

May 19, 2015

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

Re: **Notice of Exempt Modification – Facility Modification  
864 Opening Hill Road, Madison, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 170-foot level on an existing 180-foot self-supporting lattice tower at 864 Opening Hill Road in Madison (the “Property”). The tower is owned by American Tower Corporation (“ATC”). Cellco’s use of the tower was approved by the Council in 1997. Cellco now intends to modify its facility by replacing nine (9) of its existing antennas with three (3) model HBXX-6517DS-VTM, 1900 MHz; three (3) model HBXX-6517DS-VTM, 2100 MHz antennas; and three (3) model HBXX-6514DS-VTM, 850 MHz antennas, all at the 170-foot level on the tower. Cellco also intends to install three (3) remote radio heads (“RRHs”), one (1) each behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for Cellco’s replacement 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 Fillmore McPherson, First Selectman of the Town of Madison. A copy of this letter is also being sent to the North Madison Volunteer Fire Company 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).

13818480-v1

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1. The proposed modifications will not result in an increase in the height of the existing tower. The replacement antennas and RRHs will be installed on Cellco's existing antenna platform at a height of 170 feet above ground 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 with 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 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:

Fillmore McPherson, Madison First Selectman  
North Madison Volunteer Fire Department  
Tim Parks

# **ATTACHMENT 1**



## LNX-6514DS-VTM

**Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible**

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

### Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.8	15.9
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Vertical, degrees	12.4	11.2
Beam Tilt, degrees	0–10	0–10
USLS, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	23	23
CPR at Sector, dB	12	10
Isolation, dB	30	30
VSWR   Return Loss, dB	1.4   15.6	1.4   15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

### Electrical Specifications, BASTA\*

Frequency Band, MHz	698–806	806–896
Gain by all Beam Tilts, average, dBi	15.6	15.7
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.5
	0 °   15.7	0 °   15.9
Gain by Beam Tilt, average, dBi	5 °   15.7	5 °   15.8
	10 °   15.3	10 °   15.3
Beamwidth, Horizontal Tolerance, degrees	±0.9	±1.4
Beamwidth, Vertical Tolerance, degrees	±0.8	±0.6
USLS, dB	18	20
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	25	24
CPR at Sector, dB	15	12

\* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, [download the whitepaper Time to Raise the Bar on BSAs.](#)

### General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol®   Teletilt®

INX-6514DS-VTM



Operating Frequency Band 698 – 896 MHz  
Performance Note Outdoor usage

## Mechanical Specifications

Color Light gray  
Lightning Protection dc Ground  
Radiator Material Aluminum  
Radome Material Fiberglass, UV resistant  
RF Connector Interface 7-16 DIN Female  
RF Connector Location Bottom  
RF Connector Quantity, total 2  
Wind Loading, maximum 617.7 N @ 150 km/h  
138.9 lbf @ 150 km/h  
Wind Speed, maximum 241.0 km/h | 149.8 mph

## Dimensions

Depth 180.5 mm | 7.1 in  
Length 1851.0 mm | 72.9 in  
Width 301.0 mm | 11.9 in  
Net Weight 14.2 kg | 31.3 lb

## Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator LNX-6514DS-A1M  
RET System Teletilt®

## Regulatory Compliance/Certifications

### Agency

RoHS 2011/65/EU  
China RoHS SJ/T 11364-2006  
ISO 9001:2008

### Classification

Compliant by Exemption  
Above Maximum Concentration Value (MCV)  
Designed, manufactured and/or distributed under this quality management system



## Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

### \* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance



## HBXX-6517DS-VTM

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

- Superior azimuth tracking and pattern symmetry with excellent passive intermodulation suppression

### Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain, dBi	19.0	19.1	19.2
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
CPR at Boresight, dB	21	22	21
CPR at Sector, dB	10	11	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°
Impedance	50 ohm	50 ohm	50 ohm

### Electrical Specifications, BASTA\*

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
	0 °   18.4	0 °   18.4	0 °   18.7
Gain by Beam Tilt, average, dBi	3 °   18.7	3 °   18.7	3 °   18.9
	6 °   18.4	6 °   18.5	6 °   18.6
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
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

\* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the [whitepaper Time to Raise the Bar on BSAs](#).

### General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® quad
Band	Single band
Brand	DualPol®   Teletilt®
Operating Frequency Band	1710 – 2180 MHz

HBXX-6517DS-VTM

POWERED BY



Performance Note

Outdoor usage

## Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	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

## Dimensions

Depth	166.0 mm   6.5 in
Length	1903.0 mm   74.9 in
Width	305.0 mm   12.0 in
Net Weight	19.5 kg   43.0 lb

## Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	HBXX-6517DS-A2M
RET System	Teletilt®

## Regulatory Compliance/Certifications

### Agency

RoHS 2011/65/EU  
China RoHS SJ/T 11364-2006  
ISO 9001:2008

### Classification

Compliant by Exemption  
Above Maximum Concentration Value (MCV)  
Designed, manufactured and/or distributed under this quality management system



## Included Products

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

## \* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance
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# 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

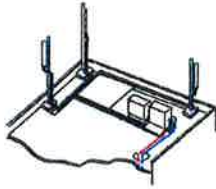
The RRH2x60-AWS includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

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.

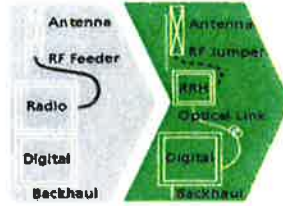
The Alcatel-Lucent RRH2x60-AWS is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

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.

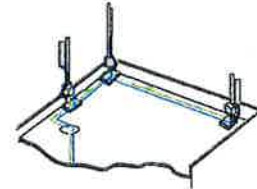




Macro



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 daisy chaining 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)

### 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

### 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)

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AT THE SPEED OF IDEAS™

Alcatel-Lucent





**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.

**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



Figure 1: HYBRIFLEX Series

**Technical Specifications**

Outer Conductor Armor	Corrugated Aluminum	(mm (in))	45.5 (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))	0.68 (0.205)
DC-Resistance Power Cable, 8.4mm <sup>2</sup> (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, UL1566 RoHS Compliant
Size (Power)		(mm (AWG))	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		(mm (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, IEC 60332-1, IEC 60332-2 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE 1202/FT4 RoHS Compliant
Installation Temperature		(°C (°F))	-40 to +65 (-40 to 149)
Operation Temperature		(°C (°F))	-40 to +65 (-40 to 149)

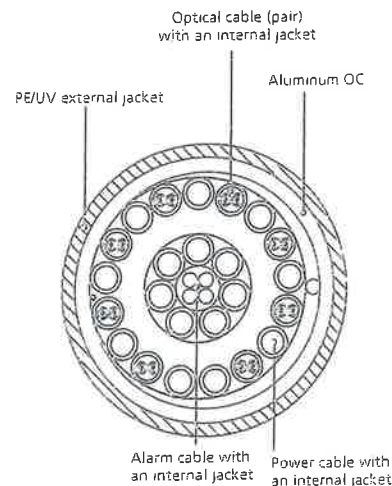


Figure 2: Construction Detail

All information contained in the present datasheet is subject to confirmation at time of ordering.

\* This data is provisional and subject to change

# **ATTACHMENT 2**

CARRIER	General			Power			Density			CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
	# OF CHAN.	WATTS ERP	HEIGHT	WATTS ERP	HEIGHT	Density								
*VoiceStream	8	246	130	246	130	0.0419	1930	1.0000	4.19%					
* Fire Company	1	100	180	100	180	0.0011	46.06	0.2000	0.55%					
* Police Dept	1	100	180	100	180	0.0011	453.5	0.3023	0.37%					
*AT&T UMTS	2	565	140	565	140	0.0207	880	0.5867	3.53%					
*AT&T UMTS	2	875	140	875	140	0.0321	1900	1.0000	3.21%					
*AT&T GSM	1	283	140	283	140	0.0052	880	0.5867	0.88%					
*AT&T GSM	4	525	140	525	140	0.0385	1900	1.0000	3.85%					
*AT&T LTE	1	1313	140	1313	140	0.0241	734	0.4893	4.92%					
*Sprint CDMA/LTE	2	693	150	693	150	0.0221	1900	1.0000	2.21%					
*Sprint CDMA/LTE	1	390	150	390	150	0.0062	850	0.5667	1.10%					
*Sprint CDMA/LTE	2	693	150	693	150	0.0221	2500	1.0000	2.21%					
*Nextel	9	100	160	100	160	0.0126	851	0.5673	2.23%					
<b>Verizon PCS</b>	<b>7</b>	<b>364</b>	<b>170</b>	<b>364</b>	<b>170</b>	<b>0.0317</b>	<b>1970</b>	<b>1.0000</b>	<b>3.17%</b>					
<b>Verizon Cellular</b>	<b>9</b>	<b>314</b>	<b>170</b>	<b>314</b>	<b>170</b>	<b>0.0352</b>	<b>869</b>	<b>0.5793</b>	<b>6.07%</b>					
<b>Verizon AWS</b>	<b>1</b>	<b>2812</b>	<b>170</b>	<b>2812</b>	<b>170</b>	<b>0.0350</b>	<b>2145</b>	<b>1.0000</b>	<b>3.50%</b>					
<b>Verizon 700</b>	<b>1</b>	<b>783</b>	<b>170</b>	<b>783</b>	<b>170</b>	<b>0.0097</b>	<b>746</b>	<b>0.4973</b>	<b>1.96%</b>			<b>43.97%</b>		
* Source: Siting Council														

# **ATTACHMENT 3**



**AMERICAN TOWER®**  
CORPORATION

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## Structural Analysis Report

**Structure** : 180 ft Self Supported Tower  
**GTP Site Name** : North Madison Volunteer FD, CT  
**GTP Site Number** : CT-9014  
**Engineering Number** : 61879423  
**Proposed Carrier** : Verizon Wireless  
**Carrier Site Name** : Madison  
**Carrier Site Number** : N/A  
**Site Location** : 864 Opening Hill Road  
Madison, CT 06443-0000  
41.35694000, -72.64013000  
**County** : New Haven  
**Date** : May 11, 2015  
**Max Usage** : 100%  
**Result** : Pass

Reviewed by:  
Scott Wirgau, PE  
Structural Team Leader

Prepared By:  
Robert D. Barrett, E.I.  
Structural Engineer I

*Robert D. Barrett*



May 11 2015 4:50 PM

COA: PEC.0001553



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## Introduction

The purpose of this report is to summarize results of a structural analysis performed on the 180 ft self supported tower to reflect the change in loading by Verizon Wireless.

## Supporting Documents

<b>Tower Drawings</b>	Rohn Drawing #C981756, dated December 2, 1998
<b>Foundation Drawing</b>	Rohn Drawing #A992935-1, dated July 21, 1999
<b>Geotechnical Report</b>	Clarence Welti Assoc. Job #35130AE, dated June 9, 1997

## Analysis

The tower was analyzed using American Tower Corporation's tower analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/EIA-222.

<b>Basic Wind Speed:</b>	100 mph (Fastest Mile)
<b>Basic Wind Speed w/ Ice:</b>	87 mph (Fastest Mile)w/ 1/2" radial ice concurrent
<b>Code:</b>	ANSI/TIA/EIA-222-F / 2003 IBC , Sec. 1609.1.1, Exception (5) & Sec. 3108.4 w/ 2005 CT Supplement & 2009 CT Amendment

## Conclusion

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report.

If you have any questions or require additional information, please contact American Tower via email at [Engineering@americantower.com](mailto:Engineering@americantower.com). Please include the American Tower site name, site number, and engineering number in the subject line for any questions.



**Existing and Reserved Equipment**

Elevation <sup>1</sup> (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
180.0	190.8	2	RFS PD455	Side Arms	(3) 7/8" Coax (1) 1/2" Coax (1) 2" Conduit (1) 1" Conduit	Town Of Madison
	186.0	1	4-Bay Dipole			
	183.0	1	2-Bay Dipole			
168.0	170.0	2	Antel BXA-70063/4CF	Sector Frames	(12) 1 5/8" Coax (1) 1 1/4" Coax	Verizon Wireless
		1	Antel BXA-70063/6CF			
		6	RFS FD9R6004/2C-3L			
160.0	160.0	12	Andrew DB844H90E-XY	Sector Frames	(12) 1 5/8" Coax	Sprint Nextel
150.0	150.0	3	ALU 800MHz 2X50W RRH w/ Filter	Sector Frames	(4) 1 1/4" Hybriflex	
		3	ALU 1900MHz 4X45 RRH			
		3	ALU TD-RRH8X20			
		3	RFS APXVSP18-C-A20			
		3	RFS APXVTM14-C-I20			
140.0	140.0	1	Raycap DC6-48-60-18-8F	Sector Frames	(12) 1 1/4" Coax (2) 0.76" 8 AWG 6 (1) 0.39" Fiber	AT&T Mobility
		6	Ericsson RRUS-11			
		6	KMW AM-X-CD-16-65-00T-RET			
		6	Powerwave LGP21901			
		6	Powerwave LGP21401			
		6	Powerwave 7770			
130.0	130.0	3	Commscope LNX-6515DS-VTM	T-Arms	(12) 1 5/8" Coax	T-Mobile
		3	EMS RR90_17_02DP			
75.0	75.0	1	PCTEL GPS-TMG-HR-26N	Standoff	(1) 1/2" Coax	Sprint Nextel

**Equipment to be Removed**

Elevation <sup>1</sup> (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
168.0	170.0	3	Antel BXA 171063/8BF	-	-	Verizon Wireless
		4	Antel APL 868013-42TO			
		2	Antel LPA 80080/6CF			
		1	Andrew 8' MW Dish			

**Proposed Equipment**

Elevation <sup>1</sup> (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
168.0	170.0	3	ALU RRH2x60 AWS	Sector Frames	(1) 1 5/8" Hybrid	Verizon Wireless
		1	RFS DB-T1-6Z-8AB-OZ			
		6	Commscope HBXX 6517DS-VTM			
		3	Commscope LNX 6514DS-VTM			

<sup>1</sup>Mount elevation is defined as height above bottom of steel structure to the bottom of mount, RAD elevation is defined as center of antenna above ground level (AGL).

Install proposed coax stacked on top of existing Verizon Wireless coax.

**Structure Usages\***

Structural Component	Controlling Usage	Pass/Fail
Legs	75%	Pass
Diagonals	93%	Pass
Horizontals	72%	Pass
Anchor Bolts	45%	Pass
Leg Bolts	69%	Pass

\*Anchorages have a factor of safety greater than 2.

**Foundations\***

Reaction Component	Analysis Reactions	% of Usage
Uplift (Kips)	349.6	100%
Axial (Kips)	409.6	49%
Shear (Kips)	46.7	19%

\*Foundations have a factor of safety greater than 2.

The structure base reactions resulting from this analysis were found to be acceptable through analysis based on geotechnical and foundation information, therefore no modification or reinforcement of the foundation will be required.

**Deflection, Twist and Sway\***

Antenna Elevation (ft)	Antenna	Carrier	Deflection (ft)	Twist (°)	Sway (Rotation) (°)
168.0	ALU RRH2x60 AWS	Verizon Wireless	0.244	0.013	0.220
	Commscope HBXX 6517DS-VTM				
	Commscope LNX 6514DS-VTM				
	RFS DB-T1-6Z-8AB-0Z				

\*Deflection, Twist and Sway was evaluated considering a design wind speed of 50 mph (Fastest Mile) per ANSI/TIA/EIA-222-F.



## Standard Conditions

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessary limited, to:

- Information supplied by the client regarding the structure itself, antenna, mounts and feed line loading on the structure and its components, or other relevant information.
- Information from drawings in the possession of American Tower Corporation, or generated by field inspections or measurements of the structure.

It is the responsibility of the client to ensure that the information provided to A.T. Engineering Service, PLLC and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and that their capacity has not significantly changed from the "as new" condition.

Unless explicitly agreed by both the client and American Tower Corporation, all services will be performed in accordance with the current revision of ANSI/TIA -222. The design basic wind speed will be determined based on the minimum basic wind speed as prescribed in ANSI/TIA-222. Although every effort is taken to ensure that the loading considered is adequate to meet the requirements of all applicable regulatory entities, we can provide no assurance to meet any other local and state codes or requirements. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement.

All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. A.T. Engineering Service, PLLC is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

**Job Information**

Tower : CT-9014      Location : North Madison Volunteer FD, CT  
 Code: TIA/EA-222-F      Shape : Triangle      Base Width : 25.33 ft  
 Client : Verizon Wireless      Top Width : 8.54 ft

**Sections Properties**

Section	Leg Members	Diagonal Members	Horizontal Members
1	PX 50 ksi	PX 50 ksi 3-1/2" DIA PIPE	PST 50 ksi 3" DIA PIPE
2	10" DIA PIPE	PST 50 ksi 3" DIA PIPE	PST 50 ksi 2-1/2" DIA PIPE
3	10" DIA PIPE	PST 50 ksi 3" DIA PIPE	PST 50 ksi 2" DIA PIPE
4	8" DIA PIPE	PST 50 ksi 3" DIA PIPE	PST 50 ksi 2" DIA PIPE
5	ROHN 8 EHS	PST 50 ksi 3" DIA PIPE	PST 50 ksi 2" DIA PIPE
6	ROHN 6 EHS	PST 50 ksi 2-1/2" DIA PIPE	PST 50 ksi 2" DIA PIPE
7	ROHN 5 EH	PX 50 ksi 2" DIA PIPE	PST 50 ksi 1-1/2" DIA PIPE
8	4" DIA PIPE	PX 50 ksi 2" DIA PIPE	PST 50 ksi 1-1/2" DIA PIPE
9	3" DIA PIPE	PST 50 ksi 2" DIA PIPE	PST 50 ksi 1-1/2" DIA PIPE

**Discrete Appurtenance**

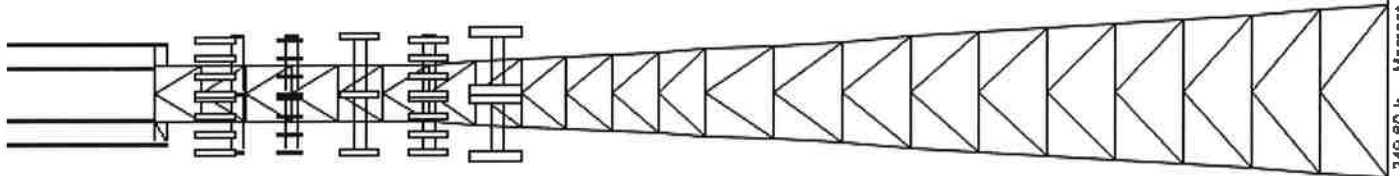
Elev (ft)	Type	Qty	Description
180.00	Whip	1	2-Bay Dipole
180.00	Whip	1	4-Bay Dipole
180.00	Whip	2	RFS PD455
180.00	Straight Arm	3	Flat Side Arm
168.00	Mounting Frame	3	Flat Light Sector Frame
168.00	Panel	2	Antel BXA-70063/4CF
168.00	Panel	1	Antel BXA-70063/6CF
168.00	Panel	6	RFS FD9R6004/2C-3L
168.00	Panel	3	ALU RRH2x60 AWS
168.00	Panel	1	RFS DB-T1-6Z-8AB-0Z
168.00	Panel	6	Commscope HBXX 6517DS-VTM
168.00	Panel	3	Commscope LNX 6514DS-VTM
160.00	Panel	12	Andrew DB844H90E-XY
160.00	Mounting Frame	3	Flat Light Sector Frame
150.00	Panel	3	ALU 800 MHz 2X50W RRH w/ Flite
150.00	Panel	3	ALU 1900 MHz 4X45 RRH
150.00	Panel	3	ALU TD-RRH8X20
150.00	Panel	3	RFS APXVSP18-C-A20
150.00	Panel	3	RFS APXVTM14-C-120
150.00	Mounting Frame	3	Flat Light Sector Frame
140.00	Mounting Frame	1	Raycap DC6-48-60-18-8F
140.00	Panel	6	Ericsson RRUS-11
140.00	Panel	6	KMW AM-X-CD-16-65-00T-RET
140.00	Panel	6	Powerwave LGP21901
140.00	Panel	6	Powerwave LGP21401
140.00	Panel	6	Powerwave 7770
140.00	Mounting Frame	3	Flat Light Sector Frame
130.00	Panel	3	Commscope LNX-6515DS-VTM
130.00	Panel	3	EMS RR90_17_02DP
130.00	Straight Arm	3	Flat T-Arm
75.00	Straight Arm	1	PCTEL GPS-TMG-HR-26N
75.00	Straight Arm	1	Standoff

**Linear Appurtenance**

Elev (ft)	From	To	Qty	Description
0.000	180.00	180.00	3	7/8" Coax
0.000	180.00	180.00	1	2" Conduit
0.000	180.00	180.00	1	1/2" Coax
0.000	180.00	180.00	1	1" Conduit
0.000	168.00	168.00	1	Waveguide
0.000	168.00	168.00	1	1 5/8" Hybrid
0.000	168.00	168.00	12	1 5/8" Coax
0.000	168.00	168.00	1	1 1/4" Coax
0.000	160.00	160.00	1	Waveguide
0.000	160.00	160.00	1	Waveguide
0.000	160.00	160.00	12	1 5/8" Coax
0.000	150.00	150.00	1	Waveguide

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Loads: 100 mph no ice  
 87 mph w/ 1/2" radial ice  
 50 mph no ice



180.00

Sect 9

160.00

Sect 8

140.00

Sect 7

120.00

Sect 6

100.00

Sect 5

80.00

Sect 4

60.00

Sect 3

40.00

Sect 2

20.00

Sect 1

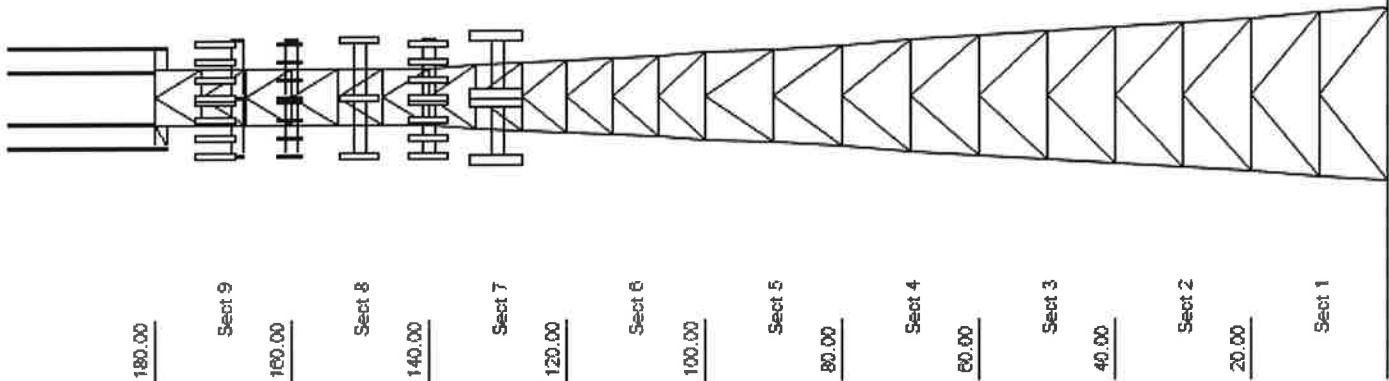
Uplift 349.60 k      Moment 8,047.04 k  
 Vert Down 58.38 k      Tot Down Ice 85.39 k      Moment Ice 5,352.11 k-ft  
 Horiz 46.65 k      Tot Shear 73.67 k      Tot Shear Ice 76.30 k

**Job Information**

Tower : CT-9014      Location : North Madison Volunteer FD, CT  
 Code: TIA/EIA-222-F      Shape : Triangle  
 Client : Verizon Wireless

0.000	150.00	3	1 1/4" Hvriflex
0.000	150.00	1	1 1/4" Hvriflex
0.000	140.00	1	Waveguide
0.000	140.00	12	1 1/4" Coax
0.000	140.00	2	0.76" 8 AWG 6
0.000	140.00	1	0.39" Fiber
0.000	130.00	1	Waveguide
0.000	130.00	6	1 5/8" Coax
0.000	130.00	6	1 5/8" Coax
0.000	75.000	1	1/2" Coax

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180.00

Sect 9

160.00

Sect 8

140.00

Sect 7

120.00

Sect 6

100.00

Sect 5

80.00

Sect 4

60.00

Sect 3

40.00

Sect 2

20.00

Sect 1

Uplift 349.60 k      Moment 8,047.04 k  
 Vert 409.61 k      Tot Down lse 85.39 k  
 Horiz 46.65 k      Tot Shear lse 76.30 k

Site Number: CT-9014

Code:

TIA/EIA-222-F

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Site Name: North Madison Volunteer FD, CT

Engineering Number: 61879423

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Customer: Verizon Wireless

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## Analysis Parameters

### Tower Loading

Location:	New Haven County, CT	Height:	180
Code:	TIA/EIA-222-F	Base Elevation:	0.00 ft
Shape:	Triangle	Base Face Width:	25.33 ft
Tower Manufacturer:	Rohn	Top Face Width:	8.54 ft
Tower Type:	Self Support		

---

### Ice & Wind Parameters

Exposure Category:	B	Design Windspeed Without Ice:	100 mph
Design Ice Thickness:	0.50 in	Design Windspeed With Ice:	87 mph

---

### Load Cases

Normal No Ice	100 mph Wind Normal To Face with No Ice
60 deg No Ice	100 mph Wind at 60 degree From Face with No Ice
90 deg No Ice	100 mph Wind at 90 degree From Face with No Ice
Normal Ice	87 mph Wind Normal To Face with Ice
60 deg Ice	87 mph Wind at 60 degree From Face with Ice
90 deg Ice	87 mph Wind at 90 degree From Face with Ice
Normal Twist/Sway	50 mph Wind Normal To Face with No Ice
60 deg Twist/Sway	50 mph Wind at 60 degree From Face with No Ice
90 deg Twist/Sway	50 mph Wind at 90 degree From Face with No Ice

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Site Number: CT-9014

Code:

TIA/EA-222-F

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Site Name: North Madison Volunteer FD, CT

Engineering Number: 61879423

5/11/2015 1:31:45 PM

Customer: Verizon Wireless

### Tower Loading

#### Discrete Appurtenance Properties Normal No Ice

Elevation (ft)	Description	Qty	Weight (lb)	CaAa (sf)	CaAa Factor	Dist. From Face (ft)	X Angle (deg)	Vert Ecc (ft)	Mom (lb-ft)	Qz (psf)	Total Force (lb)	Pu (lb)
180.00	2-Bay Dipole	1	18	2.0	1.00	0.0	0.00	3.0	273.8	41.76	91	18
180.00	4-Bay Dipole	1	35	3.9	1.00	0.0	0.00	6.0	1100.5	41.96	183	35
180.00	Flat Side Arm	3	150	6.3	0.67	0.0	0.00	0.0	0.0	41.57	590	450
180.00	RFS PD455	2	24	6.0	1.00	0.0	0.00	10.8	6131.0	42.26	570	48
168.00	ALU RRH2x60 AWS	3	44	2.5	0.67	0.0	0.00	2.0	464.3	40.89	232	132
168.00	Antel BXA-70063/4CF	2	10	5.2	0.74	0.0	0.00	2.0	701.4	40.89	351	20
168.00	Antel BXA-70063/6CF	1	17	7.7	0.77	0.0	0.00	2.0	545.6	40.89	273	17
168.00	Commscope HBXX	6	14	5.2	0.81	0.0	0.00	2.0	2334.5	40.89	1167	82
168.00	Commscope LNX	3	39	8.4	0.82	0.0	0.00	2.0	1896.6	40.89	948	116
168.00	Flat Light Sector	3	400	17.9	0.75	0.0	0.00	0.0	0.0	40.76	1840	1200
168.00	RFS DB-T1-6Z-8AB-0Z	1	44	5.6	1.00	0.0	0.00	2.0	513.4	40.89	257	44
168.00	RFS FD9R6004/2C-3L	6	3	0.4	0.50	0.0	0.00	2.0	101.8	40.89	51	16
160.00	Andrew DB844H90E-XY	12	14	3.7	0.81	0.0	0.00	0.0	0.0	40.19	1633	168
160.00	Flat Light Sector	3	400	17.9	0.75	0.0	0.00	0.0	0.0	40.19	1814	1200
150.00	ALU 1900 MHz 4X45	3	60	2.7	0.67	0.0	0.00	0.0	0.0	39.46	241	180
150.00	ALU 800 MHz 2X50W	3	64	2.4	0.67	0.0	0.00	0.0	0.0	39.46	213	192
150.00	ALU TD-RRH8X20	3	66	4.3	0.67	0.0	0.00	0.0	0.0	39.46	382	198
150.00	Flat Light Sector	3	400	17.9	0.75	0.0	0.00	0.0	0.0	39.46	1781	1200
150.00	RFS APXVSP18-C-A20	3	57	8.3	0.82	0.0	0.00	0.0	0.0	39.46	899	171
150.00	RFS APXVTM14-C-I20	3	53	6.9	0.76	0.0	0.00	0.0	0.0	39.46	696	159
140.00	Ericsson RRUS-11	6	55	4.4	0.67	0.0	0.00	0.0	0.0	38.69	770	330
140.00	Flat Light Sector	3	400	17.9	0.75	0.0	0.00	0.0	0.0	38.69	1746	1200
140.00	KMW AM-X-CD-16-65-	6	49	8.3	0.78	0.0	0.00	0.0	0.0	38.69	1676	291
140.00	Powerwave 7770	6	35	5.9	0.75	0.0	0.00	0.0	0.0	38.69	1147	210
140.00	Powerwave LGP21401	6	18	0.9	0.50	0.0	0.00	0.0	0.0	38.69	124	105
140.00	Powerwave LGP21901	6	6	0.2	0.50	0.0	0.00	0.0	0.0	38.69	30	33
140.00	Raycap DC6-48-60-18-	1	19	1.5	1.00	0.0	0.00	0.0	0.0	38.69	64	19
130.00	Commscope LNX-	3	50	11.4	0.84	0.0	0.00	0.0	0.0	37.88	1225	151
130.00	EMS RR90_17_02DP	3	14	4.4	0.73	0.0	0.00	0.0	0.0	37.88	405	41
130.00	Flat T-Arm	3	250	12.9	0.67	0.0	0.00	0.0	0.0	37.88	1101	750
75.00	PCTEL GPS-TMG-HR-	1	1	0.2	1.00	0.0	0.00	0.0	0.0	32.37	6	1
75.00	Standoff	1	75	2.5	1.00	0.0	0.00	0.0	0.0	32.37	91	75
	<b>Totals</b>	<b>110</b>	<b>8850</b>	<b>668.9</b>								

#### Discrete Appurtenance Properties Normal Ice

Elevation (ft)	Description	Qty	Weight (lb)	CaAa (sf)	CaAa Factor	Dist. From Face (ft)	X Angle (deg)	Vert Ecc (ft)	Mom (lb-ft)	Qz (psf)	Total Force (lb)	Pu (lb)
180.00	2-Bay Dipole	1	39	2.1	1.00	0.0	0.00	3.0	224.3	31.32	75	39
180.00	4-Bay Dipole	1	62	5.4	1.00	0.0	0.00	6.0	1144.9	31.47	191	62
180.00	Flat Side Arm	3	230	7.0	0.67	0.0	0.00	0.0	0.0	31.17	492	690
180.00	RFS PD455	2	68	8.2	1.00	0.0	0.00	10.8	6262.9	31.69	583	135
168.00	ALU RRH2x60 AWS	3	61	2.9	0.67	0.0	0.00	2.0	396.6	30.67	198	184
168.00	Antel BXA-70063/4CF	2	39	5.8	0.74	0.0	0.00	2.0	585.1	30.67	293	78
168.00	Antel BXA-70063/6CF	1	59	8.5	0.77	0.0	0.00	2.0	452.1	30.67	226	59
168.00	Commscope HBXX	6	41	5.9	0.81	0.0	0.00	2.0	1988.0	30.67	994	246
168.00	Commscope LNX	3	89	9.2	0.82	0.0	0.00	2.0	1562.7	30.67	781	268

### Tower Loading

168.00	Flat Light Sector	3	510	22.2	0.75	0.0	0.00	0.0	0.0	30.56	1711	1530
168.00	RFS DB-T1-6Z-8AB-0Z	1	61	3.5	1.00	0.0	0.00	2.0	238.6	30.67	119	61
168.00	RFS FD9R6004/2C-3L	6	5	0.5	0.50	0.0	0.00	2.0	103.1	30.67	52	29
160.00	Andrew DB844H90E-XY	12	37	4.3	0.81	0.0	0.00	0.0	0.0	30.14	1409	439
160.00	Flat Light Sector	3	510	22.2	0.75	0.0	0.00	0.0	0.0	30.14	1688	1530
150.00	ALU 1900 MHz 4X45	3	83	1.8	0.67	0.0	0.00	0.0	0.0	29.59	117	249
150.00	ALU 800 MHz 2X50W	3	86	1.6	0.67	0.0	0.00	0.0	0.0	29.59	104	258
150.00	ALU TD-RRH8X20	3	90	2.7	0.67	0.0	0.00	0.0	0.0	29.59	180	270
150.00	Flat Light Sector	3	510	22.2	0.75	0.0	0.00	0.0	0.0	29.59	1657	1530
150.00	RFS APXVSP18-C-A20	3	107	9.1	0.82	0.0	0.00	0.0	0.0	29.59	741	320
150.00	RFS APXVTM14-C-I20	3	92	7.6	0.76	0.0	0.00	0.0	0.0	29.59	573	277
140.00	Ericsson RRUS-11	6	81	2.8	0.67	0.0	0.00	0.0	0.0	29.01	362	485
140.00	Flat Light Sector	3	510	22.2	0.75	0.0	0.00	0.0	0.0	29.01	1624	1530
140.00	KMW AM-X-CD-16-65-	6	95	9.1	0.78	0.0	0.00	0.0	0.0	29.01	1382	570
140.00	Powerwave 7770	6	68	6.5	0.75	0.0	0.00	0.0	0.0	29.01	956	406
140.00	Powerwave LGP21401	6	23	0.7	0.50	0.0	0.00	0.0	0.0	29.01	65	140
140.00	Powerwave LGP21901	6	8	0.2	0.50	0.0	0.00	0.0	0.0	29.01	19	46
140.00	Raycap DC6-48-60-18-	1	37	1.7	1.00	0.0	0.00	0.0	0.0	29.01	54	37
130.00	Commscope LNX-	3	116	12.4	0.84	0.0	0.00	0.0	0.0	28.41	993	349
130.00	EMS RR90_17_02DP	3	36	5.0	0.73	0.0	0.00	0.0	0.0	28.41	348	108
130.00	Flat T-Arm	3	314	15.3	0.67	0.0	0.00	0.0	0.0	28.41	979	942
75.00	PCTEL GPS-TMG-HR-	1	2	0.1	1.00	0.0	0.00	0.0	0.0	24.27	4	2
75.00	Standoff	1	175	5.9	1.00	0.0	0.00	0.0	0.0	24.27	161	175
	<b>Totals</b>	<b>110</b>	<b>13046</b>	<b>750.5</b>								

### Discrete Appurtenance Properties Normal Twist/Sway

Elevation (ft)	Description	Qty	Weight (lb)	CaAa (sf)	CaAa Factor	Dist. From Face (ft)	X Angle (deg)	Vert Ecc (ft)	Mom (lb-ft)	Qz (psf)	Total Force (lb)	Pu (lb)
180.00	2-Bay Dipole	1	18	2.0	1.00	0.0	0.00	3.0	68.5	10.44	23	18
180.00	4-Bay Dipole	1	35	3.9	1.00	0.0	0.00	6.0	275.1	10.49	46	35
180.00	Flat Side Arm	3	150	6.3	0.67	0.0	0.00	0.0	0.0	10.39	147	450
180.00	RFS PD455	2	24	6.0	1.00	0.0	0.00	10.8	1532.7	10.57	143	48
168.00	ALU RRH2x60 AWS	3	44	2.5	0.67	0.0	0.00	2.0	116.1	10.22	58	132
168.00	Antel BXA-70063/4CF	2	10	5.2	0.74	0.0	0.00	2.0	175.4	10.22	88	20
168.00	Antel BXA-70063/6CF	1	17	7.7	0.77	0.0	0.00	2.0	136.4	10.22	68	17
168.00	Commscope HBXX	6	14	5.2	0.81	0.0	0.00	2.0	583.6	10.22	292	82
168.00	Commscope LNX	3	39	8.4	0.82	0.0	0.00	2.0	474.1	10.22	237	116
168.00	Flat Light Sector	3	400	17.9	0.75	0.0	0.00	0.0	0.0	10.19	460	1200
168.00	RFS DB-T1-6Z-8AB-0Z	1	44	5.6	1.00	0.0	0.00	2.0	128.3	10.22	64	44
168.00	RFS FD9R6004/2C-3L	6	3	0.4	0.50	0.0	0.00	2.0	25.4	10.22	13	16
160.00	Andrew DB844H90E-XY	12	14	3.7	0.81	0.0	0.00	0.0	0.0	10.05	408	168
160.00	Flat Light Sector	3	400	17.9	0.75	0.0	0.00	0.0	0.0	10.05	454	1200
150.00	ALU 1900 MHz 4X45	3	60	2.7	0.67	0.0	0.00	0.0	0.0	9.86	60	180
150.00	ALU 800 MHz 2X50W	3	64	2.4	0.67	0.0	0.00	0.0	0.0	9.86	53	192
150.00	ALU TD-RRH8X20	3	66	4.3	0.67	0.0	0.00	0.0	0.0	9.86	96	198
150.00	Flat Light Sector	3	400	17.9	0.75	0.0	0.00	0.0	0.0	9.86	445	1200
150.00	RFS APXVSP18-C-A20	3	57	8.3	0.82	0.0	0.00	0.0	0.0	9.86	225	171
150.00	RFS APXVTM14-C-I20	3	53	6.9	0.76	0.0	0.00	0.0	0.0	9.86	174	159
140.00	Ericsson RRUS-11	6	55	4.4	0.67	0.0	0.00	0.0	0.0	9.67	193	330
140.00	Flat Light Sector	3	400	17.9	0.75	0.0	0.00	0.0	0.0	9.67	437	1200
140.00	KMW AM-X-CD-16-65-	6	49	8.3	0.78	0.0	0.00	0.0	0.0	9.67	419	291
140.00	Powerwave 7770	6	35	5.9	0.75	0.0	0.00	0.0	0.0	9.67	287	210
140.00	Powerwave LGP21401	6	18	0.9	0.50	0.0	0.00	0.0	0.0	9.67	31	105



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### Tower Loading

140.00	Powerwave LGP21901	6	6	0.2	0.50	0.0	0.00	0.0	0.0	9.67	7	33
140.00	Raycap DC6-48-60-18-	1	19	1.5	1.00	0.0	0.00	0.0	0.0	9.67	16	19
130.00	Commscope LNX-	3	50	11.4	0.84	0.0	0.00	0.0	0.0	9.47	306	151
130.00	EMS RR90_17_02DP	3	14	4.4	0.73	0.0	0.00	0.0	0.0	9.47	101	41
130.00	Flat T-Arm	3	250	12.9	0.67	0.0	0.00	0.0	0.0	9.47	275	750
75.00	PCTEL GPS-TMG-HR-	1	1	0.2	1.00	0.0	0.00	0.0	0.0	8.09	1	1
75.00	Standoff	1	75	2.5	1.00	0.0	0.00	0.0	0.0	8.09	23	75
	Totals	110	8850	668.9								

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### Tower Loading

#### Linear Appurtenance Properties

Elev From (ft)	Elev To (ft)	Description	Qty	Width (in)	Weight (lb/ft)	Pct In Wind	Spread On Faces	Bundling Arrangement
0.00	180.0	1" Conduit	1	1.30	1.68	100.00	2	Separate
0.00	180.0	1/2" Coax	1	0.63	0.15	100.00	2	Separate
0.00	180.0	2" Conduit	1	2.38	3.65	100.00	2	Separate
0.00	180.0	7/8" Coax	3	1.09	0.33	100.00	2	Separate
0.00	168.0	1 1/4" Coax	1	1.55	0.63	100.00	2	Separate
0.00	168.0	1 5/8" Coax	12	1.98	0.82	100.00	2	Separate
0.00	168.0	1 5/8" Hybrid	1	1.63	1.61	0.00	2	Separate
0.00	168.0	Waveguide	1	2.00	6.00	100.00	2	Separate
0.00	160.0	1 5/8" Coax	12	1.98	0.82	100.00	1	Separate
0.00	160.0	Waveguide	1	2.00	6.00	100.00	1	Separate
0.00	160.0	Waveguide	1	2.00	6.00	100.00	1	Separate
0.00	150.0	1 1/4" Hybriflex	1	1.54	1.00	100.00	2	Separate
0.00	150.0	1 1/4" Hybriflex	3	1.54	1.00	100.00	2	Separate
0.00	150.0	Waveguide	1	2.00	6.00	100.00	2	Separate
0.00	140.0	0.39" Fiber	1	0.39	0.07	100.00	3	Separate
0.00	140.0	0.76" 8 AWG 6	2	0.76	0.53	100.00	3	Separate
0.00	140.0	1 1/4" Coax	12	1.55	0.63	100.00	3	Separate
0.00	140.0	Waveguide	1	2.00	6.00	100.00	3	Separate
0.00	130.0	1 5/8" Coax	6	1.98	0.82	100.00	3	Separate
0.00	130.0	1 5/8" Coax	6	1.98	0.82	0.00	3	Separate
0.00	130.0	Waveguide	1	2.00	6.00	100.00	3	Separate
0.00	75.00	1/2" Coax	1	0.63	0.15	100.00	2	Separate

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Customer: Verizon Wireless

### Force/Stress Summary

**Section: 1 1 Bot Elev (ft): 0.00 Height (ft): 20.000**

Max Compression Member	Force		Len (ft)	Bracing %				Fa (ksi)	Member			Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
	(kip)	Load Case		X	Y	Z	KL/R		Cap (kip)	Num Bolts	Num Holes				
LEG PX - 10" DIA PIPE	-393.27	Normal Ice	10.03	100	100	100	33.1	35.7	574.34	0	0	0.00	0.00	68	Member X
HORIZ PST - 3" DIA PIPE	-10.49	90 deg No Ice	12.04	100	100	100	124.6	12.8	28.61	2	0	0.00	33.70	36	Member X
DIAG PX - 3-1/2" DIA PIPE	-15.23	90 deg Ice	16.14	100	100	100	147.9	9.1	33.51	3	0	0.00	74.41	45	Member X

Max Tension Member	Force (kip)	Load Case	Fy (ksi)	Cap (kip)	Num Bolts	Num Holes	Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
LEG PX - 10" DIA PIPE	336.69	60 deg Ice	50	643.98	0	0	0.00	0.00	52	Member
HORIZ PST - 3" DIA PIPE	11.91	90 deg Ice	50	89.20	2	0	0.00	27.38	43	Bolt Bear
DIAG PX - 3-1/2" DIA PIPE	14.45	90 deg No Ice	50	147.20	3	0	0.00	65.11	22	Bolt Bear

Max Splice Forces	Force (kip)	Load Case	Capacity (kip)	Use %	Num Bolts	Bolt Type
Top Tension	319.87	60 deg Ice	0.00	0		
Top Compression	373.08	Normal Ice	0.00	0		
Bot Tension	352.56	60 deg Ice	785.47	45	16	1" A354-BC
Bot Compression	411.05	Normal Ice	0.00	0		

**Section: 2 2 Bot Elev (ft): 20.00 Height (ft): 20.000**

Max Compression Member	Force		Len (ft)	Bracing %				Fa (ksi)	Member			Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
	(kip)	Load Case		X	Y	Z	KL/R		Cap (kip)	Num Bolts	Num Holes				
LEG PX - 10" DIA PIPE	-355.19	Normal Ice	10.03	100	100	100	33.1	35.7	574.34	0	0	0.00	0.00	61	Member X
HORIZ PST - 2-1/2" DIA PIP	-10.61	90 deg Ice	10.79	100	100	100	136.7	10.6	18.14	2	0	0.00	26.39	58	Member X
DIAG PST - 3" DIA PIPE	-15.84	90 deg Ice	15.18	100	100	100	157.0	8.1	18.00	3	0	0.00	42.12	87	Member X

Max Tension Member	Force (kip)	Load Case	Fy (ksi)	Cap (kip)	Num Bolts	Num Holes	Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
LEG PX - 10" DIA PIPE	305.64	60 deg Ice	50	643.98	0	0	0.00	0.00	47	Member
HORIZ PST - 2-1/2" DIA PIP	11.25	90 deg Ice	50	68.16	2	0	0.00	21.44	52	Bolt Bear
DIAG PST - 3" DIA PIPE	14.45	90 deg Ice	50	89.20	3	0	0.00	36.85	39	Bolt Bear

Max Splice Forces	Force (kip)	Load Case	Capacity (kip)	Use %	Num Bolts	Bolt Type
Top Tension	288.30	60 deg Ice	0.00	0		
Top Compression	334.02	Normal Ice	0.00	0		
Bot Tension	319.87	60 deg Ice	552.95	58	12	1 A325
Bot Compression	373.08	Normal Ice	0.00	0		

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### Force/Stress Summary

Section: 3		3		Bot Elev (ft): 40.00				Height (ft): 20.000						
		Force	Len	Bracing %			Fa	Member		Shear	Bear	Use		
Max Compression Member		(kip)	(ft)	X	Y	Z	(ksi)	Cap	Num	Num	Cap	Cap	%	Controls
		Load Case		KL/R				(kip)	Bolts	Holes	(kip)	(kip)		
LEG	PX - 8" DIA PIPE	-315.83	10.03	100	100	100	41.8	34.1	436.53	0	0	0.00	0.00	72 Member X
HORIZ	PST - 2-1/2" DIA PIP	-9.75	9.503	100	100	100	120.4	13.7	23.40	2	0	0.00	26.39	41 Member X
DIAG	PST - 3" DIA PIPE	-15.18	14.26	100	100	100	147.6	9.1	20.39	3	0	0.00	42.12	74 Member X
Max Tension Member		Force	Fy	Cap	Num	Num	Shear	Bear	Use					
		(kip)	(ksi)	(kip)	Bolts	Holes	Cap (kip)	Cap (kip)	%	Controls				
		Load Case												
LEG	PX - 8" DIA PIPE	273.55	50	511.99	0	0	0.00	0.00	53	Member				
HORIZ	PST - 2-1/2" DIA PIP	10.08	50	68.16	2	0	0.00	21.44	46	Bolt Bear				
DIAG	PST - 3" DIA PIPE	14.23	50	89.20	3	0	0.00	36.85	38	Bolt Bear				
Max Splice Forces		Force	Capacity	Use	Num									
		(kip)	(kip)	%	Bolts	Bolt Type								
		Load Case												
Top Tension		255.59	60 deg Ice	0.00	0									
Top Compression		294.47	Normal Ice	0.00	0									
Bot Tension		288.30	60 deg Ice	552.95	52	12	1 A325							
Bot Compression		334.02	Normal Ice	0.00	0									

Section: 4		4		Bot Elev (ft): 60.00				Height (ft): 20.000						
		Force	Len	Bracing %			Fa	Member		Shear	Bear	Use		
Max Compression Member		(kip)	(ft)	X	Y	Z	(ksi)	Cap	Num	Num	Cap	Cap	%	Controls
		Load Case		KL/R				(kip)	Bolts	Holes	(kip)	(kip)		
LEG	PX - 8" DIA PIPE	-273.29	10.03	100	100	100	41.8	34.1	436.56	0	0	0.00	0.00	62 Member X
HORIZ	PST - 2" DIA PIPE	-9.84	8.214	100	100	100	125.2	12.7	13.58	2	0	0.00	20.15	72 Member X
DIAG	PST - 3" DIA PIPE	-16.34	13.35	100	100	100	138.1	10.4	23.28	3	0	0.00	42.12	70 Member X
Max Tension Member		Force	Fy	Cap	Num	Num	Shear	Bear	Use					
		(kip)	(ksi)	(kip)	Bolts	Holes	Cap (kip)	Cap (kip)	%	Controls				
		Load Case												
LEG	PX - 8" DIA PIPE	237.65	50	511.99	0	0	0.00	0.00	46	Member				
HORIZ	PST - 2" DIA PIPE	10.06	50	42.80	2	0	0.00	16.37	61	Bolt Bear				
DIAG	PST - 3" DIA PIPE	15.59	50	89.20	3	0	0.00	36.85	42	Bolt Bear				
Max Splice Forces		Force	Capacity	Use	Num									
		(kip)	(kip)	%	Bolts	Bolt Type								
		Load Case												
Top Tension		216.76	60 deg Ice	0.00	0									
Top Compression		249.14	Normal Ice	0.00	0									
Bot Tension		255.59	60 deg Ice	368.63	69	8	1 A325							
Bot Compression		294.47	Normal Ice	0.00	0									

### Force/Stress Summary

**Section: 5 5 Bot Elev (ft): 80.00 Height (ft): 20.000**

Max Compression Member	Force (kip)	Load Case	Len (ft)	Bracing %				Fa (ksi)	Member			Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
				X	Y	Z	KL/R		Cap (kip)	Num Bolts	Num Holes				
LEG PSP - ROHN 8 EHS	-223.79	Normal Ice	10.02	100	100	100	41.2	34.2	332.61	0	0	0.00	0.00	67	Member X
HORIZ PST - 2" DIA PIPE	-10.22	90 deg Ice	7.026	100	100	100	107.1	17.3	18.56	2	0	0.00	20.15	55	Member X
DIAG PST - 3" DIA PIPE	-18.37	90 deg Ice	12.55	100	100	100	129.9	11.8	26.31	3	0	0.00	42.12	69	Member X

Max Tension Member	Force (kip)	Load Case	Fy (ksi)	Cap (kip)	Num Bolts	Num Holes	Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
LEG PSP - ROHN 8 EHS	194.41	60 deg Ice	50	388.79	0	0	0.00	0.00	50	Member
HORIZ PST - 2" DIA PIPE	10.32	90 deg Ice	50	42.80	2	0	0.00	16.37	63	Bolt Bear
DIAG PST - 3" DIA PIPE	17.83	90 deg Ice	50	89.20	3	0	0.00	36.85	48	Bolt Bear

Max Splice Forces	Force (kip)	Load Case	Capacity (kip)	Use %	Num Bolts	Bolt Type
Top Tension	169.09	60 deg No Ice	0.00	0		
Top Compression	195.60	Normal Ice	0.00	0		
Bot Tension	216.76	60 deg Ice	368.63	59	8	1 A325
Bot Compression	249.14	Normal Ice	0.00	0		

**Section: 6 6 Bot Elev (ft): 100.0 Height (ft): 20.000**

Max Compression Member	Force (kip)	Load Case	Len (ft)	Bracing %				Fa (ksi)	Member			Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
				X	Y	Z	KL/R		Cap (kip)	Num Bolts	Num Holes				
LEG PSP - ROHN 6 EHS	-177.14	Normal Ice	6.68	100	100	100	36.0	35.2	235.98	0	0	0.00	0.00	75	Member X
HORIZ PST - 2" DIA PIPE	-9.74	90 deg Ice	6.108	100	100	100	93.1	21.7	23.19	2	0	0.00	20.15	48	Bolt Bear
DIAG PST - 2-1/2" DIA PIP	-14.98	90 deg Ice	9.288	100	100	100	117.7	14.4	24.49	3	0	0.00	39.58	61	Member X

Max Tension Member	Force (kip)	Load Case	Fy (ksi)	Cap (kip)	Num Bolts	Num Holes	Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
LEG PSP - ROHN 6 EHS	153.51	60 deg No Ice	50	268.39	0	0	0.00	0.00	57	Member
HORIZ PST - 2" DIA PIPE	9.88	90 deg Ice	50	42.80	2	0	0.00	16.37	60	Bolt Bear
DIAG PST - 2-1/2" DIA PIP	14.61	90 deg Ice	50	68.16	3	0	0.00	34.64	42	Bolt Bear

Max Splice Forces	Force (kip)	Load Case	Capacity (kip)	Use %	Num Bolts	Bolt Type
Top Tension	116.75	60 deg No Ice	0.00	0		
Top Compression	135.84	Normal Ice	0.00	0		
Bot Tension	169.09	60 deg No Ice	368.63	46	8	1 A325
Bot Compression	195.60	Normal Ice	0.00	0		

Site Number: CT-9014

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### Force/Stress Summary

**Section: 7 7 Bot Elev (ft): 120.0 Height (ft): 20.000**

	Force (kip)	Load Case	Len (ft)	Bracing %				Fa (ksi)	Member		Num Holes	Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
				X	Y	Z	KL/R		Cap (kip)	Bolts					
<b>Max Compression Member</b>															
LEG PSP - ROHN 5 EH	-115.25	Normal Ice	6.68	100	100	100	43.6	33.8	206.29	0	0	0.00	0.00	55 Member X	
HORIZ PST - 1-1/2" DIA PIP	-9.18	90 deg Ice	5.049	100	100	100	97.2	20.4	16.34	2	0	0.00	18.85	56 Member X	
DIAG PX - 2" DIA PIPE	-15.64	90 deg Ice	8.579	99	99	99	133.1	11.2	16.64	3	0	0.00	42.51	93 Member X	

	Force (kip)	Load Case	Fy (ksi)	Cap (kip)	Num Bolts	Num Holes	Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
LEG PSP - ROHN 5 EH	98.00	60 deg No Ice	50	244.39	0	0	0.00	0.00	40	Member
HORIZ PST - 1-1/2" DIA PIP	9.30	90 deg Ice	50	31.96	2	0	0.00	15.32	60	Bolt Bear
DIAG PX - 2" DIA PIPE	15.17	90 deg Ice	50	59.20	3	0	0.00	37.20	40	Bolt Bear

	Force (kip)	Load Case	Capacity (kip)	Use %	Num Bolts	Bolt Type
Top Tension	58.55	60 deg No Ice	0.00	0		
Top Compression	72.46	Normal Ice	0.00	0		
Bot Tension	116.75	60 deg No Ice	276.47	42	6	1 A325
Bot Compression	135.84	Normal Ice	0.00	0		

**Section: 8 8 Bot Elev (ft): 140.0 Height (ft): 20.000**

	Force (kip)	Load Case	Len (ft)	Bracing %				Fa (ksi)	Member		Num Holes	Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
				X	Y	Z	KL/R		Cap (kip)	Bolts					
<b>Max Compression Member</b>															
LEG PX - 4" DIA PIPE	-50.35	Normal Ice	6.67	100	100	100	54.1	31.6	139.39	0	0	0.00	0.00	36 Member X	
HORIZ PST - 1-1/2" DIA PIP	-7.39	90 deg No Ice	4.340	100	100	100	83.6	24.4	19.48	2	0	0.00	18.85	39 Bolt Bear	
DIAG PX - 2" DIA PIPE	-14.54	90 deg Ice	7.963	100	100	100	124.7	12.8	18.94	3	0	0.00	42.51	76 Member X	

	Force (kip)	Load Case	Fy (ksi)	Cap (kip)	Num Bolts	Num Holes	Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
LEG PX - 4" DIA PIPE	39.66	60 deg No Ice	50	176.40	0	0	0.00	0.00	22	Member
HORIZ PST - 1-1/2" DIA PIP	7.52	90 deg Ice	50	31.96	2	0	0.00	15.32	49	Bolt Bear
DIAG PX - 2" DIA PIPE	14.23	90 deg Ice	50	59.20	3	0	0.00	37.20	38	Bolt Bear

	Force (kip)	Load Case	Capacity (kip)	Use %	Num Bolts	Bolt Type
Top Tension	11.94	60 deg No Ice	0.00	0		
Top Compression	19.17	Normal Ice	0.00	0		
Bot Tension	58.55	60 deg No Ice	184.32	32	4	1 A325
Bot Compression	72.46	Normal Ice	0.00	0		

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Customer: Verizon Wireless

### Force/Stress Summary

Section: 9 9 Bot Elev (ft): 160.0 Height (ft): 20.000

Max Compression Member	Force (kip)	Load Case	Len (ft)	Bracing %				Fa (ksi)	Member		Num Holes	Shear Bear		Use %	Controls
				X	Y	Z	KL/R		Cap (kip)	Num Bolts		Cap (kip)	Cap (kip)		
LEG PST - 3" DIA PIPE	-8.98	Normal Ice	6.67	100	100	100	69.0	28.2	62.82	0	0	0.00	0.00	14	Member X
HORIZ PST - 1-1/2" DIA PIP	-3.56	Normal No Ice	4.299	100	100	100	82.8	24.6	19.65	2	0	0.00	18.85	18	Bolt Bear
DIAG PST - 2" DIA PIPE	-5.87	Normal No Ice	7.940	100	100	100	121.1	13.6	14.53	3	0	0.00	30.22	40	Member X

Max Tension Member	Force (kip)	Load Case	Fy (ksi)	Cap (kip)	Num Bolts	Num Holes	Shear Cap (kip)	Bear Cap (kip)	Use %	Controls
HORIZ PST - 1-1/2" DIA PIP	3.14	60 deg No Ice	50	31.96	2	0	0.00	15.32	20	Bolt Bear
DIAG PST - 2" DIA PIPE	5.77	Normal No Ice	50	42.80	3	0	0.00	26.45	21	Bolt Bear

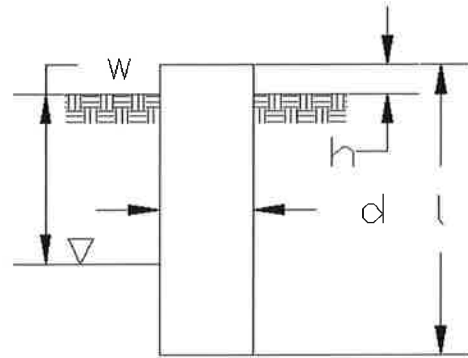
Max Splice Forces	Force (kip)	Load Case	Capacity (kip)	Use %	Num Bolts	Bolt Type
Top Compression	0.44	Normal Ice	0.00	0		
Bot Tension	11.94	60 deg No Ice	141.12	8	4	7/8 A325
Bot Compression	19.17	Normal Ice	0.00	0		

Site Name: North Madison Volunteer FD, CT  
 Site Number: CT-9014  
 Engineer: R. Barrett  
 Engineering Number: 61879423  
 Date: 05/11/15

Program Last Updated: 5/13/2014  
 American Tower Corporation

**Design Base Loads (Unfactored) - Analysis per TIA-222-F Standards**

Analyze or Design a Foundation? Analyze  
 Foundation Mapped: N  
 Moment (M): 0.0 k-ft  
 Shear/Leg (V): 46.7 k  
 Compression/Leg (P): 409.6 k  
 Uplift/Leg (U): 349.6 k  
 Tower Type (GT / SST / MP): SST  
 Diameter of Caisson (d): 6.0 ft  
 Caisson Embedment (L-h): 18.0 ft  
 Caisson Height Above Ground (h): 0.5 ft  
 Depth Below Ground Surface to Water Table (w): 2.5 ft  
 Unit Weight of Concrete: 150.0 pcf  
 Unit Weight of Water: 62.4 pcf  
 Tension Skin Friction/Compression Skin Friction: 1.00  
 Pullout Angle: 35.0 degrees



Engineer Notes

**Soil Mechanical Properties**

Depth (ft)		$\gamma_{Soil}$	Cohesion	$\phi$	Allowable Skin	Allowable Bearing
Top	Bottom	(pcf)	(psf)	(degree)	Friction (psf)	Pressure (psf)
0.0	2.0	125	0	0	0	0
2.0	10.0	125	625		156.5	
10.0	14.0	135	6250		1562.5	18359.5
14.0	19.0	145	8000		2500	18359.5

Volume of Concrete: 523.1 ft<sup>3</sup> = 19.4 yd<sup>3</sup>  
 Weight of Concrete (Buoyancy Effect Considered): 51.1 k  
 Average Soil Unit Weight: 91.8 pcf  
 Skin Friction Resistance: 329.9 k  
 Compressive Bearing Resistance: 519.1 k  
 Pullout Weight (Minus Concrete Weight): 647.7 k  
 Allowable Uplift Capacity ( $U_{Allow}$ ): 349.4 k  
 Allowable Compressive Capacity ( $P_{Allow}$ ): 849.0 k  
 Compressive Design Load (P): 411.9 k  
 $U / U_{Allow}$ : 1.00 Result: Acceptable Overstress  
 $P / P_{Allow}$ : 0.49 Result: OK  
 Total Lateral Resistance: 2200.6 k  
 Inflection Point (Below Ground Surface): 14.3 ft  
 Design Overturning Moment At Inflection Point ( $M_D$ ): 692.3 k-ft  
 Nominal Moment Capacity ( $M_{Allow}$ ): 5658.9 k-ft  
 $M_{Allow} / M_D$  Factor of Safety: 8.17 Result: OK



**Lateral Capacity**

Depth (ft)		$\gamma_{soil}$	Cohesion	$\phi$
Top	Bottom	(pcf)	(psf)	(degree)
0.0	2.3	125	0	0
2.3	4.5	125	625	0
4.5	6.8	63	625	0
6.8	9.0	63	625	0
9.0	11.3	63	625	0
11.3	13.5	73	6250	0
13.5	15.8	73	6250	0
15.8	18.0	83	8000	0

Overburden (psf)		Bearing Pressure (psf)		Resistance
Top	Bottom	Top	Bottom	(k)
0	281	0	675	4.56
281	563	4675	5350	67.67
563	703	5350	5688	74.51
703	844	5688	6026	79.07
844	985	6026	6364	83.63
985	1148	42364	42756	574.56
1148	1312	42756	43148	579.85
1312	1498	54348	54794	736.71

$\Sigma$ Forces	IP Section		
(k)	(k)	(k)	
-2247.2	0.0	2200.56	N
-2238.1	4.6	2196.01	N
-2102.8	72.2	2128.34	N
-1953.8	146.7	2053.83	N
-1795.6	225.8	1974.76	N
-1628.3	309.4	1891.13	N
-479.2	884.0	1316.57	Y
680.5	1463.9	736.71	N

	Add. Force	Add. Length	IP
	(k)	(ft)	(ft)
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	0.00	0.00
0.00	0.00	0.00	0.00
147.29	216.28	0.84	14.34
0.00	0.00	0.00	0.00

Force / Sec.			
(k)	(k)	(k)	(k)
4.56	0.00	0.00	0.00
67.67	0.00	0.00	0.00
74.51	0.00	0.00	0.00
79.07	0.00	0.00	0.00
83.63	0.00	0.00	0.00
574.56	0.00	0.00	0.00
0.00	0.00	216.28	363.57
0.00	736.71	0.00	0.00

(ft)	Distance to Inflection Point			$\Sigma$ RM
	(ft)	(ft)	(ft)	(k-ft)
13.21	0.00	0.00	0.00	60.2
10.96	0.00	0.00	0.00	741.9
8.71	0.00	0.00	0.00	649.3
6.46	0.00	0.00	0.00	511.1
4.21	0.00	0.00	0.00	352.5
1.96	0.00	0.00	0.00	1128.6
0.00	0.00	0.42	0.71	347.2
0.00	2.54	0.00	0.00	1868.1

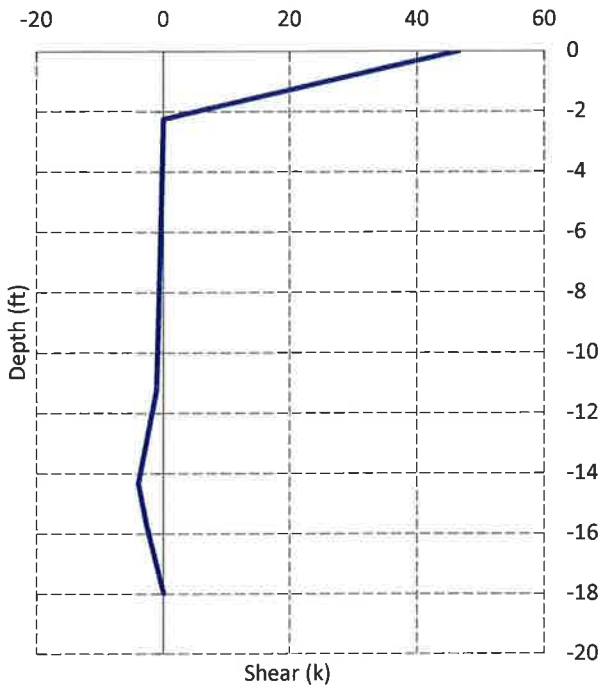
Total Lateral Resistance: 2200.6 k  
 Inflection Point (Below C 14.3 ft  
 Design Overturning Mon 692.3 k-ft  
 Nominal Moment Capac 5658.9 k-ft  
 $M_{Allow} / M_D$ : 8.2 Result: OK

Negative $V_u$	Positive $V_u$	Depth (ft)	$\Sigma V_u$ (k)	$\Sigma M_u$ (k-ft)	$\Sigma V_u$ (k)	$M_u$ (k-ft)		Negative $V_u$
-46.65		0.0	46.65	6130.1	46.65	23.3	0.0	
0.00	4.56	-2.3	-4.56	6177.5	-0.02	23.5	0.0	
0.00	67.67	-4.5	-72.23	6091.1	-0.27	23.2	0.0	
0.00	74.51	-6.8	-146.73	5844.8	-0.56	22.2	-2.3	0
0.00	79.07	-9.0	-225.80	5425.7	-0.86	20.6	-2.3	
0.00	83.63	-11.3	-309.44	4823.5	-1.18	18.4	-2.3	
0.00	574.56	-13.5	-884.00	3480.9	-3.36	13.2	-4.5	0
-363.57	216.28	-15.8	-736.71	1657.6	-2.80	6.3	-4.5	
-736.71	0.00	-18.0	0.00	0	0.00	0.0	-4.5	
							-6.8	0
							-6.8	
							-6.8	
							-9.0	0
							-9.0	
							-9.0	
							-11.3	0
							-11.3	
							-11.3	
							-13.5	0
							-14.3	
							-14.3	-363.5704
							-15.8	0.00
							-15.8	
							-15.8	
							-18.0	-736.71

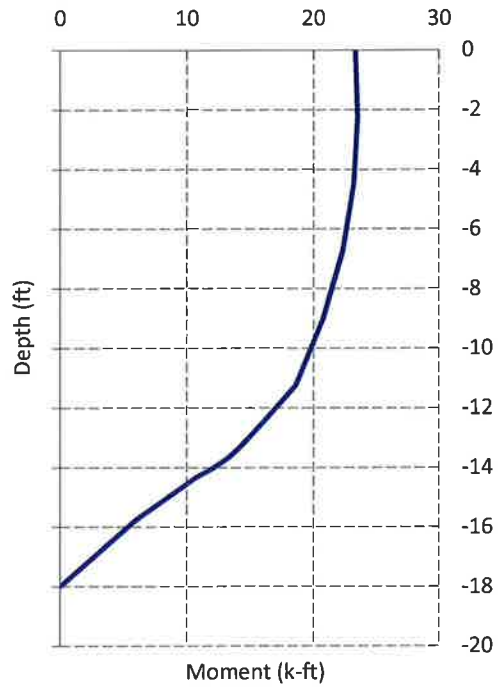
## Caisson Strength Capacity

Concrete Compressive Strength ( $f'_c$ ):	3000 psi
Vertical Steel Rebar Size #:	9
Vertical Steel Rebar Area:	1.00 in <sup>2</sup>
Design # of Vertical Steel Rebars:	28
Vertical Steel Rebar Yield Strength ( $F_y$ ):	60 ksi
Horizontal Tie / Stirrup Size #:	5
Horizontal Tie / Stirrup Area:	0.31 in <sup>2</sup>
Design Horizontal Tie / Stirrup Spacing:	10.0 in
Horizontal Tie / Stirrup Steel Yield Strength ( $F_y$ ):	60 ksi
Rebar Cage Diameter:	64.0 in
Strength Bending/Tension Reduction Factor ( $\phi_B$ ):	0.90 ACI318-05 - 9.3.2.1
Strength Shear Reduction Factor ( $\phi_V$ ):	0.75 ACI318-05 - 9.3.2.3
Strength Compression Reduction Factor ( $\phi_P$ ):	0.65 ACI318-05 - 9.3.2.2
Wind Design Factor:	1.30 ACI318-05 - 9.2.1
Steel Elastic Modulus:	29000 ksi
Design Moment ( $M_u$ ):	303.2 k-ft
Nominal Moment Capacity ( $\phi_B M_n$ ):	3944.2 k-ft - ACI318-005 - 10.2
$M_u / \phi_B M_n$ :	0.08 Result: OK
Design Shear ( $V_u$ ):	60.6 k
Nominal Shear Capacity ( $\phi_V V_n$ ):	320.1 k - ACI318-05 - 11.3.1.1 or 11.5.7.2
$V_u / \phi_V V_n$ :	0.19 Result: OK
Design Tension ( $T_u$ ):	454.5 k
Nominal Tension Capacity ( $\phi_T T_n$ ):	1512.0 k - ACI318-05 - 10.2
$T_u / \phi_T T_n$ :	0.30 Result: OK
Design Compression ( $P_u$ ):	535.4 k
Nominal Compression Capacity ( $\phi_P P_n$ ):	5361.7 k - ACI318-05 - 10.3.6.2
$P_u / \phi_P P_n$ :	0.10 Result: OK
Bending Reinforcement Ratio:	0.007 ACI318-05 - 10.8.4 & 10.9.1
$M_u / \phi_B M_n + T_u / \phi_T T_n$ :	0.38 Result: OK

Design Unfactored Shear / Depth



Design Unfactored Moment / Depth



Nominal and Factored Moment Capacity and Factored Design Loads

