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Also admitted in Massachusetts

May 23, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
423 Oronoque Road, Milford, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the top of the existing 100-foot tower at 423 Oronoque Road in Milford, Connecticut (the "Property"). The antennas maintain a centerline height of approximately 105 feet above ground level. The tower is owned by Crown Castle. The Council approved Cellco's use of this tower in 1986 (Docket No. 56). Cellco now intends to modify its facility by adding three (3) model BXA-171063-8BF, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable attached to the outside the monopole. Included in Attachment 1 are specifications for Cellco's replacement antenna, 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 Benjamin G. Blake, Mayor of the Town of Milford. A copy of this letter is also being sent to David Guernsey, the owner of the Property.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's additional three (3) antennas and RRHs will be installed at a centerline height of 105 feet on the existing tower.

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

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

4. The operation of the 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 General Power Density table for Cellco's modified facility is included in Attachment 2.

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

6. The tower and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis 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:
Benjamin G. Blake, Mayor
David Guernsey
Sandy M. Carter

ATTACHMENT 1

BXA-171063-8BF-EDIN-X

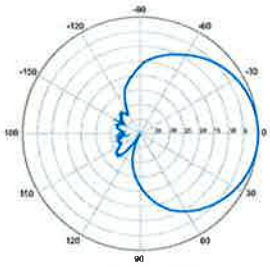
Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 63° | 17.4 dBi

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 6, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	< -25 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN / Female / Bottom		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1225 x 154 x 105 mm		48.2 x 6.1 x 4.1 in
Depth with t-brackets	133 mm		5.2 in
Weight without mounting brackets	4.2 kg		9.2 lbs
Survival wind speed	296 km/hr		184 mph
Wind area	Front: 0.19 m² Side: 0.14 m²		Front: 2.0 ft² Side: 1.5 ft²
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N		Front: 63 lbf Side: 50 lbf

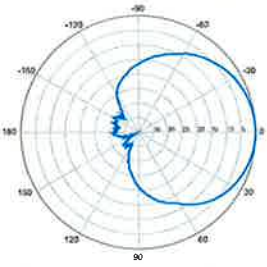
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8BF-EDIN-X-FP		

BXA-171063-8BF-EDIN-X



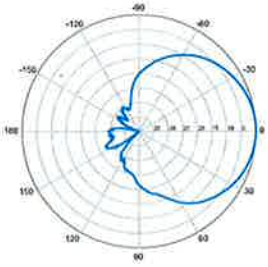
Horizontal | 1710-1880 MHz

BXA-171063-8BF-EDIN-X



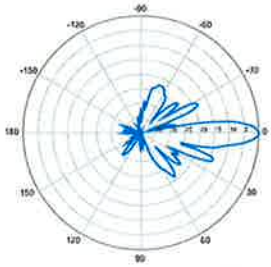
Horizontal | 1850-1990 MHz

BXA-171063-8BF-EDIN-X



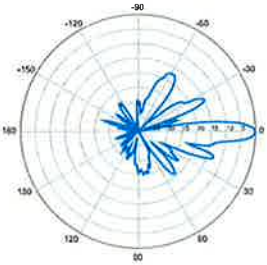
Horizontal | 1920-2170 MHz

BXA-171063-8BF-EDIN-0



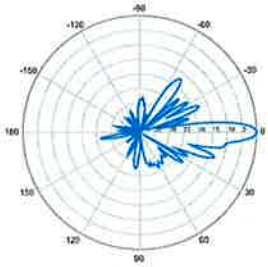
0° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-0

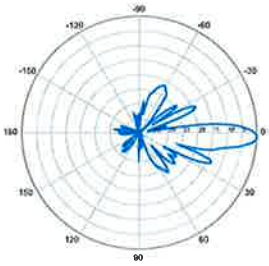


0° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-X

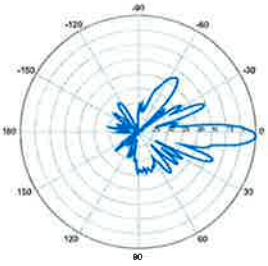
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8BF-EDIN-2



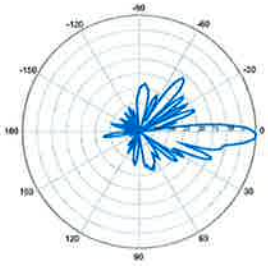
2° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-2



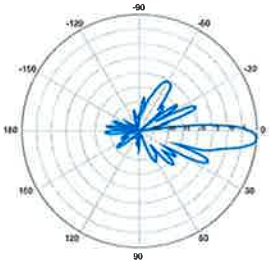
2° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-2



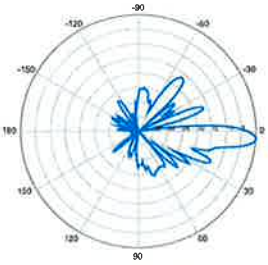
2° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-4



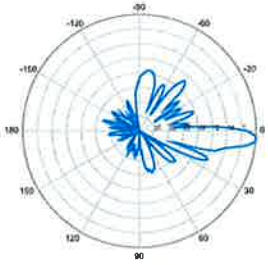
4° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-4



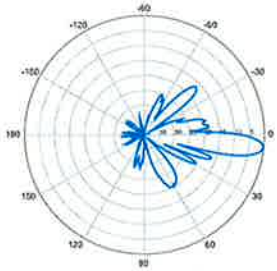
4° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-4



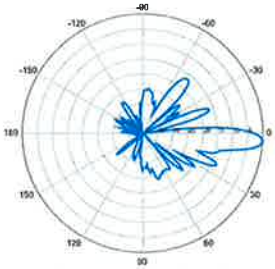
4° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-6



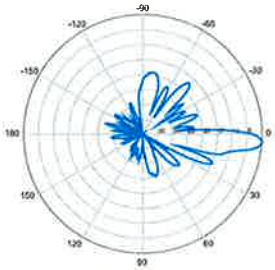
6° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-6



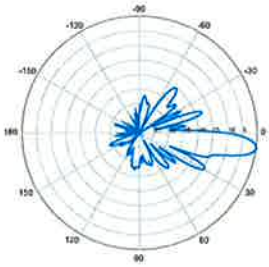
6° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-6



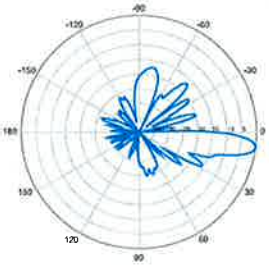
6° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-8



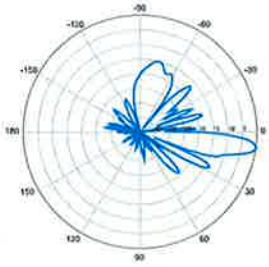
8° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-8



8° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-8



8° | Vertical | 1920-2170 MHz

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

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

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

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

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

Fast, low-cost installation and deployment

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

Excellent RF performance

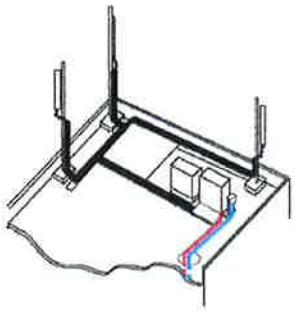
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

Features

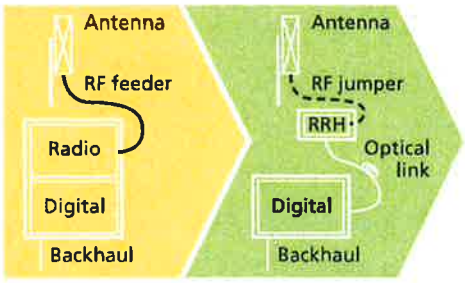
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

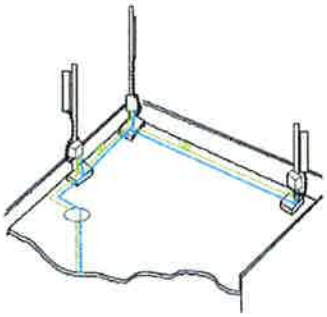
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

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

Power

- Power supply: -48VDC

Operating environment

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

RF characteristics

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

Optical characteristics

Type/number of fibers

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

Optical fiber length

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

Digital Ports and Alarms

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

www.alcatel-lucent.com

CPG2809100912 (09)

Alcatel·Lucent

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Mechanical Properties			
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
Electrical Properties			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.295)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Fiber Optic Properties			
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
DC Power Cable Properties			
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Environmental			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

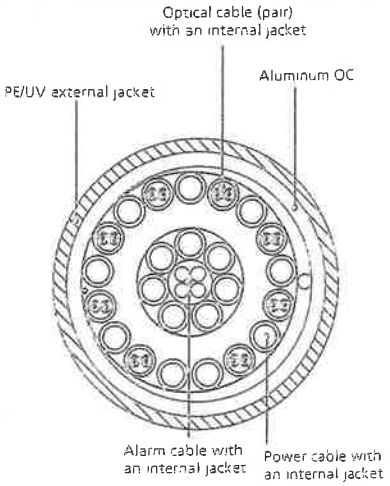


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

Site Name: MILFORD, CT
Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissable Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
VZW PCS	1970	7	323	2261	105	0.0738	1.0	7.38%
VZW Cellular	869	9	420	3779	105	0.1233	0.579333333	21.28%
VZW AWS	2145	1	1265	1265	105	0.0413	1.0	4.13%
VZW 700	698	1	762	762	105	0.0248	0.465333333	5.34%

Total Percentage of Maximum Permissible Exposure 38.12%

*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/cm^2 = milliwatts per square centimeter
ERP = Effective Radiated Power

Absolute worst case maximum values used.

ATTACHMENT 3

Date: **March 18, 2014**

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Cheryl Schultz
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Aero Solutions LLC
5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
(720) 304-6882

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	NG1914
	Carrier Site Name:	Milford
Crown Castle Designation:	**Crown Castle BU Number:**	806359
	Crown Castle Site Name:	NHV 104 943122
	Crown Castle JDE Job Number:	260054
	Crown Castle Work Order Number:	716143
	Crown Castle Application Number:	205644 Rev. 3
Engineering Firm Designation:	**Aero Solutions LLC Project Number:**	003-14-0174
Site Data:	**423 Oronoque Road, Milford, CT, New Haven County** **Latitude *41° 14' 16.23"*, Longitude *-73° 5' 10"*** **100 Foot - Monopole Tower**	

Dear Cheryl Schultz,

Aero Solutions LLC 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 620528, in accordance with application 205644, revision 3.

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:

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 85 mph fastest mile.

All modifications and 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 *Aero Solutions LLC* 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.

Structural analysis prepared by: Shawn D. Cook, P.E.

Respectfully submitted by:

Shraddha Dharia, P.E.
Structural Engineer
CT PE#: PEN0028187
Expires: 2/31/2015

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 100 ft Monopole tower designed by Valmont in August of 1986. The tower was originally designed per EIA-222-C.

The tower has been modified per reinforcement drawings prepared by Paul J Ford and Company in April of 2009. Reinforcement consists of additional anchor rods.

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
100.0	105.0	3	alcatel lucent	RRH2x40-AWS	1	1-5/8"	
		3	antel	BXA-171063-8BF-EDIN-0 w/ Mount Pipe			
		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
100.0	105.0	6	decibel	DB846F65ZAXY w/ Mount Pipe	12 1	7/8" 1/2"	1
		6	rfs celwave	FD9R6004/2C-3L			
	103.0	1	gps	GPS_A			
	101.0	3	antel	BXA-171063-8BF-EDIN-2 w/ Mount Pipe			
		3	swedcom	SWCP 2x5514 w/ Mount Pipe			
	100.0				1	1/2"	3
		1	tower mounts	Platform Mount [LP 602-1]			1
90.0	90.0	1	til-tek	TA-2335-DAB-L-095 w/ Mount Pipe	1	7/8"	2
		1	tower mounts	Side Arm Mount [SO 102-1]			
83.0	83.0	3	ericsson	KRY 112 144/1	12	1-5/8"	1
		3	rfs celwave	APX16DWV-16DWVS-E-A20 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 602-1]			
73.0	73.0	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1-5/8"	1
50.0	50.0	1	til-tek	TA-2324-LHCP	1	1/2"	2
		1	tower mounts	Side Arm Mount [SO 102-			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
				1]			
45.0	45.0	1	prodelin	1111	2	19/64"	2
		2	tower mounts	Side Arm Mount [SO 102-1]			
		1	trimble	57860-30			

Notes:
1) Existing Equipment
2) Reserved Equipment
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)
100	100	3	RFS / Celwave	PD 10017		-
83	83	3	RFS / Celwave	PD 1132D		-
80	80	2	Generic	6' Diameter MW		-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH	1256016	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	FPL Construction	1256012	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont	1245431	CCISITES
4-POST-MODIFICATION INSPECTION	Paul J Ford and Company	2419763	CCISITES

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.

This analysis may be affected if any assumptions are not valid or have been made in error. Aero Solutions LLC 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	100 - 46.8333	Pole	TP33.26x23.43x0.313	1	-8.689	1673.581	46.3	Pass
L2	46.8333 - 0	Pole	TP41.3x31.68x0.375	2	-20.779	2569.037	65.7	Pass
							Summary	
						Pole (L2)	65.7	Pass
						Rating =	65.7	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	64.1	Pass
1	Base Plate	0	27.7	Pass
1	Base Foundation	0	29.7	Pass
1	Base Foundation Soil Interaction	0	28.7	Pass

Structure Rating (max from all components) =	65.7%

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

4.1) Recommendations

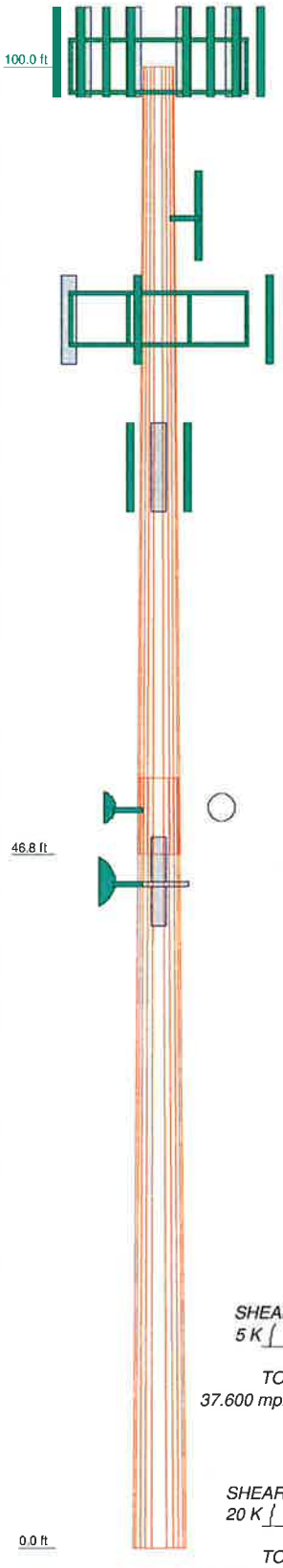
The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

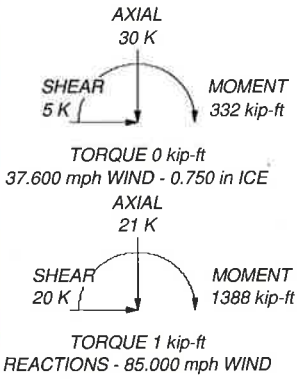
APPENDIX A

TNXTOWER OUTPUT

Section	1	2
Length (ft)	53.167	52.000
Number of Sides	12	12
Thickness (in)	0.313	0.375
Socket Length (ft)	5.167	
Top Dia (in)	23.430	31.680
Bot Dia (in)	33.260	41.300
Grade	A572-65	
Weight (K)	5.1	7.7

12.8





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	100	RRH2x40-AWS	100
		(2) FD9R6004/2C-3L	100
SWCP 2x5514 w/ Mount Pipe	100	Platform Mount [LP 602-1]	100
(2) DB846F65ZAXY w/ Mount Pipe	100	TA-2335-DAB-L-095 w/ Mount Pipe	90
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	100	Side Arm Mount [SO 102-1]	90
		KRY 112 144/1	83
DB-T1-6Z-8AB-0Z	100	APX16DWV-16DWVS-E-A20 w/ Mount Pipe	83
RRH2x40-AWS	100		
(2) FD9R6004/2C-3L	100	KRY 112 144/1	83
GPS_A	100	APX16DWV-16DWVS-E-A20 w/ Mount Pipe	83
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	100	KRY 112 144/1	83
SWCP 2x5514 w/ Mount Pipe	100	APX16DWV-16DWVS-E-A20 w/ Mount Pipe	83
(2) DB846F65ZAXY w/ Mount Pipe	100		
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	100	Platform Mount [LP 602-1]	83
		APXV18-206517S-C w/ Mount Pipe	73
RRH2x40-AWS	100	APXV18-206517S-C w/ Mount Pipe	73
(2) FD9R6004/2C-3L	100	APXV18-206517S-C w/ Mount Pipe	73
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	100	Side Arm Mount [SO 102-1]	50
		TA-2324-LHCP	50
SWCP 2x5514 w/ Mount Pipe	100	Side Arm Mount [SO 102-1]	45
(2) DB846F65ZAXY w/ Mount Pipe	100	Side Arm Mount [SO 102-1]	45
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	100	57860-30	45
		1111	45

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 85.000 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.600 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50.000 mph wind.
5. TOWER RATING: 65.7%

Aero Solutions LLC
5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
Phone: (720) 304-6882
FAX: (720) 304-6883

Job:	***BU#806359 NHV 104 943122***		
Project:	***100' Valmont Monopole***		
Client: Crown Castle	Drawn by: Shawn D. Cook, P.E.	App'd:	
Code: TIA/EIA-222-F	Date: 03/18/14	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

4) Tower is located in New Haven County, Connecticut.
5) Basic wind speed of 85.000 mph.
6) Nominal ice thickness of 0.750 in.
7) Ice thickness is considered to increase with height.
8) Ice density of 56.000 pcf.
9) A wind speed of 37.600 mph is used in combination with ice.
10) Temperature drop of 50.000 °F.
11) Deflections calculated using a wind speed of 50.000 mph.
12) A non-linear (P-delta) analysis was used.
13) Pressures are calculated at each section.
14) Stress ratio used in pole design is 1.333.
15) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
√ Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	√ Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination	Use TIA-222-G Tension Splice	
	Capacity Exemption	

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	100.000-46.833	53.167	5.167	12	23.430	33.260	0.313	1.250	A572-65 (65 ksi)
L2	46.833-0.000	52.000		12	31.680	41.300	0.375	1.500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	24.257	23.262	1586.772	8.276	12.137	130.741	3215.230	11.449	5.442	17.414
	34.433	33.153	4593.664	11.795	17.229	266.629	9308.009	16.317	8.076	25.844
L2	33.787	37.800	4728.279	11.207	16.410	288.132	9580.776	18.604	7.485	19.96
	42.757	49.417	10564.262	14.651	21.393	493.809	21406.058	24.322	10.063	26.836

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 100.000-46.833				1	1	1		
L2 46.833-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
HB158-1-08U8-S8J18(1-5/8)	A	No	CaAa (Out Of Face)	98.000 - 8.000	1	No Ice	0.198	1.300
						1/2" Ice	0.298	2.815
						1" Ice	0.398	4.941
						2" Ice	0.598	11.025
						4" Ice	0.998	30.524
LDF4-50A(1/2")	A	No	Inside Pole	98.000 - 8.000	1	No Ice	0.000	0.150
						1/2" Ice	0.000	0.150
						1" Ice	0.000	0.150
						2" Ice	0.000	0.150
						4" Ice	0.000	0.150
LDF5-50A(7/8")	A	No	Inside Pole	98.000 - 8.000	12	No Ice	0.000	0.330
						1/2" Ice	0.000	0.330
						1" Ice	0.000	0.330
						2" Ice	0.000	0.330
						4" Ice	0.000	0.330
***								
AVA5-50(7/8")	C	No	CaAa (Out Of Face)	90.000 - 8.000	1	No Ice	0.110	0.300
						1/2" Ice	0.210	1.279
						1" Ice	0.310	2.868
						2" Ice	0.510	7.880
						4" Ice	0.910	25.233
***								
LDF7-50A(1-5/8")	C	No	Inside Pole	83.000 - 8.000	12	No Ice	0.000	0.820
						1/2" Ice	0.000	0.820
						1" Ice	0.000	0.820
						2" Ice	0.000	0.820
						4" Ice	0.000	0.820
***								
CR 50 1873(1-5/8")	A	No	CaAa (Out Of Face)	73.000 - 8.000	6	No Ice	0.000	0.830
						1/2" Ice	0.000	2.345
						1" Ice	0.000	4.471
						2" Ice	0.000	10.555
						4" Ice	0.000	30.054
***								
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	50.000 - 8.000	1	No Ice	0.000	0.150
						1/2" Ice	0.000	0.840
						1" Ice	0.000	2.141
						2" Ice	0.000	6.576
						4" Ice	0.000	22.776
***								
7916A(19/64")	C	No	CaAa (Out Of Face)	45.000 - 8.000	2	No Ice	0.000	32.000
						1/2" Ice	0.000	32.487
						1" Ice	0.000	33.586
						2" Ice	0.000	37.615
						4" Ice	0.000	53.004

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	100.000-46.833	A	0.000	0.000	0.000	10.131	0.407
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	4.757	0.369
L2	46.833-0.000	A	0.000	0.000	0.000	7.689	0.403
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	4.279	2.768

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	100.000-46.833	A	0.824	0.000	0.000	0.000	18.567	1.010
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	11.874	0.461
L2	46.833-0.000	A	0.750	0.000	0.000	0.000	14.092	1.190
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	10.682	2.994

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	100.000-46.833	-0.107	-0.195	-0.230	-0.272
L2	46.833-0.000	-0.107	-0.161	-0.239	-0.226

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	A	From Leg	4.000 0.000 1.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.179 3.555 3.964 4.853 6.767	3.353 3.971 4.595 5.893 8.885	0.029 0.061 0.099 0.193 0.488
SWCP 2x5514 w/ Mount Pipe	A	From Leg	4.000 0.000 1.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.251 7.751 8.252 9.286 11.480	6.966 7.746 8.499 10.058 13.400	0.039 0.104 0.174 0.339 0.791
(2) DB846F65ZAXY w/ Mount Pipe	A	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.033 7.536 8.080 9.195 11.528	7.583 8.544 9.381 11.166 15.103	0.043 0.108 0.180 0.352 0.831
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	A	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice	3.179 3.555 3.964 4.853	3.353 3.971 4.595 5.893	0.029 0.061 0.099 0.193

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	6.767	8.885	0.488
						4" Ice			
DB-T1-6Z-8AB-0Z	A	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.600 5.915 6.240 6.914 8.365	2.333 2.558 2.791 3.284 4.373	0.044 0.080 0.120 0.213 0.455
RRH2x40-AWS	A	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.522 2.753 2.993 3.499 4.615	1.589 1.795 2.010 2.465 3.479	0.044 0.061 0.082 0.132 0.275
(2) FD9R6004/2C-3L	A	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
GPS_A	A	From Leg	4.000 0.000 3.000	-20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.297 0.374 0.459 0.655 1.151	0.297 0.374 0.459 0.655 1.151	0.001 0.005 0.010 0.025 0.079
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	B	From Leg	4.000 0.000 1.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.179 3.555 3.964 4.853 6.767	3.353 3.971 4.595 5.893 8.885	0.029 0.061 0.099 0.193 0.488
SWCP 2x5514 w/ Mount Pipe	B	From Leg	4.000 0.000 1.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.251 7.751 8.252 9.286 11.480	6.966 7.746 8.499 10.058 13.400	0.039 0.104 0.174 0.339 0.791
(2) DB846F65ZAXY w/ Mount Pipe	B	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.033 7.536 8.080 9.195 11.528	7.583 8.544 9.381 11.166 15.103	0.043 0.108 0.180 0.352 0.831
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	B	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.179 3.555 3.964 4.853 6.767	3.353 3.971 4.595 5.893 8.885	0.029 0.061 0.099 0.193 0.488
RRH2x40-AWS	B	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.522 2.753 2.993 3.499 4.615	1.589 1.795 2.010 2.465 3.479	0.044 0.061 0.082 0.132 0.275
(2) FD9R6004/2C-3L	B	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
BXA-171063-8BF-EDIN-2 w/ Mount Pipe	C	From Leg	4.000 0.000 1.000	20.000	100.000	No Ice 1/2" Ice Ice	3.179 3.555 3.964	3.353 3.971 4.595	0.029 0.061 0.099

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	4.853	5.893	0.193
						2" Ice	6.767	8.885	0.488
						4" Ice			
SWCP 2x5514 w/ Mount Pipe	C	From Leg	4.000 0.000 1.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.251 7.751 8.252 9.286 11.480	6.966 7.746 8.499 10.058 13.400	0.039 0.104 0.174 0.339 0.791
(2) DB846F65ZAXY w/ Mount Pipe	C	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.033 7.536 8.080 9.195 11.528	7.583 8.544 9.381 11.166 15.103	0.043 0.108 0.180 0.352 0.831
BXA-171063-8BF-EDIN-0 w/ Mount Pipe	C	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.179 3.555 3.964 4.853 6.767	3.353 3.971 4.595 5.893 8.885	0.029 0.061 0.099 0.193 0.488
RRH2x40-AWS	C	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.522 2.753 2.993 3.499 4.615	1.589 1.795 2.010 2.465 3.479	0.044 0.061 0.082 0.132 0.275
(2) FD9R6004/2C-3L	C	From Leg	4.000 0.000 5.000	20.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
Platform Mount [LP 602-1]	C	None		0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	32.030 38.710 45.390 58.750 85.470	32.030 38.710 45.390 58.750 85.470	1.343 1.800 2.257 3.170 4.998
***									
TA-2335-DAB-L-095 w/ Mount Pipe	B	From Leg	2.000 0.000 0.000	-10.000	90.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.978 8.426 8.885 9.835 11.896	3.873 4.430 5.005 6.208 8.960	0.048 0.103 0.163 0.304 0.690
Side Arm Mount [SO 102-1]	B	From Leg	1.000 0.000 0.000	-10.000	90.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.500 1.740 1.980 2.460 3.420	1.500 1.750 2.000 2.500 3.500	0.025 0.035 0.045 0.065 0.105
***									
KRY 112 144/1	A	From Leg	4.000 -6.000 0.000	-30.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.408 0.497 0.594 0.815 1.359	0.175 0.238 0.309 0.477 0.918	0.011 0.014 0.019 0.032 0.082
APX16DWV-16DWVS-E-A20 w/ Mount Pipe	A	From Leg	4.000 -6.000 0.000	-30.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.808 8.368 8.915 10.040 12.411	3.782 4.643 5.382 6.909 10.164	0.064 0.115 0.173 0.312 0.716

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
KRY 112 144/1	B	From Leg	4.000 -6.000 0.000	-30.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.408 0.497 0.594 0.815 1.359	0.175 0.238 0.309 0.477 0.918	0.011 0.014 0.019 0.032 0.082
APX16DWV-16DWVS-E-A20 w/ Mount Pipe	B	From Leg	4.000 -6.000 0.000	-30.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.808 8.368 8.915 10.040 12.411	3.782 4.643 5.382 6.909 10.164	0.064 0.115 0.173 0.312 0.716
KRY 112 144/1	C	From Leg	4.000 -6.000 0.000	-30.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.408 0.497 0.594 0.815 1.359	0.175 0.238 0.309 0.477 0.918	0.011 0.014 0.019 0.032 0.082
APX16DWV-16DWVS-E-A20 w/ Mount Pipe	C	From Leg	4.000 -6.000 0.000	-30.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.808 8.368 8.915 10.040 12.411	3.782 4.643 5.382 6.909 10.164	0.064 0.115 0.173 0.312 0.716
Platform Mount [LP 602-1]	C	None		0.000	83.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	32.030 38.710 45.390 58.750 85.470	32.030 38.710 45.390 58.750 85.470	1.343 1.800 2.257 3.170 4.998
***									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	1.000 0.000 0.000	0.000	73.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.404 5.960 6.481 7.547 9.919	4.700 5.860 6.734 8.515 12.277	0.052 0.097 0.150 0.280 0.679
APXV18-206517S-C w/ Mount Pipe	B	From Leg	1.000 0.000 0.000	0.000	73.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.404 5.960 6.481 7.547 9.919	4.700 5.860 6.734 8.515 12.277	0.052 0.097 0.150 0.280 0.679
APXV18-206517S-C w/ Mount Pipe	C	From Leg	1.000 0.000 0.000	0.000	73.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.404 5.960 6.481 7.547 9.919	4.700 5.860 6.734 8.515 12.277	0.052 0.097 0.150 0.280 0.679
***									
Side Arm Mount [SO 102-1]	C	From Leg	1.000 0.000 0.000	-42.000	50.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.500 1.740 1.980 2.460 3.420	1.500 1.750 2.000 2.500 3.500	0.025 0.035 0.045 0.065 0.105
***									
57860-30	A	From Leg	2.000 0.000 0.000	0.000	45.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.077 0.118 0.168 0.293 0.647	0.077 0.118 0.168 0.293 0.647	0.000 0.002 0.003 0.010 0.042
Side Arm Mount [SO 102-1]	A	From Leg	1.000 0.000	0.000	45.000	No Ice 1/2"	1.500 1.740	1.500 1.750	0.025 0.035

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			Ice	1.980	2.000	0.045
						1" Ice	2.460	2.500	0.065
						2" Ice	3.420	3.500	0.105
						4" Ice			
Side Arm Mount [SO 102-1]	C	From Leg	1.000	-24.000	45.000	No Ice	1.500	1.500	0.025
			0.000			1/2" Ice	1.740	1.750	0.035
			0.000			1" Ice	1.980	2.000	0.045
						2" Ice	2.460	2.500	0.065
						4" Ice	3.420	3.500	0.105
***									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
TA-2324-LHCP	C	Paraboloid w/o Radome	From Leg	2.000	-42.000		50.000	2.167	No Ice	3.687	0.028
				0.000					1/2" Ice	3.976	0.048
				0.000					1" Ice	4.265	0.069
									2" Ice	4.843	0.110
									4" Ice	6.000	0.191
***											
1111	C	Paraboloid w/o Radome	From Leg	2.000	-24.000		45.000	3.330	No Ice	8.709	0.040
				0.000					1/2" Ice	9.151	0.087
				0.000					1" Ice	9.592	0.134
									2" Ice	10.475	0.228
									4" Ice	12.240	0.416

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 90 deg - No Ice
4	Dead+Wind 180 deg - No Ice
5	Dead+Ice+Temp
6	Dead+Wind 0 deg+Ice+Temp
7	Dead+Wind 90 deg+Ice+Temp
8	Dead+Wind 180 deg+Ice+Temp
9	Dead+Wind 0 deg - Service
10	Dead+Wind 90 deg - Service
11	Dead+Wind 180 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	100 -	Pole	Max Tension	1	0.000	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
	46.8333						
			Max. Compression	5	-14.967	-0.355	1.170
			Max. Mx	3	-8.691	-497.191	0.780
			Max. My	2	-8.689	-0.518	498.212
			Max. Vy	3	13.817	-497.191	0.780
			Max. Vx	2	-13.796	-0.518	498.212
			Max. Torque	3			0.679
L2	46.8333 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	5	-29.880	3.758	0.554
			Max. Mx	3	-20.779	-1379.648	22.470
			Max. My	2	-20.779	-12.618	1388.049
			Max. Vy	3	19.796	-1379.648	22.470
			Max. Vx	2	-19.910	-12.618	1388.049
			Max. Torque	3			1.265

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	6	29.880	-0.073	4.619
	Max. H_x	4	20.795	0.006	-19.677
	Max. H_z	2	20.795	-0.337	19.893
	Max. M_x	2	1388.049	-0.337	19.893
	Max. M_z	3	1379.648	-19.779	0.499
	Max. Torsion	3	1.265	-19.779	0.499
	Min. Vert	1	20.795	0.000	0.000
	Min. H_x	3	20.795	-19.779	0.499
	Min. H_z	4	20.795	0.006	-19.677
	Min. M_x	4	-1380.270	0.006	-19.677
	Min. M_z	8	-4.038	0.002	-4.573
	Min. Torsion	4	-1.170	0.006	-19.677

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	20.795	0.000	0.000	1.191	3.277	0.000
Dead+Wind 0 deg - No Ice	20.795	0.337	-19.893	-1388.049	-12.618	-1.026
Dead+Wind 90 deg - No Ice	20.795	19.779	-0.499	-22.470	-1379.648	-1.265
Dead+Wind 180 deg - No Ice	20.795	-0.006	19.677	1380.270	3.878	1.170
Dead+Ice+Temp	29.880	0.000	0.000	-0.554	3.758	-0.000
Dead+Wind 0 deg+Ice+Temp	29.880	0.073	-4.619	-332.137	0.310	-0.232
Dead+Wind 90 deg+Ice+Temp	29.880	4.592	-0.108	-5.780	-326.122	-0.293
Dead+Wind 180 deg+Ice+Temp	29.880	-0.002	4.573	328.756	4.038	0.259
Dead+Wind 0 deg - Service	20.795	0.116	-6.884	-479.673	-2.201	-0.357
Dead+Wind 90 deg - Service	20.795	6.844	-0.173	-6.992	-475.382	-0.437
Dead+Wind 180 deg - Service	20.795	-0.002	6.809	478.548	3.508	0.403

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.000	-20.795	0.000	0.000	20.795	0.000	0.000%
2	0.337	-20.795	-19.893	-0.337	20.795	19.893	0.000%
3	19.779	-20.795	-0.499	-19.779	20.795	0.499	0.000%
4	-0.006	-20.795	19.677	0.006	20.795	-19.677	0.000%
5	0.000	-29.880	0.000	0.000	29.880	0.000	0.000%
6	0.073	-29.880	-4.619	-0.073	29.880	4.619	0.000%
7	4.592	-29.880	-0.108	-4.592	29.880	0.108	0.000%
8	-0.002	-29.880	4.573	0.002	29.880	-4.573	0.000%
9	0.116	-20.795	-6.884	-0.116	20.795	6.884	0.000%
10	6.844	-20.795	-0.173	-6.844	20.795	0.173	0.000%
11	-0.002	-20.795	6.809	0.002	20.795	-6.809	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	0.00001780
3	Yes	4	0.00000001	0.00005085
4	Yes	4	0.00000001	0.00002833
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00018111
7	Yes	4	0.00000001	0.00017850
8	Yes	4	0.00000001	0.00017861
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	100 - 46.8333	11.711	9	0.940	0.001
L2	52 - 0	3.521	9	0.602	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.000	BXA-171063-8BF-EDIN-2 w/ Mount Pipe	9	11.711	0.940	0.002	37335
90.000	TA-2335-DAB-L-095 w/ Mount Pipe	9	9.768	0.880	0.002	18667
83.000	KRY 112 144/1	9	8.443	0.837	0.002	10980
73.000	APXV18-206517S-C w/ Mount Pipe	9	6.648	0.770	0.001	6913
50.000	TA-2324-LHCP	9	3.285	0.583	0.001	4074
45.000	1111	9	2.745	0.534	0.001	4493

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	100 - 46.8333	33.832	2	2.715	0.002
L2	52 - 0	10.183	2	1.740	0.003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.000	BXA-171063-8BF-EDIN-2 w/ Mount Pipe	2	33.832	2.715	0.006	12977
90.000	TA-2335-DAB-L-095 w/ Mount Pipe	2	28.224	2.542	0.005	6488
83.000	KRY 112 144/1	2	24.397	2.417	0.005	3816
73.000	APXV18-206517S-C w/ Mount Pipe	2	19.214	2.225	0.004	2401
50.000	TA-2324-LHCP	2	9.500	1.686	0.003	1414
45.000	1111	2	7.940	1.545	0.003	1558

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	100 - 46.8333 (1)	TP33.26x23.43x0.313	53.167	0.000	0.0	39.000	32.192	-8.689	1255.500	0.007
L2	46.8333 - 0 (2)	TP41.3x31.68x0.375	52.000	0.000	0.0	39.000	49.417	-20.779	1927.260	0.011

Pole Bending Design Data

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 $\frac{f_{by}}{F_{by}}$
L1	100 - 46.8333 (1)	TP33.26x23.43x0.313	498.212	23.788	39.000	0.610	0.000	0.000	39.000	0.000
L2	46.8333 - 0 (2)	TP41.3x31.68x0.375	1388.108	33.732	39.000	0.865	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	100 - 46.8333 (1)	TP33.26x23.43x0.313	13.796	0.429	26.000	0.034	0.249	0.006	26.000	0.000
L2	46.8333 - 0 (2)	TP41.3x31.68x0.375	19.913	0.403	26.000	0.031	1.026	0.012	26.000	0.000

Pole Interaction Design Data

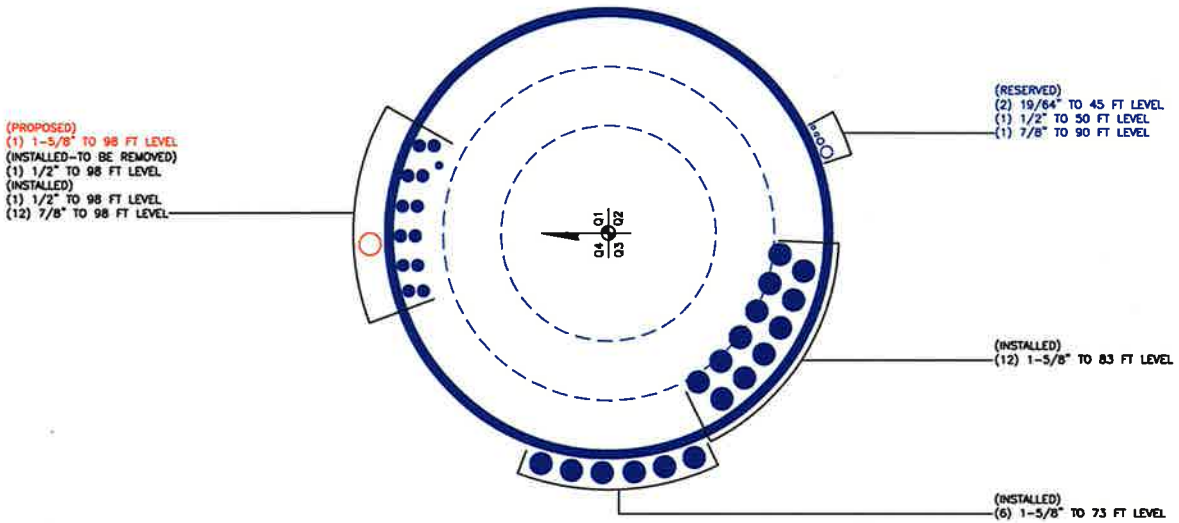
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	100 - 46.8333 (1)	0.007	0.610	0.000	0.034	0.000	0.617 ✔	1.333	H1-3+VT ✔
L2	46.8333 - 0 (2)	0.011	0.865	0.000	0.031	0.000	0.876 ✔	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	100 - 46.8333	Pole	TP33.26x23.43x0.313	1	-8.689	1673.581	46.3	Pass
L2	46.8333 - 0	Pole	TP41.3x31.68x0.375	2	-20.779	2569.037	65.7	Pass
							Summary	
						Pole (L2)	65.7	Pass
						RATING =	**65.7**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(PROPOSED)
(1) 1-5/8" TO 98 FT LEVEL
(INSTALLED-TO BE REMOVED)
(1) 1/2" TO 98 FT LEVEL
(INSTALLED)
(1) 1/2" TO 98 FT LEVEL
(12) 7/8" TO 98 FT LEVEL
(RESERVED)
(2) 19/64" TO 45 FT LEVEL
(1) 1/2" TO 50 FT LEVEL
(1) 7/8" TO 90 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 83 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 73 FT LEVEL
Q1
Q2
Q4
Q3

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

BU#: *806359*
Site Name: *NHV 104 943122*
App #: *205644 R3*

Pole Manufacturer:	*Other*

Reactions		
Moment:	1011.387	ft-kips
Axial:	20.7788	kips
Shear:	19.913148	kips

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

Anchor Rod Data		
Qty:	8	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	47.58	in

Plate Data		
Diam:	53.58	in
Thick:	2.5	in
Grade:	60	ksi
Single-Rod B-eff:	14.81	in

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

Pole Data		
Diam:	41.3	in
Thick:	0.375	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	

Anchor Rod Results

Maximum Rod Tension:	124.9 Kips	Rigid
Allowable Tension:	195.0 Kips	Service, ASD
Anchor Rod Stress Ratio:	64.1% **Pass**	Fty*ASIF

Base Plate Results

Base Plate Stress:	Flexural Check 16.6 ksi	Rigid
Allowable Plate Stress:	60.0 ksi	Service ASD
Base Plate Stress Ratio:	27.7% **Pass**	0.75*Fy*ASIF
		Y.L. Length: 23.63

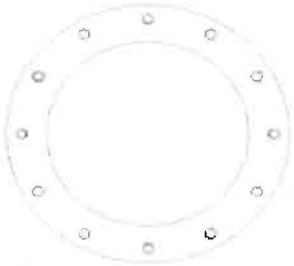
n/a

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



* 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

Anchor Rod Information for TIA/EIA-222-F and TIA-222-G-2

Site Information	
ID:	806359
Name:	NHV 104 943122
App. #:	205644 R3

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Base Reactions		
Moment:	1388	ft-kip
Axial:	21	kip
Shear:	20	kip
Base Plate Type:	Circular	

Design Information	
TIA Code:	F
ASIF:	1.333
Failure:	105%
eta Factor:	0.50

Original Anchor Rod Data		
Quantity:	8	
Diameter:	2.25	in
Material:	A615 GR 75	
Bolt Circle:	47.6	in
Bolt Spacing:		in
Bolt Group Area:	31.81	in^2
Bolt Group MOIx:	9001	in^4

Reactions Seen by Original AR Group		
Moment:	1011.4	kip-ft
Axial:	20.8	kip
Shear:	19.9	kip

Original AR Capacity Check		
Tension Load:	124.9	kip
Allowable load:	194.8	kip
AR Capacity:	64.1%	Pass

First Added Anchor Rod Data		
Quantity:	4	
Diameter:	1.75	in
Material:	A772	
Bolt Circle:	52.8	in
Bolt Group Area:	9.62	in^2
Bolt Group MOIx:	3353	in^4

Reactions Seen by First Added AR Group		
Moment:	376.7	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

First Added AR Capacity Check		
Tension Load:	85.6	kip
Allowable load:	158.7	kip
AR Capacity:	53.9%	Pass

Second Added Anchor Rod Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Second Added AR Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check		
Tension Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

Third Added Anchor Rod Data		
Quantity:		
Diameter:		in
Material:		
Bolt Circle:		in
Bolt Group Area:	0.00	in^2
Bolt Group MOIx:	0	in^4

Reactions Seen by Second Added AR Group		
Moment:	0.0	kip-ft
Axial:	0.0	kip
Shear:	0.0	kip

Second Added AR Capacity Check		
Tension Load:	0.0	kip
Allowable load:	0.0	kip
AR Capacity:	0.0%	

Rev.4.1

AeroSolutions LLC
Optimizing Your Tower Infrastructure

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Anchor Rod Embedment (v1.2)

Analysis Standard					
TIA Code:	*TIACode*	F			
Allowable Stress Increase:	*ASIF*	1.333			
Dimensions and Properties					
Pier Diameter:	*PierDia*	93.6	in		
Concrete Strength:	*Fc*	3000	psi		
Clear Cover, Side:	*cc.side*	3	in		
Clear Cover, Top:	*cc.top*	3	in		
Rebar Yield Strength:	*BarFy*	60	ksi		
Rebar Tie Size:	*TieSize*	6			
Rebar Tie Diameter:	*TieDia*	0.75	in		
Vertical Bar Quantity:	*BarQty*	24			
Vertical Bar Size:	*BarSize*	11			
Vertical Bar Diameter:	*BarDia*	1.410	in		
Vertical Bar Area:	*BarArea*	1.56	in		
Vertical Bar Circle Diameter:	*BarBC*	84.7	in		
Vertical Bar Spacing:	*BarSp*	11.1	in		
Vertical Bar Radial Angle Between:	*BarAngle*	15.0	deg		
Anchor Rod Type:	*RodType*	A772			
Anchor Rod Diameter:	*RodDia*	1.75	in		
Anchor Rod Threads per Inch:	*RodThreads*	5			
Anchor Rod Net Area Through Threads:	*RodArea*	1.90	sq in		
Anchor Rod Circle Diameter:	*RodBC*	52.8	in		
Anchor Rod Material:	*RodMatl*	A722			
Anchor Rod Yield Strength:	*RodFy*	120	ksi		
Anchor Rod Ultimate Strength:	*RodFu*	150	ksi		
Anchor Rod Loading					
Anchor Rod Tensile Requirement:	*RodP*	158.7	kip		
Anchor Rod Design Criteria:	*DesCrit*	Analysis			
Development Length of Vertical Rebar					
Reinforcement Location Factor[1]:	*Alpha*	1.0		ACI 12.2.4	
Coating Factor[1]:	*Beta*	1.0		ACI 12.2.4	
Lightweight Aggregate Concrete Factor[1]:	*Lambda*	1.0		ACI 12.2.4	
Reinforcement Size Factor[1]:	*Gamma*	1.0		ACI 12.2.4	
Transverse Reinforcement Ratio[2]:	*Ktr*	0.0	in	ACI 12.2.4	
Maximum Spacing or Cover Dimension:	*Cover*	4.46	in	ACI 12.2.4	
Development Length:	*Ld*	46.3	in	ACI 12.2.3	
Reinforcment Stress Ratio[3]:	*SR*	0.30			
Reduced Development Length:	*Ld.red*	13.8	in	ACI 12.2.5	Used only if DesCrit = "Analysis"
Force Transfer Length					
Angle to Vertical Bar:	*Angle*	7.5	deg		
Distance to Farthest Bar:	*BarDist*	16.5	in		
Epoxy Bond					
Epoxy Ultimate Bond Stress:	*EpoxyBond*	1800	psi		
Factor of Safety:	*EpoxyFS*	3			
Bond Length Required:	*EpoxyL*	48.1	in		
Embedment Length					
Total Required Embedment Length:	*EmbedIn*	**62**	**in**	**Epoxy Length Controls**	
	EmbedFt	**5.2**	**ft**		
Actual Embedment length:	*ActEmbed*	8.0	ft		
Embedment Capacity	*EmbedCap*	**64.7%**			

Notes:
(1) These factors are typically 1.0 for most tower foundations.
(2) This factor is typically 0 inches for most tower foundations.
(3) Stress ratio of reinforcement can be entered to reduce required development length. Only to be used in already installed desperate situations.
(4) This is consistent with on CCI Foundations Criteria Item AC-1, dated 06/01/2010.

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Number	806359
Site Name	NHV 104 943122

Caisson Analysis

Pier Properties		
Moment	1388	kip-ft
Shear	20	kip
Pier Diameter	7.8	ft
Height Above Grade	1.00	ft
Depth Below Grade	14.00	ft
Donut Diameter		ft
Donut Depth		ft

Analysis Properties		
TIA Code	F	
Soil Safety Factor	2.00	
Water Table Depth	99.0	ft
Ignored Soil Depth	3.9	ft
Cohesion Based on	PLS Caisson	
Max Soil Capacity	110%	

Soil Properties

Layer	Top of Soil Layer (ft)	Layer Thickness (ft)	Bottom of Soil Layer (ft)	Soil Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Soil.Layer	*Soil.Top*	*Soil.Thick*	*Soil.Bottom*	*Soil.Weight*	*Soil.Cohesion*	*Soil.Phi*
1	0.00	6	6.00	105	0	29
2	6.00	2.3	8.30	135	0	40
3	8.30	18.7	27.00	180	20000	
4						
5						
6						
7						
8						
9						
10						

Critical Depths Below Grade		
Rotation Axis	11.10	ft
Zero Shear	6.88	ft

Results		
Soil Capacity	28.7%	OK
Max Pier Moment	1521	kip-ft

Moment At User Defined Depths Below Grade	
kip-ft	kip-ft
kip-ft	kip-ft

V1.0

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *806359*
Site Name: *NHV 104 943122*
App #: *205644 R3*

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Maximum Shaft Superimposed Forces		
TIA Revision:	F	
Max. Service Shaft M:	1521.391	ft-kips (* Note)
Max. Service Shaft P:	20.7788	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	Shaft Factored Loads		
1.30	Mu:	1977.809	ft-kips
1.30	Pu:	27.01244	kips

Pier Properties		
Concrete:		
Pier Diameter =	7.8	ft
Concrete Area =	6880.8	in^2
Reinforcement:		
Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	6	
Vert. Cage Diameter =	7.06	ft
Vert. Cage Diameter =	84.69	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	24	
As Total=	37.44	in^2
A s/ Aconc, Rho:	0.0054	0.54%

Material Properties		
Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	
ACI 318 Code		
Select Analysis ACI Code=	2002	
Seismic Properties		
Seismic Design Category =	D	
Seismic Risk =	**High**	

Solve (Run) <-- Press Upon Completing All Input

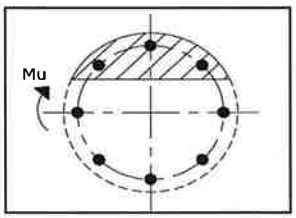
ACI 10.5 , ACI 21.10.4, and IBC 1810.

Min As for Flexural, Tension Controlled, Shafts:

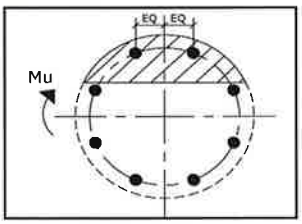
(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Results:

Governing Orientation Case: **2**



Case 1



Case 2

Dist. From Edge to Neutral Axis: **14.33** in

Extreme Steel Strain, εt: **0.0156**

εt > 0.0050, Tension Controlled

Reduction Factor,φ: **0.900**

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.54%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	10242.48	kips
at Mu=(ϕ=0.65)Mn=	6985.46	ft-kips
Max Tu, (φ=0.9) Tn =	2021.76	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	27.01	kips
Drilled Shaft Moment Capacity, φMn:	**6652.51**	ft-kips
Drilled Shaft Superimposed Mu:	**1977.81**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**29.7%**