Robinson+Cole

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December 23, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
299 Sheffield Street, Waterbury, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 148-foot level of the existing 158-foot tower at 299 Sheffield Street in Waterbury (the "Property"). The tower is owned by SBA. Cellco's shared use of this tower was approved by the Council in 2001. Cellco now intends to replace three (3) of its existing antennas with three (3) model HBXX-6517DS-VTM, 1900 MHz antennas and add three (3) model HBXX-6517DS-VTM, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 148-foot level on the tower. Cellco also intends to install six (6) remote radio heads ("RRHs") behind its 1900 MHz and 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable, inside the monopole. Included in Attachment 1 are specifications for the replacement antennas, RRHs and HYBRIFLEX™ cables.

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 Neil M. O'Leary, Mayor of the City of Waterbury. A copy of this letter is also being sent to John F. Hychko, 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 replacement antennas and RRHs will be installed on its existing antenna platform at the 148-foot level.

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 replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is 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 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:
Neil M. O'Leary, Mayor
John F. Hychko
Sandy M. Carter

ATTACHMENT 1

Product Specifications

COMMSCOPE®

HBXX-6517DS-VTM

Andrew® Quad Port Teletilt® Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

POWERED BY ANDREW

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4 3 ° | 18.7 6 ° | 18.4	0 ° | 18.4 3 ° | 18.7 6 ° | 18.5	0 ° | 18.7 3 ° | 18.9 6 ° | 18.6
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°

**Values calculated using NGMN Alliance N-P-BASTA v9.6*

Mechanical Specifications

Color | Radome Material	Light gray | PVC, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1903.0 mm x 305.0 mm x 166.0 mm | 74.9 in x 12.0 in x 6.5 in
Net Weight	19.5 kg | 43.0 lb
Model with factory installed AISG 2.0 RET	HBXX-6517DS-A2M

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

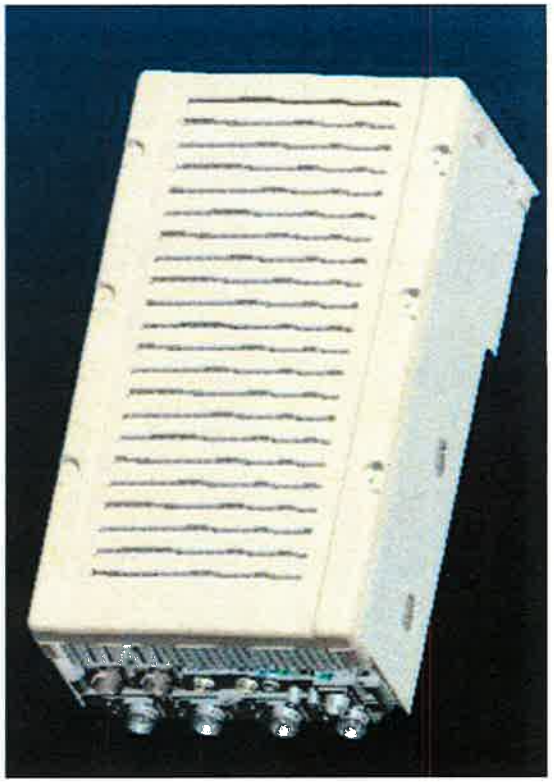
		RRH2x60
RF Output Power		2x60W
Instantaneous Bandwidth		20MHz
Transmitter		2 TX
Receiver	1900 HW version	2 Branch RX – LA6.0.1
	1900A HW version	4 Branch RX – LR13.3
Features		AISG 2.0 for RET/TMA
		Internal Smart Bias-T
Power		-48VDC
CPRI Ports		2 CPRI Rate 3 Ports
External Alarms		4 External User Alarms
Monitor Ports		TX
Environmental		GR487 Compliance
RF Connectors		7/16 DIN (top mounted)

** Not a Verizon Wireless deployed product

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (downward facing)
Dimensions	22"(h) x 12"(w)x 9.4" (d)**
Weight	55lb**

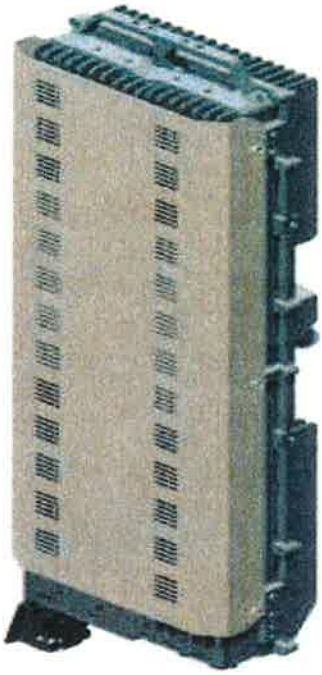


**- Includes solar shield but not mounting brackets (8 lbs.)

Alcatel·Lucent

ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2X60-AWS FOR BAND 4 APPLICATIONS

The Alcatel-Lucent RRH2x60-AWS is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.



A distributed Node B expands the 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 a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent RRH2x60-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.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-AWS is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

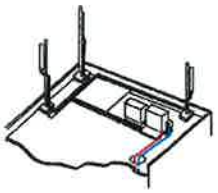
EASY INSTALLATION

The RRH2x60-AWS includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

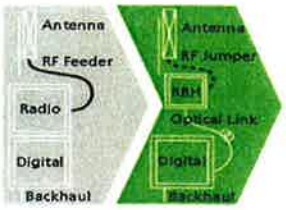
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-AWS is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

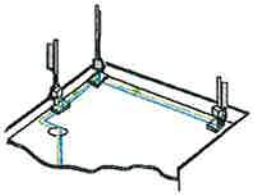
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 510x285x186mm (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 250W @2x60W

RF Characteristics

- Frequency band: 1710-1755, UL / 2110-2155 MHz, DL (3GPP band 4)
- Output power: 2x60W at antenna connectors
- Technology supported: LTE
- Instantaneous bandwidth: 45 MHz
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

AT THE SPEED OF IDEAS™

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.

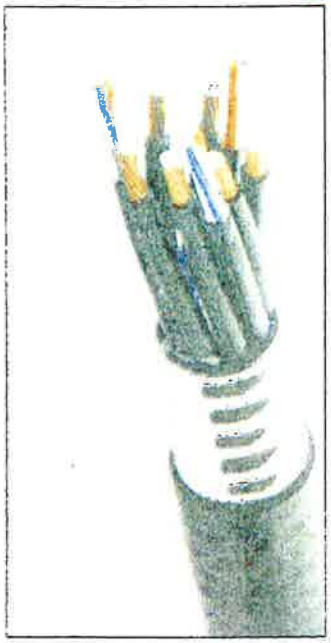


Figure 1: HYBRIFLEX Series

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
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)
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)
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
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
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

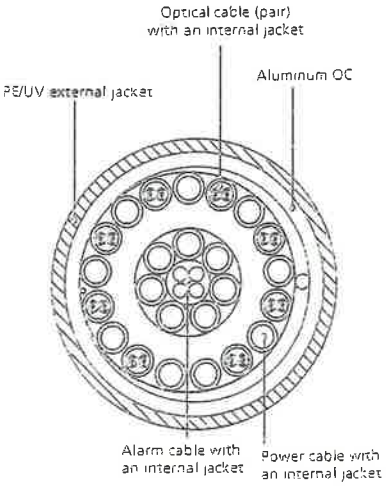


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Waterbury 3								
Tower Height: 158ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	2	565	137	0.0216	880	0.5867	3.69%	
*AT&T UMTS	2	1077	137	0.0413	1900	1.0000	4.13%	
*AT&T GSM	1	491	137	0.0094	880	0.5867	1.60%	
*AT&T GSM	4	813	137	0.0623	1900	1.0000	6.23%	
*AT&T LTE	1	1313	137	0.0252	734	0.4893	5.14%	
*MetroPCS CDMA	3	727	158	0.0314	2135	1.0000	3.14%	
*MetroPCS LTE	1	1200	158	0.0173	2130	1.0000	1.73%	
*Clearwire	2	153	127	0.0068	2496	1.0000	0.68%	
*Clearwire	1	211	127	0.0047	11 GHz	1.0000	0.47%	
*Nextel iDEN	12	100	127	0.0268	851	0.5673	4.72%	
*Nextel WiMAX	3	562	127	0.0376	2657	1.0000	3.76%	
*Nextel Microwave	2	4.42	128	0.0002	22500	1.0000	0.02%	
Verizon PCS	**7**	**358**	**148**	**0.0411**	**1970**	**1.0000**	**4.11%**	
Verizon Cellular	**9**	**303**	**148**	**0.0448**	**869**	**0.5793**	**7.73%**	
Verizon AWS	**1**	**2812**	**148**	**0.0462**	**2145**	**1.0000**	**4.62%**	
Verizon 700	**1**	**806**	**148**	**0.0132**	**746**	**0.4973**	**2.66%**	
								54.42%
* Source: Siting Council								

ATTACHMENT 3

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

Structural Analysis for SBA Network Services, Inc.

158' Monopole Tower

SBA Site Name: Waterbury
SBA Site ID: CT02722-S-02
Verizon Site Name: Waterbury 3

FDH Project Number 146HCD1400

Analysis Results

Tower Components	79.5%	Sufficient
Foundation	75.9%	Sufficient

Prepared By:

Drew Alexander, PE
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

STATE OF CONNECTICUT
BRADLEY R. NEWMAN
20630
LICENSED PROFESSIONAL ENGINEER
11/21/14

November 21, 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 Waterbury, 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 the *2005 Connecticut Building Code*. Information pertaining to the existing/proposed antenna loading, current tower geometry, geotechnical data, and member sizes was obtained from:

- Summit Manufacturing, LLC (Drawing No. 9302) original design drawings dated August 23, 2000
- Paul J. Ford and Company (Job No. 29200-553) foundation design drawings dated May 12, 2000
- SBA Network Services, Inc.

The *basic design wind speed* per the *TIA/EIA-222-F* standards and the *2005 Connecticut Building Code* 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 Wireless in place at 148 ft, the tower meets the requirements of the *TIA/EIA-222-F* standards and the *2005 Connecticut Building Code* provided the **Recommendations** listed below are satisfied. Furthermore, provided the foundation was designed and constructed to support the original design reactions (see PJF Job No. 29200-553), the foundation should have the necessary capacity to support 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 the *2005 Connecticut Building Code* are met with the existing and proposed loading in place, we have the following recommendations:

1. The proposed feedlines should be installed inside the pole's shaft.
2. The existing diplexers should be installed directly behind the proposed and existing panel antennas.
3. RRH/RRU Stipulation: The equipment may be installed in any arrangement as determined by the client.

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	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
158	(3) RFS APXV18-206517S-C	(6) 1 5/8"	Pocket	158	(1) Low Profile Platform
148	(6) Decibel DB844G65ZAXY (3) Powerwave P65-16-XL-2 (3) Rymsa MGD3-800T0 (6) RFS FD9R6004/2C-3L Diplexers	(12) 1 5/8"	Verizon	148	(1) Low Profile Platform
137	(6) KMW AM-X-CD-16-65-00T (3) Kathrein 800 10121 (3) Powerwave 7770.00 (6) CCI DTMABP7819VG12A TMAs (3) Powerwave LGP13519 TMAs (3) CSS DBC-750 Combiners	(12) 1 5/8" (1) 10 mm fiber[2] (2) 12 Ga. DC[2]	New Cingular	137	(1) Low Profile Platform
135	(6) Ericsson RRUS-11 RRUs (1) Raycap DC6-48-60-18-8F Surge Arrestor			135	(1) Andrew MTC3335 Collar Mount
127	(9) Decibel DB844H90E-XY (3) Argus LLPX310R (3) Samsung U-RAS RRHs (2) Dragonwave A-ANT-23G-2-C Dishes	(12) 1 1/4" (6) 5/16" (2) 1/2"	Sprint/Clearwire	127	(1) Low Profile Platform
122	(1) Nokia CS72188.01 Omni	(1) 1/2"	New Cingular	122	Direct

1 Coax are located inside the pole's shaft unless otherwise noted.
2 The (1) 10mm fiber cable and (2) 12 ga. DC cables are installed inside (1) 3" conduit.

Proposed Carrier - Final Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
148	(6) Commscope HBXX-6517DS (6) Decibel DB844G65ZAXY (3) Antel BXA-70063/6CF (3) Alcatel Lucent RH_2x60-AWS (3) Alcatel Lucent RH_60W-PCS (6) RFS FD9R6004/2C-3L Diplexers (1) RFS DB-T1-6ZAB-0Z Distribution Box	(12) 1 5/8" (1) Fiber	Verizon	148	(1) 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
Base Plate	50 ksi
Anchor Bolts	75 ksi (assumed)

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.

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	158 - 113.5	Pole	TP34.68x24x0.25	58.6	Pass
L2	113.5 - 78	Pole	TP42.7x33.1x0.3125	79.5	Pass
L3	78 - 38.5	Pole	TP51.55x40.755x0.4063	74.4	Pass
L4	38.5 - 0	Pole	TP59.98x49.1782x0.5	66.2	Pass
		Anchor Bolts	(20) 2.25"ø w/ BC = 67"	70.7	Pass
		Base Plate	PL 66" Square x 3.25" Thk	57.9	Pass

Table 4 - Maximum Base Reactions

Base Reactions	Current Analysis *(TIA/EIA-222-F)*	Original Design *(TIA/EIA-222-F)*
Axial	46 k*	41 k
Shear	33 k	44 k
Moment	3,911 k-ft	5,150 k-ft

* Per our experience with foundations of similar type, the axial loading should not control the foundation analysis.

GENERAL COMMENTS

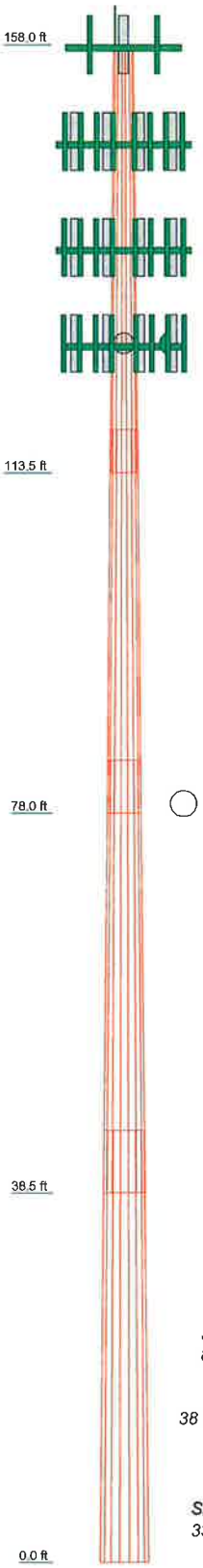
This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading 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.

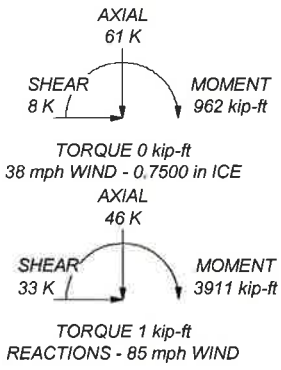
LIMITATIONS

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

Section	1	2	3	4
Length (ft)	44.50	40.00	45.00	45.00
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3125	0.4063	0.5000
Socket Length (ft)	4.50	5.50	6.50	
Top Dia (in)	24.0000	33.1000	40.7550	49.1782
Bot Dia (in)	34.6800	42.7000	51.5500	59.9800
Grade			A607-65	
Weight (K)	3.5	5.1	9.0	13.1





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	158	7770.00 w/Mount Pipe	137
APXV18-206517S-C W/Mount Pipe	158	7770.00 w/Mount Pipe	137
APXV18-206517S-C W/Mount Pipe	158	7770.00 w/Mount Pipe	137
APXV18-206517S-C W/Mount Pipe	158	(2) DTMABP7819VG12A TMA	137
(3) Antenna Mount Pipe	158	(2) DTMABP7819VG12A TMA	137
(3) Antenna Mount Pipe	158	(2) DTMABP7819VG12A TMA	137
(3) Antenna Mount Pipe	158	LGP13519 TMA	137
Low Profile Platform	158	LGP13519 TMA	137
(2) DB844G65ZAXY w/Mount Pipe	148	LGP13519 TMA	137
(2) DB844G65ZAXY w/Mount Pipe	148	DBC-750	137
(2) DB844G65ZAXY w/Mount Pipe	148	DBC-750	137
(2) FD9R6004/2C-3L Diplexer	148	DBC-750	137
(2) FD9R6004/2C-3L Diplexer	148	Low Profile Platform	137
(2) FD9R6004/2C-3L Diplexer	148	(2) RRUS-11	135
(2) HBXX-6517DS w/ Mount Pipe	148	(2) RRUS-11	135
(2) HBXX-6517DS w/ Mount Pipe	148	DC6-48-60-18-8F Surge Arrestor	135
(2) HBXX-6517DS w/ Mount Pipe	148	Collar Mount	135
Low Profile Platform	148	(2) Empty Mount Pipe	135
BXA-70063/6CF w/Mount Pipe	148	(2) Empty Mount Pipe	135
BXA-70063/6CF w/Mount Pipe	148	(2) Empty Mount Pipe	135
BXA-70063/6CF w/Mount Pipe	148	(2) RRUS-11	135
DB-T1-6Z-8AB-0Z	148	(3) DB844H90E-XY w/Mount Pipe	127
RH_2x60-AWS	148	(3) DB844H90E-XY w/Mount Pipe	127
RH_2x60-AWS	148	(3) DB844H90E-XY w/Mount Pipe	127
RH_2x60-AWS	148	LLPX310R W/ Mount Pipe	127
RH_60W-PCS	148	LLPX310R W/ Mount Pipe	127
RH_60W-PCS	148	LLPX310R W/ Mount Pipe	127
RH_60W-PCS	148	Antenna Mount Pipe	127
(2) KMW AM-X-CD-16-65-00T w/ Mount Pipe	137	Antenna Mount Pipe	127
		U-RAS RRH	127
(2) KMW AM-X-CD-16-65-00T w/ Mount Pipe	137	U-RAS RRH	127
		U-RAS RRH	127
(2) KMW AM-X-CD-16-65-00T w/ Mount Pipe	137	Low Profile Platform	127
		A-ANT-23G-2-C	127
800 10121 w/ Mount Pipe	137	A-ANT-23G-2-C	127
800 10121 w/ Mount Pipe	137	Nokia CS72188.01	122
800 10121 w/ Mount Pipe	137		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven 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: 79.5%

FDH Engineering, Inc.
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Raleigh, North Carolina 27616
Phone: 9197551012
FAX: 9197551031
Tower Analysis

Job: Waterbury - CT02722-S-02			
Project: 146HCD1400			
Client: SBA Network Services, Inc.	Drawn by: DAlexander		App'd:
Code: TIA/EIA-222-F	Date: 11/21/14		Scale: NTS
Path:			Dwg No. E-1