Robinson+Cole

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Also admitted in Massachusetts

June 28, 2019

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Facility Modification**
347 Gilead Street, Hebron, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains a wireless telecommunications facility at the Hebron Fairgrounds, 347 Gilead Street in Hebron, Connecticut (the "Property"). The existing facility consists of a canister antenna and three (3) remote radio heads ("RRHs") attached at the top of a 30-foot steel pole. The pole and the Property are owned by Hebron Lions Agricultural Society, Inc. The Council approved Cellco's use of the steel pole in 2014 (Petition No. 1095). Cellco now intends to modify its Hebron Fairgrounds facility by removing the existing canister antenna and RRHs and installing a new canister antenna (Model 2C2UT070X06F) and six (6) new RRHs (three (3) Model RFV01U-D2A and three (3) Model RFV01U-D1A). Included in Attachment 1 are specifications for the new antenna and RRHs.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being sent to Hebron's Town Manager, Andrew J. Tierney; Michael O'Leary, Hebron's Town Planner; and Hebron Lions Agricultural Society, Inc., the owner of the Property and the steel pole.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing pole. Cellco's antenna and new RRHs will be attached to the existing antenna and RRH mounting supports at the top of the existing steel pole.

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for RF emissions at each of Cellco's operating frequencies, as modified, are included behind Attachment 2. These tables demonstrate that Cellco's modified facility will comply with the RF emissions standards established by the FCC.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The steel pole and foundation can support Cellco's proposed facility modifications. (*See* Structural Analysis Report included in Attachment 3).

A copy of the Town of Hebron parcel map and Property owner information is included in Attachment 4. A Certificate of Mailing verifying that this filing was sent to municipal officials and the owner of the Property is included in Attachment 5.

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Andrew J. Tierney, Hebron Town Manager
Michael O'Leary , Hebron Town Planner
Hebron Lions Agricultural Society, Inc.
Tim Parks

ATTACHMENT 1

Amphenol ANTENNA SOLUTIONS

696-960 / 696-960 / 1695-2700 / 1695-2700 MHz

2C2UT070X06Fxys0

QUAD BAND | 3-SECTOR, CLOVER-SHAPE | CANISTER ANTENNA | X-POL | FIXED TILT | 610 MM (24.0 IN)

Features

- 3-Sector, Clover-Shape configuration with 24 connectors
- Ideal for Small Cell / DAS applications
- Available with 4.3-10 connectors
- Four unique mounting options
- Available for order with a grey, brown or black radome

Connector Description

The antenna has 24 connectors located at the bottom.

Low Band #1	R1	696-960 MHz	(6x) 4.3-10 Female
Low Band #2	R2	696-960 MHz	(6x) 4.3-10 Female
Mid Band #1	Y1	1695-2700 MHz	(6x) 4.3-10 Female
Mid Band #2	Y2	1695-2700 MHz	(6x) 4.3-10 Female

Electrical Characteristics

R1 R2 | Y1 Y2

Electrical Specifications shown are the average values of antennas in Sector #1.

Frequency Bands (MHz)	(2x) 696-960 MHz		(2x) 1695-2700 MHz			
	696-806	806-960	1695-1880	1850-1990	1920-2200	2300-2700
Polarization	(2x) ±45°		(2x) ±45°			
Horizontal Beamwidth	75° ± 4.2°	70° ± 3.1°	75° ± 11.6°	81° ± 6.4°	77° ± 9.2°	63° ± 7.7°
Vertical Beamwidth	80° ± 12.5°	85.5° ± 16.4°	18.4° ± 1.7°	17.1° ± 1.5°	16.1° ± 1.5°	12.8° ± 1.1°
Gain (dBi)	7.1 ± 0.5	6.6 ± 0.8	12.8 ± 1.3	13.2 ± 1.3	13.3 ± 1.3	13.8 ± 1.1
Upper Sidelobe Suppression	N/A	N/A	> 10 dB	> 12 dB	> 13 dB	> 12 dB
Front-to-Back Ratio	> 25 dB	> 27 dB	> 19 dB	> 20 dB	> 22 dB	> 22 dB
Cross Polar Ratio - Main Direction	> 18 dB	> 14 dB	> 19 dB	> 17 dB	> 17 dB	> 15 dB
Electrical Downtilt (°)	0		(y) 0, 6			
Impedance	50Ω		50Ω			
VSWR	≤ 1.5:1		≤ 1.5:1			
Isolation Between Ports	23 dB		22 dB			
IM3 (2x20W carrier)	< -153 dBc		< -153 dBc			
Input Power	(12x) 500 W		(12x) 300 W			
Diplexed	No					
Number of Sectors, Sector Spacing and/or Pattern Shape	3 Sectors, 120° Spacing, Clover-Shape					
Lightning Protection	Direct Ground					

Mechanical Characteristics

Antenna Dimensions (Height x Diameter)	610 x 371	mm	24.0 x 14.6	in
Weight without Mounting Bracket Kit	11.3	kg	24.9	lbs
Antenna Volume	0.07	m^3	2.3	ft^3
Survival Wind Speed	241	km/hr	150	mph
Wind Area	0.22	m^2	2.4	ft^2
Wind Load (160 km/hr or 100 mph)	191	N	43	lbf

Quoted performance parameters are provided to offer typical, peak or range values only and may vary as a result of normal testing, manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to products may be made without notice.

2C2UT070X06Fxys0

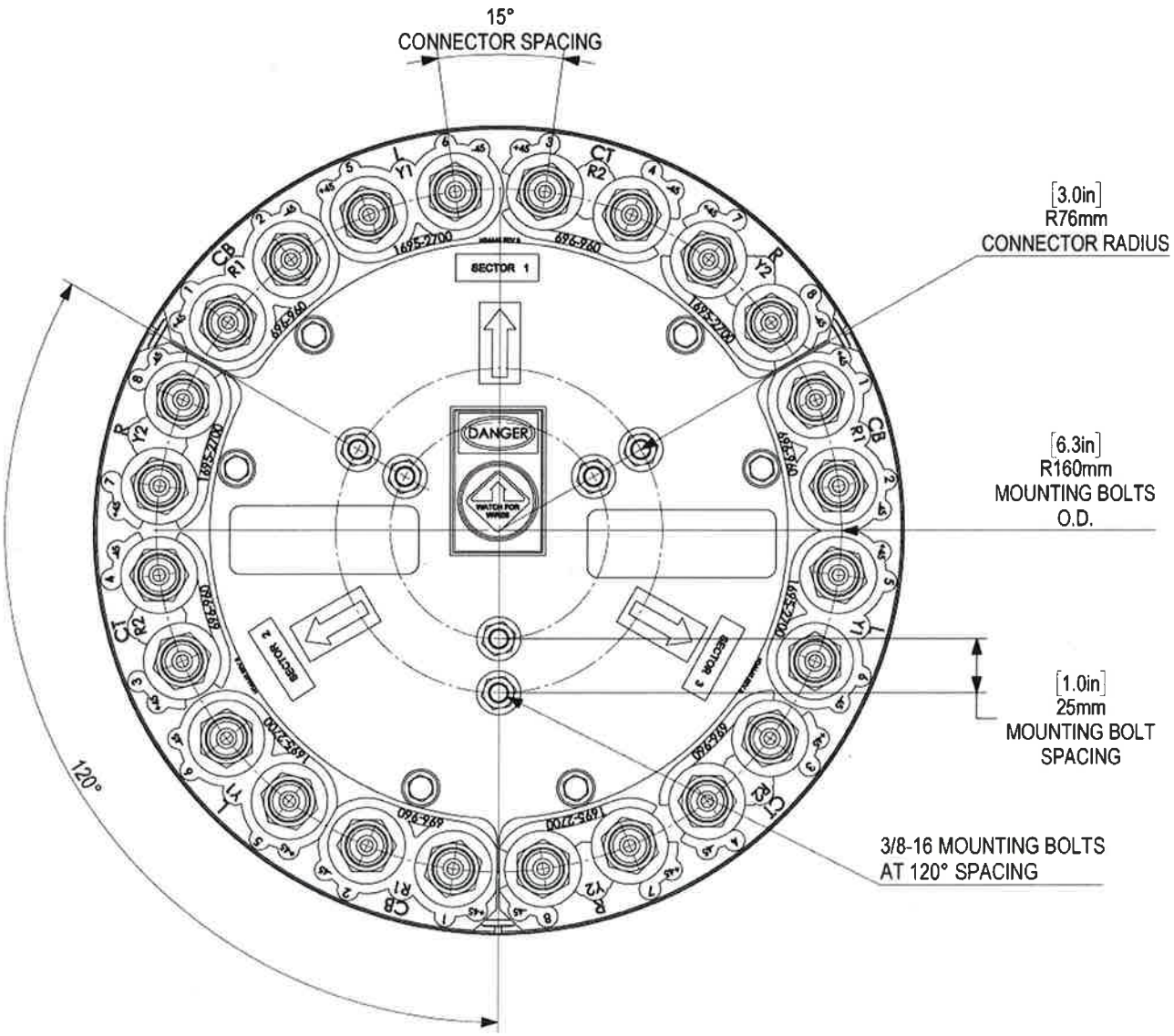
QUAD BAND | 3-SECTOR, CLOVER-SHAPE | CANISTER ANTENNA | X-POL | FIXED TILT | 610 MM (24.0 IN)

Bottom View - Labeling

2C2UT070X06Fxys0

QUAD BAND | 3-SECTOR, CLOVER-SHAPE | CANISTER ANTENNA | X-POL | FIXED TILT | 610 MM (24.0 IN)

Bottom View - Connector Diagram



2C2UT070X06Fxys0

QUAD BAND | 3-SECTOR, CLOVER-SHAPE | CANISTER ANTENNA | X-POL | FIXED TILT | 610 MM (24.0 IN)

Ordering Options

When ordering, select the Radome Color and Degree of Electrical Downtilt for the Low and Mid Bands (**xy**).

Radome Color	Electrical Downtilt Degree		Connector Type
	R1 R2 (x)	Y1 Y2 (y)	4.3-10 Female
Grey Pantone 420 C	0°	0°	2C2UT070X06F**00**s0
	0°	6°	2C2UT070X06F**06**s0
Brown Pantone 476 C	0°	0°	2C2UT070X06F**00**s0**BR**
	0°	6°	2C2UT070X06F**06**s0**BR**
Black RAL 9011	0°	0°	2C2UT070X06F**00**s0**BK**
	0°	6°	2C2UT070X06F**06**s0**BK**

Mounting Kits

This antenna can be mounted using any of the following mounting kits. Mounting kits must be ordered separately.

Side Mounting Bracket Kit	Top Mounting Bracket Kit	Utility Pole Mounting Bracket Kit	Wide Diameter Pole Top Mounting Bracket Kit
CWT-MKS-SIDE	CWT-MKS-TOP	WB3X-MKS-01	CWT-MKS-BASE-xx
			

SAMSUNG

Dual-Band Radio Unit
700/850MHz (B13/B5)

RFV01U-D2A

Samsung's RFV01U-D2A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.

The RFV01U-D2A RU targets dual-band support across Band 13 (700MHz) and Band 5 (850MHz), making it an ideal product for broad coverage footprints across multiple common low-end, long-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed- and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
B13: DL(746-756MHz)/UL(777-787MHz)
B5: DL(869-894MHz)/UL(824-849MHz)
Instantaneous Bandwidth: 10MHz(B13) + 25MHz(B5)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 207mm (29.9L)
Weight: 31.9kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

SAMSUNG

Dual-Band Radio Unit
AWS/PCS (B66/B2)
RFV01U-D1A

Samsung's RFV01U-D1A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.

The RFV01U-D1A RU targets dual-band support across Band 66 (AWS) and Band 2 (PCS), making it an ideal product for broad coverage footprints across multiple common mid-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed- and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation
- Built-in Broadcast Auxiliary Services (BAS) filter ensures compliant AWS operation without impacting footprint

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
B66: DL(2,110-2,180MHz)/UL(1,710-1,780MHz)
B2: DL(1,930-1,990MHz)/UL(1,850-1,910MHz)
Instantaneous Bandwidth:
70MHz(B66) + 60MHz(B2)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 255mm (36.8L)
Weight: 38.3kg
Input Power: -48V DC
Operating Temp.: -40 ~ 55°(w/o solar load)
Cooling: Natural convection

ATTACHMENT 2

Far Field Approximation
with downtilt variation

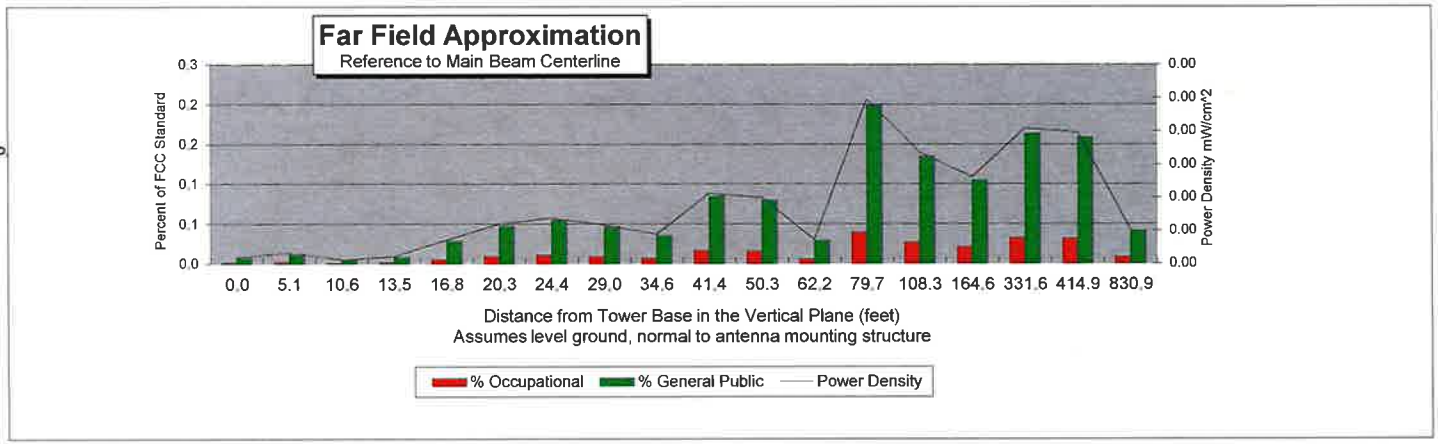
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Hebron Farigrounds, CT
Site #:	
Date:	06/25/19
Name:	Mark Brauer
File Name:	Hebron Fairgrounds, CT - FF P

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**32.0**
Antenna Gain (dBi):	**6.1**
Antenna Size (in.):	**24.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**160.0**
Number of Channels	**1**



Distance in feet below:

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	29.0	29.5	30.9	32.0	33.5	35.4	37.9	41.0	45.1	50.6	58.0	68.7	84.8	112.1	167.1	332.9	415.9	831.4	
Distance from Antenna Structure Base in Horizontal plane	0.0	5.1	10.6	13.5	16.8	20.3	24.4	29.0	34.6	41.4	50.3	62.2	79.7	108.3	164.6	331.6	414.9	830.9	
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.2	0.1	0.1	0.2	0.2	0.0	

Antenna Type 2C2UT070X06F0YS0
Max% 0.20%

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 Pov
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

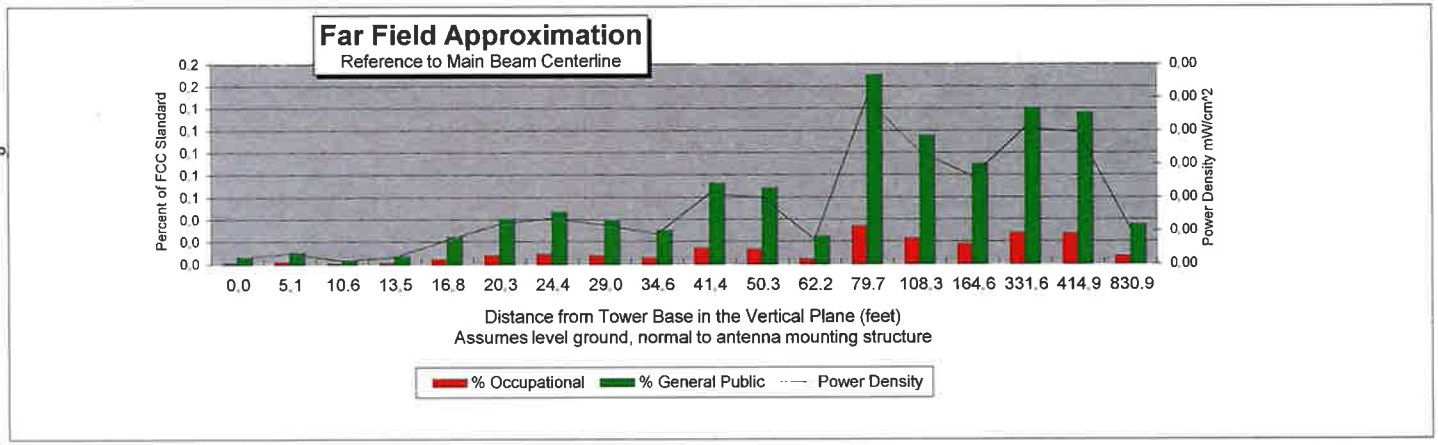
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Hebron Fairgrounds, CT
Site #:	
Date:	06/25/19
Name:	Mark Brauer
File Name:	Hebron Fairgrounds, CT - FF P

Operating Freq. (MHz)	869.0
Antenna Height (ft):	32.0
Antenna Gain (dBi):	6.1
Antenna Size (in.):	24.0
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
Power @ J4 (w):	160.0
Number of Channels	1



Distance in feet below:

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	29.0	29.5	30.9	32.0	33.5	35.4	37.9	41.0	45.1	50.6	58.0	68.7	84.8	112.1	167.1	332.9	415.9	831.4	
Distance from Antenna Structure Base in Horizontal plane	0.0	5.1	10.6	13.5	16.8	20.3	24.4	29.0	34.6	41.4	50.3	62.2	79.7	108.3	164.6	331.6	414.9	830.9	
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Percent of General Population 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	

Antenna Type 2C2UT070X06F0YS0
Max% 0.17%

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 Pov
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

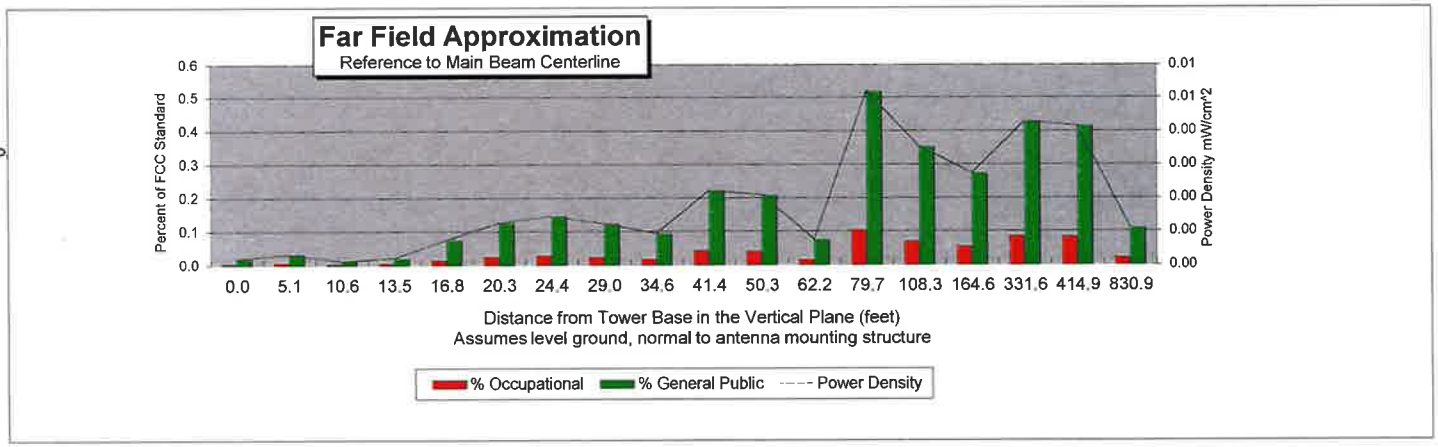
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Hebron Fairgrounds, CT
Site #:	
Date:	06/25/19
Name:	Mark Brauer
File Name:	Hebron Fairgrounds, CT - FF P

Operating Freq. (MHz)	1970.0
Antenna Height (ft):	32.0
Antenna Gain (dBi):	13.3
Antenna Size (in.):	24.0
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
Power @ J4 (w):	160.0
Number of Channels	1



Distance in feet below:

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	29.0	29.5	30.9	32.0	33.5	35.4	37.9	41.0	45.1	50.6	58.0	68.7	84.8	112.1	167.1	332.9	415.9	831.4	
Distance from Antenna Structure Base in Horizontal plane	0.0	5.1	10.6	13.5	16.8	20.3	24.4	29.0	34.6	41.4	50.3	62.2	79.7	108.3	164.6	331.6	414.9	830.9	
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	0.01	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	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.5	0.4	0.3	0.4	0.4	0.1	

Antenna Type 2C2UT070X06F0YS0
Max% 0.52%

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 Pov
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.
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Far Field Approximation
with downtilt variation

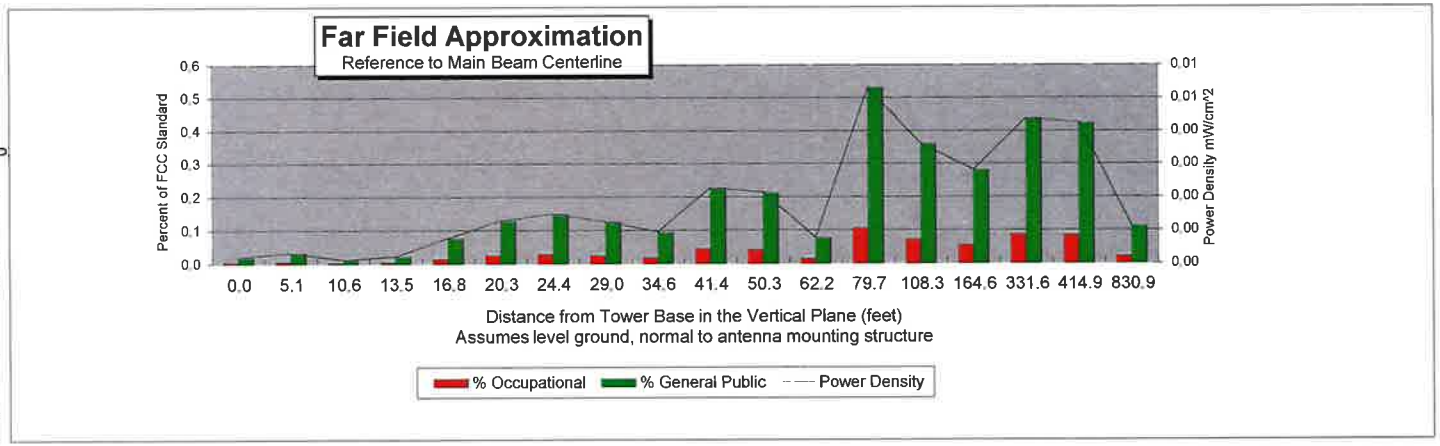
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Hebron Fairgrounds, CT
Site #:	
Date:	06/25/19
Name:	Mark Brauer
File Name:	Hebron Fairgrounds, CT - FF P

Operating Freq. (MHz)	**2110.0**
Antenna Height (ft):	**32.0**
Antenna Gain (dBi):	**13.4**
Antenna Size (in.):	**24.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**160.0**
Number of Channels	**1**



Distance in feet below:

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	29.0	29.5	30.9	32.0	33.5	35.4	37.9	41.0	45.1	50.6	58.0	68.7	84.8	112.1	167.1	332.9	415.9	831.4	
Distance from Antenna Structure Base in Horizontal plane	0.0	5.1	10.6	13.5	16.8	20.3	24.4	29.0	34.6	41.4	50.3	62.2	79.7	108.3	164.6	331.6	414.9	830.9	
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	0.01	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	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.5	0.4	0.3	0.4	0.4	0.1	

Antenna Type 2C2UT070X06F0YS0
Max% 0.53%

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 Pov
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.

ATTACHMENT 3

ALL-POINTS
TECHNOLOGY CORPORATION

STRUCTURAL ANALYSIS REPORT
FOR PROPOSED ANTENNA & APPURTENANCE
UPGRADE ON AN EXISTING 30-ft STEEL MONOPOLE TOWER,
HEBRON, CONNECTICUT

Prepared for
Verizon Wireless

Verizon Wireless Site Ref:
Hebron Fairgrounds CT

VZW Project Code: 20181900683
VZW Location Code 468112
VZW FUZE Project. I.D.: 2498457

June 19, 2019

APT Project #CT141ANTMO10840

☒ 3 SADDLEBROOK DRIVE · KILLINGWORTH, CT 06419 · PHONE 860-663-1697 · FAX 860-663-0935
☐ 116 GRANDVIEW ROAD · CONWAY, NH 03818 · PHONE 603-496-5853 · FAX 603-447-2124

Structural Analysis Report
30-ft Steel Monopole Tower
Hebron, Connecticut
prepared for
Verizon Wireless

EXECUTIVE SUMMARY:

All-Points Technology Corporation, P.C. (APT) performed a structural evaluation of an existing 30-ft monopole tower structure to support a proposed Verizon equipment modification.

The proposed VZW antenna and appurtenance modification consists of the replacement of three (3) existing Metro Radios Outdoor units (MROs) with three (3) proposed Remote Radio Head (RRHs), one (1) existing 2 OVP with one (1) proposed 12 OVP, the installation of one (1) proposed canister antenna, three (3) proposed RRHs, and three (3) proposed Quad Diplexers, and the removal of one (1) fiber splice box. The proposed Verizon equipment shall be fed by one (1) 12x24 hybrid fiber cable routed vertically within the interior of the existing monopole tower structure. Reference is made to the Construction Drawings prepared by this office, marked Rev 0, dated 06/19/19.

Our analysis indicates that the subject tower structure meets the requirements of the 2015 International Building Code (IBC) as amended by the 2018 Connecticut State Building Code, and the TIA-222-G standard with the existing and proposed equipment loading.

INTRODUCTION:

A structural analysis was performed on the above-mentioned communications tower by APT for Verizon Wireless. The subject tower is located at 347 Gilead Street, Hebron, Connecticut.

The following information was utilized in the preparation of this analysis:

- Field observations conducted from grade by APT during December 2018 and March of 2019.
- RFDS provided by Verizon Wireless, dated November 07, 2018.
- Original fabrication drawings prepared by Engineered Endeavors, Project No. 17275, marked Rev 1 August 12, 2014.
- Foundation construction images provided by Verizon Wireless.
- Structural analysis report prepared by Centek Engineering, Centek Project No. 13326.000, dated June 17, 2014.

The analysis was conducted using the following equipment inventory (proposed equipment shown in bold text):

Carrier	Antenna and Appurtenance Make/Model	Elevation (AGL)	Status	Mount Type	Coax/Feed-Line
n/a	5/8" Dia. x 7' Lg. Lightning Rod	34'±,	E	Tower Bracket	n/a
Verizon	One (1) Amphenol 2C2UT0X06F00S0 canister antenna, three (3) Commscope CBC1923Q-43 Quad Diplexers, three (3) Samsung B2/B66a PCS/AWS Remote Radio Heads (RRHs), three (3) Samsung B5/B13 850/700 RRHs, and one (1) RayCap RxxDC-6627-PF-48 (12 OVP)	32.5', 30.0', 28' & 27.5'	P	Three (3) P2.0STD. x 8.5' Lg. Mounting Pipes (To be Cut)	(1) 12x24 Hybrid Fiber Cable
Fairground Equipment	Four (4) 21"± Dia. Projector Horn Type Speakers & Four (4) Wi-Fi Cameras	26'±/24'±	E	Two (2) Stand-off Pipe Mounts	n/a

Notes:

1. E = Existing; P = Proposed.
2. All existing Verizon AC power and fiber lines feeding existing 2 OVP/MRO's to be removed from within pole.
3. One (1) existing Verizon 2 OVP and one (1) existing Verizon fiber splice box to be removed.

STRUCTURAL ANALYSIS:

Methodology:

This structural analysis has been prepared in accordance with the ANSI TIA-222-G standard entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures," the American Institute of Steel Construction (AISC) Manual of Steel Construction and the 2015 International Building Code (IBC) as amended by the 2018 Connecticut State Building Code.

Antenna, appurtenance and mount assembly loads were evaluated utilizing the ANSI TIA-222-G standard.

- Load Case 1: 101mph (3-second gust), 0" ice
- Load Case 2: 50mph (3-second gust) w/ 1.0in ice thickness
- Load Case 3: 60mph (3-second gust) (Service Load)
- Structure Class II,
- Exposure Category C
- Topographic Category 1.

Note:
Based upon IBC 2015/2018 Connecticut State Building Code maximum ultimate wind speed for site location of 130 mph (3-sec gust), equivalent to a nominal design speed of 101 mph (3-sec gust) per exception #5, Section 1609.1.1.

ANALYSIS RESULTS:

The analysis was conducted in accordance with the criteria outlined above with the aforementioned existing and proposed equipment loading. The following table summarizes the results of the analysis:

Component	Usage (%)
Tower Steel Shaft (1)	28%
Base Plate (2)	60%
Anchor Bolts (3)	20%

Notes:
1. Based on ASTM A500-42 for Round HSS14 x 0.375
2. Based on ASTM A36 per EEI Dwg No. 17275-P01-S1.
3. Based on ASTM F1554-55.

Foundation:

Evaluation of the existing foundation was limited to a global stability check of the structure with the existing and proposed loading. The existing foundation consists of a 3-ft square x 3-ft long reinforced concrete pedestal on an 8-ft square x 2-ft thick reinforced concrete pad. Subgrade conditions were based on the presumptive soil parameters per TIA-222-G Section 9.3 and Table F-1 (Annex F) & IBC 2015.

The calculated base reactions utilized in the analysis of the foundation system with the existing and proposed loading are as follows:

Load Effect	Calculated Reactions (4)	Usage (4)
Axial	3 k	Pass
Base Shear	3 k	Pass
Overturning Moment	60 ft-k	(FS = 2.6 >1.0) Pass

Notes:
4. Based Load Combination #3 (0.9DL +1.6 WL, no ice).

CONCLUSIONS AND RECOMMENDATIONS:

In conclusion, we find that the existing 30-ft tall tower structure, located at 347 Gilead Street, Hebron, Connecticut meets the requirements of the 2015 International Building Code, as amended by the 2018 Connecticut State Building Code and the ANSI TIA-222-G standard with the existing and proposed equipment loading.

Sincerely,
APT Engineering

Robert E. Adair, P.E.
Principal

Prepared By:
APT Engineering

Jason R. Mead
Department Manager/
Structural Engineer

Limitations:

This report is based on the following:

1. Tower/structure is properly installed and maintained.
2. All members and components are in a non-deteriorated condition.
3. All required members are in place.
4. All bolts are in place and are properly tightened.
5. Tower/structure is in plumb condition.
6. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.

All-Points Technology Corporation, P.C. (APT) is not responsible for any modifications completed prior to or hereafter which APT is not or was not directly involved. Modifications include but are not limited to:

1. Replacing or reinforcing bracing members.
2. Reinforcing members in any manner.
3. Installing antenna mounts or waveguide cables.
4. Adding or relocating antennas.
5. Extending tower/structure.

APT hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon the information contained and set forth herein. If you are aware of any information which is contrary to that which is contained herein, or you are aware of any defects arising from the original design, material, fabrication and erection deficiencies, you should disregard this report and immediately contact APT. APT disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

Appendix A

Photographs

Verizon Wireless – Hebron Fairgrounds CT
347 Gilead Street, Hebron, CT

Overview image of ±30-ft steel monopole tower.

Image at base of tower.

Photos taken by All-Points Technology Corporation, P.C. during March 2019.

Verizon Wireless – Hebron Fairgrounds CT
347 Gilead Street, Hebron, CT

Image of existing Verizon and fairground pole mounted equipment.

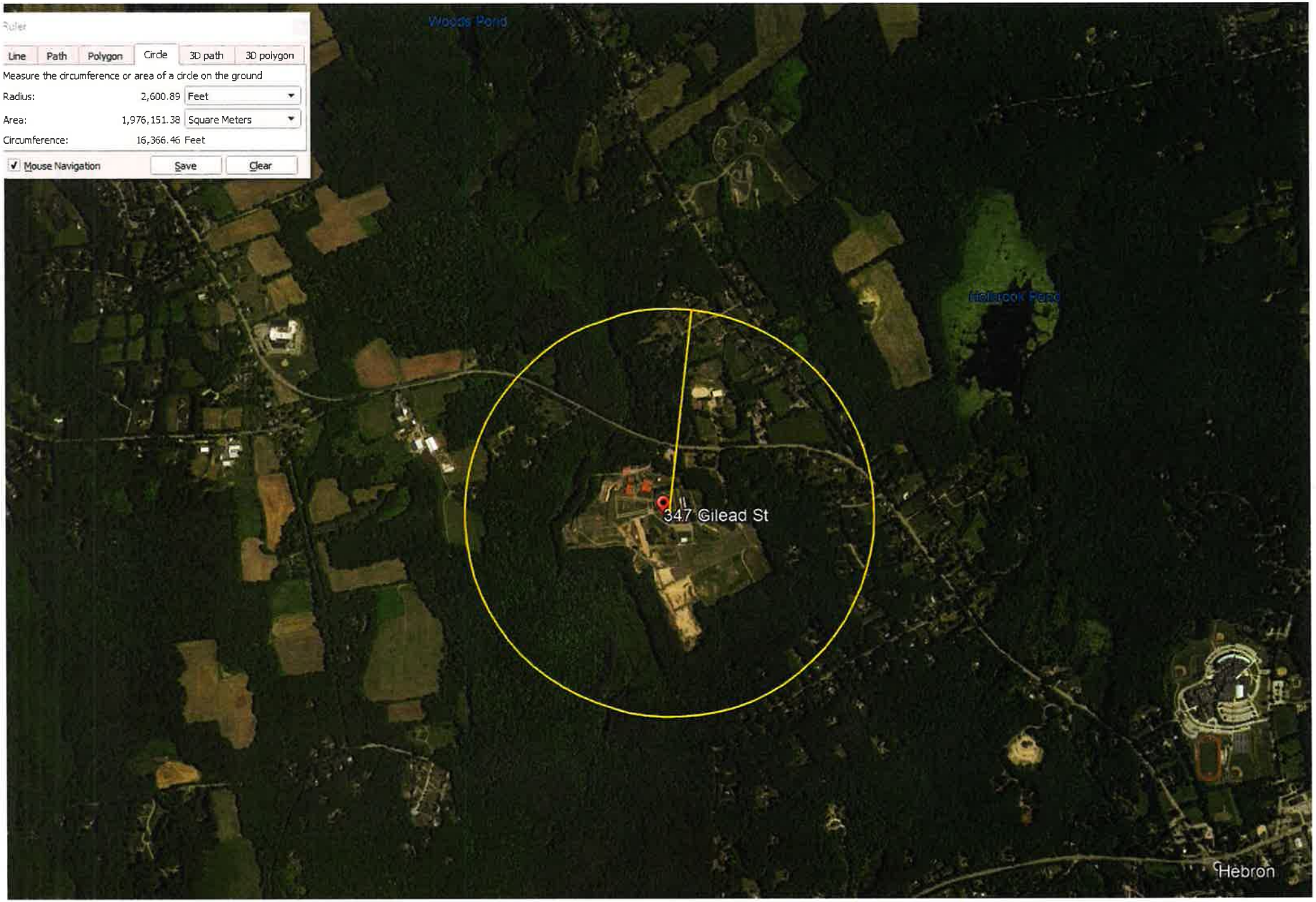
Photos taken by All-Points Technology Corporation, P.C. during March 2019.

Appendix B

Calculations

(APPENDIX N) MUNICIPALITY - SPECIFIC STRUCTURAL DESIGN PARAMETERS												
				Wind Design Parameters								
Municipality	**Ground Snow Load (psf)**	**MCE Spectral Accelerations (%g)**		**Ultimate Design Wind Speeds, V_{ult} (mph)**			**Nominal Design Wind Speeds, V_{asd} (mph)**			**Wind-Borne Debris Regions[1]**		**Hurricane-Prone Regions**
		S_s	S_1	Risk Cat.I	Risk Cat.II	Risk Cat III-IV	Risk Cat. I	Risk Cat. II	Risk Cat. III-IV	Risk Cat. II & III except Occup I-2	Risk Cat III Occup I-2 & Risk Cat. IV	
East Hampton	30	0.177	0.062	120	130	140	93	101	108			Yes
East Hartford	30	0.180	0.064	115	125	135	89	97	105			Yes
East Haven	30	0.182	0.062	120	130	140	93	101	108		Type B	Yes
East Lyme	30	0.164	0.059	125	135	145	97	105	112	Type B	Type A	Yes
Easton	30	0.215	0.066	110	120	130	85	93	101			Yes
East Windsor	35	0.177	0.064	115	125	135	89	97	105			Yes
Ellington	35	0.176	0.064	115	125	135	89	97	105			Yes
Enfield	35	0.176	0.065	110	125	130	85	97	101			Yes
Essex	30	0.168	0.059	120	135	145	93	105	112		Type A	Yes
Fairfield	30	0.215	0.065	115	125	135	89	97	105		Type B	Yes
Farmington	35	0.183	0.064	115	125	135	89	97	105			Yes
Franklin	30	0.171	0.061	120	130	140	93	101	108		Type A	Yes
Glastonbury	30	0.180	0.063	115	125	135	89	97	105			Yes
Goshen	40	0.181	0.065	105	115	125	81	89	97			
Granby	35	0.176	0.065	110	120	130	85	93	101			Yes
Greenwich	30	0.259	0.070	110	120	130	85	93	101			Yes
Griswold	30	0.168	0.060	125	135	145	97	105	112		Type A	Yes
Groton	30	0.160	0.058	125	135	145	97	105	112	Type B	Type A	Yes
Guilford	30	0.176	0.061	120	130	140	93	101	108		Type B	Yes
Haddam	30	0.175	0.061	120	130	140	93	101	108			Yes
Hamden	30	0.185	0.063	115	125	135	89	97	105			Yes
Hampton	35	0.172	0.062	120	130	140	93	101	108			Yes
Hartford	30	0.181	0.064	115	125	135	89	97	105			Yes
Hartland	40	0.175	0.065	110	120	125	85	93	97			Yes
Harwinton	35	0.183	0.065	110	120	130	85	93	101			Yes
Hebron	30	0.177	0.063	120	130	140	93	101	108			Yes
Kent	40	0.188	0.065	105	115	120	81	89	93			
Killingly	40	0.171	0.062	120	130	140	93	101	108			Yes
Killingworth	30	0.173	0.061	120	130	140	93	101	108			Yes
Lebanon	30	0.173	0.062	120	130	140	93	101	108			Yes
Ledyard	30	0.163	0.059	125	135	145	97	105	112		Type A	Yes
Lisbon	30	0.169	0.061	125	135	145	97	105	112		Type A	Yes
Litchfield	40	0.184	0.065	110	120	125	85	93	97			Yes
Lyme	30	0.164	0.059	125	135	145	97	105	112		Type A	Yes
Madison	30	0.173	0.060	120	130	140	93	101	108		Type B	Yes
Manchester	30	0.178	0.064	115	125	135	89	97	105			Yes
Mansfield	35	0.173	0.062	120	130	140	93	101	108			Yes
Marlborough	30	0.177	0.062	120	130	140	93	101	108			Yes
Meriden	30	0.183	0.063	115	125	135	89	97	105			Yes
Middlebury	35	0.191	0.064	110	120	130	85	93	101			Yes
Middlefield	30	0.181	0.063	115	125	135	89	97	105			Yes
Middletown	30	0.180	0.063	115	130	135	89	101	105			Yes
Milford	30	0.194	0.063	115	125	135	89	97	105		Type B	Yes
Monroe	30	0.205	0.065	110	120	130	85	93	101			Yes

State	County	Min. Basic Wind Speed V (mph)	Max. Basic Wind Speed V (mph)	Min. Basic Wind Speed with Ice V_i (mph)	Max. Basic Wind Speed with Ice V_i (mph)	Min. Design Ice Thickness t_i (in.)	Max. Design Ice Thickness t_i (in.)	Design Frost Depth (in.)	Min. S_S	Max. S_S	Notes
CO	LINCOLN	90	90	50	50	0.00	0.25	50	0.12	0.16	2
CO	LOGAN	90	90	50	60	0.25	0.25	50	0.09	0.11	-
CO	MESA	90	90	40	50	0.00	0.25	50	0.27	0.54	2
CO	MINERAL	90	90	40	40	0.00	0.00	40	0.37	0.49	2
CO	MOFFAT	90	90	50	50	0.00	0.25	50	0.26	0.37	2
CO	MONTEZUMA	90	90	40	40	0.00	0.25	30	0.19	0.37	2
CO	MONTROSE	90	90	40	40	0.00	0.25	40	0.26	0.55	2
CO	MORGAN	90	90	50	50	0.00	0.25	50	0.11	0.15	2
CO	OTERO	90	90	50	50	0.00	0.25	40	0.14	0.18	2
CO	OURAY	90	90	40	40	0.00	0.25	40	0.43	0.56	2
CO	PARK	90	90	50	50	0.00	0.00	50	0.22	0.35	2
CO	PHILLIPS	90	90	50	60	0.25	0.50	50	0.08	0.09	-
CO	PITKIN	90	90	50	50	0.00	0.00	50	0.37	0.54	2
CO	PROWERS	90	90	50	50	0.25	0.50	40	0.11	0.12	-
CO	PUEBLO	90	90	50	50	0.00	0.00	40	0.16	0.23	1, 2
CO	RIO BLANCO	90	90	40	50	0.00	0.25	50	0.27	0.40	2
CO	RIO GRANDE	90	90	40	40	0.00	0.00	40	0.34	0.39	2
CO	ROUTT	90	90	50	50	0.00	0.00	50	0.25	0.31	2
CO	SAGUACHE	90	90	40	50	0.00	0.00	40	0.35	0.49	1, 2
CO	SAN JUAN	90	90	40	40	0.00	0.00	40	0.37	0.54	2
CO	SAN MIGUEL	90	90	40	40	0.00	0.25	40	0.24	0.51	2
CO	SEDGWICK	90	90	60	60	0.25	0.50	50	0.08	0.09	-
CO	SUMMIT	90	90	50	50	0.00	0.00	50	0.27	0.33	2
CO	TELLER	90	90	50	50	0.00	0.00	40	0.18	0.22	1, 2
CO	WASHINGTON	90	90	50	50	0.00	0.25	50	0.09	0.13	-
CO	WELD	90	90	50	50	0.00	0.25	50	0.11	0.21	1, 2
CO	YUMA	90	90	50	50	0.25	0.50	50	0.08	0.11	-
CT	FAIRFIELD	90	110	40	50	0.75	0.75	40	0.30	0.41	1, 2
CT	HARTFORD	90	105	40	50	1.00	1.00	40	0.26	0.28	-
CT	LITCHFIELD	90	100	40	40	0.75	1.00	40	0.26	0.33	1, 2
CT	MIDDLESEX	100	120	50	50	0.75	0.75	40	0.25	0.28	-
CT	NEW HAVEN	95	115	50	50	0.75	0.75	40	0.26	0.32	-
CT	NEW LONDON	105	120	50	50	0.75	0.75	40	0.24	0.27	-
CT	TOLLAND	95	105	40	50	0.75	1.00	40	0.26	0.27	-
CT	WINDHAM	100	110	40	50	0.75	1.00	40	0.26	0.27	-
DE	KENT	90	105	30	40	0.50	0.75	30	0.17	0.25	-
DE	NEW CASTLE	90	90	40	40	0.75	0.75	30	0.24	0.33	-
DE	SUSSEX	95	120	40	40	0.50	0.50	20	0.13	0.18	-
FL	ALACHUA	100	105	30	30	0.00	0.00	0	0.11	0.13	-
FL	BAKER	100	105	30	30	0.00	0.00	0	0.13	0.15	-
FL	BAY	115	130	30	30	0.00	0.25	0	0.08	0.11	-
FL	BRADFORD	100	105	30	30	0.00	0.00	0	0.12	0.14	-
FL	BREVARD	115	135	30	30	0.00	0.00	0	0.08	0.11	-
FL	BROWARD	120	140	30	30	0.00	0.00	0	0.06	0.08	-
FL	CALHOUN	110	120	30	30	0.00	0.00	0	0.09	0.11	-
FL	CHARLOTTE	110	130	30	30	0.00	0.00	0	0.08	0.09	-
FL	CITRUS	100	115	30	30	0.00	0.00	0	0.09	0.11	-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Path
Polygon
Circle
3D path
3D polygon
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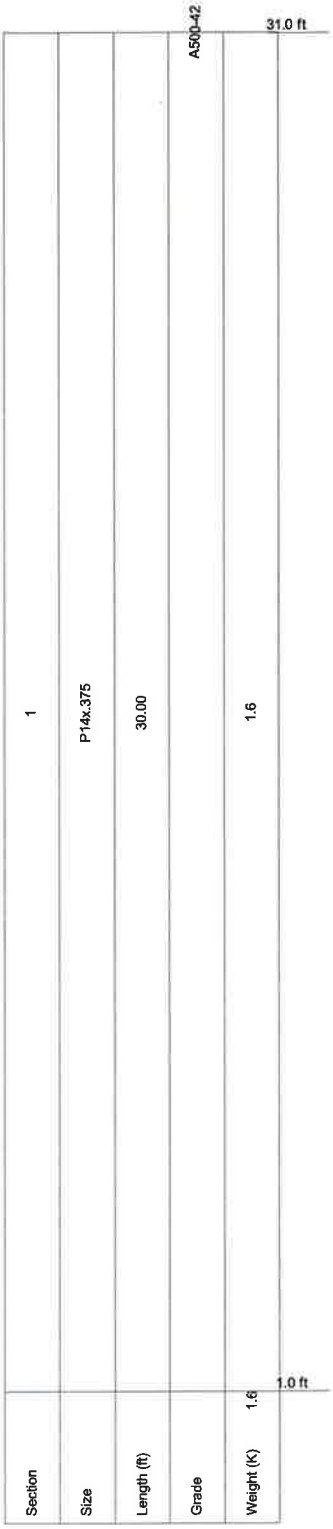
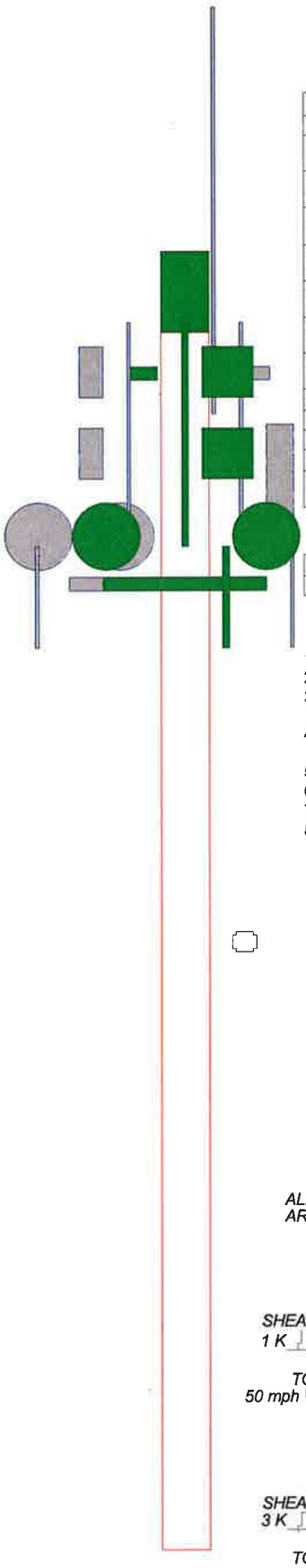
Area: 1,976,151.38 Square Meters
Circumference: 16,366.46 Feet
Mouse Navigation
Save
Clear
Woods Pond
Hollibrook Pond
347 Gilead St
Hebron





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 5/8x7'	34	Samsung B5/B13 700/850 RRH (Verizon)	28
2C2UT070X06F00S0 Quad Band Canister (Verizon)	32	Samsung B5/B13 700/850 RRH (Verizon)	28
Samsung B2/B66 PCS/AWS RRH (Verizon)	30	Raycap RDC-6627-PF-48 OVP (Verizon)	27.5
Samsung B2/B66 PCS/AWS RRH (Verizon)	30	21" Dia. Projector Horn	26
Samsung B2/B66 PCS/AWS RRH (Verizon)	30	21" Dia. Projector Horn	26
Commscope CBC1923Q-43 Quad Diplexer (Verizon)	30	21" Dia. Projector Horn	26
Commscope CBC1923Q-43 Quad Diplexer (Verizon)	30	21" Dia. Projector Horn	26
Commscope CBC1923Q-43 Quad Diplexer (Verizon)	30	Custom Pipe Mount	25
Valmont Uni-Tri Bracket (Verizon)	29	Custom Pipe Mount	25
P2.0 x 5.5' Pipe Mount (Verizon)	28.5	Valmont Uni-Tri Bracket	25
P2.0 x 5.5' Pipe Mount (Verizon)	28.5	P2.0 x 2.5' Pipe Mount	24.5
P2.0 x 5.5' Pipe Mount (Verizon)	28.5	P2.0 x 2.5' Pipe Mount	24.5
Samsung B5/B13 700/850 RRH (Verizon)	28	P2.0 x 2.5' Pipe Mount	24.5
		WiFi Camera	24
		(3) WiFi Camera	24

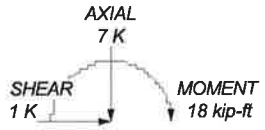
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-42	42 ksi	58 ksi			

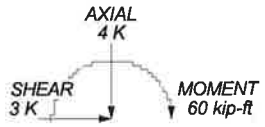
TOWER DESIGN NOTES

1. Tower is located in Tolland County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 59.9%

ALL REACTIONS ARE FACTORED



TORQUE 0 kip-ft
50 mph WIND - 1.0000 in ICE



TORQUE 1 kip-ft
REACTIONS - 101 mph WIND

All-Points Engineering
3 Saddlebrook Drive
Killingworth, CT 06419
Phone: (860) 663-1697
FAX: (860) 663-0935

Job:	30-ft Monopole - 347 Gilead Street, Hebron, CT 062		
Project:	CT141ANTMO10840 Hebron Fairgrounds		
Client: Verizon Wireless	Drawn by: JRM	App'd:	
Code: TIA-222-G	Date: 06/19/19	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Tolland County, Connecticut.
Basic wind speed of 101 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
HB158-1-13U6-S6F 18 (Verizon)	C	No	No	Inside Pole	29.50 - 1.00	1	No Ice	0.00	1.90
							1/2" Ice	0.00	1.90
							1" Ice	0.00	1.90

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	31.00-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.05

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	31.00-1.00	A	1.860	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.05

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	31.00-1.00	0.0000	0.0000	0.0000	0.0000

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Discrete Tower Loads

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 K
2C2UT070X06F00S0 Quad Band Canister (Verizon)	A	None		0.0000	32.00	No Ice 1/2" Ice 1" Ice	1.22 1.90 2.10	1.22 1.90 2.10	0.02 0.05 0.08
Lightning Rod 5/8x7'	B	From Face	0.25 0.00 0.00	0.0000	34.00	No Ice 1/2" Ice 1" Ice	0.44 1.15 1.88	0.44 1.15 1.88	0.03 0.03 0.04
P2.0 x 5.5' Pipe Mount (Verizon)	A	From Face	1.00 0.00 0.00	0.0000	28.50	No Ice 1/2" Ice 1" Ice	1.31 1.70 2.04	1.31 1.70 2.04	0.02 0.03 0.04
P2.0 x 5.5' Pipe Mount (Verizon)	B	From Face	1.00 0.00 0.00	0.0000	28.50	No Ice 1/2" Ice 1" Ice	1.31 1.70 2.04	1.31 1.70 2.04	0.02 0.03 0.04
P2.0 x 5.5' Pipe Mount (Verizon)	C	From Face	1.00 0.00 0.00	0.0000	28.50	No Ice 1/2" Ice 1" Ice	1.31 1.70 2.04	1.31 1.70 2.04	0.02 0.03 0.04
Valmont Uni-Tri Bracket (Verizon)	C	None		0.0000	29.00	No Ice 1/2" Ice 1" Ice	1.75 1.94 2.13	1.75 1.94 2.13	0.29 0.31 0.32
Raycap RDC-6627-PF-48 OVP (Verizon)	B	From Face	1.50 1.00 0.00	0.0000	27.50	No Ice 1/2" Ice 1" Ice	4.06 4.32 4.58	3.10 3.34 3.58	0.03 0.07 0.11
Samsung B5/B13 700/850 RRH (Verizon)	A	From Face	1.50 -1.00 0.00	0.0000	28.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.08 0.10 0.12
Samsung B5/B13 700/850 RRH (Verizon)	B	From Face	1.50 -1.00 0.00	0.0000	28.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	0.08 0.10 0.12

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 K
Samsung B5/B13 700/850	C	From Face	1.50	0.0000	28.00	No Ice	1.88	1.01	0.08
RRH			-1.00			1/2" Ice	2.05	1.14	0.10
(Verizon)			0.00			1" Ice	2.22	1.28	0.12
Samsung B2/B66 PCS/AWS	A	From Face	1.50	0.0000	30.00	No Ice	1.88	1.25	0.10
RRH			-1.00			1/2" Ice	2.05	1.39	0.12
(Verizon)			0.00			1" Ice	2.22	1.54	0.14
Samsung B2/B66 PCS/AWS	B	From Face	1.50	0.0000	30.00	No Ice	1.88	1.25	0.10
RRH			-1.00			1/2" Ice	2.05	1.39	0.12
(Verizon)			0.00			1" Ice	2.22	1.54	0.14
Samsung B2/B66 PCS/AWS	C	From Face	1.50	0.0000	30.00	No Ice	1.88	1.25	0.10
RRH			-1.00			1/2" Ice	2.05	1.39	0.12
(Verizon)			0.00			1" Ice	2.22	1.54	0.14
Commscope CBC1923Q-43	A	From Face	1.00	0.0000	30.00	No Ice	0.32	0.13	0.01
Quad Diplexer			1.00			1/2" Ice	0.39	0.17	0.01
(Verizon)			0.00			1" Ice	0.48	0.23	0.01
Commscope CBC1923Q-43	B	From Face	1.00	0.0000	30.00	No Ice	0.32	0.13	0.01
Quad Diplexer			1.00			1/2" Ice	0.39	0.17	0.01
(Verizon)			0.00			1" Ice	0.48	0.23	0.01
Commscope CBC1923Q-43	C	From Face	1.00	0.0000	30.00	No Ice	0.32	0.13	0.01
Quad Diplexer			1.00			1/2" Ice	0.39	0.17	0.01
(Verizon)			0.00			1" Ice	0.48	0.23	0.01
Custom Pipe Mount	A	From Face	1.50	0.0000	25.00	No Ice	4.00	4.00	0.09
			0.00			1/2" Ice	5.30	5.30	0.12
			0.00			1" Ice	6.60	6.60	0.14
Custom Pipe Mount	C	From Face	1.50	0.0000	25.00	No Ice	4.00	4.00	0.09
			0.00			1/2" Ice	5.30	5.30	0.12
			0.00			1" Ice	6.60	6.60	0.14
Valmont Uni-Tri Bracket	C	None		0.0000	25.00	No Ice	1.75	1.75	0.29
						1/2" Ice	1.94	1.94	0.31
						1" Ice	2.13	2.13	0.32
P2.0 x 2.5' Pipe Mount	A	From Face	3.00	0.0000	24.50	No Ice	0.46	0.46	0.01
			-1.00			1/2" Ice	0.62	0.62	0.01
			0.00			1" Ice	0.78	0.78	0.02
P2.0 x 2.5' Pipe Mount	B	From Face	3.00	0.0000	24.50	No Ice	0.46	0.46	0.01
			-1.00			1/2" Ice	0.62	0.62	0.01
			0.00			1" Ice	0.78	0.78	0.02
P2.0 x 2.5' Pipe Mount	C	From Face	3.00	0.0000	24.50	No Ice	0.46	0.46	0.01
			-1.00			1/2" Ice	0.62	0.62	0.01
			0.00			1" Ice	0.78	0.78	0.02
WiFi Camera	C	From Face	3.50	0.0000	24.00	No Ice	0.34	0.51	0.00
			-1.00			1/2" Ice	0.44	0.66	0.00
			0.00			1" Ice	0.54	0.81	0.00
(3) WiFi Camera	A	From Face	3.50	0.0000	24.00	No Ice	0.34	0.51	0.00
			-1.00			1/2" Ice	0.44	0.66	0.00
			0.00			1" Ice	0.54	0.81	0.00

Dishes

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 (K)
21" Dia. Projector Horn	C	Paraboloid w/o Radome	From Centroid -Face	3.00 2.00 0.00	0.0000		26.00	1.75	No Ice 1/2" Ice 1" Ice	2.41 2.64 2.87	0.02 0.03 0.05
21" Dia. Projector Horn	C	Paraboloid w/o Radome	From Centroid -Face	3.00 -2.00 0.00	0.0000		26.00	1.75	No Ice 1/2" Ice 1" Ice	2.41 2.64 2.87	0.02 0.03 0.05
21" Dia. Projector Horn	A	Paraboloid w/o Radome	From Centroid -Face	3.00 2.00 0.00	0.0000		26.00	1.75	No Ice 1/2" Ice 1" Ice	2.41 2.64 2.87	0.02 0.03 0.05
21" Dia. Projector Horn	A	Paraboloid w/o Radome	From Centroid -Face	3.00 -2.00 0.00	0.0000		26.00	1.75	No Ice 1/2" Ice 1" Ice	2.41 2.64 2.87	0.02 0.03 0.05

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp

Comb. No.	Description
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	33	6.81	-0.05	-0.80
	Max. H_x	21	2.93	2.44	-0.02
	Max. H_z	3	2.93	0.01	2.62
	Max. M_x	2	59.98	0.01	2.62
	Max. M_z	8	57.83	-2.54	-0.14
	Max. Torsion	2	0.52	0.01	2.62
	Min. Vert	21	2.93	2.44	-0.02
	Min. H_x	9	2.93	-2.54	-0.14
	Min. H_z	15	2.93	-0.24	-2.60
	Min. M_x	14	-59.86	-0.24	-2.60
	Min. M_z	20	-55.94	2.44	-0.02
	Min. Torsion	10	-0.57	-2.25	-1.32

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	3.26	0.00	0.00	0.13	0.19	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	3.91	-0.01	-2.62	-59.98	0.40	-0.52
0.9 Dead+1.6 Wind 0 deg - No Ice	2.93	-0.01	-2.62	-59.89	0.34	-0.52
1.2 Dead+1.6 Wind 30 deg - No Ice	3.91	1.15	-2.28	-52.13	-25.81	-0.37
0.9 Dead+1.6 Wind 30 deg - No Ice	2.93	1.15	-2.28	-52.06	-25.82	-0.37
1.2 Dead+1.6 Wind 60 deg - No Ice	3.91	2.28	-1.32	-30.22	-52.12	0.05
0.9 Dead+1.6 Wind 60 deg - No Ice	2.93	2.28	-1.32	-30.20	-52.06	0.05
1.2 Dead+1.6 Wind 90 deg - No Ice	3.91	2.54	0.14	3.61	-57.83	0.46
0.9 Dead+1.6 Wind 90 deg - No Ice	2.93	2.54	0.14	3.56	-57.77	0.46

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
1.2 Dead+1.6 Wind 120 deg - No Ice	3.91	2.25	1.32	30.37	-51.49	0.57
0.9 Dead+1.6 Wind 120 deg - No Ice	2.93	2.25	1.32	30.27	-51.43	0.57
1.2 Dead+1.6 Wind 150 deg - No Ice	3.91	1.43	2.18	50.08	-32.85	0.49
0.9 Dead+1.6 Wind 150 deg - No Ice	2.93	1.43	2.18	49.93	-32.83	0.49
1.2 Dead+1.6 Wind 180 deg - No Ice	3.91	0.24	2.60	59.86	-5.70	0.31
0.9 Dead+1.6 Wind 180 deg - No Ice	2.93	0.24	2.60	59.69	-5.75	0.31
1.2 Dead+1.6 Wind 210 deg - No Ice	3.91	-1.24	2.12	48.44	28.51	0.06
0.9 Dead+1.6 Wind 210 deg - No Ice	2.93	-1.24	2.12	48.30	28.39	0.06
1.2 Dead+1.6 Wind 240 deg - No Ice	3.91	-2.14	1.24	28.47	48.99	-0.05
0.9 Dead+1.6 Wind 240 deg - No Ice	2.93	-2.14	1.24	28.37	48.82	-0.05
1.2 Dead+1.6 Wind 270 deg - No Ice	3.91	-2.44	0.02	0.65	55.94	-0.15
0.9 Dead+1.6 Wind 270 deg - No Ice	2.93	-2.44	0.02	0.61	55.76	-0.15
1.2 Dead+1.6 Wind 300 deg - No Ice	3.91	-2.13	-1.51	-34.83	48.69	-0.36
0.9 Dead+1.6 Wind 300 deg - No Ice	2.93	-2.13	-1.51	-34.79	48.52	-0.36
1.2 Dead+1.6 Wind 330 deg - No Ice	3.91	-1.17	-2.34	-53.58	26.68	-0.49
0.9 Dead+1.6 Wind 330 deg - No Ice	2.93	-1.17	-2.34	-53.51	26.57	-0.49
1.2 Dead+1.0 Ice+1.0 Temp	6.81	0.00	0.00	0.42	0.37	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	6.81	-0.00	-0.80	-17.44	0.40	-0.17
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	6.81	0.37	-0.70	-15.09	-7.69	-0.12
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	6.81	0.70	-0.40	-8.58	-15.12	-0.01
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	6.81	0.78	0.03	1.15	-17.01	0.11
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	6.81	0.69	0.40	9.37	-14.99	0.16
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	6.81	0.43	0.68	15.42	-9.18	0.16
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	6.81	0.05	0.80	18.18	-0.89	0.12
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	6.81	-0.39	0.66	15.08	8.90	0.06
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	6.81	-0.67	0.39	8.98	15.10	0.01
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	6.81	-0.76	0.00	0.53	17.25	-0.05
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	6.81	-0.66	-0.44	-9.55	15.03	-0.12
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	6.81	-0.37	-0.71	-15.40	8.51	-0.16
Dead+Wind 0 deg - Service	3.26	-0.00	-0.52	-11.72	0.22	-0.10
Dead+Wind 30 deg - Service	3.26	0.23	-0.45	-10.17	-4.94	-0.07
Dead+Wind 60 deg - Service	3.26	0.45	-0.26	-5.85	-10.13	0.01
Dead+Wind 90 deg - Service	3.26	0.50	0.03	0.81	-11.25	0.09

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 120 deg - Service	3.26	0.44	0.26	6.09	-10.00	0.11
Dead+Wind 150 deg - Service	3.26	0.28	0.43	9.97	-6.33	0.10
Dead+Wind 180 deg - Service	3.26	0.05	0.51	11.90	-0.98	0.06
Dead+Wind 210 deg - Service	3.26	-0.24	0.42	9.65	5.76	0.01
Dead+Wind 240 deg - Service	3.26	-0.42	0.24	5.71	9.80	-0.01
Dead+Wind 270 deg - Service	3.26	-0.48	0.00	0.23	11.17	-0.03
Dead+Wind 300 deg - Service	3.26	-0.42	-0.30	-6.76	9.74	-0.07
Dead+Wind 330 deg - Service	3.26	-0.23	-0.46	-10.46	5.40	-0.10

Maximum Tower Deflections - Service Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	31 - 1	0.515	45	0.1152	0.0026

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
34.00	Lightning Rod 5/8x7'	45	0.515	0.1152	0.0026	Inf
32.00	2C2UT070X06F00S0 Quad Band Canister	45	0.515	0.1152	0.0026	Inf
30.00	Samsung B2/B66 PCS/AWS RRH	45	0.497	0.1113	0.0025	Inf
29.00	Valmont Uni-Tri Bracket	45	0.480	0.1075	0.0024	Inf
28.50	P2.0 x 5.5' Pipe Mount	45	0.472	0.1056	0.0024	Inf
28.00	Samsung B5/B13 700/850 RRH	45	0.463	0.1036	0.0024	Inf
27.50	Raycap RDC-6627-PF-48 OVP	45	0.454	0.1017	0.0023	Inf
26.00	21" Dia. Projector Horn	45	0.429	0.0960	0.0022	Inf
25.00	Custom Pipe Mount	45	0.412	0.0921	0.0021	Inf
24.50	P2.0 x 2.5' Pipe Mount	45	0.403	0.0902	0.0020	Inf
24.00	WiFi Camera	45	0.394	0.0883	0.0020	Inf

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	31 - 1	2.580	14	0.5762	0.0132

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
34.00	Lightning Rod 5/8x7'	14	2.580	0.5762	0.0132	Inf
32.00	2C2UT070X06F00S0 Quad Band Canister	14	2.580	0.5762	0.0132	Inf
30.00	Samsung B2/B66 PCS/AWS RRH	14	2.494	0.5570	0.0128	Inf
29.00	Valmont Uni-Tri Bracket	14	2.408	0.5378	0.0124	Inf
28.50	P2.0 x 5.5' Pipe Mount	14	2.365	0.5282	0.0121	Inf
28.00	Samsung B5/B13 700/850 RRH	14	2.322	0.5186	0.0119	Inf
27.50	Raycap RDC-6627-PF-48 OVP	14	2.279	0.5090	0.0117	Inf
26.00	21" Dia. Projector Horn	14	2.150	0.4802	0.0110	Inf
25.00	Custom Pipe Mount	14	2.064	0.4610	0.0106	Inf
24.50	P2.0 x 2.5' Pipe Mount	14	2.021	0.4514	0.0104	Inf
24.00	WiFi Camera	14	1.978	0.4418	0.0102	Inf

Base Plate Design Data

Plate Thickness	Number of Anchor Bolts	Anchor Bolt Size	Actual Allowable Ratio Bolt Tension K	Actual Allowable Ratio Concrete Stress ksi	Actual Allowable Ratio Plate Stress ksi	Actual Allowable Ratio Stiffener Stress ksi	Controlling Condition	Critical Ratio
in		in						
1.2500	8	1.5000	14.68 74.55 0.20	0.749 4.080 0.18	19.414 32.400 0.60		Plate	0.60 ✔

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
L1	31 - 1 (1)	P14x.375	30.00	0.00	0.0	16.0516	-3.91	606.75	0.006

Pole Bending Design Data

Section No.	Elevation	Size	M_{ux}	ϕM_{nx}	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy}	ϕM_{ny}	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	ft		kip-ft	kip-ft		kip-ft	kip-ft	
L1	31 - 1 (1)	P14x.375	60.25	219.34	0.275	0.00	219.34	0.000

tnxTower	Job: 30-ft Monopole - 347 Gilead Street, Hebron, CT 06248	Page: 9 of 9
All-Points Engineering 3 Saddlebrook Drive Killingworth, CT 06419 Phone: (860) 663-1697 FAX: (860) 663-0935	Project: CT141ANTMO10840 Hebron Fairgrounds	Date: 11:45:17 06/19/19
	Client: Verizon Wireless	Designed by: JRM

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	31 - 1 (1)	P14x.375	2.64	303.38	0.009	0.05	335.48	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	31 - 1 (1)	0.006	0.275	0.000	0.009	0.000	0.281 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	31 - 1	Pole	P14x.375	1	-3.91	606.75	28.1	Pass
							Summary	
							Pole (L1) 28.1	Pass
							Base Plate 59.9	Pass
							RATING = **59.9**	**Pass**

Program Version 8.0.5.0 - 11/28/2018 File:C:/APT Work/Hebron Fairgrounds - ANTMO10840/Engineering/Structure/Tower Analysis/tnxTower/Hebron Fairgrounds CT.eri

ALL-POINTS TECHNOLOGY CORPORATION
3 Saddlebrook Drive,
Killingworth, CT 06419
PH: 860-663-1697

Monopole Pad & Pier Foundation Analysis per TIA-222-G

Input Data:

Tower Reactions (0.9DL +1.6WL):

Overturning Moment =	$Moment := 60 \cdot ft \cdot kip$	(Input From tnxTower)
Axial Force =	$Axial := 3 \cdot kip$	(Input From tnxTower)
Shear Force =	$Shear := 3 \cdot kip$	(Input From tnxTower)

Footing Data:

Overall Depth of Footing =	$D_f := 4.0\ ft$	(User Input)
Length of Pier =	$L_p := 3.0\ ft$	(User Input)
Extension of Pier Above Grade =	$L_{pg} := 1.0\ ft$	(User Input)
Diameter of Pier =	$d_p := 3.0\ ft$	(User Input)
Thickness of Footing =	$T_f := 2.0 \cdot ft$	(User Input)
Width of Footing =	$W_f := 8.0 \cdot ft$	(User Input)

Anchor Bolt Data:

ASTM F1554 Grade 55

Length of Anchor Bolts =	$L := 72.0\ in$	(User Input)
Base Plate Bolt Circle =	$D_{bc} := 19.00 \cdot in$	(User Input)
Bolt Projection Above Pier=	$l_{bp} := 12.0\ in$	(User Input)
Nominal Diameter of Anchor Bolts =	$D := 1.50\ in$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)
Steel Reinforcment Yield Strength =	$F_y := 60000\ psi$	(User Input)
Anchor Bolt Yield Strength =	$f_{ya} := 50000 \cdot psi$	(User Input)
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)
Ultimate Soil Bearing Capacity =	$q_u := 6000 \cdot psf$	(Presumptive Soil Bearing Value)
Allowable Soil Bearing Capacity =	$q_s := 3000 \cdot psf$	(Presumptive Soil Bearing Value)
Unit Weight of Soil =	$\gamma_{soil} := 110 \cdot pcf$	(User Input)
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)
Foundation Bouyancy =	$Bouyancy := 0$ (Yes=1 / No=0)	(User Input)
Depth to Neglect =	$n := 0\ ft$	(User Input)
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$ (Use 0 for Sandy Soil)	(User Input)
Coefficient of Friction Beween Concrete =	$\mu := 0.45$	(User Input)

Pier Reinforcement:			
Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.000 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 12$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3\ in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI 318-14 Section 25.4.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	
Pad Reinforcement:			
Bar Size =	$BS_{top} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.000 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 8$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.000 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 8$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI 318-14 Section 25.4.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	
Calculated Factors:			
Pier Reinforcement Bar Area =	$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785\ in^2$		
Pad Top Reinforcement Bar Area =	$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.785\ in^2$		
Pad Bottom Reinforcement Bar Area =	$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.785\ in^2$		
Coefficient of Lateral Soil Pressure =	$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$		

ALL-POINTS TECHNOLOGY CORPORATION
3 Saddlebrook Drive,
Killingworth, CT 06419
PH: 860-663-1697

Stability of Footing:

Adjusted Concrete Unit Weight =	$\gamma_c := \text{if}(Bouyancy = 1, \gamma_{conc} - 62.4 \cdot pcf, \gamma_{conc}) = 150\ pcf$
Adjusted Soil Unit Weight =	$\gamma_s := \text{if}(Bouyancy = 1, \gamma_{soil} - 62.4 \cdot pcf, \gamma_{soil}) = 110\ pcf$
Weight of Concrete Pedestal/Pier =	$WT_{ped} = 4.05\ kip$
Weight of Concrete Pad =	$WT_c = 23.25\ kip$
Weight of Soil Above Footing =	$WT_{s1} = 12.52\ kip$
Weight of Soil Wedge at Back Face =	$WT_{s2} = 4.06\ kip$
Weight of Soil Wedge at back face Corners =	$WT_{s3} = 2.71\ kip$
Total Nominal Resisting Weight =	$WT_{tot} = 38.77\ kip$
Total Overturning Moment =	$M_{ot} = 75\ kip \cdot ft$
Resisting Design Moment =	$M_r = 192\ kip \cdot ft$
Required Factor of Safety =	$FS_{req} := 1.0$
Provided Factor of Safety =	$FS = 2.56$
	$OverTurning\_Usage := \text{if}(FS \geq FS_{req}, \text{"Okay"}, \text{"No Good"})$
	$OverTurning\_Usage = \text{"Okay"}$

Appendix C

Reference Materials

2C2UT070X06Fxys0

QUAD BAND | 3-SECTOR, CLOVER-SHAPE | CANISTER ANTENNA | X-POL | FIXED TILT | 610 MM (24.0 IN)

Features

- 3-Sector, Clover-Shape configuration with 24 connectors
- Ideal for Small Cell / DAS applications
- Available with 4.3-10 connectors
- Four unique mounting options
- Available for order with a grey, brown or black radome

Connector Description

The antenna has 24 connectors located at the bottom.

Low Band #1	R1	696-960 MHz	(6x) 4.3-10 Female
Low Band #2	R2	696-960 MHz	(6x) 4.3-10 Female
Mid Band #1	Y1	1695-2700 MHz	(6x) 4.3-10 Female
Mid Band #2	Y2	1695-2700 MHz	(6x) 4.3-10 Female

Electrical Characteristics

Electrical Specifications shown are the average values of antennas in Sector #1.

	R1 R2		Y1 Y2			
Frequency Bands (MHz)	(2x) 696-960 MHz		(2x) 1695-2700 MHz			
	696-806	806-960	1695-1880	1850-1990	1920-2200	2300-2700
Polarization	(2x) ±45°		(2x) ±45°			
Horizontal Beamwidth	75° ± 4.2°	70° ± 3.1°	75° ± 11.6°	81° ± 6.4°	77° ± 9.2°	63° ± 7.7°
Vertical Beamwidth	80° ± 12.5°	85.5° ± 16.4°	18.4° ± 1.7°	17.1° ± 1.5°	16.1° ± 1.5°	12.8° ± 1.1°
Gain (dBi)	7.1 ± 0.5	6.6 ± 0.8	12.8 ± 1.3	13.2 ± 1.3	13.3 ± 1.3	13.8 ± 1.1
Upper Sidelobe Suppression	N/A	N/A	> 10 dB	> 12 dB	> 13 dB	> 12 dB
Front-to-Back Ratio	> 25 dB	> 27 dB	> 19 dB	> 20 dB	> 22 dB	> 22 dB
Cross Polar Ratio - Main Direction	> 18 dB	> 14 dB	> 19 dB	> 17 dB	> 17 dB	> 15 dB
Electrical Downtilt (°)	0		(y) 0, 6			
Impedance	50Ω		50Ω			
VSWR	≤ 1.5:1		≤ 1.5:1			
Isolation Between Ports	23 dB		22 dB			
IM3 (2x20W carrier)	< -153 dBc		< -153 dBc			
Input Power	(12x) 500 W		(12x) 300 W			
Diplexed	No					
Number of Sectors, Sector Spacing and/or Pattern Shape	3 Sectors, 120° Spacing, Clover-Shape					
Lightning Protection	Direct Ground					

Mechanical Characteristics

Antenna Dimensions (Height x Diameter)	610 x 371	mm	24.0 x 14.6	in
Weight without Mounting Bracket Kit	11.3	kg	24.9	lbs
Antenna Volume	0.07	m^3	2.3	ft^3
Survival Wind Speed	241	km/hr	150	mph
Wind Area	0.22	m^2	2.4	ft^2
Wind Load (160 km/hr or 100 mph)	191	N	43	lbf

CBC1923Q-43 | E14F55P12

Quad-pack Diplexer PCS/AWS+WCS, DC block, 4.3-10

- Full performance in a fraction of the size
- High power handling
- Includes AWS-3 and AWS-4 bands
- New 4.3-10 connectors for improved PIM performance and size reduction
- dc/AISG blocking on all ports (DC grounded)
- Ideal for small cell applications

General Specifications

Modularity	4-Quad

Electrical Specifications

Sub-module	1 | 2	1 | 2
Branch	1	2
Port Designation	Port 1695-1780/2110-2360	Port 1850-1990
License Band	AWS 1700 WCS 2300 TDD 2300	PCS 1900

Electrical Specifications, Band Pass

Frequency Range	1695–1780 MHz 2110–2360 MHz	1850–1990 MHz
Insertion Loss, typical	0.25 dB	0.25 dB
Total Group Delay, maximum	15 ns	15 ns
Return Loss, typical	23 dB	23 dB
Isolation, typical	40 dB	40 dB
Input Power, RMS, maximum	100 W	100 W
Input Power, PEP, maximum	1500 W	1500 W
3rd Order PIM, minimum	-161 dBc	-161 dBc
3rd Order PIM Test Method	1 x 20 W AWS CW tone 1 x 20 W PCS CW tone	2 x 20 W CW tones

Product Classification

Product Type	Diplexer

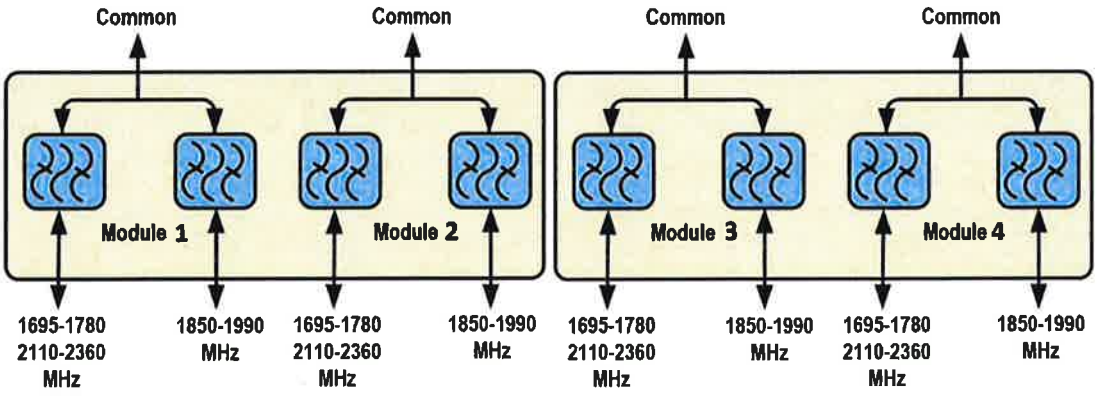
dc Power/Alarm Electrical Specifications

Lightning Surge Current	5 kA
Lightning Surge Current Waveform	8/20 waveform

Electrical Specifications

Impedance	50 ohm

Block Diagram



DC/AISG blocking on all ports(DC Grounded)

Mechanical Specifications

RF Connector Interface	4.3-10 Female
RF Connector Interface Body Style	Long neck
Color	Gray
Finish	Painted
Wind Loading, frontal	12.0 N @ 150 km/h 2.7 lbf @ 150 km/h
Wind Loading, lateral	7.0 N @ 150 km/h 1.6 lbf @ 150 km/h

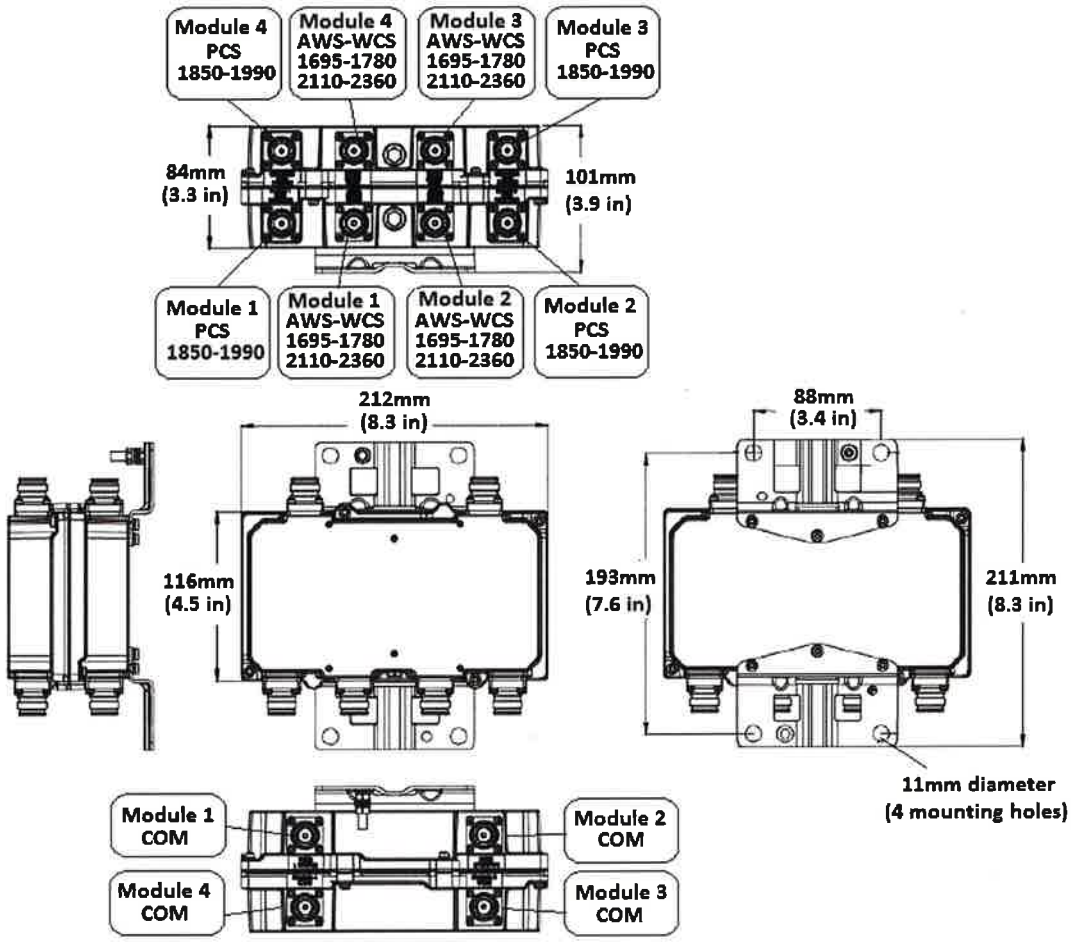
Dimensions

Height	116.0 mm | 4.6 in
Width	212.0 mm | 8.3 in
Depth	84.0 mm | 3.3 in
Weight, without mounting hardware	3.3 kg | 7.3 lb
Mounting Hardware Weight	0.3 kg | 0.7 lb

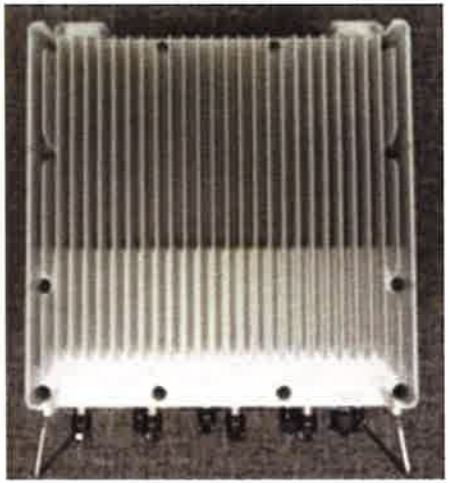
Environmental Specifications

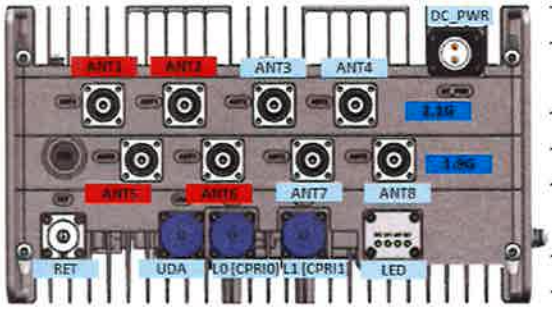
Operating Temperature	-40 °C to +65 °C (-40 °F to +149 °F)
Relative Humidity	Up to 100%
Ingress Protection Test Method	IEC 60529:2001, IP67

Outline Drawing



PCS+AWS Dual Band RRH(Model : RFV01U-D1A)

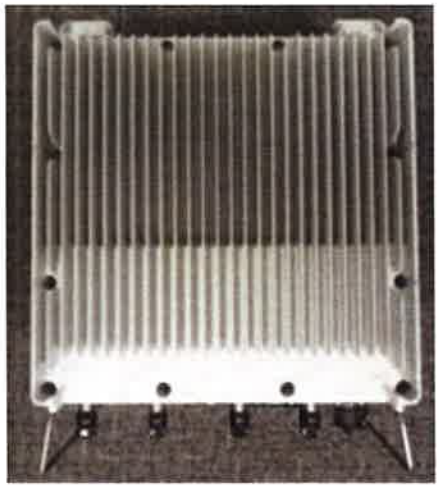


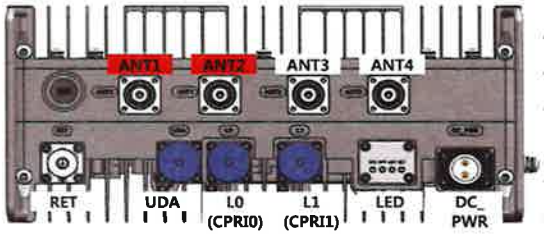


8 port Dual Band

Item	Specification	
Band	Band2 (1.9GHz)	Band66 (2.1GHz)
Frequency	DL : 1930~1990MHz	DL : 2110~2180MHz
	UL : 1850~1910MHz	UL : 1710~1780MHz
IBW	60MHz	70MHz
OBW	20MHz	30MHz
Carrier Bandwidth	5MHz, 10MHz, 15MHz, 20MHz	
# of carriers	2 carriers	3 carriers
Total # of carriers	4 carriers	
RF Chain	4T4R, 2T4R, 2T2R (SW configurable)	
RF Output Power	Total : 320W (for OBW 40MHz)	
	4 x 40W or 2 x 60W	4 x 60W or 2 x 90W
Spectrum Analyzer	TX/RX Support	
Noise Figure	Less than 3.0 dB	
RX Sensitivity	Typical : -105dBm @1Rx (25RBs 5MHz)	
Modulation	256QAM support	
Input Power	-48VDC (-38VDC to -57VDC)	
Power Consumption	About 1,270 Watt @ 100% RF load, typical conditions (w/ BAS OOBE)+TMA/RET	
Size (WHD)	380 x 380 x 255 mm (15.0" x 15.0" x 10.0") (w/ BAS OOBE)	
Volume	36.8 L	
Weight	38.3 kg(84.4 lb) w/o solar shield(finger guard) & mount bracket 44.2 kg (97.5 lb) with solar shield(finger guard) & mount bracket	
Operating Temperature	-40℃ (-40℉) ~ 55℃ (131℉) (Without solar load)	
Cooling	Natural convection	
Unwanted Emission	3GPP 36.104 Category A	3GPP 36.104 Category A,
	[B2] : FCC 47 CFR 24.238	[B66] : FCC 47 CFR 27.53 h)
CPRI Cascade	Not supported	
Optic Interface	20km, 2 ports (9.8Gbps x 2), SFP, single mode, Duplex	
RET & TMA Interface	AISG 2.2	
Bias-T	4 ports (2 ports per band) (Max. 49W)	
Mounting Options	Pole, wall, tower, side by side, back to back	
NB-IoT	Support	
PIM Cancellation	Support	
# of antenna port	4	4
External Alarm	4	

700+850MHz Dual Band RRH(Model : RFV01U-D2A)





Item	Specification	
Band	Band13 (700MHz)	Band5 (850MHz)
Frequency	DL : 746~756MHz	DL : 869~894MHz
	UL : 777~787MHz	UL : 824~849MHz
IBW	10MHz	25MHz
OBW	10MHz	25MHz
Carrier Bandwidth	10MHz	5MHz, 10MHz
# of carriers	1 carrier	3C
Total # of carriers	4C	
RF Chain	4T4R, 2T4R, 2T2R (SW configurable)	
RF Output Power	Total : 320W	
	4 x 40W or 2 x 60W	4 x 40W or 2 x 60W
Spectrum Analyzer	TX/RX Support	
Noise Figure	Less than 3.0 dB	
RX Sensitivity	Typical : -105dBm @1Rx (25RBs 5MHz)	
Modulation	256QAM support	
Input Power	-48VDC (-38VDC to -57VDC)	
Power Consumption	About 1,106Watt @ 100% RF load, typical conditions + TMA/RET	
Size (WHD)	380 x 380 x 207 mm (15.0" x 15.0" x 8.1")	
Volume	29.9 L	
Weight	31.9 kg(70.3 lb) w/o solar shield(finger guard) & mount bracket 37.2 kg(82.0 lb) with solar shield(finger guard) & mount bracket	
Operating Temperature	-40℃ (-40°F) ~ 55℃ (131°F) (Without solar load)	
Cooling	Natural convection	
Unwanted Emission	3GPP 36.104 Category A,	3GPP 36.104 Category A
	FCC 47 CFR 27.53 c), f)	FCC 47 CFR 22.917
CPRI Cascade	Not supported	
Optic Interface	20km, 2 ports (9.8Gbps x 2), SFP, single mode, Duplex	
RET & TMA Interface	AISG 2.2	
Bias-T	2 ports (Max. 49W)	
Mounting Options	Pole, wall, tower, side by side, back to back	
NB-IoT	Support	
PIM Cancellation	Support	
# of antenna port	4	
External Alarm	4	

SPECIFICATIONS

DC Surge Protection for RRH/Integrated Antenna Radio Head

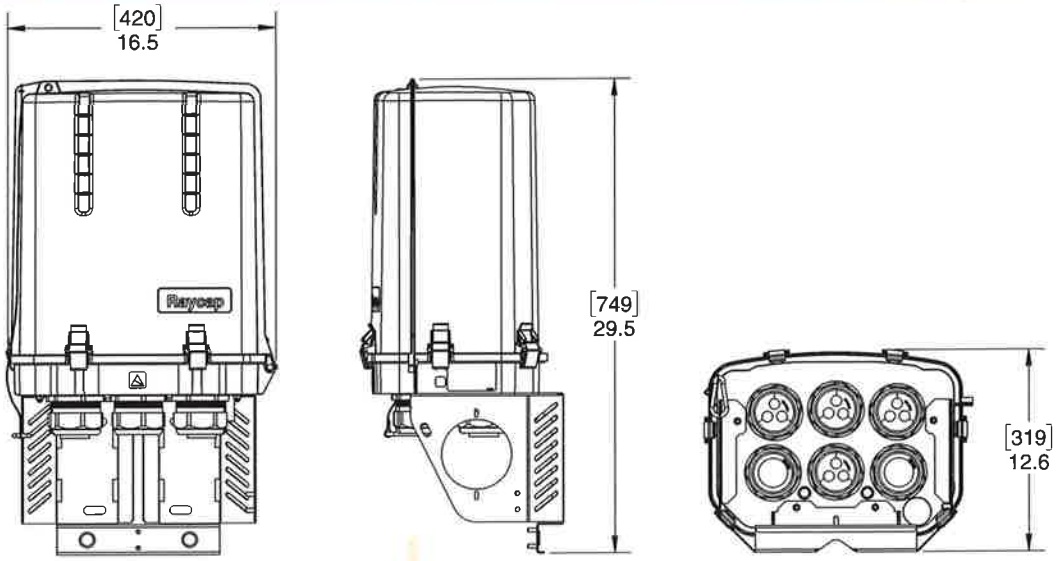
RVZDC-6627-PF-48

Tower / Base / Rooftop

Electrical	
Model Numbers	**RVZDC-6627-PF-48**
Nominal Operating Voltage	48 VDC
Nominal Discharge Current [I_n]	20kA 8/20 µs
Maximum Surge Current [I_{max}]	60kA 8/20 µs
Maximum Impulse (Lightning) Current per IEC 61643-11	5 kA 10/350 µs
Maximum Continuous Operating Voltage [U_c]	75 VDC
Voltage Protection Rating (VPR) per UL 1449 4th Edition	400V
Protection Class as per IEC 61643-11	Class I
Power Alarm	cross polarity, short circuit, or power outage
Intrusion Sensor	microswitch
Moisture Sensor	infrared moisture detector
Strikesorb Module Type	30-V1-2CHV Strikesorb modules installed to protect 12 Remote Radio Heads
Power Boost Ready	RS485 twisted pair connection available
Mechanical	
Suppression Connection Method	Compression lug, #14 - #2 AWG (2 mm² - 33 mm²)
Fiber Connection Method	LC-LC Single mode
Pressure Equalizing Vent	Gore™ Vent
Environmental Rating	IP 67
Operating Temperature	-40° C to +80° C
UV Resistant	Yes
Dimensions (L x W x H)	12.6" x 16.5" x 29.5" [319mm x 420mm 749mm]
Weight	System: 32 lbs (14.51 kg)
Combined Wind Loading	150mph (sustained): 185 lbs (823 N)
Standards Compliance	
Strikesorb modules are compliant to the following Surge Protective Device (SPD) Standards	
Standards	UL 1449 4th Edition, IEC 61643-11:2011, EN 61643-11:2012, IEEE C62.11, IEEE C62.41.2, IEEE C62.45 NEBS certified to: GR-63-CORE Issue 4, GR-1089-CORE Issue 6, GR-3108-CORE Issue 3, GR-487-CORE Issue 4, GR-950-CORE Issue 1

Product Diagram

[mm]
inches

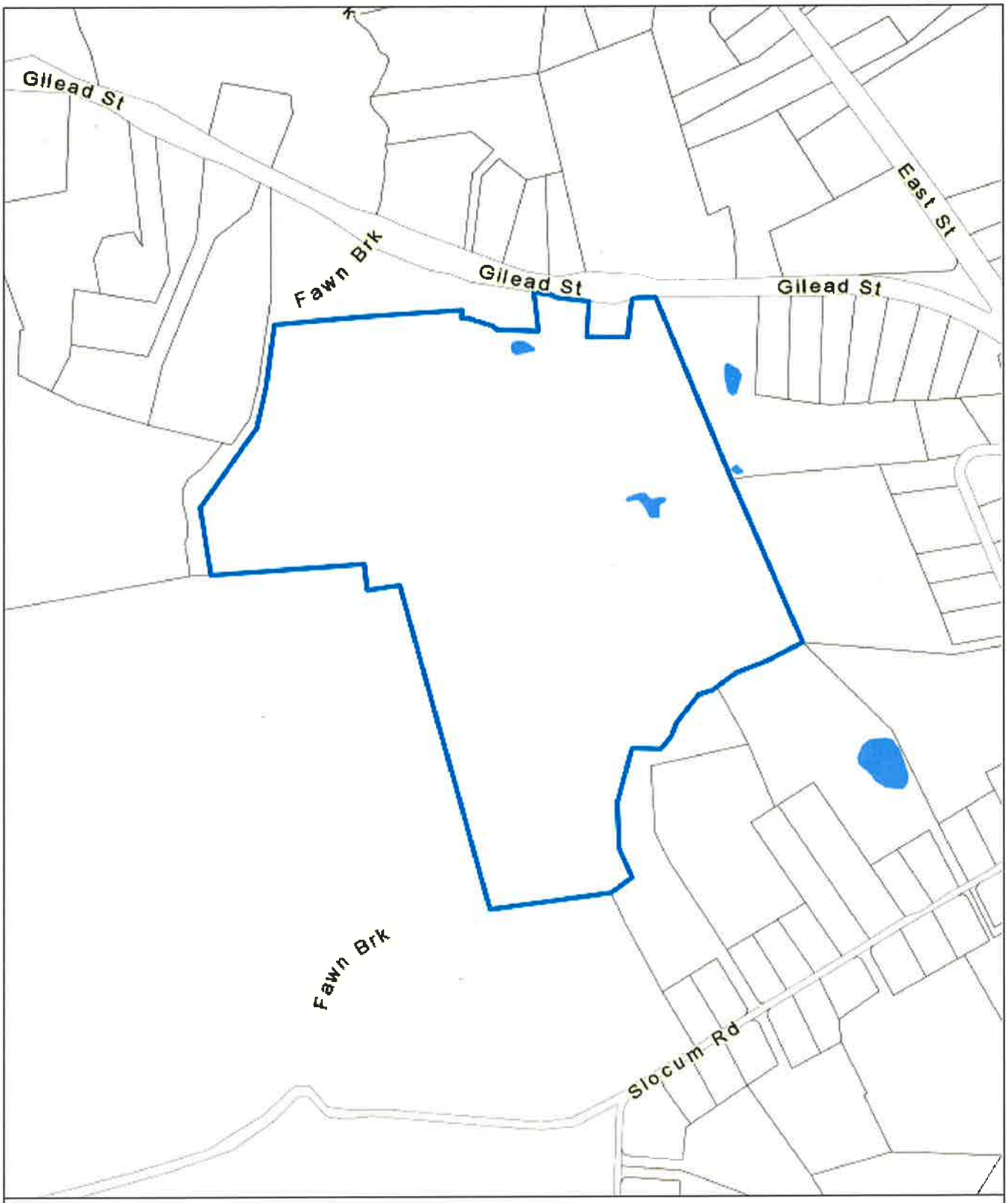


AWG=American Wire Gauge

Raycap

www.raycap.com

ATTACHMENT 4



Town of Hebron, Connecticut

Selected Parcel: 347 GILEAD ST ID: 24-24

100 m
500 ft

N

MainStreetGIS
MainStreetGIS, LLC
www.mainstreetgis.com

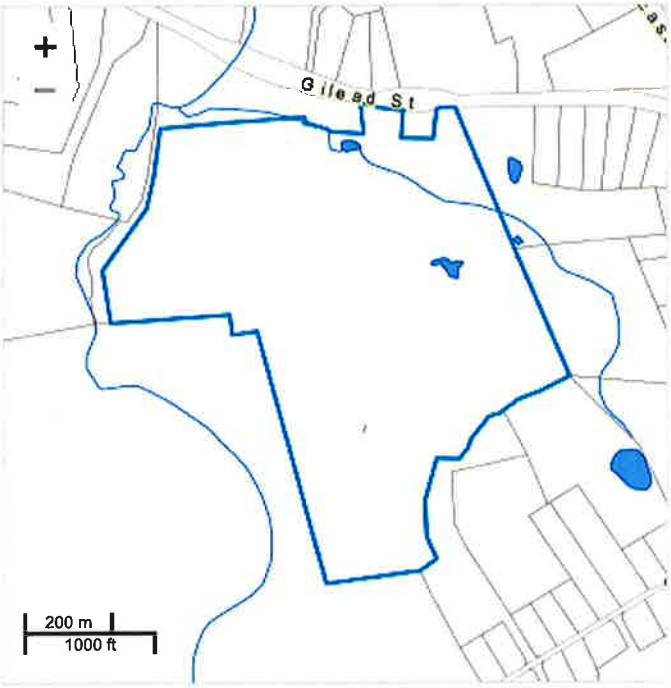
Printed 6/26/2019 from http://www.mainstreetmaps.com/ct/hebron/public.asp

Town of Hebron, Connecticut
Property Record Card

347 GILEAD ST

ID: 3158

Parcel ID: **24-24**



Owner: HEBRON LIONS AGRICULTURAL
Co-Owner: SOCIETY INC /
Address: 347 GILEAD ST
HEBRON CT 06248

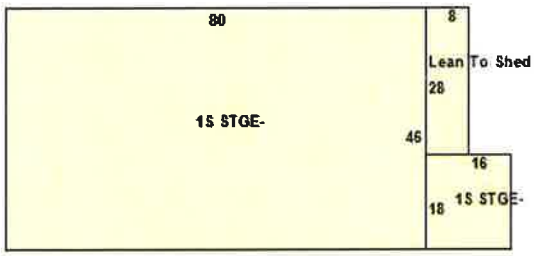
Assessment: Total: $1,611,960
Building: $428,220 Land: $620,270 Other: $563,470

Sales History

Grantee	Book / Page	Sale Date	Sale Price
HEBRON LIONS AGRICULTURALSOCIETY INC	0094 / 0915	9/29/1978	$0

MainStreetGIS, LLC
www.mainstreetgis.com

Land Information
Land Area: 101.48 AC / 4420468.8 SF
Zoning: R-1 (See Map)
Land Use: Storage Building
Neighborhood: Comm



Building Information
Style:
Year Built: 1995
Stories: 1
Rooms: 0 Bedrooms: 0
Baths: 0 Half Baths: 0
Total Living Area: 3968
Condition: Average

Heat Type: Forced Hot Air
Heat Fuel: Natural Gas
AC Type:
Fireplaces: 0
Roof Structure: Gable
Roof Covering: Metal
Exterior Wall: Metal /
Interior Floor: /
Basement: 0

Extra Features

Description	Area / Units
Frame Barn	5000
Frame Shed	868
Frame Shed	240
Open Porch	288
Bath House	2400
Frame Shed	1008
Frame Shed	3750
Frame Shed	5124
Open Porch	2660
Masonry Shed	320
Frame Shed	6000
Frame Barn	3220
Frame Shed	2800
Frame Barn	2800
Frame Shed	576
Frame Shed	120
Light Poles	35
Frame Shed	5670
Lean To Shed	224
Frame Shed	1400
Frame Barn	2800
Open Porch	400
Frame Shed	660
Frame Shed	192
Frame Shed	120
Frame Shed	180
Frame Barn	9360
Cblk/Fr Shed	180

Sub Areas

Description	Living Area	Gross Area

ATTACHMENT 5

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	3	3	neopost 06/26/2019 US POSTAGE $002.79⁰ ZIP 06103 041L12203037
	Postmaster, per *(name of receiving employee)*		

HARTFORD STATE HOUSE STATION CT 06103
JUN 28 2019
USPS

USPS® Tracking Number Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Andrew J. Tierney, Town Manager Town of Hebron 15 Gilead Street Hebron, CT 06248				
2.	Michael K. O'Leary, AICP, Town Planner Town of Hebron 15 Gilead Street Hebron, CT 06248				
3.	Hebron Lions Agricultural Society, Inc. 347 Gilead Street Hebron, CT 06248				
4.					
5.					
6.					

Hebron Fairgrounds

See Reverse for Instructions