ROBINSON & COLE LLP

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
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Direct (860) 275-8345

Also admitted in Massachusetts

June 10, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
500 Moose Hill Road, Monroe, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 99-foot level of the existing 149-foot tower at 500 Moose Hill Road in Monroe, Connecticut (the "Property"). The tower is owned by SBA. The Council approved Cellco's use of this tower in 2005. Cellco now intends to modify its facility by adding three (3) model 742 213, 2100 MHz antennas, for a total of fifteen (15) antennas all at the same level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable attached to the outside the monopole. Included in Attachment 1 are specifications for Cellco's additional antennas, RRHs and HYBRIFLEX™ cable.

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 letter is being sent to Steve Vavrek, First Selectman of the Town of Monroe. A copy of this letter is also being sent to St. John The Baptist Greek Catholic Cemetery Association Inc., the owner of the Property.

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 tower. Cellco's additional three (3) antennas and RRHs will be installed at a centerline height of 99 feet on the existing tower.

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 additional antennas 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 Cellco's modified facility are included in Attachment 2.

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

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

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:
Steve Vavrek, Monroe First Selectman
St. John The Baptist Greek Catholic Cemetery Association Inc.
Sandy M. Carter

ATTACHMENT 1

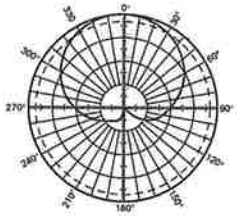
KATHREIN
SCALA DIVISION

742 213V01

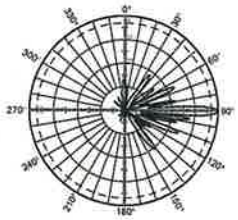
65° Panel Antenna

Kathrein's X-polarized adjustable electrical downtilt antennas offer the wireless carrier the ability to tailor polarization diversity sites for optimum performance. Using variable downtilt, only a few models need be procured to accommodate the needs of widely varying conditions. Remotely controlled downtilt is available as a retrofitable option.

- 0-6° downtilt range.
- UV resistant pulltruded fiberglass radome.
- DC Grounded metallic parts for impulse suppression.
- No moving electrical connections.
- Wideband vector dipole technology.
- Optional remote downtilt Control.
- Will accomodate future 3G / UMTS applications.



Horizontal pattern
±45°- polarization



Vertical pattern
±45°- polarization
0°–6° electrical downtilt

General specifications:

Frequency range	1710–2200 MHz
VSWR	< 1.5:1
Impedance	50 ohms
Intermodulation (2x20w)	IM3: <-150 dBc
Polarization	+45° and -45°
Front-to-back ratio (180°±30°)	>30 dB (co-polar) >25 dB (total power)
Maximum input power	300 watts per input (at 50°C)
Electrical downtilt continuously adjustable	0–6 degrees
Connector	2 x 7-16 DIN female
Isolation	>30 dB
Cross polar ratio Main direction 0° Sector ±60°	 25 dB (typical) >10 dB
Tracking, average	0.5 dB
Squint	±2.0°
Weight	19.8 lb (9 kg) 24.3 lb (11 kg) clamps included
Dimensions	76.9 x 6.1 x 2.8 inches (1954 x 155 x 70 mm)
Wind load Front/Side/Rear Mounting category	at 93 mph (150kph) 115 lbf / 32 lbf / 115 lbf (510 N) / (140 N) / (510 N) M (Medium)
Wind survival rating*	120 mph (200 kph)
Shipping dimensions	88 x 6.8 x 3.6 inches (2235 x 172 x 92 mm)
Shipping weight	28.7 lb (13 kg)
Mounting	Fixed mounts for 2 to 4.6 inch (50 to 115 mm) OD masts are included and tilt options are available.
See reverse for order information.	

Specifications:	**1710–1880 MHz**	**1850–1990 MHz**	**1920–2200 MHz**
Gain	19 dBi	19.2 dBi	19.5 dBi
+45° and -45° polarization horizontal beamwidth	67° (half-power)	65° (half-power)	63° (half-power)
+45° and -45° polarization vertical beamwidth	4.7° (half-power)	4.5° (half-power)	4.3° (half-power)
Sidelobe suppression for first sidelobe above main beam	0° 2° 4° 6° T 18 18 16 15 dB	0° 2° 4° 6° T 18 18 17 16 dB	0° 2° 4° 6° T 18 18 18 18 dB

RoHS
Lead-Free

11271-B
936.3740/b

*Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.

A distributed eNodeB expands deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-AWS is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-AWS is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-AWS is compact and weighs less than 20 kg (44 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

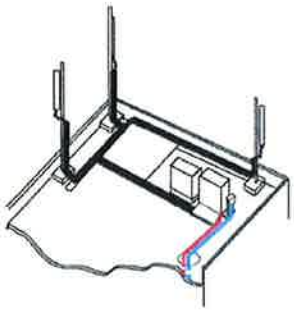
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-AWS provides more RF power while at the same time consuming less electricity.

Features

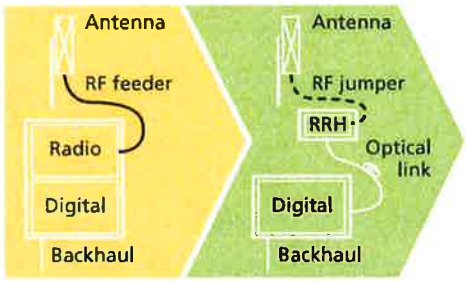
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

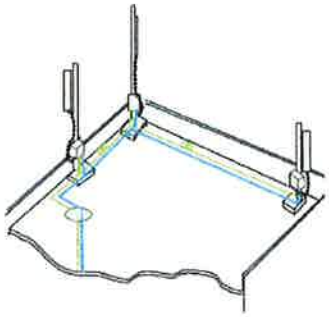
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170m (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
  - ¬ With solar load: -40°C to +50°C (-40°F to +122°F)
  - ¬ Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)
- Enclosure protection
  - ¬ IP65 (International Protection rating)

RF characteristics

- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
  - ¬ TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
  - ¬ One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
  - ¬ Single mode dual fiber (SM/DF)
- Multi-mode variant
  - ¬ Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Digital Ports and Alarms

- Two optical ports to support daisy-chaining
- Six external alarms

CPG2809100912 (09)

Alcatel·Lucent

Product Data Sheet HB158-1-08U8-S8J18

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Figure 1: HYBRIFLEX Series

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics – minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design – Decreases tower loading
- Robust cabling – Eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- Outdoor polyethylene jacket – Ensures long-lasting cable protection

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Mechanical Properties			
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
Electrical Properties			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	.068 (0.205)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Fiber Optic Properties			
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
DC Power Cable Properties			
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Other Properties			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

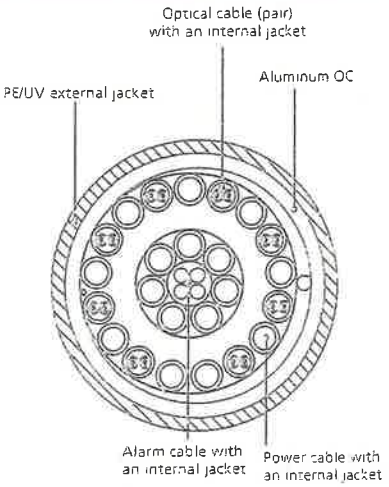


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

Far Field Approximation
with downtilt variation

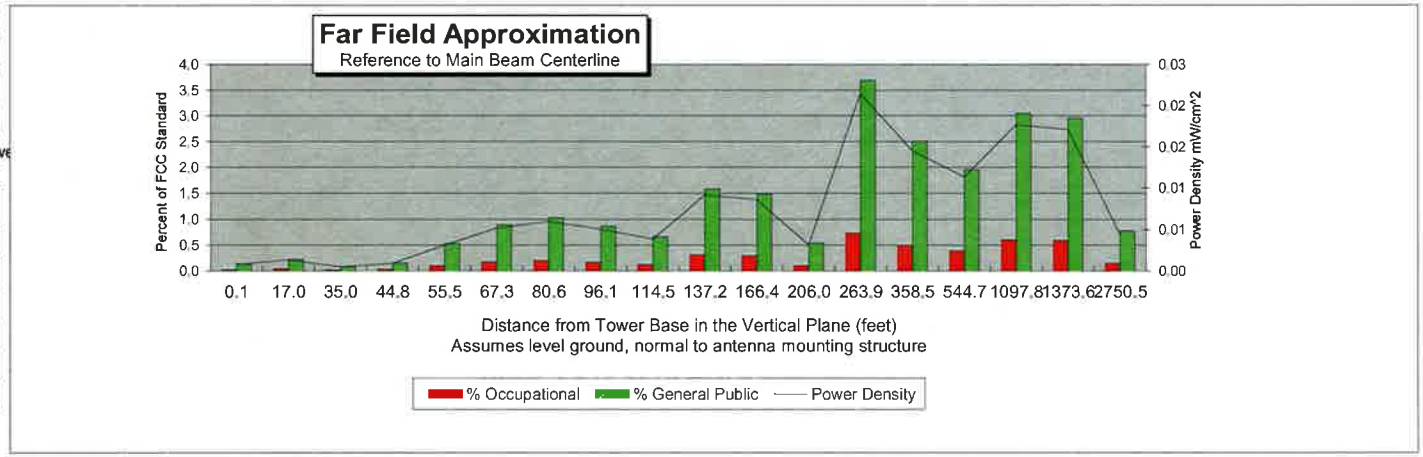
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	MONROE EAST, CT
Site #:	5-0165
Date:	06/10/14
Name:	Ryan Ulanday
File Name:	MONROE EAST, CT - FF Powe

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**99.0**
Antenna Gain (dBi):	**16.2**
Antenna Size (in.):	**71.1**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**3753.0**



This approximation is only valid in the far field, which begins at: 62.7 Feet

Enter Main Beam 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	96.0	97.5	102.2	106.0	110.9	117.2	125.4	135.8	149.4	167.4	192.1	227.3	280.8	371.1	553.1	1102.0	1376.9	2752.2	
Distance from Antenna Structure Base in Horizontal plane	0.1	17.0	35.0	44.8	55.5	67.3	80.6	96.1	114.5	137.2	166.4	206.0	263.9	358.5	544.7	1097.8	1373.6	2750.5	#NUM!
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	0
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	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	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.02	0.02	0.00	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.3	0.3	0.1	0.7	0.5	0.4	0.6	0.6	0.2	#NUM!
Percent of General Population Standard	0.1	0.2	0.1	0.2	0.5	0.9	1.0	0.9	0.7	1.6	1.5	0.5	3.7	2.5	1.9	3.0	3.0	0.8	#NUM!

Antenna Type LPA-80063-6CF-2
Max% 3.70%

Instructions:

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

Far Field Approximation
with downtilt variation

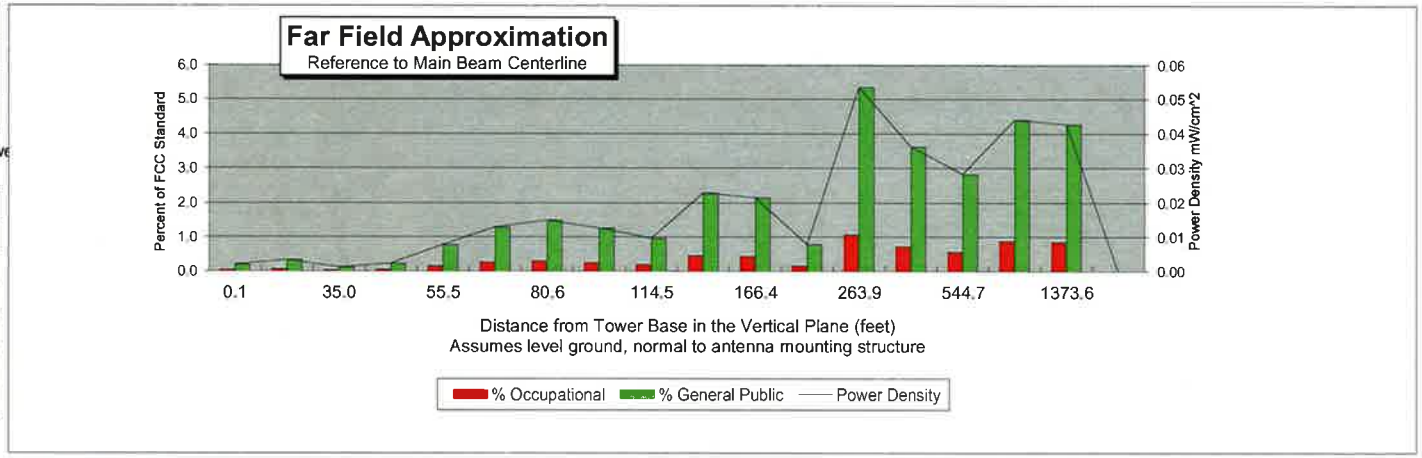
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	MONROE EAST, CT
Site #:	5-0165
Date:	06/10/14
Name:	Ryan Ulanday
File Name:	MONROE EAST, CT - FF Powe

Operating Freq. (MHz)	**1971.0**
Antenna Height (ft):	**99.0**
Antenna Gain (dBi):	**17.5**
Antenna Size (in.):	**48.5**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**6945.0**



This approximation is only valid in the far field, which begins at: 29.2 Feet

Enter Main Beam Distance in feet below:

Distance from Antenna Structure Base in Horizontal plane	0.1	17.0	35.0	44.8	55.5	67.3	80.6	96.1	114.5	137.2	166.4	206.0	263.9	358.5	544.7	1097.8	1373.6	#####	#NUM!
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	0	0
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	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	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.05	0.04	0.03	0.04	0.04	#####	#NUM!
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.2	0.3	0.3	0.3	0.2	0.5	0.4	0.2	1.1	0.7	0.6	0.9	0.9	#####	#NUM!
Percent of General Population Standard	0.2	0.3	0.1	0.2	0.8	1.3	1.5	1.3	1.0	2.3	2.1	0.8	5.3	3.6	2.8	4.4	4.3	#####	#NUM!

Antenna Type BXA-171063-8BF-EDIN-2

Instructions:

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

Far Field Approximation
with downtilt variation

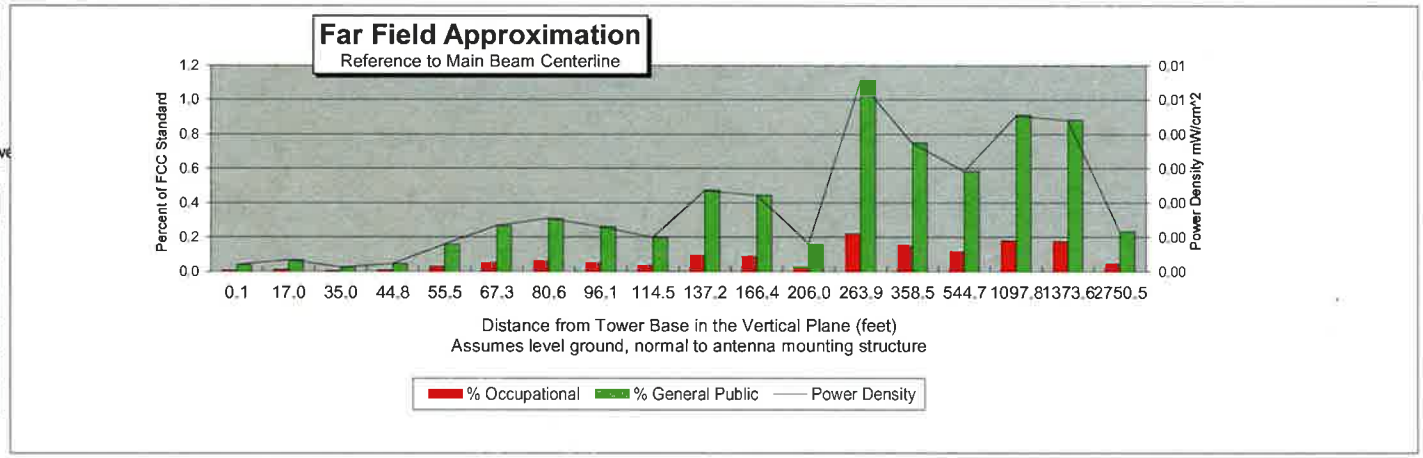
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	MONROE EAST, CT
Site #:	5-0165
Date:	06/10/14
Name:	Ryan Ulanday
File Name:	MONROE EAST, CT - FF Powe

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**99.0**
Antenna Gain (dBi):	**16.7**
Antenna Size (in.):	**71.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**860.0**



This approximation is only valid in the far field, which begins at: 62.6 Feet

Enter Main Beam 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	96.0	97.5	102.2	106.0	110.9	117.2	125.4	135.8	149.4	167.4	192.1	227.3	280.8	371.1	553.1	1102.0	1376.9	2752.2	
Distance from Antenna Structure Base in Horizontal plane	0.1	17.0	35.0	44.8	55.5	67.3	80.6	96.1	114.5	137.2	166.4	206.0	263.9	358.5	544.7	1097.8	1373.6	2750.5	#NUM!
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	0
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	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	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	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.2	0.2	0.1	0.2	0.2	0.0	#NUM!
Percent of General Population Standard	0.0	0.1	0.0	0.0	0.2	0.3	0.3	0.3	0.2	0.5	0.4	0.2	1.1	0.8	0.6	0.9	0.9	0.2	#NUM!

Antenna Type BXA-70063-6CF-2
Max% 1.11%

Instructions:

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

Far Field Approximation
with downtilt variation

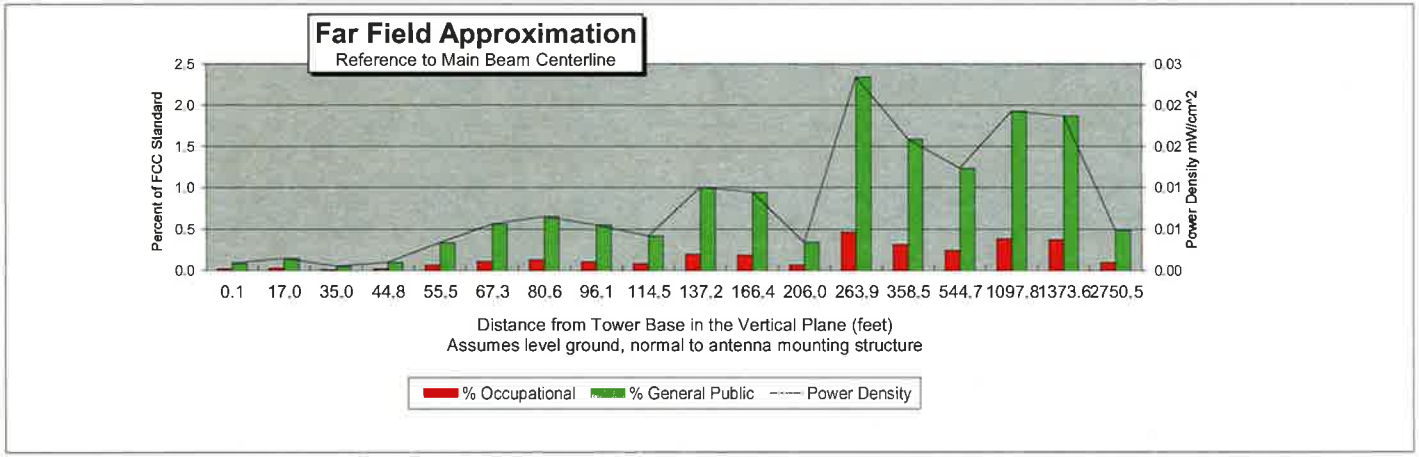
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	MONROE EAST, CT
Site #:	5-0165
Date:	06/10/14
Name:	Ryan Ulanday
File Name:	Monroe East, CT - FF Power

Operating Freq. (MHz)	**2110.0**
Antenna Height (ft):	**99.0**
Antenna Gain (dBi):	**19.9**
Antenna Size (in.):	**76.9**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**1750.0**



This approximation is only valid in the far field, which begins at: 73.4 Feet

Enter Main Beam 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	96.0	97.5	102.2	106.0	110.9	117.2	125.4	135.8	149.4	167.4	192.1	227.3	280.8	371.1	553.1	1102.0	1376.9	2752.2	
Distance from Antenna Structure Base in Horizontal plane	0.1	17.0	35.0	44.8	55.5	67.3	80.6	96.1	114.5	137.2	166.4	206.0	263.9	358.5	544.7	1097.8	1373.6	2750.5	#NUM!
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	0
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	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	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.02	0.02	0.01	0.02	0.02	0.00	#NUM!
Percent of Occupational 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	0.3	0.2	0.4	0.4	0.1	#NUM!
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.3	0.6	0.7	0.5	0.4	1.0	0.9	0.3	2.3	1.6	1.2	1.9	1.9	0.5	#NUM!

Antenna Type 742213_2110
Max% 2.34%

Instructions:

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

ATTACHMENT 3

FDH Engineering, Inc., 6521 Meridien Drive Raleigh, NC 27616, Ph. 919.755.1012

Structural Analysis for SBA Network Services, Inc.

149' Monopole Tower

SBA Site Name: Moosehill
SBA Site ID: CT13056-A-05
Verizon Site Name: Monroe East

FDH Project Number 1424831400

Analysis Results

Tower Components	92.8%	Sufficient
Foundation	93.4%	Sufficient

Prepared By:

Heather W. Jones, EI
Project Engineer

Reviewed By:

Bradley R. Newman, PE
Senior Project Engineer
CT PE License No. 29630

FDH Engineering, Inc.
6521 Meridien Drive
Raleigh, NC 27616
(919) 755-1012
info@fdh-inc.com

March 11, 2014

Prepared pursuant to TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and 2005 Connecticut Building Code

TABLE OF CONTENTS

EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the monopole located in Monroe, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads pursuant to the *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, TIA/EIA-222-F* and *2005 Connecticut Building Code (CBC)*. Information pertaining to the existing/proposed antenna loading, current tower geometry, geotechnical data, and member sizes was obtained from:

- Sabre Communications Corporation (Job No. 02-03107 Revision A) Structural Design Report dated April 3, 2002
- FDH, Inc. (Job No. 08-07121T Revised) TIA Inspection Report dated November 10, 2008
- SBA Network Services, Inc.

The *basic design wind speed* per the *TIA/EIA-222-F* standards and *2005 CBC* is 85 mph without ice and 38 mph with 3/4" radial ice. Ice is considered to increase in thickness with height.

Conclusions

With the existing and proposed antennas from Verizon in place at 99 ft, the tower meets the requirements of the *TIA/EIA-222-F* standards and *2005 CBC* provided the **Recommendations** listed below are satisfied. Furthermore, provided the foundations were designed and constructed to support the original design reactions (see Sabre Job No.02-03107 Revision A), the foundation should have the necessary capacity to support both the existing and proposed loading. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Engineering, Inc. is accurate (i.e., the steel data, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the *TIA/EIA-222-F* standards and *2005 CBC* are met with the existing and proposed loading in place, we have the following recommendations:

1. The proposed feed lines should be installed outside the pole's shaft, as shown in **Figure 1**.
2. The existing diplexers should be installed directly behind the existing/proposed panel antennas.

APPURTENANCE LISTING

The proposed and existing antennas with their corresponding cables/coax lines are shown in **Table 1**. *If the actual layout determined in the field deviates from the layout, FDH Engineering, Inc. should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

Existing Loading:

Antenna Elevation (ft)	Description	Feed[1] Lines	Carrier	Mount Elevation (ft)	Mount Type
152.5	(1) Decibel DB404-B Dipole	(1) 7/8"	Town of Monroe	149	(1) Pipe Mount
147[2]	(3) RFS APXVSPP18-C-A20 (3) Alcatel lucent 1900 MHz RRHs (3) Alcatel lucent 800 MHz RRHs (3) Alcatel lucent 800 MHz Filters (4) RFS ACU-A20-N RETs (3) Argus LLPX310R (1) Andrew VHLP2-11 Dish (1) Andrew VHLP800-11-DW1 Dish (3) U-RAS Flexible RRH ODUs	(3) 1-1/4" (2) 1/2 (6) 5/16	Sprint\Clearwire	147	(1) 12.5' Low Profile Platform
139	(6) Powerwave 7770 (3) Powerwave P65-16 (6) Powerwave LGP 21401 TMAs (6) Powerwave LGP 13519 Diplexers (6) Ericsson RRUS-11 RRHs (1) Raycap DC6-48-60-18-8F Surge Suppressor	(12) 1-1/4" (1) 0.393" (2) 0.645"	AT&T	139	(1) 13' Low Profile Platform
---	---	---	---	128	(1) 12.5' Low Profile Platform
121	(3) Ericsson Air B2A/B4P (3) Ericsson Air B4A/B2P (3) Ericsson KRY 112 144 TMAs	(12) 1-5/8" (1) 1-5/8" Fiber	T-Mobile	121	(1) 13' Low Profile Platform
109	(12) Decibel DB844H90E-XY	(12) 7/8"	Nextel	109	(1) 14' Low Profile Platform
99[3]	(1) Antel BXA-70063/4CF (2) Antel BXA-171063/8BF (1) Antel BXA-70063/6CF (1) Antel BXA-171063/12BF (4) RFS APL866513-42TO (2) Antel LPA-80063/6CF (1) Swedcom SLCP 2x6014F (6) RFS FD9R6004/2C-3L Diplexers	(12) 1-5/8"	Verizon	99	(1) 12.5' Low Profile Platform
65.5[4]	(1) Decibel 26OB GPS	(1) 1/2"	Sprint	64	(1) 3' Standoff

1. Feed lines installed inside the pole's shaft unless otherwise noted.
2. The (3) 1-1/4" coax for Sprint/Clearwire is installed on the outside of the pole's shaft, single stacked.
3. The (12) 1-5/8" coax for Verizon at 99 ft is installed on the outside of the pole's shaft, double stacked.
4. The (1) 1/2" coax for Sprint at 64 ft is installed on the outside of the pole's shaft.

Proposed Loading:

Antenna Elevation (ft)	Description	Feed Lines	Carrier	Mount Elevation (ft)	Mount Type
99	(1) Antel BXA-70063/4CF (2) Antel BXA-171063/8BF (1) Antel BXA-70063/6CF (1) Antel BXA-171063/12BF (4) RFS APL866513-42TO (2) Antel LPA-80063/6CF (1) Swedcom SLCP 2x6014F (3) Kathrein 7442213_2110_P45_02.0 (3) Alcatel Lucent RRH 2x40-AWS RRHs (6) RFS FD9R6004/2C-3L Diplexers (1) RFS DB-T1-6Z-8AB-0Z Distribution Box	(12) 1-5/8" (1) 1-5/8" Fiber	Verizon	99	(1) 12.5' Low Profile Platform

RESULTS

The following yield strength of steel for individual members was used for analysis:

Table 2 - Material Strength

Member Type	Yield Strength
Tower Shaft Sections	65 ksi
Flange Plate	60 ksi
Flange Bolts	Fu = 120 ksi
Base Plate	60 ksi
Anchor Bolts	75 ksi

Table 3 displays the summary of the ratio (as a percentage) of force in the member to their capacities. Values greater than 100 % indicate locations where the maximum force in the member exceeds its capacity. *Note: Capacities up to 100 % are considered acceptable.* **Table 4** displays the maximum foundation reactions. **Table 5** displays the maximum antennas rotations at service wind speeds (dishes only).

If the assumptions outlined in this report differ from actual field conditions, FDH Engineering, Inc. should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the existing or proposed appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information.

Table 3 - Summary of Working Percentage of Structural Components

Section No.	Elevation ft	Component Type	Size	% Capacity*	Pass Fail
L1	149 – 129	Pole	TP28.82x24x0.1875	29.7	Pass
	129	Flange Bolts	(8) 1" Ø w/ BC = 32.5"	58.8	Pass
	129	Flange Plate	36.25" Ø PL x 1" thk.	52.5	Pass
L2	129 – 96	Pole	TP36.9x28.82x0.25	62.2	Pass
L3	96 - 47.25	Pole	TP48.15x35.237x0.3125	91.0	Pass
L4	47.25 – 0	Pole	TP58.91x46.0768x0.375	92.8	Pass
		Anchor Bolts	(16) 2.25" Ø w/ BC = 66"	89.7	Pass
		Base Plate	PL 64" Sq x 3" Thk.	71.4	Pass

*Capacities include a 1/3 allowable stress increase for wind per *TIA/EIA-222-F* standards.

Table 4 - Maximum Base Reactions

Base Reactions	Current Analysis *(TIA/EIA-222-F)*	Original Design *(TIA/EIA-222-F)*
Axial	42 k	45 k
Shear	37 k	39 k
Moment	3,906 k-ft	4,184 k-ft

Table 5 - Maximum Antenna Rotations at Service Wind Speeds (Dishes Only)

Centerline Elevation (ft)	Antenna	Tilt* (deg)	Twist* (deg)
147	(1) Andrew VHLP2-11 Dish (1) Andrew VHLP800-11-DW1 Dish	1.7188	0.0031

*Allowable tilt and twist values to be determined by the carrier.

GENERAL COMMENTS

This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Engineering, Inc. should be notified immediately to perform a revised analysis.

LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Engineering, Inc.

APPENDIX

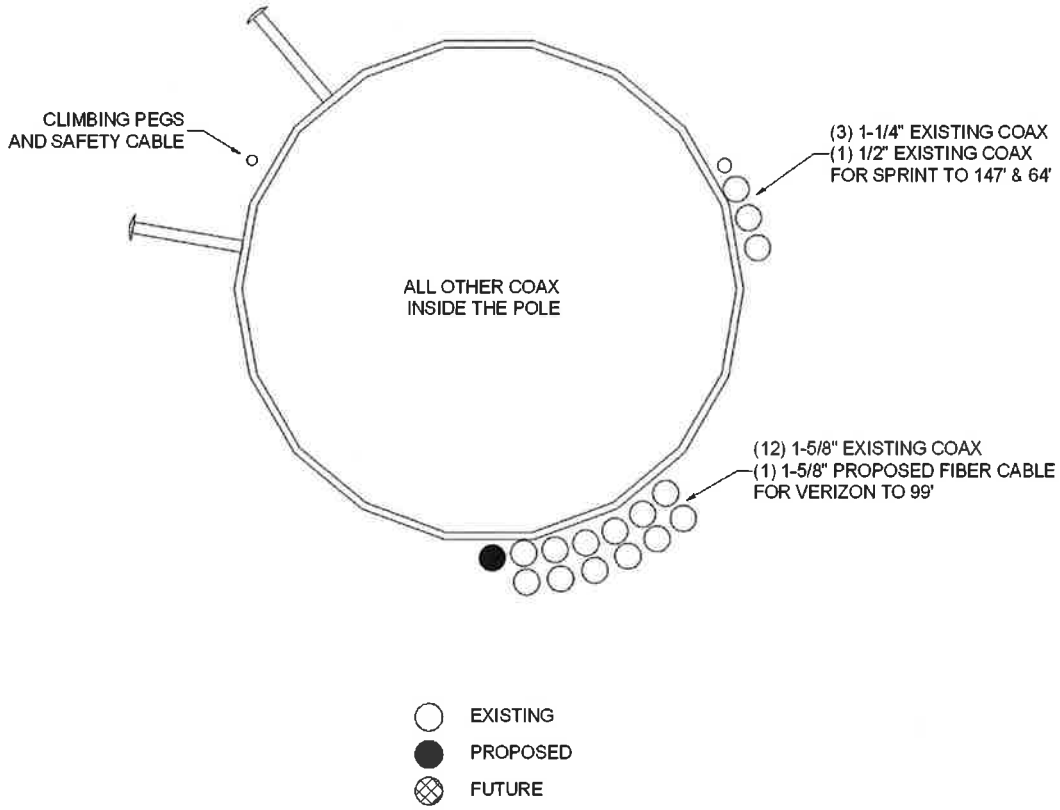
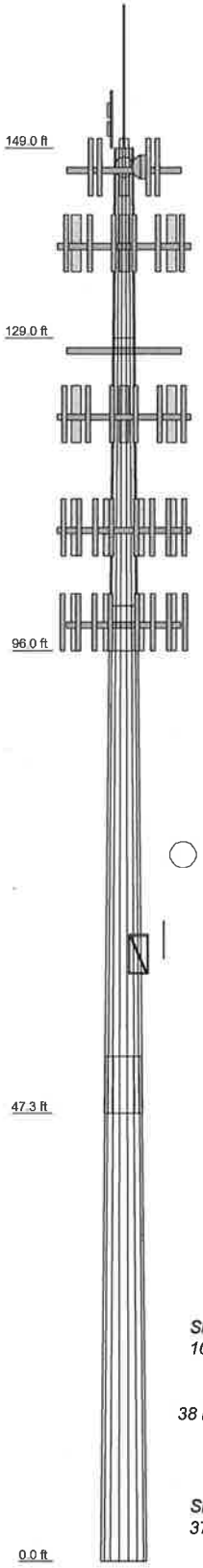


Figure 1 – Assumed Feed Line Layout

Section	1	2	3	4
Length (ft)	20.00	33.00	53.50	53.25
Number of Sides	18	18	18	18
Thickness (in)	0.1875	0.2500	0.3125	0.3750
Socket Length (ft)		4.75	6.00	
Top Dia (in)	24.0000	28.8200	35.2370	46.0768
Bot Dia (in)	28.8200	36.9000	48.1500	58.9100
Grade	A572-65			
Weight (K)	1.1	2.9	7.5	11.2

22.7



AXIAL
64 K

SHEAR
10 K

MOMENT
1077 kip-ft

TORQUE 1 kip-ft
38 mph WIND - 0.7500 in ICE

AXIAL
42 K

SHEAR
37 K

MOMENT
3906 kip-ft

TORQUE 3 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	149	13' Low Profile Platform	139
Pipe Mount	149	(2) 7770.00 w/Mount Pipe	139
DB404-B	149	(2) 7770.00 w/Mount Pipe	139
Pipe Mount	149	(4) Empty Mount Pipe	128
APXVSPP18-C-A20 w/Mount Pipe	147	12.5' Low Profile Platform	128
APXVSPP18-C-A20 w/Mount Pipe	147	(4) Empty Mount Pipe	128
APXVSPP18-C-A20 w/Mount Pipe	147	(4) Empty Mount Pipe	128
LLPX310R w/Mount Pipe	147	AIR 21 B2A/B4P w/Mount Pipe	121
LLPX310R w/Mount Pipe	147	AIR 21 B4A/B2P w/Mount Pipe	121
LLPX310R w/Mount Pipe	147	AIR 21 B4A/B2P w/Mount Pipe	121
U-RAS Flexible RRH ODU	147	AIR 21 B4A/B2P w/Mount Pipe	121
U-RAS Flexible RRH ODU	147	KRY 112 144 TMA	121
U-RAS Flexible RRH ODU	147	KRY 112 144 TMA	121
1900 MHz RRH	147	KRY 112 144 TMA	121
1900 MHz RRH	147	13' Low Profile Platform	121
1900 MHz RRH	147	AIR 21 B2A/B4P w/Mount Pipe	121
800 MHz RRH	147	AIR 21 B2A/B4P w/Mount Pipe	121
800 MHz RRH	147	(4) DB844H90E-XY w/Mount Pipe	109
800 MHz RRH	147	14' Low Profile Platform	109
800 MHz Filter	147	(4) DB844H90E-XY w/Mount Pipe	109
800 MHz Filter	147	(4) DB844H90E-XY w/Mount Pipe	109
800 MHz Filter	147	BXA-171063/8BF w/ Mount Pipe	99
(2) ACU-A20-N RET	147	BXA-70063/6CF w/Mount Pipe	99
ACU-A20-N RET	147	BXA-171063-12BF w/ Mount Pipe	99
ACU-A20-N RET	147	APL866513-42TO w/ Mount Pipe	99
12.5' Low Profile Platform	147	APL866513-42TO w/ Mount Pipe	99
VHLP2-11	147	(2) APL866513-42TO w/ Mount Pipe	99
VHLP800-11-DW1	147	LPA-80063/6CF w/ Mount Pipe	99
(2) 7770.00 w/Mount Pipe	139	LPA-80063/6CF w/ Mount Pipe	99
P65-16 w/Mount Pipe	139	SLCP 2x6014F w/ Mount Pipe	99
P65-16 w/Mount Pipe	139	742213_2110_P45_02.0 w/ Mount Pipe	99
P65-16 w/Mount Pipe	139	742213_2110_P45_02.0 w/ Mount Pipe	99
(2) LGP21401 TMA	139	742213_2110_P45_02.0 w/ Mount Pipe	99
(2) LGP21401 TMA	139	RRH2X40-AWS	99
(2) LGP21401 TMA	139	RRH2X40-AWS	99
(2) LGP13519 Diplexer	139	RRH2X40-AWS	99
(2) LGP13519 Diplexer	139	(2) FD9R6004/2C-3L Diplexer	99
(2) LGP13519 Diplexer	139	(2) FD9R6004/2C-3L Diplexer	99
(2) RRUS-11	139	(2) FD9R6004/2C-3L Diplexer	99
(2) RRUS-11	139	DB-T1-6Z-8AB-0Z	99
(2) RRUS-11	139	12.5' Low Profile Platform	99
DC6-48-60-18-8F Surge Arrestor	139	BXA-70063/4CF w/ Mount Pipe	99
Empty Mount Pipe	139	BXA-171063/8BF w/ Mount Pipe	99
Empty Mount Pipe	139	Decibel - 26OB GPS	64
Empty Mount Pipe	139	3' Standoff	64

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 92.8%

FDH Engineering, Inc.
6521 Meridien Drive
Raleigh, NC 27616
Phone: (919) 755-1012
FAX: (919) 755-1031
Tower Analysis

Job: Moosehill, CT13056-A-05			
Project: 1424831400			
Client: SBA Network Services, Inc.	Drawn by: Heather Jones	App'd:	
Code: TIA/EIA-222-F	Date: 03/11/14	Scale: NTS	
Path:		Dwg No. E-1	