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Hartford, CT 06103-3597
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kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

March 4, 2014

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

Re: **Notice of Exempt Modification – Antenna Swap
180 & 184 North Main Street, Branford, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains fifteen (15) wireless telecommunications antennas at the 97-foot and 103-foot levels of the existing 110-foot tower at 180 & 184 North Main Street in Branford, Connecticut (the “Property”). The tower is owned by Crown Castle. The Council approved Cellco’s use of the tower in 1990. Cellco now intends to replace seven (7) of its existing antennas with one (1) model BXA-70063-6CF 700 MHz antenna at the 97-foot level; three (3) model 742-213V01, 1900 MHz antennas at the 103-foot level; and three (3) model 742-213V01, 2100 MHz antennas at the 103-foot 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, installed inside the monopole. 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 James B. Cosgrove, First Selectman for the Town of Branford. A copy of this letter is also being sent to Three M&M Limited Partnership, 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).



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12767471-v1


ROBINSON & COLE_{LLP}

Melanie A. Bachman
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Page 2

1. The proposed modifications will not result in an increase in the height of the existing tower. The replaced antennas and RRHs will be located on Cellco's existing platform at the 97-foot and 103-foot levels on the 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 modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A worst-case 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 foundation can support Cellco's proposed facility 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:

James B. Cosgrove, Branford First Selectman
Three M&M Limited Partnership
Sandy M. Carter



ATTACHMENT 1

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

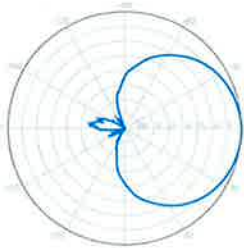
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz		
Frequency bands	696-806 MHz	806-900 MHz	
Polarization	±45°		
Horizontal beamwidth	65°	63°	
Vertical beamwidth	13°	11°	
Gain	14,0 dBd (16,1 dBi)	14,5 dBd (16,6 dBi)	
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10		
Impedance	50Ω		
VSWR	≤1,35:1		
Upper sidelobe suppression (0°)	-18,3 dB	-18,2 dB	
Front-to-back ratio (+/-30°)	-33,4 dB	-36,3 dB	
Null fill	5% (-26,02 dB)		
Isolation between ports	< -25 dB		
Input power with EDIN connectors	500 W		
Input power with NE connectors	300 W		
IM3 (2x20W carriers)	< -153 dBc		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in	
Depth with z-brackets	172 mm	6.8 in	
Weight without mounting brackets	7.9 kg	17 lbs	
Survival wind speed	> 201 km/hr	> 125 mph	
Wind area	Front: 0,51 m ² Side: 0,24 m ²	Front: 5,5 ft ² Side: 2,6 ft ²	
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf	
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1,57-4,5 in	6,9 kg 15,2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

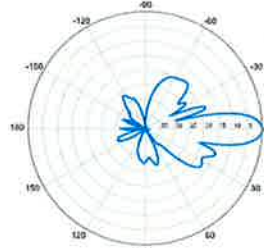


BXA-70063-6CF-EDIN-X



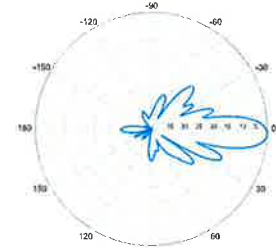
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

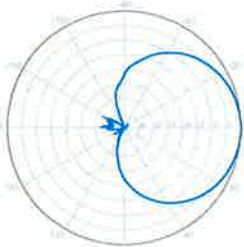


0° | Vertical | 750 MHz

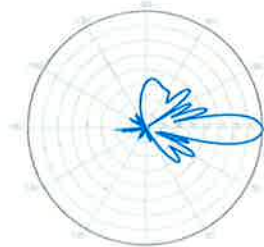
BXA-70063-6CF-EDIN-2



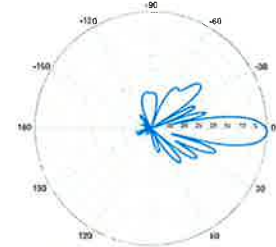
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



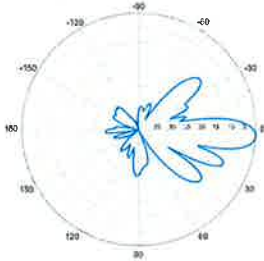
2° | Vertical | 850 MHz

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

BXA-70063-6CF-EDIN-X

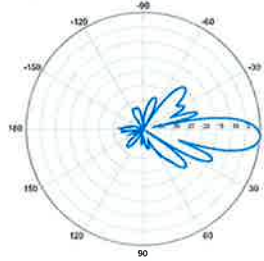
X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3



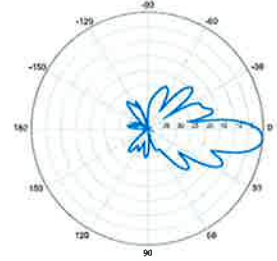
3° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-4

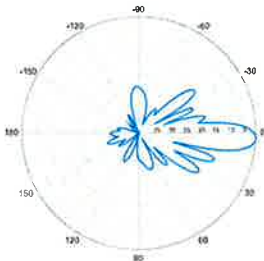


4° | Vertical | 750 MHz

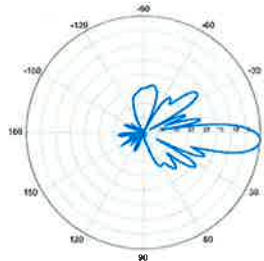
BXA-70063-6CF-EDIN-5



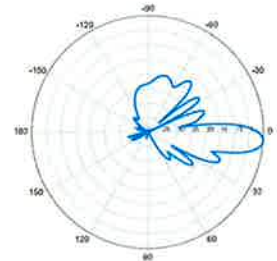
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

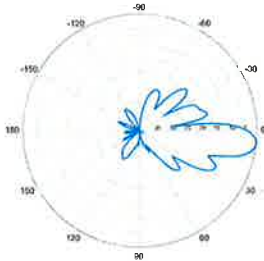


4° | Vertical | 850 MHz



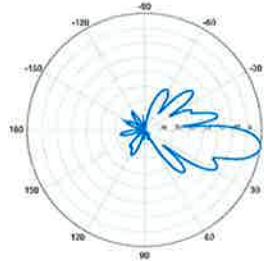
5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6



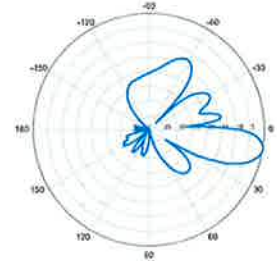
6° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-8

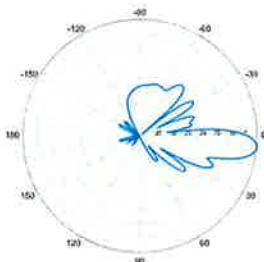


8° | Vertical | 750 MHz

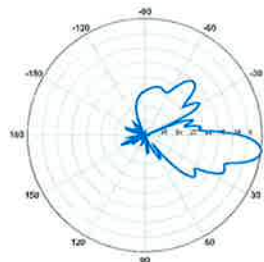
BXA-70063-6CF-EDIN-10



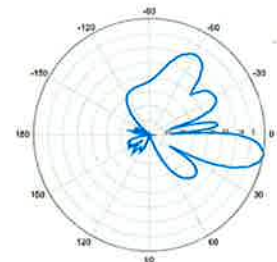
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz

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KATHREIN SCALA DIVISION

742 213V01

65° Panel Antenna

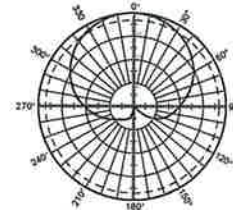
Kathrein's X-polarized adjustable electrical downtilt antennas offer the wireless carrier the ability to tailor polarization diversity sites for optimum performance. Using variable downtilt, only a few models need be procured to accommodate the needs of widely varying conditions. Remotely controlled 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 accommodate future 3G / UMTS applications.

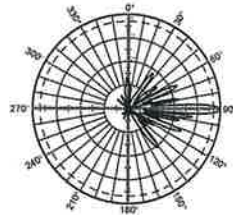
General specifications:

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° 25 dB (typical)
Sector ±60°	>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	at 93 mph (150kph)
Front/Side/Rear	115 lbf / 32 lbf / 115 lbf (510 N) / (140 N) / (510 N)
Mounting category	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.



Horizontal pattern
±45°- polarization



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



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



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.

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

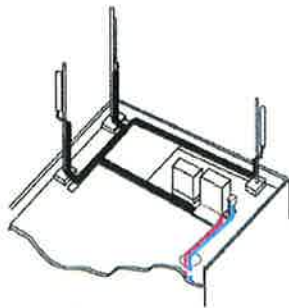
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent 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

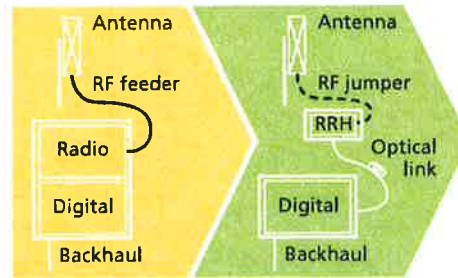
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation 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.



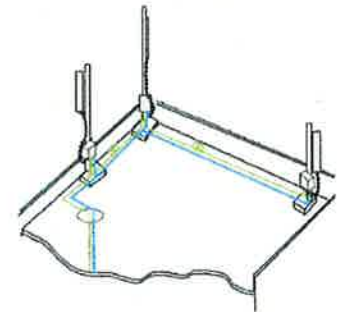
Macro

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



RRH for space-constrained cell sites



Distributed

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

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170mm (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

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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))	46.5 (1.83)
Jacket	Polyethylene, PE	(mm (in))	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight and Bending			
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			
DC-Resistance Outer Conductor Armor		(Ω/km (Ω/1000ft))	0.68 (0.205)
DC-Resistance Power Cable, 8.4mm ² (8AWG)		(Ω/km (Ω/1000ft))	2.1 (0.307)
Optical 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
Power Cable Properties			
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, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE 1292/FT4 RoHS Compliant
Operating Temperature			
Installation Temperature		(°C (°F))	-40 to +65 (-40 to 149)
Operation Temperature		(°C (°F))	-40 to +65 (-40 to 149)

* This data is provisional and subject to change

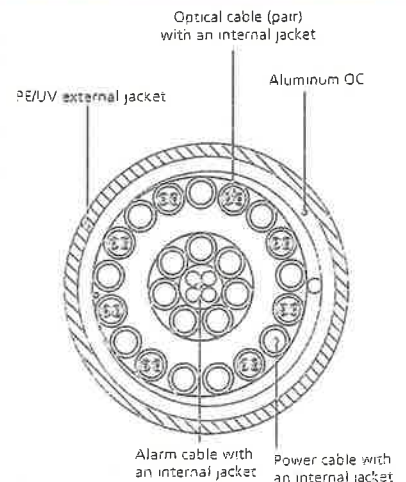


Figure 2: Construction Detail

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

ATTACHMENT 2

General Power Density

Site Name: BRANFORD, CT
 Cumulative Power Density

Operator	Operating Frequency (MHz)	Number of Trans.	ERP Per Trans. (watts)	Total ERP (watts)	Distance to Target (feet)	Calculated Power Density (mW/cm ²)	Maximum Permissible Exposure* (mW/cm ²)	Fraction of MPE (%)
VZW PCS	1970	7	576	4030	103	0.1366	1.0	13.66%
VZW Cellular	869	9	417	3751	97	0.1434	0.5793333333	24.75%
VZW AWS	2145	1	2173	2173	103	0.0737	1.0	7.37%
VZW 700	698	1	859	859	97	0.0328	0.4653333333	7.05%

Total Percentage of Maximum Permissible Exposure

52.82%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Part 1 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz

mW/cm² = milliwatts per square centimeter

ERP = Effective Radiated Power

Absolute worst case maximum values used.

ATTACHMENT 3

January 19, 2014

Cathy Garziano
Crown Castle
5350 North 48th Street Suite 305
Chandler, AZ 85226
(480) 735-6952



B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630
btwo@btgrp.com

Subject: **Structural Analysis Report**

Carrier Designation: **Verizon Wireless Co-Locate**

Carrier Site Number: N/A

Carrier Site Name: Branford, CT

Crown Castle Designation:

Crown Castle BU Number: 806360

Crown Castle Site Name: NHV 113 943126

Crown Castle JDE Job Number: 256451

Crown Castle Work Order Number: 699839

Crown Castle Application Number: 211221 Rev. 1

Engineering Firm Designation: **B+T Group Project Number:** 87395.002.01

Site Data: **180 & 184 North Main Street, Branford, New Haven County, CT**
Latitude 41° 17' 22.77", Longitude -72° 48' 42.22"
110 Foot - Monopole Tower

Dear Cathy Garziano,

B+T Group is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 609261, in accordance with application 211221, revision 1.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table 1 and Table 2 for the proposed and existing loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and IBC 2006 based upon a wind speed of 85 mph fastest mile.

All equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at B+T Group appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:
B+T Engineering, Inc.

Venu Ambati
Project Engineer

Chad E. Tuttle, P.E.
President



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1) INTRODUCTION

This tower is a 110 ft Monopole tower designed by Valmont in May of 1990. The tower was originally designed for a wind speed of 90 mph per EIA-222-D.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
94.0	103.0	6	Kathrein	742 213	1	1 5/8	--
	97.0	3	Alcatel Lucent	RRH2x40-AWS			
		1	Antel	BXA-70063-6CF-EDIN-0			
		1	Rfs Celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
107.0	107.0	1	--	Platform Mount [LP 712-1]	--	--	1
97.0	97.0	1	--	Sector Mount [SM 201-3]	--	--	1
94.0	108.0	1	Gps	GPS_A	--	--	1
	103.0	1	Antel	LPA-171063-12CF-EDIN-2	--	--	3
		1	Antel	LPA-171063/8CFx2	12	1 1/4	1
	97.0	6	Decibel	DB846F65ZAXY			
		1	Antel	BXA-70063-6CF-EDIN-0	1	1/2	
		1	Antel	LPA-171063-12CF-EDIN-2	--	--	3
	1	Antel	LPA-171063/8CFx2				
	2	Decibel	DB846F65ZAXY	--	--	3	
	1	Antel	BXA-70063-6CF-EDIN-0				
	94.0	94.0	1	--	Platform Mount [LP 712-1]	--	--
83.0	83.0	1	Decibel	DB225-A	--	--	2
		1	--	Pipe Mount [PM 602-1]			
64.0	64.0	1	Decibel	DB225-A	--	--	2
		1	--	Pipe Mount [PM 602-1]			

Notes:

- 1) Existing Equipment
- 2) Abandoned equipment consider in this analysis
- 3) **Equipment To Be Removed**

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
107	110	4	Celwave	PD10017	--	--
	107	1	Generic	Platform		
94	94	12	Celwave	PD1132	--	--
		1	Generic	Platform		
79	79	1	--	DB-212-2	--	--
		1	Generic	14' Pipe		
60	60	1	--	DB-212-2	--	--
		1	Generic	14' Pipe		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	Verizon Wireless Co-Locate Revision # 1	211221	CCI Sites
Tower Manufacturing Drawing	Valmont Order No. 10666-90	971913	CCI Sites
Foundation Drawings	SAC Project No.990-10	217660	CCI Sites
Geotech Report	Applied Earth Technologies, Date:06/12/1990	262228	CCI Sites
Antenna Configuration	Crown CAD Package	Date:01/13/2014	CCI Sites

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
- 5) Mount areas and weights are assumed based on photographs provided.

This analysis may be affected if any assumptions are not valid or have been made in error. B+T Group should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	110 - 67.333	Pole	TP30.45x21.91x0.219	1	-6.844	1013.902	50.2	Pass
L2	67.333 - 29.4167	Pole	TP37.6x29.078x0.313	2	-12.003	1892.127	59.9	Pass
L3	29.4167 - 0	Pole	TP42.85x35.858x0.406	3	-19.465	2886.411	58.9	Pass
							Summary	
						Pole (L2)	59.9	Pass
						RATING =	59.9	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	Base	57.6	Pass
1	Base Plate	Base	33.8	Pass
1	Base Foundation	Base	32.3	Pass

Structure Rating (max from all components) =	59.9%
---	--------------

Notes:

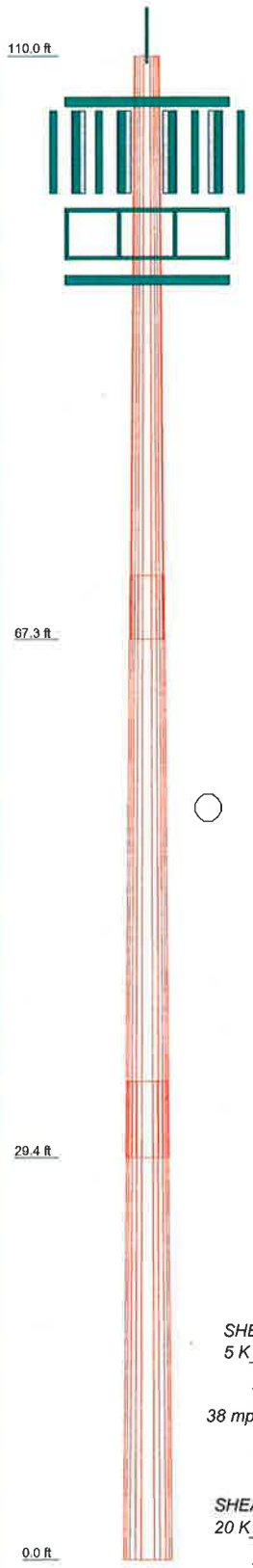
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

APPENDIX A
TNXTOWER OUTPUT

Section	1	2	3
Length (ft)	42.667	42.583	35.000
Number of Sides	12	12	12
Thickness (in)	0.219	0.313	0.406
Socket Length (ft)	4.667	5.583	
Top Dia (in)	21.910	29.078	35.858
Bot Dia (in)	30.450	37.600	42.850
Grade		A572-65	
Weight (K)	2.7	4.8	6.1



DESIGNED APPURTENANCE LOADING

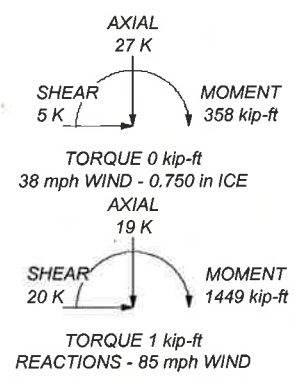
TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 5/8" x 3' (E)	111.5	RRH2x40-AWS (P)	94
Platform Mount [LP 712-1] (E)	107	DB-T1-6Z-8AB-0Z (P)	94
Sactor Mount [SM 201-3] (E (4 mount pipes))	97	Platform Mount [LP 712-1] (E)	94
(2) 742 213 (P)	94	16' x 2" Pipe Mount (E)	94
(2) 742 213 (P)	94	16' x 2" Pipe Mount (E)	94
(2) 742 213 (P)	94	16' x 2" Pipe Mount (E)	94
BXA-70063-6CF-EDIN-0 w/ Mount Pipe (E)	94	8' x 2" Pipe Mount (E)	94
(2) DB846F65ZAXY (E)	94	8' x 2" Pipe Mount (E)	94
(2) DB846F65ZAXY (E)	94	BXA-70063-6CF-EDIN-0 w/ Mount Pipe (P)	94
(2) DB846F65ZAXY (E)	94	DB225-A (AB)	83
BXA-70063-6CF-2 w/ Mount Pipe (E)	94	Pipe Mount [PM 602-1] (E)	83
GPS_A (E)	94	DB225-A (AB)	64
RRH2x40-AWS (P)	94	Pipe Mount [PM 602-1] (E)	64
RRH2x40-AWS (P)	94		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

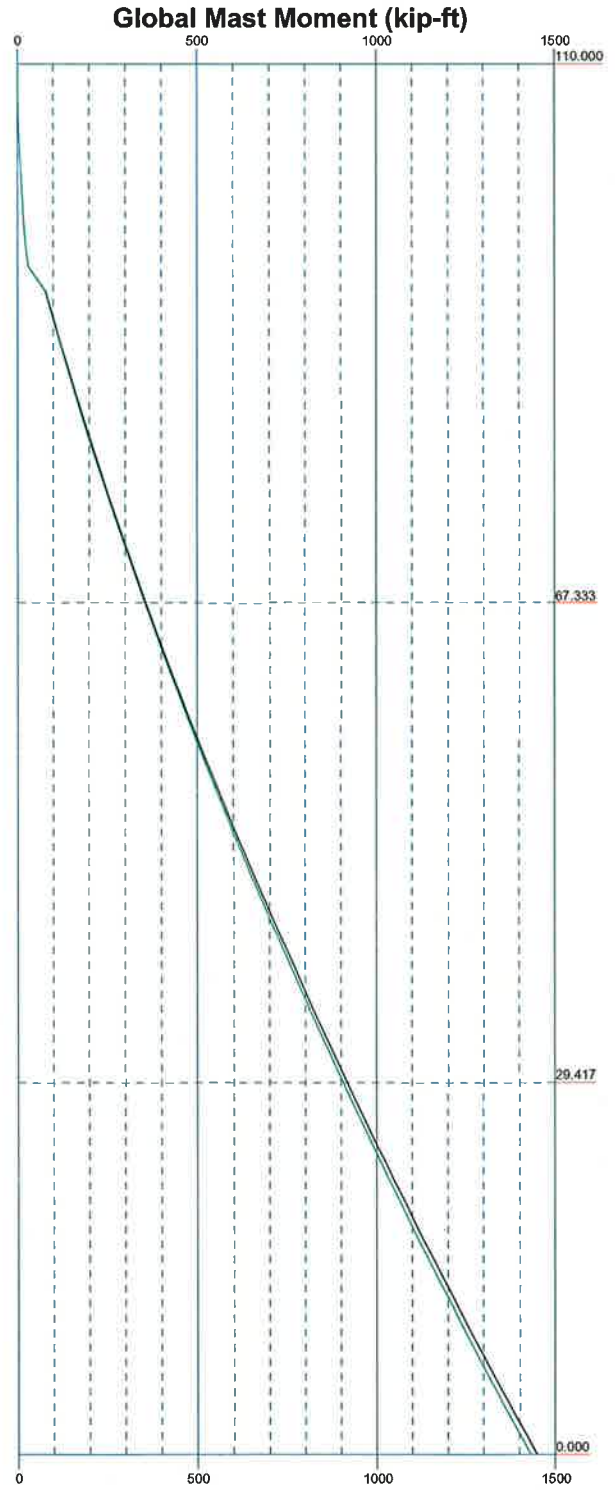
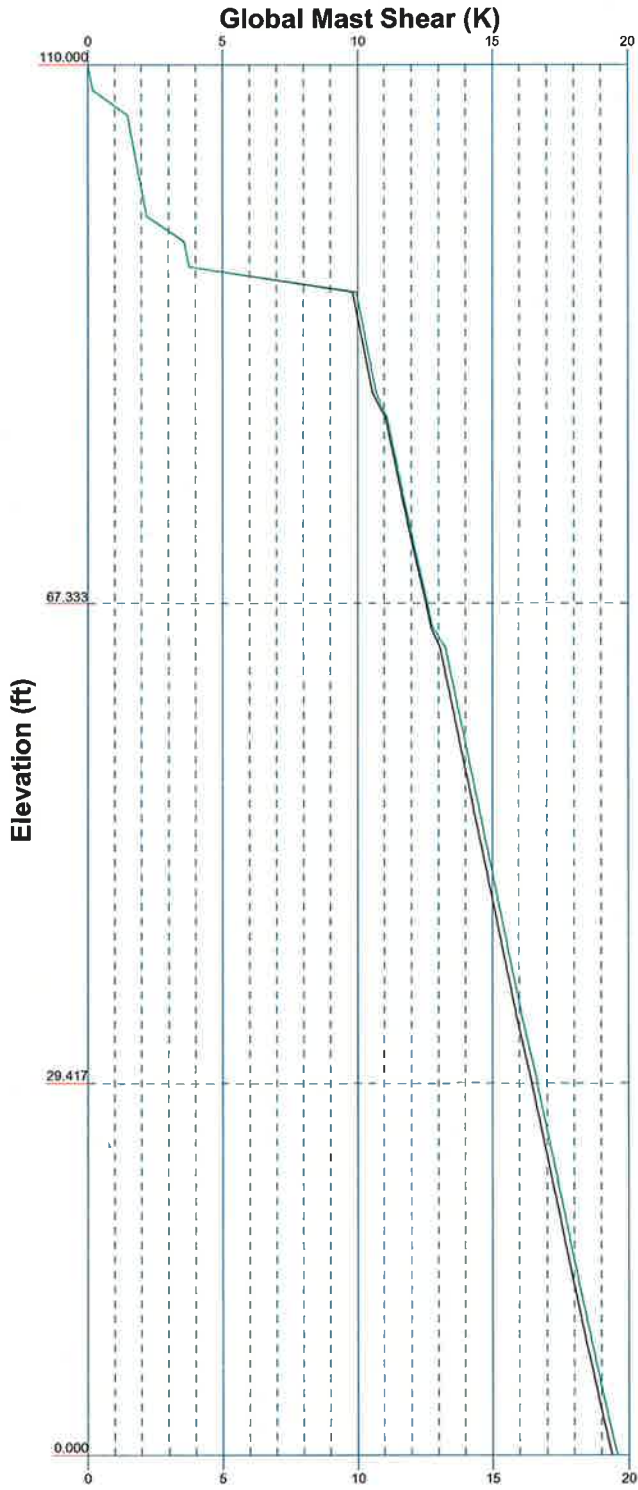
1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 59.9%




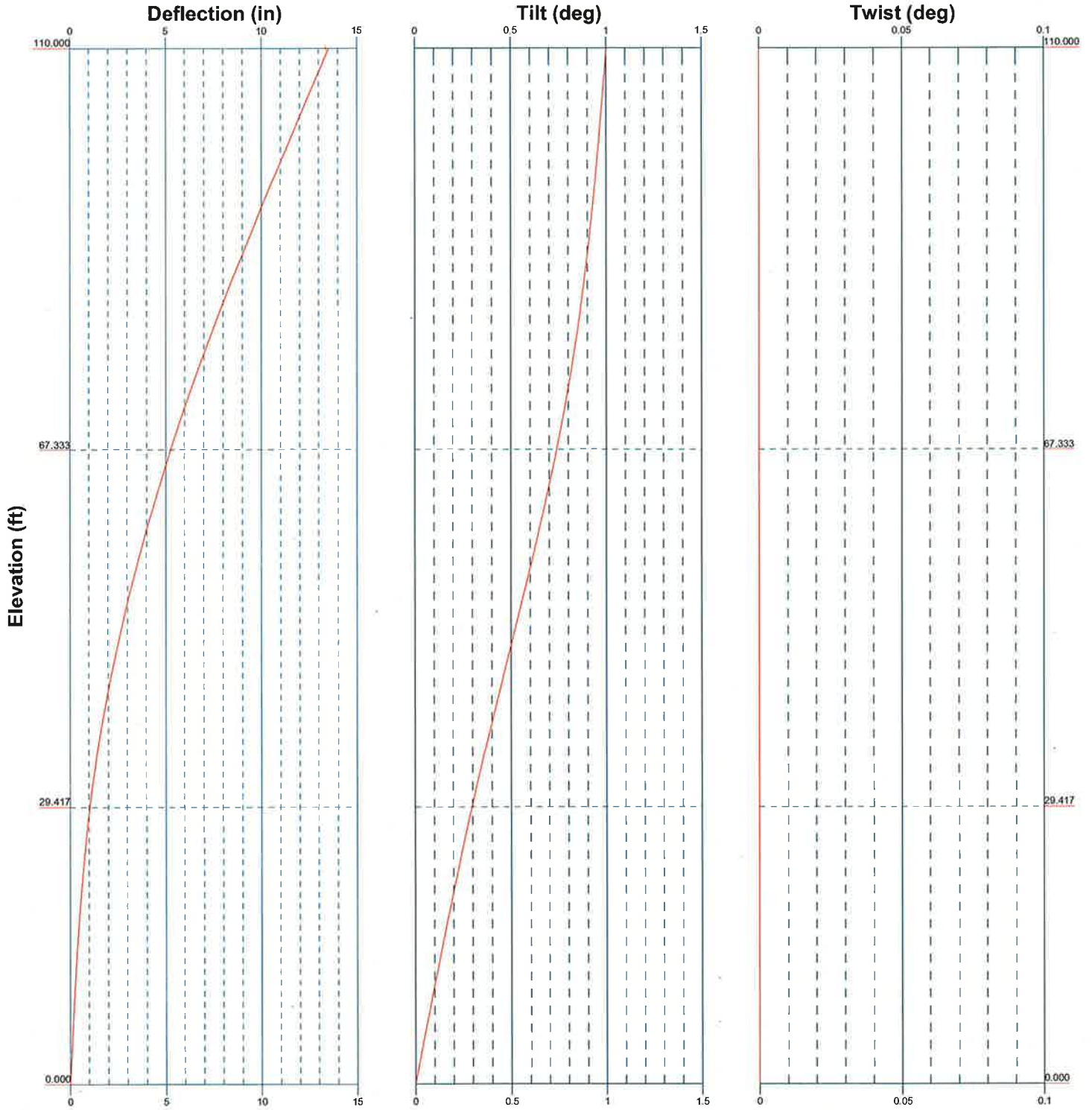
<p>B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265</p>	Job: 87395.002.01- NHV113 943126, CT (BU# 80636)		
	Project:		
	Client: Crown Castle	Drawn by: VenuAmbati	App'd:
	Code: TIA/EIA-222-F	Date: 01/20/14	Scale: NTS
	Path:	Dwg No. E-1	


Vx Vz

Mx Mz



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	<p>Project:</p>	<p>Client: Crown Castle</p>	<p>Drawn by: VenuAmbati</p>	<p>App'd:</p>
	<p>Code: TIA/EIA-222-F</p>	<p>Date: 01/20/14</p>	<p>Scale: NTS</p>	<p>Dwg No. E-4</p>
	<p>Path:</p>	<p><small>\\www.btt.com\csm\BTT\87395.002.01\NHV113 943126.ctb</small></p>		
	<p>Printed: 1/20/14 10:00 AM</p>			

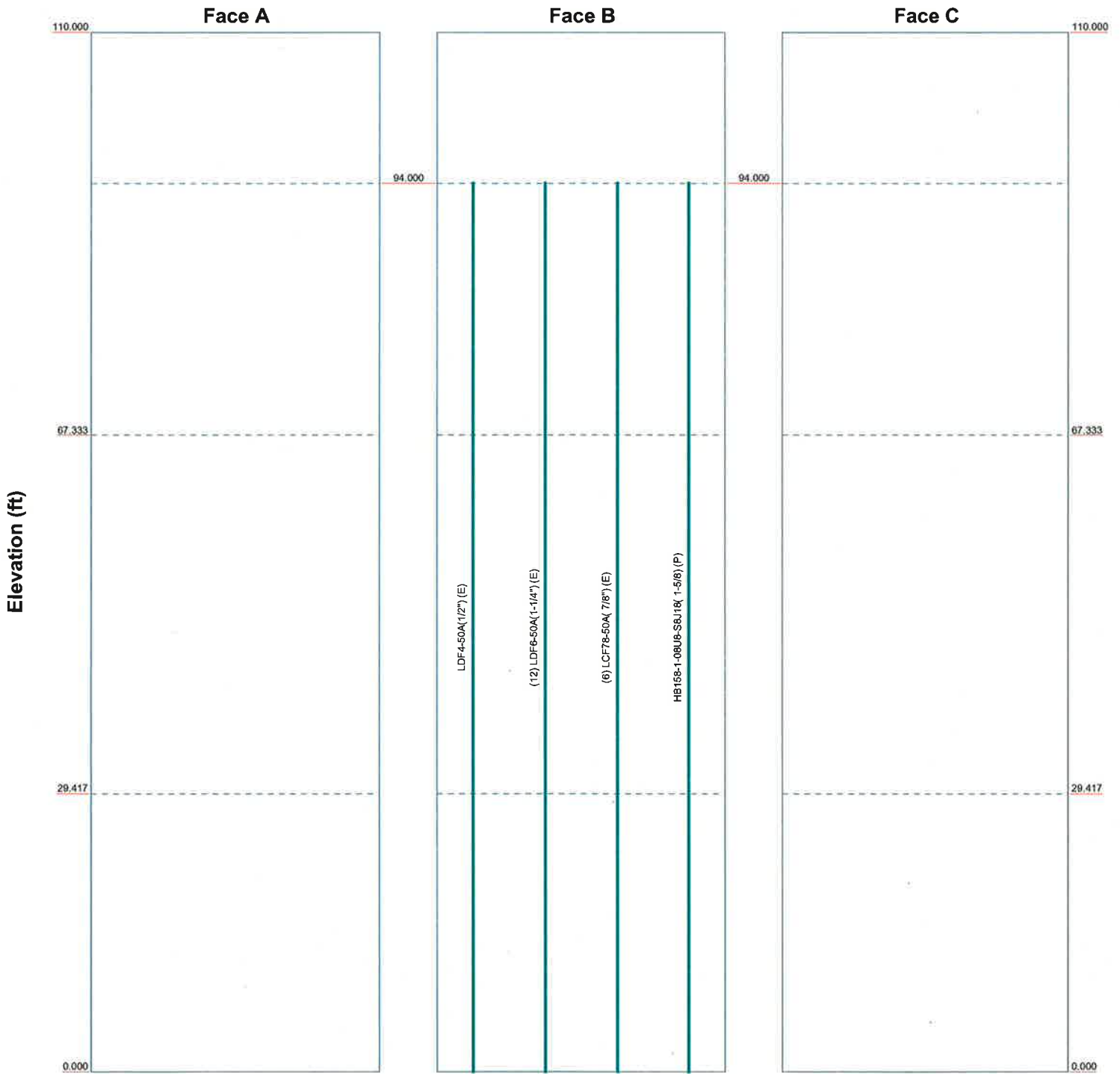


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	<p>Client: Crown Castle</p>	<p>Drawn by: VenuAmbati</p>	<p>App'd:</p>
	<p>Code: TIA/EIA-222-F</p>	<p>Date: 01/20/14</p>	<p>Scale: NTS</p>
	<p>Path:</p>	<p>Dwg No. E-5</p>	
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Feed Line Distribution Chart

0' - 110'

— Round
 — Flat
 — App In Face
 — App Out Face
 — Truss Leg



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	Code: TIA/EIA-222-F		Date: 01/20/14		Scale: NTS		App'd:	
	Path:		Dwg No: E-7		Date: 01/20/14		Scale: NTS	
	Path:		Dwg No: E-7		Date: 01/20/14		Scale: NTS	

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	Client Crown Castle	Designed by VenuAmbati

Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in New Haven County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.750 in.

Ice thickness is considered to increase with height.

Ice density of 56.000 pcf.

A wind speed of 38 mph is used in combination with ice.

Temperature drop of 50.000 °F.

Deflections calculated using a wind speed of 50 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

<ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys √ Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination 	<ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension √ Bypass Mast Stability Checks √ Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. Autocalc Torque Arm Areas SR Members Have Cut Ends Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Use TIA-222-G Tension Splice Capacity Exemption 	<ul style="list-style-type: none"> Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feedline Torque Include Angle Block Shear Check <li style="text-align: center;">Poles √ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
--	---	---

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	110.000-67.333	42.667	4.667	12	21.910	30.450	0.219	0.875	A572-65 (65 ksi)
L2	67.333-29.417	42.583	5.583	12	29.078	37.600	0.313	1.250	A572-65 (65 ksi)
L3	29.417-0.000	35.000		12	35.858	42.850	0.406	1.625	A572-65 (65 ksi)

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Tapered Pole Properties

Section	Tip Dia. in	Area in ²	J in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	22.683	15.279	917.579	7.765	11.349	80.848	1859.264	7.520	5.286	24.163
	31.524	21.294	2484.038	10.823	15.773	157.486	5033.334	10.480	7.574	34.626
L2	31.071	28.946	3057.206	10.298	15.063	202.967	6194.729	14.246	6.956	22.258
	38.926	37.521	6658.580	13.349	19.477	341.872	13492.089	18.466	9.239	29.566
L3	38.277	46.375	7439.381	12.692	18.574	400.521	15074.203	22.824	8.521	20.975
	44.362	55.522	12766.635	15.195	22.196	575.170	25868.664	27.326	10.395	25.588

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
L1 110.000-67.33				1	1	1		
L2 67.333-29.417				1	1	1		
L3 29.417-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _{AA} ft ² /ft	Weight klf
LDF4-50A(1/2") (E)	B	No	Inside Pole	94.000 - 0.000	1	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.000 0.000 0.000
LDF6-50A(1-1/4") (E)	B	No	Inside Pole	94.000 - 0.000	12	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.000 0.000 0.000
LCF78-50A(7/8") (E)	B	No	Inside Pole	94.000 - 0.000	6	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.000 0.000 0.000
HB158-1-08U8-S8J18(1-5/8) (P)	B	No	Inside Pole	94.000 - 0.000	1	No Ice 1/2" Ice 1" Ice	0.000 0.000 0.000

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _{AA} ft ² /ft	Weight klf
						2" Ice 0.000	0.001
						4" Ice 0.000	0.001

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	110.000-67.333	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.304
		C	0.000	0.000	0.000	0.000	0.000
L2	67.333-29.417	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.433
		C	0.000	0.000	0.000	0.000	0.000
L3	29.417-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.336
		C	0.000	0.000	0.000	0.000	0.000

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	110.000-67.333	A	0.844	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.304
		C		0.000	0.000	0.000	0.000	0.000
L2	67.333-29.417	A	0.785	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.433
		C		0.000	0.000	0.000	0.000	0.000
L3	29.417-0.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.336
		C		0.000	0.000	0.000	0.000	0.000

Feed Line Center of Pressure

Section	Elevation ft	CP _X in	CP _Z in	CP _X Ice in	CP _Z Ice in
L1	110.000-67.333	0.000	0.000	0.000	0.000
L2	67.333-29.417	0.000	0.000	0.000	0.000
L3	29.417-0.000	0.000	0.000	0.000	0.000

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	Client Crown Castle	Designed by VenuAmbati

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
Lightning Rod 5/8" x 3' (E)	C	None		0.000	111.500	No Ice	0.188	0.188	0.025
						1/2" Ice	0.480	0.480	0.027
						1" Ice	0.669	0.669	0.031
						2" Ice	1.075	1.075	0.046
						4" Ice	2.108	2.108	0.108
** Platform Mount [LP 712-1] (E)	C	None		0.000	107.000	No Ice	24.530	24.530	1.335
						1/2" Ice	29.940	29.940	1.646
						1" Ice	35.350	35.350	1.956
						2" Ice	46.170	46.170	2.577
						4" Ice	67.810	67.810	3.820
*** BXA-70063-6CF-EDIN-0 w/ Mount Pipe (P)	A	From Leg	4.000 0.000 3.000	0.000	94.000	No Ice	7.969	5.801	0.042
						1/2" Ice	8.609	6.953	0.103
						1" Ice	9.216	7.819	0.171
						2" Ice	10.459	9.601	0.335
						4" Ice	13.066	13.366	0.804
(2) 742 213 (P)	A	From Leg	4.000 0.000 9.000	0.000	94.000	No Ice	5.135	2.869	0.022
						1/2" Ice	5.609	3.483	0.047
						1" Ice	6.090	3.946	0.078
						2" Ice	7.074	4.893	0.158
						4" Ice	9.130	6.876	0.394
(2) 742 213 (P)	B	From Leg	4.000 0.000 9.000	0.000	94.000	No Ice	5.135	2.869	0.022
						1/2" Ice	5.609	3.483	0.047
						1" Ice	6.090	3.946	0.078
						2" Ice	7.074	4.893	0.158
						4" Ice	9.130	6.876	0.394
(2) 742 213 (P)	C	From Leg	4.000 0.000 9.000	0.000	94.000	No Ice	5.135	2.869	0.022
						1/2" Ice	5.609	3.483	0.047
						1" Ice	6.090	3.946	0.078
						2" Ice	7.074	4.893	0.158
						4" Ice	9.130	6.876	0.394
BXA-70063-6CF-EDIN-0 w/ Mount Pipe (E)	C	From Leg	4.000 0.000 3.000	0.000	94.000	No Ice	7.969	5.801	0.042
						1/2" Ice	8.609	6.953	0.103
						1" Ice	9.216	7.819	0.171
						2" Ice	10.459	9.601	0.335
						4" Ice	13.066	13.366	0.804
(2) DB846F65ZAXY (E)	A	From Leg	4.000 0.000 3.000	0.000	94.000	No Ice	7.033	6.158	0.021
						1/2" Ice	7.536	6.619	0.070
						1" Ice	8.080	7.087	0.125
						2" Ice	9.195	8.106	0.254
						4" Ice	11.528	10.401	0.593
(2) DB846F65ZAXY (E)	B	From Leg	4.000 0.000 3.000	0.000	94.000	No Ice	7.033	6.158	0.021
						1/2" Ice	7.536	6.619	0.070
						1" Ice	8.080	7.087	0.125
						2" Ice	9.195	8.106	0.254
						4" Ice	11.528	10.401	0.593
(2) DB846F65ZAXY (E)	C	From Leg	4.000 0.000 3.000	0.000	94.000	No Ice	7.033	6.158	0.021
						1/2" Ice	7.536	6.619	0.070
						1" Ice	8.080	7.087	0.125
						2" Ice	9.195	8.106	0.254
						4" Ice	11.528	10.401	0.593

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral						Vert
BXA-70063-6CF-2 w/ Mount Pipe (E)	B	From Leg	4.000	0.000	0.000	94.000	No Ice	7.969	5.801	0.042
			0.000				1/2" Ice	8.609	6.953	0.103
			3.000				1" Ice	9.216	7.819	0.171
							2" Ice	10.459	9.601	0.335
							4" Ice	13.066	13.366	0.804
GPS_A (E)	A	From Leg	4.000	0.000	0.000	94.000	No Ice	0.297	0.297	0.001
			0.000				1/2" Ice	0.374	0.374	0.005
			14.000				1" Ice	0.459	0.459	0.010
							2" Ice	0.655	0.655	0.025
							4" Ice	1.151	1.151	0.079
RRH2x40-AWS (P)	A	From Leg	4.000	0.000	0.000	94.000	No Ice	2.522	1.589	0.044
			0.000				1/2" Ice	2.753	1.795	0.061
			3.000				1" Ice	2.993	2.010	0.082
							2" Ice	3.499	2.465	0.132
							4" Ice	4.615	3.479	0.275
RRH2x40-AWS (P)	B	From Leg	4.000	0.000	0.000	94.000	No Ice	2.522	1.589	0.044
			0.000				1/2" Ice	2.753	1.795	0.061
			3.000				1" Ice	2.993	2.010	0.082
							2" Ice	3.499	2.465	0.132
							4" Ice	4.615	3.479	0.275
RRH2x40-AWS (P)	C	From Leg	4.000	0.000	0.000	94.000	No Ice	2.522	1.589	0.044
			0.000				1/2" Ice	2.753	1.795	0.061
			3.000				1" Ice	2.993	2.010	0.082
							2" Ice	3.499	2.465	0.132
							4" Ice	4.615	3.479	0.275
DB-T1-6Z-8AB-0Z (P)	A	From Leg	4.000	0.000	0.000	94.000	No Ice	5.600	2.333	0.044
			0.000				1/2" Ice	5.915	2.558	0.080
			3.000				1" Ice	6.240	2.791	0.120
							2" Ice	6.914	3.284	0.213
							4" Ice	8.365	4.373	0.455
Platform Mount [LP 712-1] (E)	C	None			0.000	94.000	No Ice	24.530	24.530	1.335
							1/2" Ice	29.940	29.940	1.646
							1" Ice	35.350	35.350	1.956
							2" Ice	46.170	46.170	2.577
							4" Ice	67.810	67.810	3.820
16' x 2" Pipe Mount (E)	A	From Leg	4.000	0.000	0.000	94.000	No Ice	3.800	3.800	0.059
			0.000				1/2" Ice	5.428	5.428	0.087
			15.000				1" Ice	7.073	7.073	0.125
							2" Ice	10.413	10.413	0.234
							4" Ice	15.459	15.459	0.579
16' x 2" Pipe Mount (E)	B	From Leg	4.000	0.000	0.000	94.000	No Ice	3.800	3.800	0.059
			0.000				1/2" Ice	5.428	5.428	0.087
			15.000				1" Ice	7.073	7.073	0.125
							2" Ice	10.413	10.413	0.234
							4" Ice	15.459	15.459	0.579
16' x 2" Pipe Mount (E)	C	From Leg	4.000	0.000	0.000	94.000	No Ice	3.800	3.800	0.059
			0.000				1/2" Ice	5.428	5.428	0.087
			15.000				1" Ice	7.073	7.073	0.125
							2" Ice	10.413	10.413	0.234
							4" Ice	15.459	15.459	0.579
8' x 2" Pipe Mount (E)	A	From Leg	4.000	0.000	0.000	94.000	No Ice	1.900	1.900	0.029
			0.000				1/2" Ice	2.728	2.728	0.044
			12.000				1" Ice	3.401	3.401	0.063
							2" Ice	4.396	4.396	0.119
							4" Ice	6.498	6.498	0.300
8' x 2" Pipe Mount (E)	B	From Leg	4.000	0.000	0.000	94.000	No Ice	1.900	1.900	0.029
			0.000				1/2" Ice	2.728	2.728	0.044

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
			12.000			1" Ice 3.401	3.401	0.063
						2" Ice 4.396	4.396	0.119
						4" Ice 6.498	6.498	0.300
8' x 2" Pipe Mount (E)	C	From Leg	4.000	0.000	94.000	No Ice 1.900	1.900	0.029
			0.000			1/2" Ice 2.728	2.728	0.044
			12.000			1" Ice 3.401	3.401	0.063
						2" Ice 4.396	4.396	0.119
						4" Ice 6.498	6.498	0.300
Sector Mount [SM 201-3] (E 4 mount pipes)	C	None		0.000	97.000	No Ice 26.690	26.690	1.083
						1/2" Ice 37.600	37.600	1.490
						1" Ice 48.510	48.510	1.896
						2" Ice 70.330	70.330	2.709
						4" Ice 113.970	113.970	4.336
** DB225-A (AB)	B	From Leg	2.000	0.000	83.000	No Ice 3.210	3.210	0.037
			0.000			1/2" Ice 5.778	5.778	0.048
			0.000			1" Ice 8.346	8.346	0.059
						2" Ice 13.482	13.482	0.081
						4" Ice 23.754	23.754	0.126
Pipe Mount [PM 602-1] (E)	B	From Leg	0.500	0.000	83.000	No Ice 5.250	1.580	0.093
			0.000			1/2" Ice 6.500	1.950	0.118
			0.000			1" Ice 7.750	2.320	0.142
						2" Ice 10.250	3.060	0.192
						4" Ice 15.250	4.540	0.291
** DB225-A (AB)	A	From Leg	2.000	0.000	64.000	No Ice 3.210	3.210	0.037
			0.000			1/2" Ice 5.778	5.778	0.048
			0.000			1" Ice 8.346	8.346	0.059
						2" Ice 13.482	13.482	0.081
						4" Ice 23.754	23.754	0.126
Pipe Mount [PM 602-1] (E)	A	From Leg	0.500	0.000	64.000	No Ice 5.250	1.580	0.093
			0.000			1/2" Ice 6.500	1.950	0.118
			0.000			1" Ice 7.750	2.320	0.142
						2" Ice 10.250	3.060	0.192
						4" Ice 15.250	4.540	0.291
**								

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice

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Comb. No.	Description
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	110 - 67.333	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-11.783	-0.342	0.390
			Max. Mx	5	-6.852	-296.791	-0.638
			Max. My	2	-6.844	0.510	299.379
			Max. Vy	5	12.044	-296.791	-0.638
			Max. Vx	2	-12.111	0.510	299.379
			Max. Torque	5			0.581
			Max Tension	1	0.000	0.000	0.000
L2	67.333 - 29.4167	Pole	Max. Compression	14	-18.211	-0.342	0.808
			Max. Mx	5	-12.010	-815.848	-2.782
			Max. My	2	-12.003	2.931	825.234
			Max. Vy	5	15.877	-815.848	-2.782
			Max. Vx	2	-16.082	2.931	825.234
			Max. Torque	12			-0.937
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-26.907	-0.342	0.808
L3	29.4167 - 0	Pole	Max. Mx	5	-19.465	-1432.267	-5.062
			Max. My	2	-19.465	5.212	1448.812
			Max. Vy	5	19.381	-1432.267	-5.062
			Max. Vx	2	-19.584	5.212	1448.812
			Max. Torque	12			-0.936

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Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	15	26.907	0.018	4.586
	Max. H _x	11	19.474	19.373	0.065
	Max. H _z	2	19.474	0.065	19.576
	Max. M _x	2	1448.812	0.065	19.576
	Max. M _z	5	1432.267	-19.373	-0.065
	Max. Torsion	6	0.935	-16.810	-9.844
	Min. Vert	1	19.474	0.000	0.000
	Min. H _x	5	19.474	-19.373	-0.065
	Min. H _z	8	19.474	-0.065	-19.576
	Min. M _x	8	-1448.035	-0.065	-19.576
	Min. M _z	11	-1431.789	19.373	0.065
	Min. Torsion	12	-0.936	16.810	9.844

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	19.474	0.000	0.000	-0.379	-0.232	0.000
Dead+Wind 0 deg - No Ice	19.474	-0.065	-19.576	-1448.812	5.212	0.444
Dead+Wind 30 deg - No Ice	19.474	9.630	-16.921	-1252.041	-711.530	-0.033
Dead+Wind 60 deg - No Ice	19.474	16.745	-9.732	-719.886	-1237.687	-0.501
Dead+Wind 90 deg - No Ice	19.474	19.373	0.065	5.062	-1432.267	-0.831
Dead+Wind 120 deg - No Ice	19.474	16.810	9.844	728.547	-1243.131	-0.935
Dead+Wind 150 deg - No Ice	19.474	9.742	16.985	1256.708	-720.966	-0.789
Dead+Wind 180 deg - No Ice	19.474	0.065	19.576	1448.035	-5.688	-0.434
Dead+Wind 210 deg - No Ice	19.474	-9.630	16.921	1251.263	711.052	0.033
Dead+Wind 240 deg - No Ice	19.474	-16.745	9.732	719.110	1237.209	0.491
Dead+Wind 270 deg - No Ice	19.474	-19.373	-0.065	-5.838	1431.789	0.822
Dead+Wind 300 deg - No Ice	19.474	-16.810	-9.844	-729.322	1242.654	0.936
Dead+Wind 330 deg - No Ice	19.474	-9.742	-16.985	-1257.485	720.490	0.798
Dead+Ice+Temp	26.907	0.000	0.000	-0.808	-0.342	0.000
Dead+Wind 0 deg+Ice+Temp	26.907	-0.018	-4.586	-357.857	1.151	0.185
Dead+Wind 30 deg+Ice+Temp	26.907	2.255	-3.963	-309.272	-175.779	0.040
Dead+Wind 60 deg+Ice+Temp	26.907	3.923	-2.278	-178.044	-305.705	-0.117
Dead+Wind 90 deg+Ice+Temp	26.907	4.540	0.018	0.664	-353.813	-0.242
Dead+Wind 120 deg+Ice+Temp	26.907	3.941	2.308	178.968	-307.213	-0.302
Dead+Wind 150 deg+Ice+Temp	26.907	2.286	3.980	309.092	-178.392	-0.281
Dead+Wind 180 deg+Ice+Temp	26.907	0.018	4.586	356.168	-1.866	-0.185
Dead+Wind 210 deg+Ice+Temp	26.907	-2.255	3.963	307.583	175.063	-0.040
Dead+Wind 240 deg+Ice+Temp	26.907	-3.923	2.278	176.356	304.988	0.116
Dead+Wind 270 deg+Ice+Temp	26.907	-4.540	-0.018	-2.353	353.097	0.241
Dead+Wind 300 deg+Ice+Temp	26.907	-3.941	-2.308	-180.657	306.497	0.301
Dead+Wind 330 deg+Ice+Temp	26.907	-2.286	-3.980	-310.780	177.676	0.281
Dead+Wind 0 deg - Service	19.474	-0.022	-6.774	-501.746	1.647	0.153
Dead+Wind 30 deg - Service	19.474	3.332	-5.855	-433.634	-246.445	-0.012
Dead+Wind 60 deg - Service	19.474	5.794	-3.367	-249.434	-428.566	-0.173
Dead+Wind 90 deg - Service	19.474	6.703	0.022	1.497	-495.918	-0.287
Dead+Wind 120 deg - Service	19.474	5.816	3.406	251.923	-430.452	-0.324
Dead+Wind 150 deg - Service	19.474	3.371	5.877	434.742	-249.712	-0.275
Dead+Wind 180 deg - Service	19.474	0.022	6.774	500.968	-2.126	-0.152
Dead+Wind 210 deg - Service	19.474	-3.332	5.855	432.856	245.966	0.011
Dead+Wind 240 deg - Service	19.474	-5.794	3.367	248.656	428.087	0.172
Dead+Wind 270 deg - Service	19.474	-6.703	-0.022	-2.276	495.439	0.286

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Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 300 deg - Service	19.474	-5.816	-3.406	-252.701	429.974	0.324
Dead+Wind 330 deg - Service	19.474	-3.371	-5.877	-435.520	249.233	0.276

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-19.474	0.000	0.000	19.474	0.000	0.000%
2	-0.065	-19.474	-19.576	0.065	19.474	19.576	0.000%
3	9.630	-19.474	-16.921	-9.630	19.474	16.921	0.000%
4	16.745	-19.474	-9.732	-16.745	19.474	9.732	0.000%
5	19.373	-19.474	0.065	-19.373	19.474	-0.065	0.000%
6	16.810	-19.474	9.844	-16.810	19.474	-9.844	0.000%
7	9.742	-19.474	16.985	-9.742	19.474	-16.985	0.000%
8	0.065	-19.474	19.576	-0.065	19.474	-19.576	0.000%
9	-9.630	-19.474	16.921	9.630	19.474	-16.921	0.000%
10	-16.745	-19.474	9.732	16.745	19.474	-9.732	0.000%
11	-19.373	-19.474	-0.065	19.373	19.474	0.065	0.000%
12	-16.810	-19.474	-9.844	16.810	19.474	9.844	0.000%
13	-9.742	-19.474	-16.985	9.742	19.474	16.985	0.000%
14	0.000	-26.907	0.000	0.000	26.907	0.000	0.000%
15	-0.018	-26.907	-4.586	0.018	26.907	4.586	0.000%
16	2.255	-26.907	-3.963	-2.255	26.907	3.963	0.000%
17	3.923	-26.907	-2.278	-3.923	26.907	2.278	0.000%
18	4.540	-26.907	0.018	-4.540	26.907	-0.018	0.000%
19	3.941	-26.907	2.308	-3.941	26.907	-2.308	0.000%
20	2.286	-26.907	3.980	-2.286	26.907	-3.980	0.000%
21	0.018	-26.907	4.586	-0.018	26.907	-4.586	0.000%
22	-2.255	-26.907	3.963	2.255	26.907	-3.963	0.000%
23	-3.923	-26.907	2.278	3.923	26.907	-2.278	0.000%
24	-4.540	-26.907	-0.018	4.540	26.907	0.018	0.000%
25	-3.941	-26.907	-2.308	3.941	26.907	2.308	0.000%
26	-2.286	-26.907	-3.980	2.286	26.907	3.980	0.000%
27	-0.022	-19.474	-6.774	0.022	19.474	6.774	0.000%
28	3.332	-19.474	-5.855	-3.332	19.474	5.855	0.000%
29	5.794	-19.474	-3.367	-5.794	19.474	3.367	0.000%
30	6.703	-19.474	0.022	-6.703	19.474	-0.022	0.000%
31	5.816	-19.474	3.406	-5.816	19.474	-3.406	0.000%
32	3.371	-19.474	5.877	-3.371	19.474	-5.877	0.000%
33	0.022	-19.474	6.774	-0.022	19.474	-6.774	0.000%
34	-3.332	-19.474	5.855	3.332	19.474	-5.855	0.000%
35	-5.794	-19.474	3.367	5.794	19.474	-3.367	0.000%
36	-6.703	-19.474	-0.022	6.703	19.474	0.022	0.000%
37	-5.816	-19.474	-3.406	5.816	19.474	3.406	0.000%
38	-3.371	-19.474	-5.877	3.371	19.474	5.877	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00003392
3	Yes	4	0.00000001	0.00074639
4	Yes	4	0.00000001	0.00076640

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5	Yes	4	0.00000001	0.00006151
6	Yes	4	0.00000001	0.00072270
7	Yes	4	0.00000001	0.00079358
8	Yes	4	0.00000001	0.00004573
9	Yes	4	0.00000001	0.00074463
10	Yes	4	0.00000001	0.00072503
11	Yes	4	0.00000001	0.00007365
12	Yes	4	0.00000001	0.00079851
13	Yes	4	0.00000001	0.00072726
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00037506
16	Yes	4	0.00000001	0.00039517
17	Yes	4	0.00000001	0.00039354
18	Yes	4	0.00000001	0.00037103
19	Yes	4	0.00000001	0.00039373
20	Yes	4	0.00000001	0.00039580
21	Yes	4	0.00000001	0.00037179
22	Yes	4	0.00000001	0.00039075
23	Yes	4	0.00000001	0.00038944
24	Yes	4	0.00000001	0.00036960
25	Yes	4	0.00000001	0.00039588
26	Yes	4	0.00000001	0.00039673
27	Yes	4	0.00000001	0.00000946
28	Yes	4	0.00000001	0.00005226
29	Yes	4	0.00000001	0.00005570
30	Yes	4	0.00000001	0.00001353
31	Yes	4	0.00000001	0.00004824
32	Yes	4	0.00000001	0.00005954
33	Yes	4	0.00000001	0.00001000
34	Yes	4	0.00000001	0.00005187
35	Yes	4	0.00000001	0.00004885
36	Yes	4	0.00000001	0.00001418
37	Yes	4	0.00000001	0.00006045
38	Yes	4	0.00000001	0.00004874

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	110 - 67.333	13.540	27	1.002	0.002
L2	72 - 29.4167	6.028	27	0.786	0.001
L3	35 - 0	1.421	38	0.363	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
111.500	Lightning Rod 5/8" x 3'	27	13.540	1.002	0.002	41434
107.000	Platform Mount [LP 712-1]	27	12.905	0.990	0.002	41434
97.000	Sector Mount [SM 201-3]	27	10.810	0.947	0.002	15936
94.000	BXA-70063-6CF-EDIN-0 w/ Mount	27	10.193	0.933	0.002	12948
83.000	Pipe DB225-A	27	8.016	0.871	0.001	7672

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	Client Crown Castle	Designed by VenuAmbati

Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
64.000	DB225-A	38	4.742	0.707	0.001	5086

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	110 - 67.333	39.062	2	2.892	0.006
L2	72 - 29.4167	17.401	13	2.270	0.004
L3	35 - 0	4.102	13	1.048	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
111.500	Lightning Rod 5/8" x 3'	2	39.062	2.892	0.006	14432
107.000	Platform Mount [LP 712-1]	2	37.232	2.856	0.006	14432
97.000	Sector Mount [SM 201-3]	2	31.189	2.733	0.005	5550
94.000	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	2	29.411	2.691	0.005	4509
83.000	DB225-A	13	23.134	2.513	0.004	2671
64.000	DB225-A	13	13.691	2.042	0.003	1768

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _n ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P/P _a
L1	110 - 67.333 (1)	TP30.45x21.91x0.219	42.667	0.000	0.0	36.858	20.636	-6.844	760.617	0.009
L2	67.333 - 29.4167 (2)	TP37.6x29.078x0.313	42.583	0.000	0.0	39.000	36.396	-12.003	1419.450	0.008
L3	29.4167 - 0 (3)	TP42.85x35.858x0.406	35.000	0.000	0.0	39.000	55.522	-19.465	2165.350	0.009

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} /F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} /F _{by}
L1	110 - 67.333 (1)	TP30.45x21.91x0.219	299.380	24.295	36.858	0.659	0.000	0.000	36.858	0.000

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	Project	Date 07:47:51 01/20/14
	Client Crown Castle	Designed by VenuAmbati

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L2	67.333 - 29.4167 (2)	TP37.6x29.078x0.313	825.499	30.801	39.000	0.790	0.000	0.000	39.000	0.000
L3	29.4167 - 0 (3)	TP42.85x35.858x0.406	1449.26	30.237	39.000	0.775	0.000	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	110 - 67.333 (1)	TP30.45x21.91x0.219	12.111	0.587	26.000	0.046	0.444	0.017	26.000	0.001
L2	67.333 - 29.4167 (2)	TP37.6x29.078x0.313	16.088	0.442	26.000	0.035	0.799	0.014	26.000	0.001
L3	29.4167 - 0 (3)	TP42.85x35.858x0.406	19.590	0.353	26.000	0.028	0.798	0.008	26.000	0.000

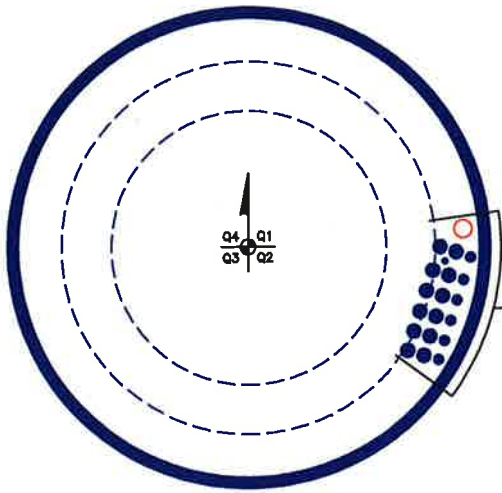
Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	110 - 67.333 (1)	0.009	0.659	0.000	0.046	0.001	0.669	1.333	H1-3+VT ✓
L2	67.333 - 29.4167 (2)	0.008	0.790	0.000	0.035	0.001	0.799	1.333	H1-3+VT ✓
L3	29.4167 - 0 (3)	0.009	0.775	0.000	0.028	0.000	0.784	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF * P_{allow}$ K	% Capacity	Pass Fail	
L1	110 - 67.333	Pole	TP30.45x21.91x0.219	1	-6.844	1013.902	50.2	Pass	
L2	67.333 - 29.4167	Pole	TP37.6x29.078x0.313	2	-12.003	1892.127	59.9	Pass	
L3	29.4167 - 0	Pole	TP42.85x35.858x0.406	3	-19.465	2886.411	58.9	Pass	
							Summary		
							Pole (L2)	59.9	Pass
							RATING =	59.9	Pass

APPENDIX B
BASE LEVEL DRAWING



- (PROPOSED)
- (1) 1-5/8" TO 94 FT LEVEL
- (INSTALLED)
- (1) 1/2" TO 94 FT LEVEL
- (6) 7/8" TO 94 FT LEVEL
- (12) 1-1/4" TO 94FT LEVEL

BUSINESS UNIT: 808380 TOWER ID: C_BASELEVEL

APPENDIX C
ADDITIONAL CALCULATIONS

Stiffened or Unstiffened, UngROUTED, Circular Base Plate - Any Rod Material

TIA Rev F

Site Data

BU#: 806360
Site Name: NHV 113 943126, CT
App #: 211221, REV.1
Pole Manufacturer: <i>Other</i>

Reactions		
Moment:	1449	ft-kips
Axial:	19	kips
Shear:	20	kips

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	50.86	in

If No stiffeners, Criteria: **AISC ASD** <-Only Applicable to Unstiffened Cases

Anchor Rod Results

Maximum Rod Tension: 112.4 Kips
 Allowable Tension: 195.0 Kips
 Anchor Rod Stress Ratio: 57.6% **Pass**

Rigid
Service, ASD
Fty*ASIF

Plate Data		
Diam:	56.86	in
Thick:	2.75	in
Grade:	60	ksi
Single-Rod B-eff:	11.48	in

Base Plate Results

Base Plate Stress: 20.3 ksi
 Allowable Plate Stress: 60.0 ksi
 Base Plate Stress Ratio: 33.8% **Pass**

Flexural Check

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length:
27.40

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

Stiffener Results

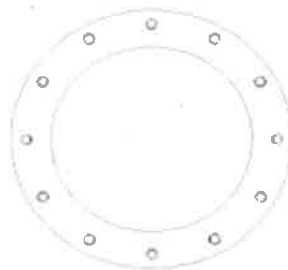
Horizontal Weld : n/a
 Vertical Weld: n/a
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: n/a
 Plate Tension+Shear, ft/Ft+(fv/Fv)^2: n/a
 Plate Comp. (AISC Bracket): n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	42.85	in
Thick:	0.40625	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

BU: 806360
 Site Name: NHV 113 943126,CT
 App Number: 211221, Rev:1
 Work Order: 699839



Monopole Drilled Pier

Input

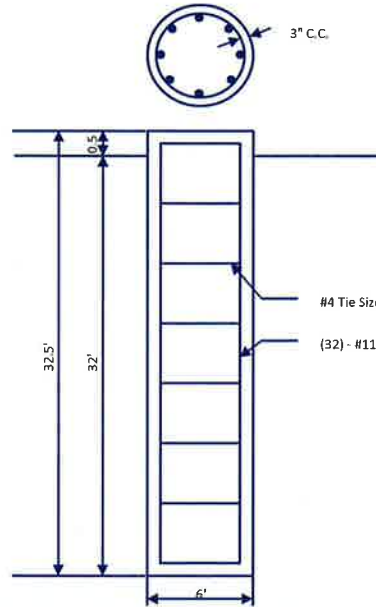
Criteria
 TIA Revision: F
 ACI 318 Revision: 2002
 Seismic Category: B

Forces
 Compression: 24.7 kips
 Shear: 26 kips
 Moment: 1883.7 k-ft
 Swelling Force: 0 kips

Foundation Dimensions
 Pier Diameter: 6 ft
 Ext. above grade: 0.5 ft
 Depth below grade: 32 ft

Material Properties
 Number of Rebar: 32
 Rebar Size: 11
 Tie Size: 4
 Rebar tensile strength: 60 ksi
 Concrete Strength: 3000 psi
 Ultimate Concrete Strain: 0.003 in/in
 Clear Cover to Ties: 3 in

Soil Profile: Soil



Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3	0	3	155	0	0	0	0	0	
2	4	3	7	155	1300	0			0	
3	25	7	32	92.6	1300	0				50

Analysis Results

Soil Lateral Capacity
 Depth to Zero Shear: 5.32 ft
 Max Moment, Mu: 1534.60 k-ft
 Soil Safety Factor: 7.11
 Safety Factor Req'd: 2
 RATING: 28.1%

Soil Axial Capacity
 Skin Friction (k): 209.08 kips
 End Bearing (k): 165.40 kips
 Comp. Capacity (k), φCn: 368.48 kips
 Comp. (k), Cu: 24.70 kips
 RATING: 6.7%

Concrete/Steel Check

Mu (from soil analysis) 1994.98 k-ft
 φMn 6180.34 k-ft
 RATING: 32.3%

rho provided 1.23
 rho required 0.33 OK

Rebar Spacing 4.83
 Spacing required 22.56 OK

Dev. Length required 26.43
 Dev. Length provided 61.78 OK

Overall Foundation Rating: 32.3%