ROBINSON & COLE LLP

KENNETH C. BALDWIN

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Hartford, CT 06103-3597
Main (860) 275-8200
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Direct (860) 275-8345

Also admitted in Massachusetts

February 19, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
258 Ridge Road, Madison, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 130-foot level of the existing 150-foot tower at 258 Ridge Road in Madison, Connecticut (the "Property"). The tower is owned by Crown Castle . The Council approved Cellco's use of the existing tower in 2009. Cellco now intends to modify its facility by adding three (3) model 742 213V01, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 130-foot level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its 2100 MHz antennas; six (6) new coaxial cables; and one (1) HYBRIFLEX™ antenna cable. All new cables will be attached to the outside of 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 Fillmore McPherson, First Selectman of the Town of Madison. The Town of Madison is 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. The new antennas and RRHs will be located at the 130-foot level on the 150-foot 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 cumulative worst-case RF emissions calculation 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:
Fillmore McPherson, Madison First Selectman
Sandy M. Carter

ATTACHMENT 1

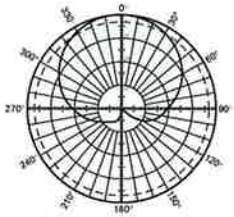
KATHREIN
SCALA DIVISION

742 213V01

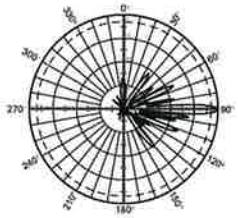
65° Panel Antenna

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

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



Horizontal pattern
±45°- polarization



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

General specifications:

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

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

11271-B
936.3740/b

RoHS
Lead-Free

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

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

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

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

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

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

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

Fast, low-cost installation and deployment

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

Excellent RF performance

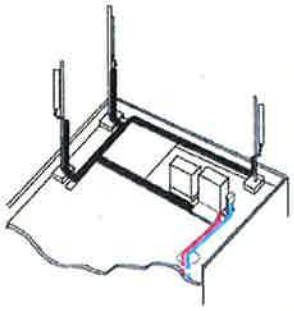
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

Features

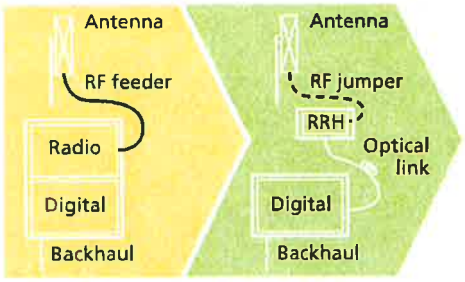
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

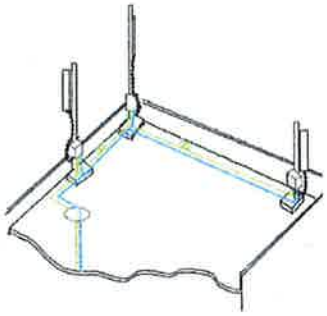
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

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

Power

- Power supply: -48VDC

Operating environment

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

RF characteristics

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

Optical characteristics

Type/number of fibers

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

Optical fiber length

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

Digital Ports and Alarms

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

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

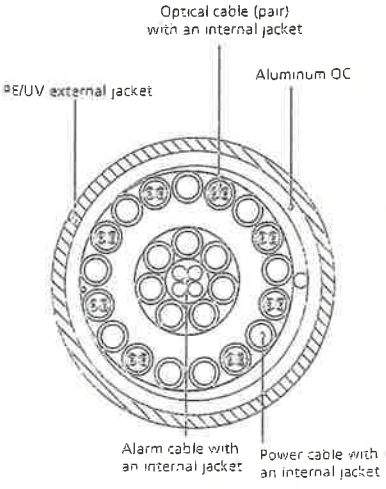


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Madison 3								
Tower Height: Verizon @ 130ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*T-Mobile	8	151	150	0.0193	1945	1.0000	1.93%	
*AT&T UMTS	2	565	140	0.0207	880	0.5867	3.53%	
*AT&T UMTS	2	875	140	0.0321	1900	1.0000	3.21%	
*AT&T GSM	1	283	140	0.0052	880	0.5867	0.88%	
*AT&T GSM	4	525	140	0.0385	1900	1.0000	3.85%	
*AT&T LTE	1	1313	140	0.0241	734	0.4893	4.92%	
Verizon	**7**	**428**	**130**	**0.0637**	**1970**	**1.0000**	**6.37%**	
Verizon	**9**	**397**	**130**	**0.0760**	**869**	**0.5793**	**13.12%**	
Verizon	**1**	**2198**	**130**	**0.0468**	**2145**	**1.0000**	**4.68%**	
Verizon	**1**	**824**	**130**	**0.0175**	**698**	**0.4653**	**3.77%**	
								46.28%
* Source: Siting Council								

ATTACHMENT 3

Date: **January 16, 2014**

Marianne Dunst
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Crown Castle
2000 Corporate Drive
Canonsburg PA 15317
(724) 416-2000

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate Carrier Site Name:**	Madison 3, CT
Crown Castle Designation:	**Crown Castle BU Number:**	5800059
	Crown Castle Site Name:	Ridge Road, Madison
	Crown Castle JDE Job Number:	255348
	Crown Castle Work Order Number:	700362
	Crown Castle Application Number:	210586 Rev. 3
Engineering Firm Designation:	**Crown Castle Project Number:**	700362
Site Data:	**258 Ridge Road, MADISON, New Haven County, CT** **Latitude *41° 18' 33.3"*, Longitude *-72° 36' 51.57"*** **150** Foot - **Monopole Tower**	

Dear Marianne Dunst,

Crown Castle 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 700362, in accordance with application 210586, 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 *Crown Castle* 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: Truc Lac T. CMS

Respectfully submitted by:

STATE OF CONNECTICUT
DOUGLAS K. PINEO
No. 21110
PROFESSIONAL ENGINEER
1/16/14

Douglas K. Pineo, P.E.
Manager Structural Design

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 150 ft Monopole tower designed by Valmont in October of 2008. The tower was originally designed for a wind speed of 115 mph per TIA-222-G.

The tower is designed to accommodate a 30 ft extension that has not yet been installed.

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
132.0	132.0	3	alcatel lucent	RRH2X40-AWS	-	-	-
		1	tower mounts	Side Arm Mount [SO 102-3]			
130.0	130.0	3	kathrein	742 213 w/ Mount Pipe	7	1-5/8	-
		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
150.0	159.0	1	dbspectra	DS4C06F36D-N	2	7/8	2
	150.0	3	remec	GSM PCS 1900 MASTHEAD AMPLIFIER	12	1-5/8	1
		3	rfs celwave	APX16PV-16PVL-E w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 303-1]			
141.0	141.0	3	ericsson	TME-RRUS-11	-	-	1
		1	tower mounts	Side Arm Mount [SO 102-3]			
140.0	140.0	3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe	12 3	1-5/8 3/8	1
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21903			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 304-1]			
130.0	130.0	3	antel	BXA-185063/8CF w/ Mount Pipe	12	1-5/8	1
		3	antel	BXA-70063/6CF w/ Mount Pipe			
		6	decibel	DB846F65ZAXY w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 304-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
124.0	124.0	1	kathrein	800 10251 w/ Mount Pipe	1 1	7/8 11/32	1
		1	radiowaves	HP2-4.7NS			
		1	tower mounts	Side Arm Mount [SO 701-1]			
113.0	113.0	3	kathrein	800 10252 w/ Mount Pipe	3	7/8	1
		1	tower mounts	T-Arm Mount [TA 702-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment

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)
150	150	12	allgon	7273	-	-
		2	decibel	DB616		
		6	generic	TMA		
140	140	12	antel	RWA-80017	-	-
		6	generic	TMA		
130	130	12	allgon	7273	-	-
		6	generic	TMA		
120	120	12	allgon	7273	-	-
		6	generic	TMA		
80	80	1	generic	4-FT STD. MICROWAVE	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	ANS Consultants, Inc.	2354009	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Valmont PennSummit / DaVinci Engineering, Inc.	2354010	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont PennSummit / DaVinci Engineering, Inc.	2354011	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. Crown Castle 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	150 - 110	Pole	TP39.633x28.4x0.25	1	-9.81	1556.78	27.2	Pass
L2	110 - 94.25	Pole	TP43.556x37.659x0.281	2	-12.96	1936.62	36.3	Pass
L3	94.25 - 46.25	Pole	TP56.472x41.449x0.375	3	-24.45	3345.18	43.1	Pass
L4	46.25 - 0	Pole	TP68.71x53.686x0.438	4	-43.73	4844.04	45.3	Pass
							Summary	
						Pole (L4)	45.3	Pass
						Rating =	45.3	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	39.8	Pass
1	Base Plate	0	36.1	Pass
1	Base Foundation	0	51.7	Pass

Structure Rating (max from all components) =	51.7%

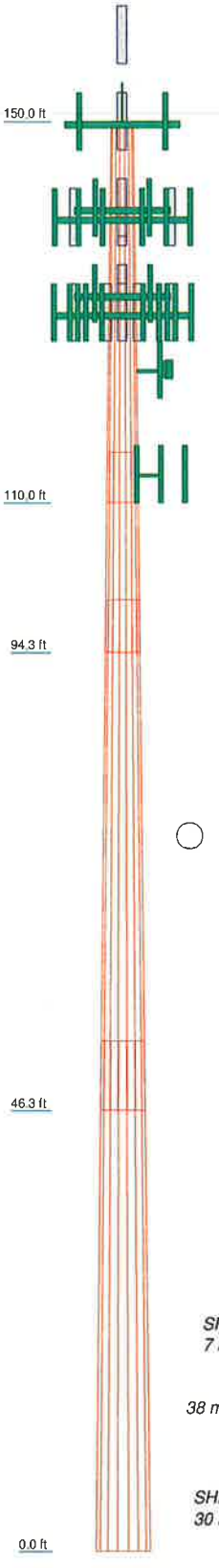
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

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	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	40.000	18	0.250	5.250	28.400	39.633	A572-65	3.6
2	21.000	18	0.281	5.500	37.659	43.556		2.6
3	53.500	18	0.375	7.250	41.449	56.472		10.5
4	53.500	18	0.438		53.686	68.710		15.4
								32.1

DESIGNED APPURTENANCE LOADING

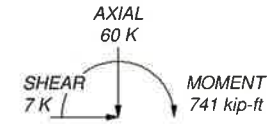
TYPE	ELEVATION	TYPE	ELEVATION
Lighting Rod 5/8" x 5'	152	(2) LGP21903	140
DS4C06F36D-N	150	(2) LGP21903	140
APX16PV-16PVL-E w/ Mount Pipe	150	(2) LGP21903	140
APX16PV-16PVL-E w/ Mount Pipe	150	DC6-48-60-18-8F	140
APX16PV-16PVL-E w/ Mount Pipe	150	Platform Mount [LP 304-1]	140
GSM PCS 1900 MASTHEAD AMPLIFIER	150	RRH2X40-AWS	132
		RRH2X40-AWS	132
GSM PCS 1900 MASTHEAD AMPLIFIER	150	RRH2X40-AWS	132
		Side Arm Mount [SO 102-3]	132
GSM PCS 1900 MASTHEAD AMPLIFIER	150	(2) DB846F65ZAXY w/ Mount Pipe	130
		(2) DB846F65ZAXY w/ Mount Pipe	130
4' x 2" Pipe Mount	150	(2) DB846F65ZAXY w/ Mount Pipe	130
Platform Mount [LP 303-1]	150	BXA-185063/8CF w/ Mount Pipe	130
TME-RRUS-11	141	BXA-185063/8CF w/ Mount Pipe	130
TME-RRUS-11	141	BXA-185063/8CF w/ Mount Pipe	130
TME-RRUS-11	141	BXA-70063/6CF w/ Mount Pipe	130
Side Arm Mount [SO 102-3]	141	BXA-70063/6CF w/ Mount Pipe	130
(2) 7770.00 w/ Mount Pipe	140	BXA-70063/6CF w/ Mount Pipe	130
(2) 7770.00 w/ Mount Pipe	140	742 213 w/ Mount Pipe	130
(2) 7770.00 w/ Mount Pipe	140	742 213 w/ Mount Pipe	130
AM-X-CD-16-65-00T-RET w/ Mount Pipe	140	742 213 w/ Mount Pipe	130
		DB-T1-6Z-8AB-0Z	130
AM-X-CD-16-65-00T-RET w/ Mount Pipe	140	Platform Mount [LP 304-1]	130
		800 10251 w/ Mount Pipe	124
AM-X-CD-16-65-00T-RET w/ Mount Pipe	140	5' x 2" Pipe Mount	124
		Side Arm Mount [SO 701-1]	124
(2) LGP21401	140	HP2-4.7NS	124
(2) LGP21401	140	T-Arm Mount [TA 702-1]	113
(2) LGP21401	140	(3) 800 10252 w/ Mount Pipe	113

MATERIAL STRENGTH

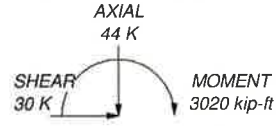
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

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: 45.3%



TORQUE 1 kip-ft
38 mph WIND - 0.750 in ICE



TORQUE 4 kip-ft
REACTIONS - 85 mph WIND

CROWN CASTLE
We Are Solutions
Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
Phone: (724) 416-2000
FAX:

Job: **BU #5800059**			
Project:			
Client: Crown Castle	Drawn by: cschanck		App'd:
Code: TIA/EIA-222-F	Date: 01/16/14		Scale: NTS
Path: R:\SA Models - Letters\Work Area\TLac\5800059\temp\5800059.eri			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:

1) Tower is located in New Haven County, Connecticut.
2) Basic wind speed of 85 mph.
3) Nominal ice thickness of 0.750 in.
4) Ice thickness is considered to increase with height.
5) Ice density of 56.000 pcf.
6) A wind speed of 38 mph is used in combination with ice.
7) Temperature drop of 50.000 °F.
8) Deflections calculated using a wind speed of 50 mph.
9) A non-linear (P-delta) analysis was used.
10) Pressures are calculated at each section.
11) Stress ratio used in pole design is 1.333.
12) 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	150.000-110.000	40.000	5.250	18	28.400	39.633	0.250	1.000	A572-65 (65 ksi)
L2	110.000-94.250	21.000	5.500	18	37.659	43.556	0.281	1.125	A572-65 (65 ksi)
L3	94.250-46.250	53.500	7.250	18	41.449	56.472	0.375	1.500	A572-65 (65 ksi)
L4	46.250-0.000	53.500		18	53.686	68.710	0.438	1.750	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

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	28.838	22.337	2236.246	9.993	14.427	155.002	4475.435	11.171	4.558	18.234
	40.244	31.250	6123.656	13.981	20.134	304.152	12255.369	15.628	6.535	26.142
L2	39.737	33.366	5889.316	13.269	19.131	307.848	11786.381	16.686	6.133	21.806
	44.228	38.631	9139.882	15.363	22.126	413.075	18291.791	19.319	7.171	25.496
L3	43.657	48.888	10420.184	14.581	21.056	494.878	20854.080	24.449	6.635	17.693
	57.343	66.769	26545.722	19.914	28.688	925.332	53126.374	33.391	9.279	24.744
L4	56.582	73.942	26487.970	18.903	27.273	971.231	53010.794	36.978	8.679	19.837
	69.770	94.805	55829.000	24.237	34.905	1599.470	111731.461	47.411	11.323	25.881

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 150.000-110.000				1	1	1		
L2 110.000-94.250				1	1	1		
L3 94.250-46.250				1	1	1		
L4 46.250-0.000				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 klf
***								
LCF158-50A(1-5/8")	A	No	Inside Pole	150.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
LDF5-50A(7/8")	A	No	Inside Pole	150.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
*								
AVA7-50(1-5/8)	C	No	Inside Pole	140.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
FB-L98B-002-75000(3/8")	C	No	Inside Pole	140.000 - 0.000	3	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
2" Rigid Conduit	C	No	Inside Pole	140.000 - 0.000	1	No Ice	0.000	0.003
						1/2" Ice	0.000	0.003
						1" Ice	0.000	0.003
						2" Ice	0.000	0.003
						4" Ice	0.000	0.003
*								
AVA7-50(1-5/8)	B	No	Inside Pole	130.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
AVA7-50(1-5/8)	B	No	CaAa (Out Of Face)	130.000 - 0.000	2	No Ice	0.201	0.001
						1/2" Ice	0.301	0.002
						1" Ice	0.401	0.004
						2" Ice	0.601	0.010

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
AVA7-50(1-5/8)	B	No	CaAa (Out Of Face)	130.000 - 0.000	5	4" Ice	1.001	0.030
						No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.010
						4" Ice	0.000	0.030
LDF5-50A(7/8")	A	No	Inside Pole	124.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
7921A(11/32")	A	No	Inside Pole	124.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
LDF5-50A(7/8")	A	No	Inside Pole	113.000 - 0.000	3	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000

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	150.000-110.000	A	0.000	0.000	0.000	0.000	0.42
		B	0.000	0.000	0.000	8.040	0.27
		C	0.000	0.000	0.000	0.000	0.34
L2	110.000-94.250	A	0.000	0.000	0.000	0.000	0.19
		B	0.000	0.000	0.000	6.332	0.21
		C	0.000	0.000	0.000	0.000	0.18
L3	94.250-46.250	A	0.000	0.000	0.000	0.000	0.58
		B	0.000	0.000	0.000	19.296	0.64
		C	0.000	0.000	0.000	0.000	0.55
L4	46.250-0.000	A	0.000	0.000	0.000	0.000	0.56
		B	0.000	0.000	0.000	18.592	0.62
		C	0.000	0.000	0.000	0.000	0.53

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	150.000-110.000	A	0.883	0.000	0.000	0.000	0.000	0.42
		B		0.000	0.000	0.000	15.107	0.71
		C		0.000	0.000	0.000	0.000	0.34
L2	110.000-94.250	A	0.859	0.000	0.000	0.000	0.000	0.19
		B		0.000	0.000	0.000	11.897	0.56
		C		0.000	0.000	0.000	0.000	0.18
L3	94.250-46.250	A	0.820	0.000	0.000	0.000	0.000	0.58
		B		0.000	0.000	0.000	35.784	1.67
		C		0.000	0.000	0.000	0.000	0.55
L4	46.250-0.000	A	0.750	0.000	0.000	0.000	0.000	0.56
		B		0.000	0.000	0.000	33.772	1.56
		C		0.000	0.000	0.000	0.000	0.53

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	150.000-110.000	0.264	0.152	0.448	0.259
L2	110.000-94.250	0.468	0.270	0.778	0.449
L3	94.250-46.250	0.476	0.275	0.797	0.460
L4	46.250-0.000	0.485	0.280	0.813	0.469

Discrete Tower Loads

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
Lighting Rod 5/8" x 5'	C	None		0.000	152.000	No Ice	0.313	0.313	0.03
						1/2" Ice	0.826	0.826	0.03
						1" Ice	1.322	1.322	0.04
						2" Ice	1.957	1.957	0.07
						4" Ice	3.338	3.338	0.16
***									
DS4C06F36D-N	A	From Leg	4.000 0.000 9.000	0.000	150.000	No Ice	5.500	5.500	0.07
						1/2" Ice	7.367	7.367	0.11
						1" Ice	9.250	9.250	0.16
						2" Ice	13.067	13.067	0.30
						4" Ice	19.246	19.246	0.72
APX16PV-16PVL-E w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice	6.936	3.289	0.06
						1/2" Ice	7.439	3.995	0.11
						1" Ice	7.942	4.661	0.16
						2" Ice	8.978	6.044	0.28
						4" Ice	11.175	9.023	0.65
APX16PV-16PVL-E w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice	6.936	3.289	0.06
						1/2" Ice	7.439	3.995	0.11
						1" Ice	7.942	4.661	0.16
						2" Ice	8.978	6.044	0.28
						4" Ice	11.175	9.023	0.65
APX16PV-16PVL-E w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice	6.936	3.289	0.06
						1/2" Ice	7.439	3.995	0.11
						1" Ice	7.942	4.661	0.16
						2" Ice	8.978	6.044	0.28
						4" Ice	11.175	9.023	0.65
GSM PCS 1900 MASTHEAD AMPLIFIER	A	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice	1.434	0.394	0.01
						1/2" Ice	1.596	0.505	0.02
						1" Ice	1.767	0.624	0.03
						2" Ice	2.135	0.889	0.06
						4" Ice	2.975	1.522	0.14
GSM PCS 1900 MASTHEAD AMPLIFIER	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice	1.434	0.394	0.01
						1/2" Ice	1.596	0.505	0.02
						1" Ice	1.767	0.624	0.03
						2" Ice	2.135	0.889	0.06
						4" Ice	2.975	1.522	0.14
GSM PCS 1900 MASTHEAD AMPLIFIER	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice	1.434	0.394	0.01
						1/2" Ice	1.596	0.505	0.02
						1" Ice	1.767	0.624	0.03
						2" Ice	2.135	0.889	0.06
						4" Ice	2.975	1.522	0.14

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
							4" Ice			
4' x 2" Pipe Mount	A	From Leg	4.000	0.000	0.000	150.000	No Ice	0.785	0.785	0.03
			0.000				1/2" Ice	1.028	1.028	0.04
			2.000				1" Ice	1.281	1.281	0.04
							2" Ice	1.814	1.814	0.07
							4" Ice	3.111	3.111	0.17
Platform Mount [LP 303-1]	C	None			0.000	150.000	No Ice	14.660	14.660	1.25
							1/2" Ice	18.870	18.870	1.48
							1" Ice	23.080	23.080	1.71
							2" Ice	31.500	31.500	2.18
							4" Ice	48.340	48.340	3.10
***										
TME-RRUS-11	A	From Leg	2.000	0.000	0.000	141.000	No Ice	3.423	1.850	0.06
			0.000				1/2" Ice	3.725	2.192	0.08
			0.000				1" Ice	4.038	2.552	0.12
							2" Ice	4.720	3.378	0.19
							4" Ice	6.246	5.290	0.43
TME-RRUS-11	B	From Leg	2.000	0.000	0.000	141.000	No Ice	3.423	1.850	0.06
			0.000				1/2" Ice	3.725	2.192	0.08
			0.000				1" Ice	4.038	2.552	0.12
							2" Ice	4.720	3.378	0.19
							4" Ice	6.246	5.290	0.43
TME-RRUS-11	C	From Leg	2.000	0.000	0.000	141.000	No Ice	3.423	1.850	0.06
			0.000				1/2" Ice	3.725	2.192	0.08
			0.000				1" Ice	4.038	2.552	0.12
							2" Ice	4.720	3.378	0.19
							4" Ice	6.246	5.290	0.43
Side Arm Mount [SO 102-3]	C	None			0.000	141.000	No Ice	3.000	3.000	0.08
							1/2" Ice	3.480	3.480	0.11
							1" Ice	3.960	3.960	0.14
							2" Ice	4.920	4.920	0.20
							4" Ice	6.840	6.840	0.32
*										
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.000	0.000	0.000	140.000	No Ice	6.119	4.254	0.06
			0.000				1/2" Ice	6.626	5.014	0.10
			0.000				1" Ice	7.128	5.711	0.16
							2" Ice	8.164	7.155	0.29
							4" Ice	10.360	10.412	0.66
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	140.000	No Ice	6.119	4.254	0.06
			0.000				1/2" Ice	6.626	5.014	0.10
			0.000				1" Ice	7.128	5.711	0.16
							2" Ice	8.164	7.155	0.29
							4" Ice	10.360	10.412	0.66
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.000	0.000	0.000	140.000	No Ice	6.119	4.254	0.06
			0.000				1/2" Ice	6.626	5.014	0.10
			0.000				1" Ice	7.128	5.711	0.16
							2" Ice	8.164	7.155	0.29
							4" Ice	10.360	10.412	0.66
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.000	0.000	0.000	140.000	No Ice	8.498	6.304	0.07
			0.000				1/2" Ice	9.149	7.479	0.14
			0.000				1" Ice	9.767	8.368	0.21
							2" Ice	11.031	10.179	0.38
							4" Ice	13.679	14.024	0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	140.000	No Ice	8.498	6.304	0.07
			0.000				1/2" Ice	9.149	7.479	0.14

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
			0.000			Ice	9.767	8.368	0.21
						1" Ice	11.031	10.179	0.38
						2" Ice	13.679	14.024	0.87
						4" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.304 7.479 8.368 10.179 14.024	0.07 0.14 0.21 0.38 0.87
(2) LGP21401	A	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.288 1.445 1.611 1.969 2.788	0.233 0.313 0.403 0.608 1.121	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	B	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.288 1.445 1.611 1.969 2.788	0.233 0.313 0.403 0.608 1.121	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	C	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.288 1.445 1.611 1.969 2.788	0.233 0.313 0.403 0.608 1.121	0.01 0.02 0.03 0.05 0.14
(2) LGP21903	A	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.270 0.343 0.425 0.616 1.101	0.184 0.248 0.322 0.494 0.943	0.01 0.01 0.02 0.03 0.07
(2) LGP21903	B	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.270 0.343 0.425 0.616 1.101	0.184 0.248 0.322 0.494 0.943	0.01 0.01 0.02 0.03 0.07
(2) LGP21903	C	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.270 0.343 0.425 0.616 1.101	0.184 0.248 0.322 0.494 0.943	0.01 0.01 0.02 0.03 0.07
DC6-48-60-18-8F	B	From Leg	4.000 0.000 0.000	0.000	140.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.266 1.456 1.658 2.093 3.098	1.266 1.456 1.658 2.093 3.098	0.02 0.04 0.05 0.10 0.21
Platform Mount [LP 304-1]	C	None		0.000	140.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	17.460 22.440 27.420 37.380 57.300	17.460 22.440 27.420 37.380 57.300	1.35 1.62 1.90 2.45 3.55
***									
RRH2X40-AWS	A	From Leg	2.000 0.000 0.000	0.000	132.000	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	0.04 0.06 0.08 0.13 0.28

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
RRH2X40-AWS	B	From Leg	2.000 0.000 0.000	0.000	132.000	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	0.04 0.06 0.08 0.13 0.28
RRH2X40-AWS	C	From Leg	2.000 0.000 0.000	0.000	132.000	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	0.04 0.06 0.08 0.13 0.28
Side Arm Mount [SO 102-3]	C	None		0.000	132.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.000 3.480 3.960 4.920 6.840	3.000 3.480 3.960 4.920 6.840	0.08 0.11 0.14 0.20 0.32
***									
(2) DB846F65ZAXY w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.271 7.877 8.484 9.724 12.325	7.821 9.010 9.912 11.812 15.978	0.05 0.11 0.19 0.37 0.87
(2) DB846F65ZAXY w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.271 7.877 8.484 9.724 12.325	7.821 9.010 9.912 11.812 15.978	0.05 0.11 0.19 0.37 0.87
(2) DB846F65ZAXY w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.271 7.877 8.484 9.724 12.325	7.821 9.010 9.912 11.812 15.978	0.05 0.11 0.19 0.37 0.87
BXA-185063/8CF w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.181 3.559 3.963 4.855 6.773	2.997 3.614 4.236 5.529 8.423	0.03 0.06 0.09 0.19 0.47
BXA-185063/8CF w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.181 3.559 3.963 4.855 6.773	2.997 3.614 4.236 5.529 8.423	0.03 0.06 0.09 0.19 0.47
BXA-185063/8CF w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.181 3.559 3.963 4.855 6.773	2.997 3.614 4.236 5.529 8.423	0.03 0.06 0.09 0.19 0.47
BXA-70063/6CF w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.979 8.621 9.228 10.473 13.082	5.695 6.849 7.715 9.497 13.262	0.04 0.10 0.17 0.33 0.80
BXA-70063/6CF w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	130.000	No Ice 1/2" Ice 1" Ice	7.979 8.621 9.228 10.473	5.695 6.849 7.715 9.497	0.04 0.10 0.17 0.33

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
							2" Ice	13.082	13.262	0.80
							4" Ice			
BXA-70063/6CF w/ Mount Pipe	C	From Leg	4.000	0.000	0.000	130.000	No Ice	7.979	5.695	0.04
			0.000				1/2" Ice	8.621	6.849	0.10
			0.000				1" Ice	9.228	7.715	0.17
							2" Ice	10.473	9.497	0.33
							4" Ice	13.082	13.262	0.80
742 213 w/ Mount Pipe	A	From Leg	4.000	0.000	0.000	130.000	No Ice	5.373	4.620	0.05
			0.000				1/2" Ice	5.950	6.000	0.09
			0.000				1" Ice	6.501	6.982	0.15
							2" Ice	7.611	8.852	0.28
							4" Ice	9.933	12.794	0.68
742 213 w/ Mount Pipe	B	From Leg	4.000	0.000	0.000	130.000	No Ice	5.373	4.620	0.05
			0.000				1/2" Ice	5.950	6.000	0.09
			0.000				1" Ice	6.501	6.982	0.15
							2" Ice	7.611	8.852	0.28
							4" Ice	9.933	12.794	0.68
742 213 w/ Mount Pipe	C	From Leg	4.000	0.000	0.000	130.000	No Ice	5.373	4.620	0.05
			0.000				1/2" Ice	5.950	6.000	0.09
			0.000				1" Ice	6.501	6.982	0.15
							2" Ice	7.611	8.852	0.28
							4" Ice	9.933	12.794	0.68
DB-T1-6Z-8AB-0Z	C	From Leg	4.000	0.000	0.000	130.000	No Ice	5.600	2.333	0.04
			0.000				1/2" Ice	5.915	2.558	0.08
			0.000				1" Ice	6.240	2.791	0.12
							2" Ice	6.914	3.284	0.21
							4" Ice	8.365	4.373	0.45
Platform Mount [LP 304-1]	C	None			0.000	130.000	No Ice	17.460	17.460	1.35
							1/2" Ice	22.440	22.440	1.62
							1" Ice	27.420	27.420	1.90
							2" Ice	37.380	37.380	2.45
							4" Ice	57.300	57.300	3.55
***										
800 10251 w/ Mount Pipe	B	From Leg	3.000	0.000	0.000	124.000	No Ice	4.883	2.256	0.04
			0.000				1/2" Ice	5.288	2.773	0.08
			0.000				1" Ice	5.703	3.306	0.11
							2" Ice	6.567	4.424	0.21
							4" Ice	8.448	7.080	0.50
5' x 2" Pipe Mount	B	From Leg	3.000	0.000	0.000	124.000	No Ice	1.000	1.000	0.03
			0.000				1/2" Ice	1.393	1.393	0.04
			0.000				1" Ice	1.703	1.703	0.05
							2" Ice	2.351	2.351	0.08
							4" Ice	3.778	3.778	0.20
Side Arm Mount [SO 701-1]	B	From Leg	1.500	0.000	0.000	124.000	No Ice	0.850	1.670	0.07
			0.000				1/2" Ice	1.140	2.340	0.08
			0.000				1" Ice	1.430	3.010	0.09
							2" Ice	2.010	4.350	0.12
							4" Ice	3.170	7.030	0.18
***										
(3) 800 10252 w/ Mount Pipe	B	From Leg	3.000	0.000	0.000	113.000	No Ice	7.578	3.787	0.04
			0.000				1/2" Ice	8.022	4.352	0.09
			0.000				1" Ice	8.476	4.935	0.15
							2" Ice	9.418	6.154	0.29
							4" Ice	11.461	8.932	0.66
T-Arm Mount [TA 702-1]	B	From Leg	1.500	0.000	0.000	113.000	No Ice	2.780	2.230	0.11

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
			0.000				1/2" Ice	3.390	2.430	0.14
			0.000				1" Ice	4.000	2.630	0.17
							2" Ice	5.220	3.030	0.23
							4" Ice	7.660	3.830	0.35
***										

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
HP2-4.7NS	B	Paraboloid w/Shroud (HP)	From Leg	3.000		-11.000		124.000	2.042	No Ice	3.270	0.03
				0.000						1/2" Ice	3.550	0.05
				0.000						1" Ice	3.820	0.06
										2" Ice	4.360	0.10
										4" Ice	5.460	0.17

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
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

Comb. No.	Description
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	150 - 110	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.96	-1.42	-0.42
			Max. Mx	5	-9.81	-322.10	0.31
			Max. My	8	-9.83	-0.41	-319.59
			Max. Vy	11	-15.73	321.29	-0.33
			Max. Vx	8	15.53	-0.41	-319.59
			Max. Torque	3			-2.17
L2	110 - 94.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21.64	-4.07	-1.94
			Max. Mx	5	-12.96	-592.93	-3.21
			Max. My	8	-12.98	-4.60	-583.96
			Max. Vy	11	-18.48	590.99	2.39
			Max. Vx	8	18.01	-4.60	-583.96
			Max. Torque	3			-3.35
L3	94.25 - 46.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-36.58	-6.27	-3.21
			Max. Mx	5	-24.45	-1571.78	-14.10
			Max. My	8	-24.46	-16.64	-1542.67
			Max. Vy	11	-23.92	1570.89	13.25
			Max. Vx	8	23.45	-16.64	-1542.67
			Max. Torque	3			-3.60
L4	46.25 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-60.11	-9.23	-4.92
			Max. Mx	11	-43.73	3011.77	25.70
			Max. My	8	-43.73	-30.55	-2959.35
			Max. Vy	11	-29.98	3011.77	25.70
			Max. Vx	8	29.51	-30.55	-2959.35
			Max. Torque	3			-3.89

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	60.11	-0.00	-0.00
	Max. H_x	11	43.74	29.96	0.24
	Max. H_z	2	43.74	0.27	29.49
	Max. M_x	2	2956.89	0.27	29.49
	Max. M_z	5	3011.66	-29.92	-0.23
	Max. Torsion	9	3.86	14.79	-25.42
	Min. Vert	1	43.74	0.00	0.00
	Min. H_x	5	43.74	-29.92	-0.23
	Min. H_z	8	43.74	-0.25	-29.50
	Min. M_x	8	-2959.35	-0.25	-29.50
	Min. M_z	11	-3011.77	29.96	0.24
	Min. Torsion	3	-3.89	-14.80	25.42

Tower Mast Reaction Summary

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 Only	43.74	0.00	0.00	1.10	-2.42	0.00
Dead+Wind 0 deg - No Ice	43.74	-0.27	-29.49	-2956.89	27.92	3.66
Dead+Wind 30 deg - No Ice	43.74	14.80	-25.42	-2547.03	-1488.89	3.89
Dead+Wind 60 deg - No Ice	43.74	25.82	-14.53	-1452.56	-2598.94	2.86
Dead+Wind 90 deg - No Ice	43.74	29.92	0.23	26.67	-3011.66	1.17
Dead+Wind 120 deg - No Ice	43.74	26.02	14.93	1500.93	-2620.84	-0.83
Dead+Wind 150 deg - No Ice	43.74	15.18	25.64	2572.95	-1532.14	-2.54
Dead+Wind 180 deg - No Ice	43.74	0.25	29.50	2959.35	-30.55	-3.73
Dead+Wind 210 deg - No Ice	43.74	-14.79	25.42	2549.15	1482.92	-3.86
Dead+Wind 240 deg - No Ice	43.74	-25.86	14.51	1453.37	2598.01	-2.85
Dead+Wind 270 deg - No Ice	43.74	-29.96	-0.24	-25.70	3011.77	-1.21
Dead+Wind 300 deg - No Ice	43.74	-26.06	-14.95	-1500.38	2620.62	0.78
Dead+Wind 330 deg - No Ice	43.74	-15.21	-25.65	-2572.88	1530.88	2.51
Dead+Ice+Temp	60.11	0.00	0.00	4.92	-9.23	-0.00
Dead+Wind 0 deg+Ice+Temp	60.11	-0.05	-6.94	-714.20	-3.60	1.01
Dead+Wind 30 deg+Ice+Temp	60.11	3.48	-5.98	-615.34	-370.76	1.02
Dead+Wind 60 deg+Ice+Temp	60.11	6.06	-3.43	-349.85	-639.16	0.71
Dead+Wind 90 deg+Ice+Temp	60.11	7.02	0.04	9.64	-738.44	0.23
Dead+Wind 120 deg+Ice+Temp	60.11	6.10	3.50	368.31	-642.99	-0.31
Dead+Wind 150 deg+Ice+Temp	60.11	3.55	6.02	629.54	-378.60	-0.75
Dead+Wind 180 deg+Ice+Temp	60.11	0.05	6.94	724.21	-14.58	-1.03
Dead+Wind 210 deg+Ice+Temp	60.11	-3.48	5.98	625.28	351.82	-1.02
Dead+Wind 240 deg+Ice+Temp	60.11	-6.07	3.42	359.49	621.36	-0.71
Dead+Wind 270 deg+Ice+Temp	60.11	-7.03	-0.04	0.04	720.88	-0.24
Dead+Wind 300 deg+Ice+Temp	60.11	-6.11	-3.50	-358.73	625.35	0.30
Dead+Wind 330 deg+Ice+Temp	60.11	-3.56	-6.03	-620.07	360.72	0.74
Dead+Wind 0 deg - Service	43.74	-0.09	-10.21	-1022.59	8.04	1.27
Dead+Wind 30 deg - Service	43.74	5.12	-8.80	-880.74	-516.89	1.35
Dead+Wind 60 deg - Service	43.74	8.94	-5.03	-501.97	-901.06	0.99
Dead+Wind 90 deg - Service	43.74	10.35	0.08	9.96	-1043.90	0.41
Dead+Wind 120 deg - Service	43.74	9.00	5.17	520.18	-908.64	-0.29
Dead+Wind 150 deg - Service	43.74	5.25	8.87	891.18	-531.86	-0.88
Dead+Wind 180 deg - Service	43.74	0.09	10.21	1024.90	-12.19	-1.29
Dead+Wind 210 deg - Service	43.74	-5.12	8.80	882.94	511.59	-1.34
Dead+Wind 240 deg - Service	43.74	-8.95	5.02	503.71	897.50	-0.99
Dead+Wind 270 deg - Service	43.74	-10.37	-0.08	-8.16	1040.70	-0.42
Dead+Wind 300 deg - Service	43.74	-9.02	-5.17	-518.52	905.33	0.27
Dead+Wind 330 deg - Service	43.74	-5.26	-8.88	-889.69	528.19	0.87

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	0.00	-43.74	0.00	0.00	43.74	0.00	0.000%
2	-0.27	-43.74	-29.49	0.27	43.74	29.49	0.000%
3	14.80	-43.74	-25.42	-14.80	43.74	25.42	0.000%
4	25.82	-43.74	-14.53	-25.82	43.74	14.53	0.000%
5	29.92	-43.74	0.23	-29.92	43.74	-0.23	0.000%
6	26.02	-43.74	14.93	-26.02	43.74	-14.93	0.000%
7	15.18	-43.74	25.64	-15.18	43.74	-25.64	0.000%
8	0.25	-43.74	29.50	-0.25	43.74	-29.50	0.000%
9	-14.79	-43.74	25.42	14.79	43.74	-25.42	0.000%
10	-25.86	-43.74	14.51	25.86	43.74	-14.51	0.000%
11	-29.96	-43.74	-0.24	29.96	43.74	0.24	0.000%
12	-26.06	-43.74	-14.95	26.06	43.74	14.95	0.000%
13	-15.21	-43.74	-25.65	15.21	43.74	25.65	0.000%
14	0.00	-60.11	0.00	-0.00	60.11	-0.00	0.000%
15	-0.05	-60.11	-6.94	0.05	60.11	6.94	0.000%
16	3.48	-60.11	-5.98	-3.48	60.11	5.98	0.000%
17	6.06	-60.11	-3.43	-6.06	60.11	3.43	0.000%
18	7.02	-60.11	0.04	-7.02	60.11	-0.04	0.000%
19	6.10	-60.11	3.50	-6.10	60.11	-3.50	0.000%
20	3.55	-60.11	6.02	-3.55	60.11	-6.02	0.000%
21	0.05	-60.11	6.94	-0.05	60.11	-6.94	0.000%
22	-3.48	-60.11	5.98	3.48	60.11	-5.98	0.000%
23	-6.07	-60.11	3.42	6.07	60.11	-3.42	0.000%
24	-7.03	-60.11	-0.04	7.03	60.11	0.04	0.000%
25	-6.11	-60.11	-3.50	6.11	60.11	3.50	0.000%
26	-3.56	-60.11	-6.03	3.56	60.11	6.03	0.000%
27	-0.09	-43.74	-10.21	0.09	43.74	10.21	0.000%
28	5.12	-43.74	-8.80	-5.12	43.74	8.80	0.000%
29	8.94	-43.74	-5.03	-8.94	43.74	5.03	0.000%
30	10.35	-43.74	0.08	-10.35	43.74	-0.08	0.000%
31	9.00	-43.74	5.17	-9.00	43.74	-5.17	0.000%
32	5.25	-43.74	8.87	-5.25	43.74	-8.87	0.000%
33	0.09	-43.74	10.21	-0.09	43.74	-10.21	0.000%
34	-5.12	-43.74	8.80	5.12	43.74	-8.80	0.000%
35	-8.95	-43.74	5.02	8.95	43.74	-5.02	0.000%
36	-10.37	-43.74	-0.08	10.37	43.74	0.08	0.000%
37	-9.02	-43.74	-5.17	9.02	43.74	5.17	0.000%
38	-5.26	-43.74	-8.88	5.26	43.74	8.88	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	0.00022656
3	Yes	5	0.00000001	0.00001966
4	Yes	4	0.00000001	0.00083425
5	Yes	4	0.00000001	0.00009372
6	Yes	4	0.00000001	0.00092126
7	Yes	5	0.00000001	0.00001930
8	Yes	4	0.00000001	0.00027266
9	Yes	4	0.00000001	0.00081762
10	Yes	5	0.00000001	0.00001879
11	Yes	4	0.00000001	0.00006214
12	Yes	4	0.00000001	0.00098210
13	Yes	4	0.00000001	0.00087934
14	Yes	4	0.00000001	0.00001228
15	Yes	4	0.00000001	0.00048203
16	Yes	4	0.00000001	0.00051418
17	Yes	4	0.00000001	0.00051781
18	Yes	4	0.00000001	0.00049950
19	Yes	4	0.00000001	0.00052881
20	Yes	4	0.00000001	0.00052684
21	Yes	4	0.00000001	0.00049059
22	Yes	4	0.00000001	0.00050822

23	Yes	4	0.00000001	0.00050936
24	Yes	4	0.00000001	0.00048350
25	Yes	4	0.00000001	0.00050893
26	Yes	4	0.00000001	0.00050641
27	Yes	4	0.00000001	0.00003968
28	Yes	4	0.00000001	0.00008507
29	Yes	4	0.00000001	0.00005473
30	Yes	4	0.00000001	0.00001794
31	Yes	4	0.00000001	0.00005996
32	Yes	4	0.00000001	0.00007869
33	Yes	4	0.00000001	0.00004275
34	Yes	4	0.00000001	0.00005676
35	Yes	4	0.00000001	0.00007691
36	Yes	4	0.00000001	0.00001672
37	Yes	4	0.00000001	0.00006730
38	Yes	4	0.00000001	0.00005725

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 110	12.934	31	0.732	0.003
L2	115.25 - 94.25	7.796	31	0.644	0.003
L3	99.75 - 46.25	5.818	31	0.560	0.002
L4	53.5 - 0	1.649	31	0.282	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
152.000	Lighting Rod 5/8" x 5'	31	12.934	0.732	0.003	80016
150.000	DS4C06F36D-N	31	12.934	0.732	0.003	80016
141.000	TME-RRUS-11	31	11.553	0.718	0.003	44453
140.000	(2) 7770.00 w/ Mount Pipe	31	11.401	0.716	0.003	40008
132.000	RRH2X40-AWS	31	10.194	0.700	0.003	22226
130.000	(2) DB846F65ZAXY w/ Mount Pipe	31	9.897	0.695	0.003	20004
124.000	HP2-4.7NS	31	9.021	0.678	0.003	15387
113.000	(3) 800 10252 w/ Mount Pipe	31	7.493	0.634	0.002	11437

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 110	37.266	6	2.109	0.008
L2	115.25 - 94.25	22.467	6	1.856	0.007
L3	99.75 - 46.25	16.771	6	1.614	0.005
L4	53.5 - 0	4.756	6	0.813	0.002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
152.000	Lighting Rod 5/8" x 5'	6	37.266	2.109	0.008	27894
150.000	DS4C06F36D-N	6	37.266	2.109	0.008	27894
141.000	TME-RRUS-11	6	33.288	2.067	0.008	15497
140.000	(2) 7770.00 w/ Mount Pipe	6	32.849	2.062	0.008	13947
132.000	RRH2X40-AWS	6	29.373	2.015	0.008	7748
130.000	(2) DB846F65ZAXY w/ Mount Pipe	6	28.518	2.001	0.008	6973
124.000	HP2-4.7NS	6	25.996	1.952	0.008	5363
113.000	(3) 800 10252 w/ Mount Pipe	6	21.595	1.826	0.007	3983

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	150 - 110 (1)	TP39.633x28.4x0.25	40.000	0.000	0.0	38.825	30.080	-9.81	1167.88	0.008
L2	110 - 94.25 (2)	TP43.556x37.659x0.281	21.000	0.000	0.0	39.000	37.252	-12.96	1452.83	0.009
L3	94.25 - 46.25 (3)	TP56.472x41.449x0.375	53.500	0.000	0.0	39.000	64.346	-24.45	2509.51	0.010
L4	46.25 - 0 (4)	TP68.71x53.686x0.438	53.500	0.000	0.0	38.331	94.805	-43.73	3633.94	0.012

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	150 - 110 (1)	TP39.633x28.4x0.25	322.10	13.719	38.825	0.353	0.00	0.000	38.825	0.000
L2	110 - 94.25 (2)	TP43.556x37.659x0.281	593.10	18.533	39.000	0.475	0.00	0.000	39.000	0.000
L3	94.25 - 46.25 (3)	TP56.472x41.449x0.375	1575.83	22.009	39.000	0.564	0.00	0.000	39.000	0.000
L4	46.25 - 0 (4)	TP68.71x53.686x0.438	3020.20	22.659	38.331	0.591	0.00	0.000	38.331	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	150 - 110 (1)	TP39.633x28.4x0.25	15.69	0.522	26.000	0.040	0.44	0.009	26.000	0.000
L2	110 - 94.25 (2)	TP43.556x37.659x0.281	18.52	0.497	26.000	0.038	0.83	0.013	26.000	0.000
L3	94.25 - 46.25 (3)	TP56.472x41.449x0.375	23.97	0.372	26.000	0.029	0.83	0.006	26.000	0.000
L4	46.25 - 0 (4)	TP68.71x53.686x0.438	30.02	0.317	26.000	0.024	0.83	0.003	26.000	0.000

Pole Interaction Design Data

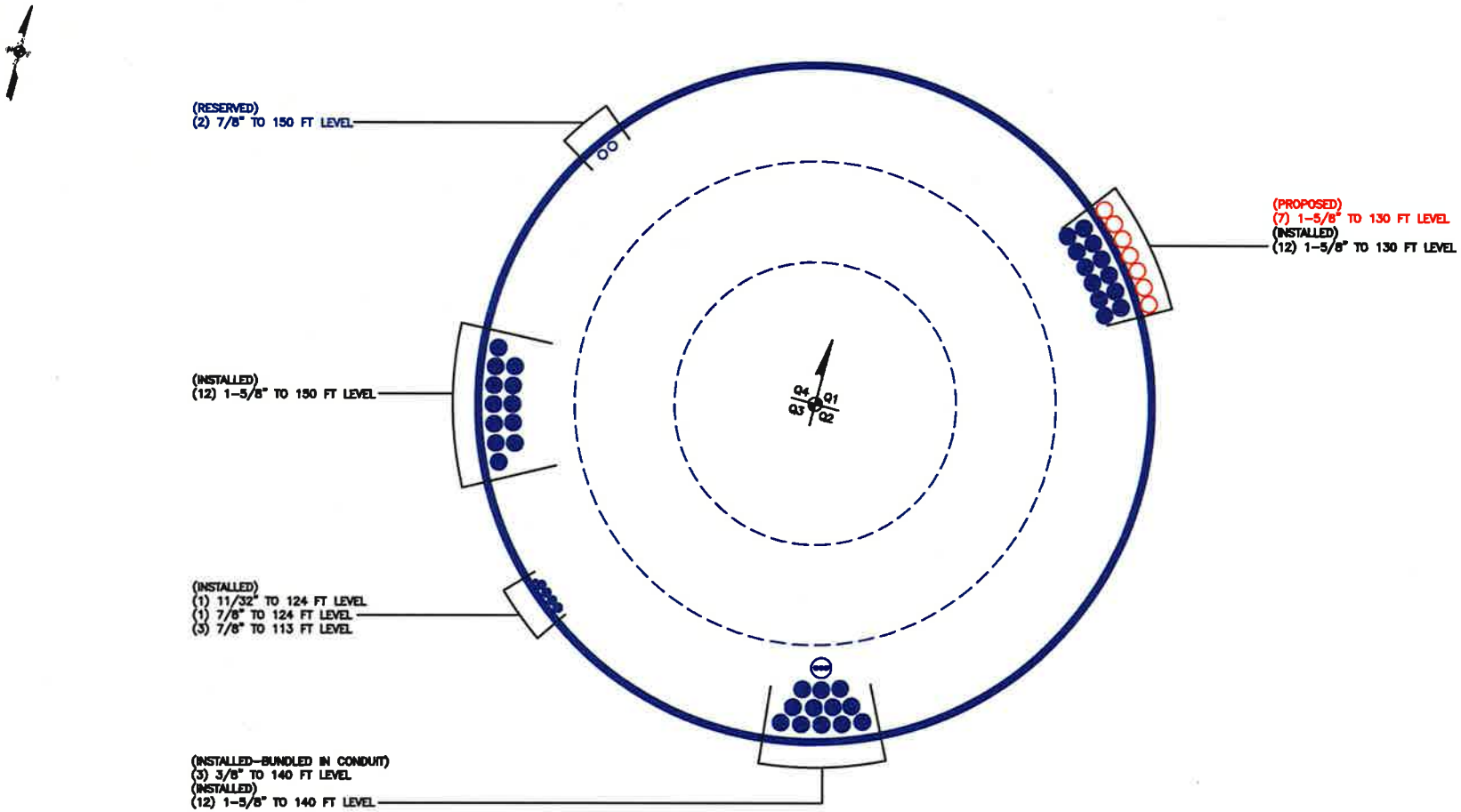
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 110 (1)	0.008	0.353	0.000	0.040	0.000	0.362 ✔	1.333	H1-3+VT ✔
L2	110 - 94.25 (2)	0.009	0.475	0.000	0.038	0.000	0.485 ✔	1.333	H1-3+VT ✔
L3	94.25 - 46.25 (3)	0.010	0.564	0.000	0.029	0.000	0.574 ✔	1.333	H1-3+VT ✔
L4	46.25 - 0 (4)	0.012	0.591	0.000	0.024	0.000	0.603 ✔	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	150 - 110	Pole	TP39.633x28.4x0.25	1	-9.81	1556.78	27.2	Pass
L2	110 - 94.25	Pole	TP43.556x37.659x0.281	2	-12.96	1936.62	36.3	Pass
L3	94.25 - 46.25	Pole	TP56.472x41.449x0.375	3	-24.45	3345.18	43.1	Pass
L4	46.25 - 0	Pole	TP68.71x53.686x0.438	4	-43.73	4844.04	45.3	Pass
							Summary	
						Pole (L4)	45.3	Pass
						RATING =	**45.3**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 5800059 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *5800059*
Site Name: *Ridge Road, Madison*
App #: *210586 Rev. 3*

Anchor Rod Data		
Qty:	24	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	76	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	77	in
Thick:	3	in
Grade:	50	ksi
Clip Distance:	12	in

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
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:	68.71	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

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

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	3020	ft-kips
Unfactored Axial, P:	44	kips
Unfactored Shear, V:	30	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	77.6 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	39.8% **Pass**

Base Plate Results Flexural Check

Base Plate Stress:	18.0 ksi
Allowable PL Bending Stress:	50.0 ksi
Base Plate Stress Ratio:	36.1% **Pass**

PL Ref. Data	
Yield Line (in):	40.18
Max PL Length:	40.18

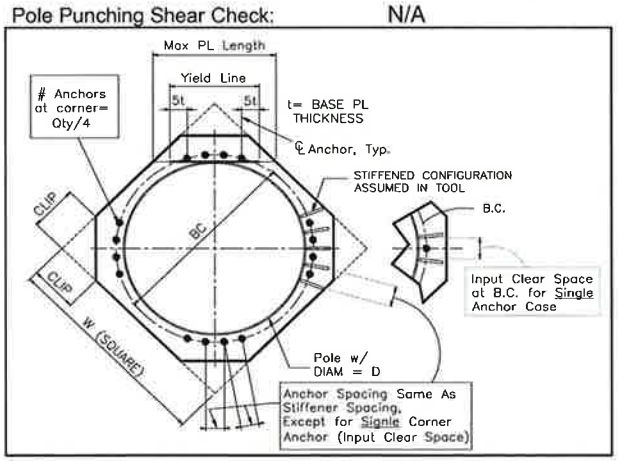
N/A - Unstiffened

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



CCI Foundation Tool Suite - Monopole Pier - Beta Release

CCI Foundation Tool Suite - v1.0 Date: 1/16/2014

BU:	5800059
Site Name:	Ridge Road, Madison
App Number:	210586 Rev. 3
Work Order:	700362

Monopole Drilled Pier

Input

Criteria

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

Forces

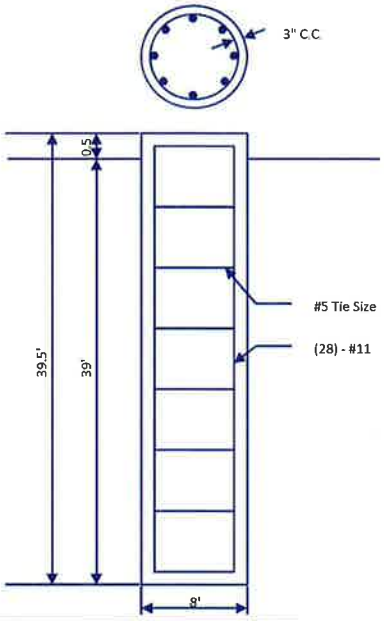
Compression	44 kips
Shear	30 kips
Moment	3020 k-ft
Swelling Force	0 kips

Foundation Dimensions

Pier Diameter:	8 ft
Ext. above grade:	0.5 ft
Depth below grade:	39 ft

Material Properties

Number of Rebar:	28
Rebar Size:	11
Tie Size	5
Rebar tensile strength:	60 ksi
Concrete Strength:	4000 psi
Ultimate Concrete Strain	0.003 in/in
Clear Cover to Ties:	3 in



Soil Profile: Profile per ANS Geotech

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	4	0	4	65					0	
2	8	4	12	65	100	22			0	
3	8	12	20	42.6	400	27			0	
4	21	20	41	62.6	200	31			12	

Analysis Results

Soil Lateral Capacity

Depth to Zero Shear:	10.52 ft
Max Moment, Mu:	3254.09 k-ft
Soil Safety Factor:	7.03
Safety Factor Req'd:	2
RATING:	28.5%

Soil Axial Capacity

Skin Friction (k):	287.57 kips
End Bearing (k):	301.59 kips
Comp. Capacity (k), ϕCn:	589.16 kips
Comp. (k), Cu:	44.00 kips
RATING:	7.5%

Concrete/Steel Check

Mu (from soil analysis)	4230.32 k-ft
ϕMn	8177.26 k-ft
RATING:	51.7%
rho provided	0.60
rho required	0.33 OK
Rebar Spacing	8.39
Spacing required	22.56 OK
Dev. Length required	28.23
Dev. Length provided	53.51 OK

Overall Foundation Rating: 51.7%