762.23	29330.09	-2129.52
Dead+Wind 210 deg+Ice+Temp	66655.63	-17601.68	30302.95	3747014.59	2180577.91	-2751.02
Dead+Wind 240 deg+Ice+Temp	66655.63	-30285.09	17542.26	2171954.59	3749029.94	-2440.63
Dead+Wind 270 deg+Ice+Temp	66655.63	-34940.79	135.72	21317.94	4323592.25	-1489.32
Dead+Wind 300 deg+Ice+Temp	66655.63	-30257.82	-17299.04	-2134282.81	3742492.71	-334.29
Dead+Wind 330 deg+Ice+Temp	66655.63	-17366.32	-30212.93	-3735421.70	2142797.50	1161.46
Dead+Wind 0 deg - Service	54739.37	90.16	-15394.54	-1886664.52	-14282.93	905.45
Dead+Wind 30 deg - Service	54739.37	7783.55	-13359.47	-1637201.32	-956601.33	1209.98
Dead+Wind 60 deg - Service	54739.37	13373.70	-7760.25	-952044.94	-1641373.63	1140.85
Dead+Wind 90 deg - Service	54739.37	15393.59	-96.40	-13683.60	-1889181.34	762.35
Dead+Wind 120 deg - Service	54739.37	13303.43	7609.67	930673.96	-1633160.45	225.44
Dead+Wind 150 deg - Service	54739.37	7652.76	13303.18	1628689.53	-939139.31	-369.56
Dead+Wind 180 deg - Service	54739.37	-106.45	15410.92	1887456.87	14854.29	-828.18
Dead+Wind 210 deg - Service	54739.37	-7770.53	13367.53	1637889.44	954089.62	-1185.38
Dead+Wind 240 deg - Service	54739.37	-13355.45	7743.81	950201.70	1638417.69	-1130.76
Dead+Wind 270 deg - Service	54739.37	-15403.95	71.54	10932.91	1888809.11	-779.08
Dead+Wind 300 deg - Service	54739.37	-13336.48	-7615.84	-930891.88	1634444.25	-312.76
Dead+Wind 330 deg - Service	54739.37	-7646.45	-13318.25	-1631639.75	934604.41	361.77

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	lb	lb	lb	lb	lb	lb	
1	0.00	-54739.37	0.00	0.00	54739.37	0.00	0.000%
2	230.80	-54739.37	-39410.02	-230.80	54739.37	39410.02	0.000%
3	19925.89	-54739.37	-34200.23	-19925.89	54739.37	34200.23	0.000%
4	34236.66	-54739.37	-19866.23	-34236.66	54739.37	19866.23	0.000%
5	39407.58	-54739.37	-246.78	-39407.58	54739.37	246.78	0.000%
6	34056.78	-54739.37	19480.75	-34056.78	54739.37	-19480.75	0.000%
7	19591.06	-54739.37	34056.13	-19591.06	54739.37	-34056.13	0.000%
8	-272.52	-54739.37	39451.95	272.52	54739.37	-39451.96	0.000%
9	-19892.55	-54739.37	34220.86	19892.55	54739.37	-34220.87	0.000%
10	-34189.96	-54739.37	19824.15	34189.96	54739.37	-19824.15	0.000%
11	-39434.12	-54739.37	183.14	39434.12	54739.37	-183.14	0.000%
12	-34141.40	-54739.37	-19496.55	34141.40	54739.37	19496.55	0.000%
13	-19574.92	-54739.37	-34094.71	19574.92	54739.37	34094.71	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
14	0.00	-66655.63	0.00	-0.00	66655.63	-0.00	0.000%
15	174.57	-66655.63	-34913.09	-174.57	66655.63	34913.10	0.000%
16	17629.55	-66655.63	-30286.81	-17629.55	66655.63	30286.81	0.000%
17	30323.92	-66655.63	-17576.99	-30323.92	66655.63	17576.99	0.000%
18	34920.08	-66655.63	-187.84	-34920.09	66655.63	187.84	0.000%
19	30189.52	-66655.63	17285.50	-30189.52	66655.63	-17285.50	0.000%
20	17378.76	-66655.63	30181.92	-17378.76	66655.63	-30181.92	0.000%
21	-207.66	-66655.63	34947.03	207.66	66655.63	-34947.05	0.000%
22	-17601.68	-66655.63	30302.95	17601.68	66655.63	-30302.95	0.000%
23	-30285.09	-66655.63	17542.26	30285.09	66655.63	-17542.26	0.000%
24	-34940.77	-66655.63	135.72	34940.79	66655.63	-135.72	0.000%
25	-30257.82	-66655.63	-17299.04	30257.82	66655.63	17299.04	0.000%
26	-17366.32	-66655.63	-30212.93	17366.32	66655.63	30212.93	0.000%
27	90.16	-54739.37	-15394.54	-90.16	54739.37	15394.54	0.000%
28	7783.55	-54739.37	-13359.47	-7783.55	54739.37	13359.47	0.000%
29	13373.70	-54739.37	-7760.25	-13373.70	54739.37	7760.25	0.000%
30	15393.59	-54739.37	-96.40	-15393.59	54739.37	96.40	0.000%
31	13303.43	-54739.37	7609.67	-13303.43	54739.37	-7609.67	0.000%
32	7652.76	-54739.37	13303.18	-7652.76	54739.37	-13303.18	0.000%
33	-106.45	-54739.37	15410.92	106.45	54739.37	-15410.92	0.000%
34	-7770.53	-54739.37	13367.53	7770.53	54739.37	-13367.53	0.000%
35	-13355.45	-54739.37	7743.81	13355.45	54739.37	-7743.81	0.000%
36	-15403.95	-54739.37	71.54	15403.95	54739.37	-71.54	0.000%
37	-13336.48	-54739.37	-7615.84	13336.48	54739.37	7615.84	0.000%
38	-7646.45	-54739.37	-13318.25	7646.45	54739.37	13318.25	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	184 - 166.5	68.6097	29	3.2888	0.0194
L2	169.5 - 133.08	58.7044	29	3.2282	0.0120
L3	136.91 - 112.99	37.7796	29	2.7827	0.0059
L4	112.99 - 87.99	25.0039	29	2.2684	0.0038
L5	92.99 - 43.91	16.5160	29	1.7783	0.0024
L6	50.08 - 1	4.5189	29	0.8571	0.0009

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'	29	68.6097	3.2888	0.0198	29173
163.00	PiROD 13' Low Profile Platform	29	54.3283	3.1742	0.0098	6674
153.00	PiROD 13' Low Profile Platform	29	47.7505	3.0530	0.0077	4396
151.00	RRH 8x20-25	29	46.4645	3.0239	0.0074	4113
150.00	Andrew VHLP2-11	29	45.8259	3.0088	0.0073	3985
143.00	PiROD 13' Low Profile Platform	29	41.4451	2.8940	0.0065	3269
123.00	PiROD 13' Low Profile Platform	29	30.0134	2.4975	0.0047	2457
113.00	PiROD 13' Low Profile Platform	29	25.0087	2.2686	0.0038	2283
54.00	1' Side Mount Standoff	29	5.2466	0.9326	0.0010	2384

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Job	Page
MANCHESTER GREEN CT	12 of 12
Project	**Date**
183 ft Monopole	14:11:45 04/19/16
Client	**Designed by**
VERIZON	kw

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
38.90	Andrew VHLPX2-18-2WH/B	29	2.8501	0.6495	0.0006	3042

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	TP19.399x15.5x0.1875	1	-2467.78	573700.52	13.9	Pass
L2	166.5 - 133.08	Pole	TP26.401x18.3556x0.25	2	-11105.80	1043870.92	70.8	Pass
L3	133.08 - 112.99	Pole	TP30.285x25.0549x0.375	3	-18804.10	1850750.45	81.5	Pass
L4	112.99 - 87.99	Pole	TP35.892x30.285x0.415	4	-23174.10	2352598.27	93.3	Pass
L5	87.99 - 43.91	Pole	TP44.903x33.9406x0.485	5	-35868.60	3444405.21	99.3	Pass
L6	43.91 - 1	Pole	TP53.5x42.5549x0.54	6	-50512.70	4494542.56	95.8	Pass
							Summary	
						Pole (L5)	99.3	Pass
						Base Plate	91.0	Pass
						RATING =	**99.3**	**Pass**

CCI Foundation Tool Suite - Monopole Pier

CCIFTS 1.1.103.14128 - Phase 1 Date: 4/19/2016

BU:	MANCHESTER GREEN CT
Site Name:	
App Number:	N/A
Work Order:	

Monopole Drilled Pier

Input

Criteria

TIA Revision:	F
ACI 318 Revision:	2002
Seismic Category:	B

Forces

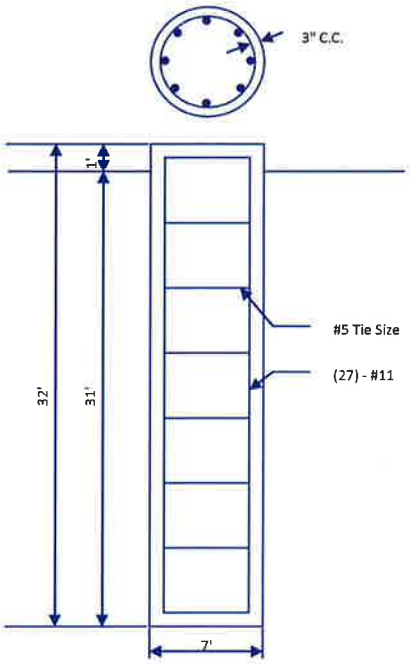
Compression	54.7 kips
Shear	39.6 kips
Moment	4845 k-ft
Swelling Force	0 kips

Foundation Dimensions

Pier Diameter:	7 ft
Ext. above grade:	1 ft
Depth below grade:	31 ft

Material Properties

Number of Rebar:	27
Rebar Size:	11
Tie Size	5
Rebar tensile strength:	60 ksi
Concrete Strength:	4000 psi
Ultimate Concrete Strain	0.003 in/in
Clear Cover to Ties:	3 in



Soil Profile: Profile 1

Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3.5	0	3.5	100	0	0	0	0		
2	2.5	3.5	6	100	0	30				
3	10	6	16	37.6	0	30				
4	15	16	31	37.6	0	30				

Analysis Results

Soil Lateral Capacity

Depth to Zero Shear:	5.91 ft
Max Moment, Mu:	5089.34 k-ft
Soil Safety Factor:	2.05
Safety Factor Req'd:	2
RATING:	97.7%

Soil Axial Capacity

Skin Friction (k):	106.41 kips
End Bearing (k):	0.00 kips
Comp. Capacity (k), ϕCn:	106.41 kips
Comp. (k), Cu:	71.11 kips
RATING:	66.8%

Concrete/Steel Check

Mu (from soil analysis)	6616.14 k-ft
ϕMn	6758.90 k-ft
RATING:	97.9%

rho provided	0.76	
rho required	0.33	OK
Rebar Spacing	7.36	
Spacing required	22.56	OK
Dev. Length required	24.84	
Dev. Length provided	53.51	OK

Overall Foundation Rating: 97.9%