Robinson+Cole

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Also admitted in Massachusetts

June 30, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
21 Acorn Road, Branford, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 116-foot level on an existing 147-foot tower at 21 Acorn Road in Branford, Connecticut (the "Property"). The tower is owned by SBA. Cellco's use of the tower was approved by the Council in 2005. Cellco now intends to modify its facility by adding three (3) model BXA-171063-12CF, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the 116-foot level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its new 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable installed inside the monopole. Included in Attachment 1 are specifications for Cellco's new and replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to James B. Cosgrove, First Selectman of the Town of Branford. A copy of this letter is also being sent to Altrio Investment Group LLC, the owner of the Property.

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

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1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's new antennas and RRHs will be installed at the 116-foot level on the existing 147-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 replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included in Attachment 2.

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

6. The tower and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis included in Attachment 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
James B. Cosgrove, Branford First Selectman
Altrio Investment Group LLC
Sandy M. Carter

ATTACHMENT 1

BXA-171063-12CF-EDIN-X

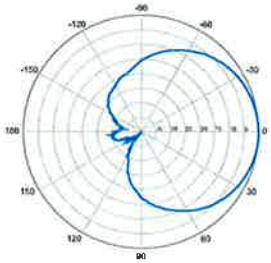
X-Pol | FET Panel | 63° | 19.0 dBi

Replace "X" with desired electrical downtilt.

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

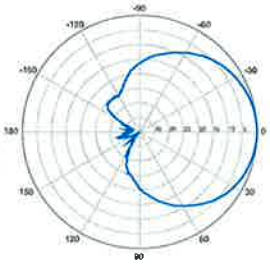
Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	4.5°	4.5°	4.5°
Gain	16.1 dBd / 18.2 dBi	16.5 dBd / 18.6 dBi	16.9 dBd / 19.0 dBi
Electrical downtilt (X)	0, 2, 5		
Impedance	**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 or NE / Female / Center (Back)		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1842 x 154 x 105 mm		72.5 x 6.1 x 4.1 in
Depth with z-brackets	133 mm		5.2 in
Weight without mounting brackets	5.8 kg		12.8 lbs
Survival wind speed	> 201 km/hr		> 125 mph
Wind area	Front: 0.28 m^2 Side: 0.19 m^2		Front: 3.1 ft^2 Side: 2.1 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 460 N Side: 304 N		Front: 103 lbf Side: 68 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-171063-12CF-EDIN-X-FP		

BXA-171063-12CF-EDIN-X



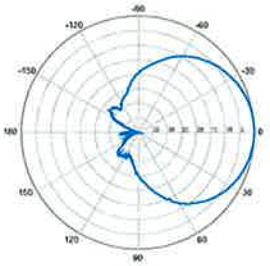
Horizontal | 1710-1880 MHz

BXA-171063-12CF-EDIN-X



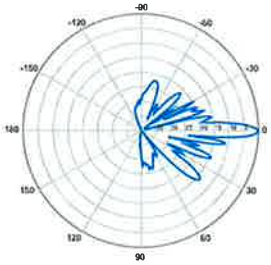
Horizontal | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



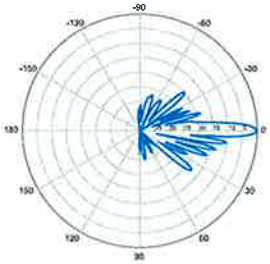
Horizontal | 1920-2170 MHz

BXA-171063-12CF-EDIN-0



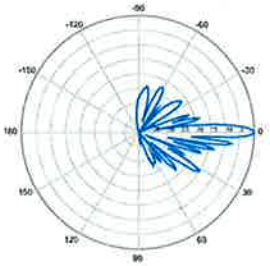
0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-0

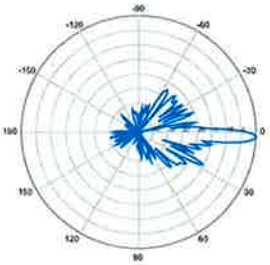


0° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-X

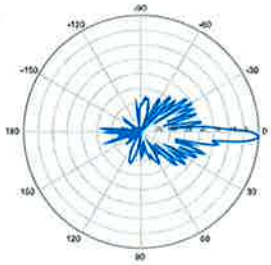
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12CF-EDIN-2



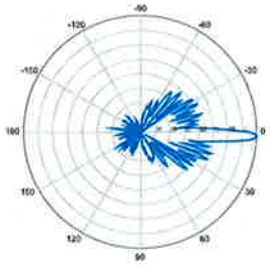
2° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-2



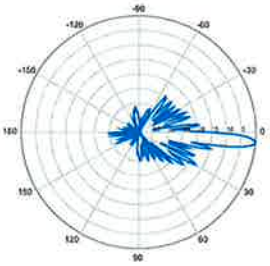
2° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-2



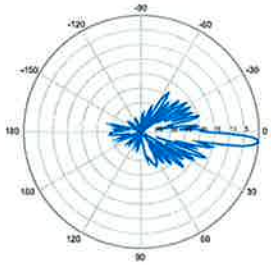
2° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-5



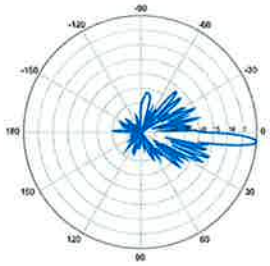
5° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-5



5° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-5

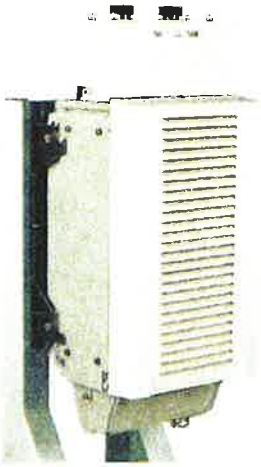


5° | Vertical | 1920-2170 MHz

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

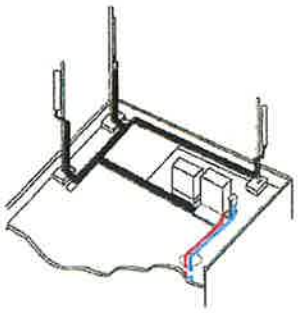
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

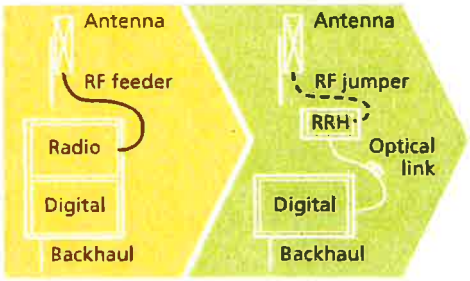
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

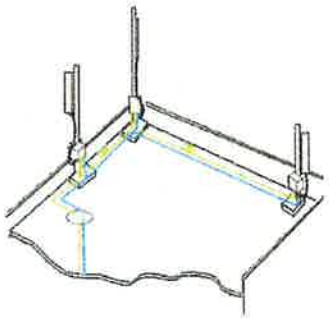
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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

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.

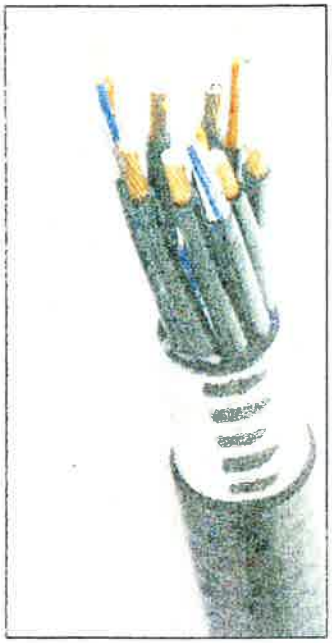


Figure 1: HYBRIFLEX Series

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)

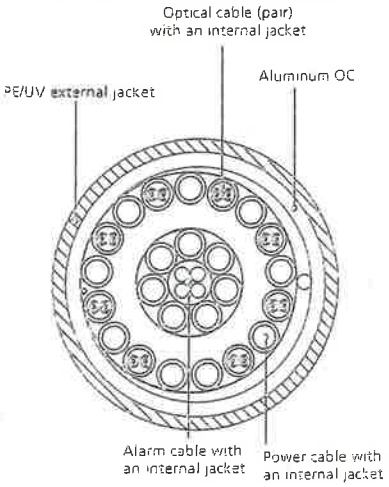


Figure 2: Construction Detail

- This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Branford 3								
Tower Height: 147Ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	13	500	105	0.2120	1900	1.0000	21.20%	
*AT&T GSM	6	296	105	0.0579	880	0.5867	9.87%	
*AT&T GSM	9	427	105	0.1253	1900	1.0000	12.53%	
*AT&T LTE	1	500	105	0.0163	740	0.4933	3.31%	
*Pocket (now MetroPCS)	3	631	137	0.0363	2130	1.0000	3.63%	
*Sprint CDMA/LTE	3	347.5	147	0.0173	1900	1.0000	1.73%	
*Sprint CDMA/LTE	1	195	147	0.0032	850	0.5667	0.57%	
*Sprint CDMA/LTE	2	195	147	0.0065	2500	1.0000	0.65%	
*Nextel	9	100	130	0.0191	851	0.5673	3.38%	
Verizon	**7**	**243**	**116**	**0.0455**	**1970**	**1.0000**	**4.55%**	
Verizon	**9**	**406**	**116**	**0.0976**	**869**	**0.5793**	**16.85%**	
Verizon	**1**	**1195**	**116**	**0.0319**	**2145**	**1.0000**	**3.19%**	
Verizon	**1**	**839**	**116**	**0.0224**	**698**	**0.4653**	**4.82%**	
								86.28%
* Source: Siting Council								

ATTACHMENT 3

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **May 02, 2014**

Debra Elliott
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
740.440.5659

Paul J. Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
614.221.6679
jmeinerding@pjfweb.com

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	Branford 3, CT
Crown Castle Designation:	**Crown Castle BU Number:**	876316
	Crown Castle Site Name:	SECONDINO PROPERTY
	Crown Castle JDE Job Number:	285591
	Crown Castle Work Order Number:	751635
	Crown Castle Application Number:	242002 Rev. 0
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37514-0035 R1
Site Data:	**21 Acorn Road, BRANFORD, New Haven County, CT**	
	Latitude *41° 17' 35.06"*, Longitude *-72° 45' 46.4"*	
	147 Foot - Monopole Tower	

Dear Debra Elliott,

Paul J. Ford and Company 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 641098, in accordance with application 242002, revision 0.

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.

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the 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.

We at *Paul J. Ford and Company* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Joey Meinerding, E.I.
Structural Designer

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 147 ft. monopole tower designed by Summit in August of 1997. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of the 2005 Connecticut Building Code and the 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
116.0	116.0	3	alcatel lucent	RRH2x40-AWS	1	1-5/8	--
		3	antel	BXA-171063-12CF-EDIN-2 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
147.0	147.0	3	alcatel lucent	TME-800MHZ RRH	--	--	3
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe	1	5/8	2
		3	alcatel lucent	800MHZ RRH			
		3	alcatel lucent	TD-RRH8x20-25			
		3	alcatel lucent	1900MHz RRH (65MHz)	3	1-1/4	1
		3	alcatel lucent	800 EXTERNAL NOTCH FILTER			
		9	rfs celwave	ACU-A20-N			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 712-1]			
	143.0	1	tower mounts	Miscellaneous (NA507-1)			
135.0	135.0	3	celwave	Celwave APXV18-206515L-03 w/Mount Pipe	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
126.0	126.0	1	tower mounts	Platform Mount [LP 712-1]	--	--	1

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
116.0	116.0	2	adc	ClearGain Dual Band 800/1900 MHz	12	1-5/8	1
		3	antel	BXA-171085-8BF-EDIN-2 w/ Mount Pipe			
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe			
		2	antel	LPA-80063/6CF w/ Mount Pipe			
		2	antel	LPA-80080/4CF w/ Mount Pipe			
		2	rfs celwave	APL868013 w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 712-1]			
106.0	108.0	6	ericsson	RRUS-11	1 1 2 12	1/4 3/8 7/8 1-1/4	1
		3	kmw communications	AM-X-CD-14-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	Powerwave Technologies 7770 w/ Mount Pipe			
		12	powerwave technologies	Powerwave Technologies LGP2140X			
		1	raycap	DC6-48-60-18-8F			
	106.0	1	tower mounts	Platform Mount [LP 712-1]			
80.0	81.0	1	kathreinscala	Kathrein OG-860/1920/GPS-A	3	1/2	1
		2	lucent	KS24019-L112A			
	80.0	1	tower mounts	Side Arm Mount [SO 701-3]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, 12/16/1996	1529736	CCISITES
4-POST-MODIFICATION INSPECTION	PJF, 41708-0180, 03/15/2009	2417887	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit/PJF, 2737/29297-566, 09/29/1997	1632435	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit/PJF, 2737-9729297-566, 09/29/1997	1632399	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) Monopole was reinforced in conformance with the referenced modification drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J. Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	147 - 105	Pole	TP29.141x22x0.25	1	-8.38	1075.85	55.3	Pass
L2	105 - 89.75	Pole	TP31.2343x28.0034x0.3125	2	-13.42	1471.82	81.4	Pass
L3	89.75 - 88.25	Pole	TP31.4893x31.2343x0.3125	3	-13.64	1464.66	84.8	Pass
L4	88.25 - 86	Pole	TP31.8719x31.4893x0.5085	4	-14.12	2314.39	57.2	Pass
L5	86 - 84.25	Pole	TP32.1695x31.8719x0.5063	5	-14.48	2304.61	59.6	Pass
L6	84.25 - 73.75	Pole	TP33.955x32.1695x0.455	6	-15.93	2207.19	70.1	Pass
L7	73.75 - 42.75	Pole	TP38.601x32.3223x0.537	7	-24.05	2922.04	81.9	Pass
L8	42.75 - 8.25	Pole	TP43.7172x36.6809x0.5757	8	-36.68	3650.30	91.5	Pass
L9	8.25 - 6.25	Pole	TP44.0573x43.7172x0.596	9	-37.35	3777.23	89.6	Pass
L10	6.25 - 0	Pole	TP45.12x44.0573x0.5918	10	-39.43	3837.49	91.5	Pass
							Summary	
						Pole (L8)	91.5	Pass
						Rating =	91.5	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	92.3	Pass
1	Base Plate	0	69.2	Pass
1	Base Foundation Structural Steel	0	56.8	Pass
1,2	Base Foundation Soil Interaction	0	91.6	Pass

Structure Rating (max from all components) =	92.3%

Notes:

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

2) Foundation Analysis Notes: According to the procedures prescribed and agreed to by the Crown Castle Engineering Foundation Committee, held in January 2010, the existing caisson foundation was analyzed using the methodology in the software 'PLS-Caisson' (Version 8.10, or newer, by Power Line Systems, Inc.). Per the methods in PLS-Caisson, the soil reactions of cohesive soils are calculated using 8CD independent of the depth of the soil layer. The depth of soil to be ignored at the top of the caisson is the greater of the geotechnical report's recommendation, the frost depth of the site or half of the caisson diameter.

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

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 0.7500 in.
4) Ice thickness is considered to increase with height.
5) Ice density of 56 pcf.
6) A wind speed of 38 mph is used in combination with ice.
7) Deflections calculated using a wind speed of 50 mph.
8) A non-linear (P-delta) analysis was used.
9) Pressures are calculated at each section.
10) Stress ratio used in pole design is 1.333.
11) 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	147.00-105.00	42.00	3.75	18	22.0000	29.1410	0.2500	1.0000	A607-60 (60 ksi)
L2	105.00-89.75	19.00	0.00	18	28.0034	31.2343	0.3125	1.2500	A607-60 (60 ksi)
L3	89.75-88.25	1.50	0.00	18	31.2343	31.4893	0.3125	1.2500	Reinf 59.22 ksi (59 ksi)
L4	88.25-86.00	2.25	0.00	18	31.4893	31.8719	0.5085	2.0338	Reinf 57.17 ksi (57 ksi)
L5	86.00-84.25	1.75	0.00	18	31.8719	32.1695	0.5063	2.0252	Reinf 56.63 ksi (57 ksi)
L6	84.25-73.75	10.50	4.25	18	32.1695	33.9550	0.4550	1.8200	Reinf 58.30 ksi (58 ksi)
L7	73.75-42.75	35.25	4.75	18	32.3223	38.6010	0.5370	2.1481	Reinf 57.59 ksi (58 ksi)
L8	42.75-8.25	39.25	0.00	18	36.6809	43.7172	0.5757	2.3026	Reinf 57.90 ksi (58 ksi)
L9	8.25-6.25	2.00	0.00	18	43.7172	44.0573	0.5960	2.3841	Reinf 57.44 ksi (57 ksi)
L10	6.25-0.00	6.25		18	44.0573	45.1200	0.5918	2.3670	Reinf 57.37 ksi

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 (57 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	22.3394	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	29.5905	22.9250	2417.5313	10.2563	14.8036	163.3067	4838.2436	11.4647	4.6888	18.755
L2	29.0829	27.4659	2660.7623	9.8303	14.2257	187.0387	5325.0257	13.7356	4.3786	14.012
	31.7161	30.6705	3704.9933	10.9772	15.8670	233.5029	7414.8618	15.3382	4.9472	15.831
L3	31.7161	30.6705	3704.9933	10.9772	15.8670	233.5029	7414.8618	15.3382	4.9472	15.831
	31.9751	30.9235	3797.4379	11.0678	15.9966	237.3905	7599.8725	15.4647	4.9921	15.975
L4	31.9751	49.9986	6062.9281	10.9982	15.9966	379.0139	12133.8339	25.0040	4.6472	9.14
	32.3636	50.6160	6290.3368	11.1340	16.1909	388.5095	12588.9506	25.3128	4.7146	9.272
L5	32.3636	50.4045	6264.9089	11.1348	16.1909	386.9390	12538.0613	25.2070	4.7184	9.319
	32.6658	50.8827	6444.9201	11.2404	16.3421	394.3749	12898.3205	25.4462	4.7707	9.423
L6	32.6658	45.8012	5820.0967	11.2587	16.3421	356.1409	11647.8516	22.9049	4.8610	10.684
	34.4788	48.3797	6859.4641	11.8925	17.2491	397.6699	13727.9542	24.1944	5.1753	11.374
L7	33.5896	54.1791	6915.4595	11.2838	16.4197	421.1676	13840.0186	27.0947	4.7436	8.833
	39.1965	64.8813	11876.4096	13.5127	19.6093	605.6516	23768.4465	32.4468	5.8486	10.891
L8	38.1114	65.9694	10864.7579	12.8173	18.6339	583.0647	21743.8119	32.9910	5.4427	9.455
	44.3916	78.8258	18535.2035	15.3152	22.2083	834.6056	37094.7960	39.4204	6.6811	11.606
L9	44.3916	81.5766	19163.9090	15.3080	22.2083	862.9151	38353.0344	40.7960	6.6452	11.149
	44.7369	82.2200	19620.9094	15.4287	22.3811	876.6732	39267.6364	41.1178	6.7051	11.25
L10	44.7369	81.6376	19485.7703	15.4303	22.3811	870.6351	38997.1804	40.8266	6.7126	11.344
	45.8160	83.6336	20950.2650	15.8075	22.9210	914.0221	41928.0969	41.8247	6.8996	11.66

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 147.00-105.00				1	1	1		
L2 105.00-89.75				1	1	1		
L3 89.75-88.25				1	1	1		
L4 88.25-86.00				1	1	1		
L5 86.00-84.25				1	1	1		
L6 84.25-73.75				1	1	1		
L7 73.75-42.75				1	1	1		
L8 42.75-8.25				1	1	1		
L9 8.25-6.25				1	1	1		
L10 6.25-0.00				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
HB114-1-0813U4-M5J(1 1/4")	C	No	Inside Pole	147.00 - 0.00	3	No Ice	0.00	1.20
						1/2" Ice	0.00	1.20
						1" Ice	0.00	1.20
						2" Ice	0.00	1.20
						4" Ice	0.00	1.20
HB058-M12-XXXF(5/8")	C	No	CaAa (Out Of Face)	147.00 - 0.00	1	No Ice	0.08	0.24
						1/2" Ice	0.18	1.06
						1" Ice	0.28	2.49
						2" Ice	0.48	7.18
						4" Ice	0.88	23.89
***								
LDF7-50A (1-5/8 FOAM)	C	No	CaAa (Out Of Face)	135.00 - 0.00	1	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
						2" Ice	0.60	10.54
						4" Ice	1.00	30.04
LDF7-50A (1-5/8 FOAM)	C	No	CaAa (Out Of Face)	135.00 - 0.00	5	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
						2" Ice	0.00	10.54
						4" Ice	0.00	30.04
***								
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	116.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	116.00 - 0.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
						2" Ice	0.00	1.30
						4" Ice	0.00	1.30
***								
LDF2-50A(3/8")	C	No	Inside Pole	106.00 - 0.00	1	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
						1" Ice	0.00	0.08
						2" Ice	0.00	0.08
						4" Ice	0.00	0.08
LDF6-50A (1-1/4 FOAM)	C	No	Inside Pole	106.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
2" (Nominal) Conduit	C	No	Inside Pole	106.00 - 0.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
						2" Ice	0.00	0.72
						4" Ice	0.00	0.72
VXL5-50 (7/8 FOAM)	C	No	Inside Pole	106.00 - 0.00	2	No Ice	0.00	0.29
						1/2" Ice	0.00	0.29
						1" Ice	0.00	0.29
						2" Ice	0.00	0.29
						4" Ice	0.00	0.29
LDF1-50A (1/4 FOAM)	C	No	Inside Pole	106.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
***								
LDF4RN-50A (1/2 FOAM)	C	No	Inside Pole	80.00 - 0.00	3	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
***								
Aero MP3-05	C	No	CaAa (Out Of Face)	90.50 - 0.00	1	No Ice	0.35	0.00
						1/2" Ice	0.40	0.00
						1" Ice	0.66	0.00
						2" Ice	0.88	0.00
						4" Ice	1.32	0.00

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	147.00-105.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	9.468	0.44
L2	105.00-89.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.561	0.45
L3	89.75-88.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.945	0.04
L4	88.25-86.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.417	0.07
L5	86.00-84.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.102	0.05
L6	84.25-73.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.613	0.31
L7	73.75-42.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	19.524	0.92
L8	42.75-8.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	21.728	1.03
L9	8.25-6.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.260	0.06
L10	6.25-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.936	0.19

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	147.00-105.00	A	0.880	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	22.143	1.08
L2	105.00-89.75	A	0.854	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	10.116	0.76
L3	89.75-88.25	A	0.845	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	1.795	0.07
L4	88.25-86.00	A	0.843	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.689	0.11
L5	86.00-84.25	A	0.840	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.087	0.09

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
L6	84.25-73.75	A	0.833	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	12.452	0.51
L7	73.75-42.75	A	0.803	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	36.762	1.52
L8	42.75-8.25	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	39.968	1.66
L9	8.25-6.25	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	2.221	0.09
L10	6.25-0.00	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	6.939	0.29

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	147.00-105.00	-0.2715	0.1567	-0.5308	0.3065
L2	105.00-89.75	-0.3478	0.2008	-0.6517	0.3763
L3	89.75-88.25	-0.6593	0.3806	-1.0284	0.5938
L4	88.25-86.00	-0.6606	0.3814	-1.0308	0.5952
L5	86.00-84.25	-0.6619	0.3822	-1.0333	0.5966
L6	84.25-73.75	-0.6659	0.3845	-1.0403	0.6006
L7	73.75-42.75	-0.6757	0.3901	-1.0672	0.6161
L8	42.75-8.25	-0.6898	0.3983	-1.0892	0.6288
L9	8.25-6.25	-0.6979	0.4030	-1.0782	0.6225
L10	6.25-0.00	-0.6996	0.4039	-1.0825	0.6250

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
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
800 EXTERNAL NOTCH FILTER	A	From Leg	4.00 0.00	0.0000	147.00	No Ice 1/2"	0.77 0.89	0.37 0.46	0.01 0.02

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
			0.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11
						4" Ice			
800 EXTERNAL NOTCH FILTER	B	From Leg	4.00	0.0000	147.00	No Ice	0.77	0.37	0.01
			0.00			1/2"	0.89	0.46	0.02
			0.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11
						4" Ice			
800 EXTERNAL NOTCH FILTER	C	From Leg	4.00	0.0000	147.00	No Ice	0.77	0.37	0.01
			0.00			1/2"	0.89	0.46	0.02
			0.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11
						4" Ice			
(3) ACU-A20-N	A	From Leg	4.00	0.0000	147.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			0.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
						4" Ice			
(3) ACU-A20-N	B	From Leg	4.00	0.0000	147.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			0.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
						4" Ice			
(3) ACU-A20-N	C	From Leg	4.00	0.0000	147.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			0.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
						4" Ice			
1900MHz RRH (65MHz)	A	From Leg	4.00	0.0000	147.00	No Ice	2.71	2.61	0.06
			0.00			1/2"	2.95	2.84	0.08
			0.00			Ice	3.20	3.09	0.11
						1" Ice	3.72	3.61	0.17
						2" Ice	4.86	4.74	0.35
						4" Ice			
1900MHz RRH (65MHz)	B	From Leg	4.00	0.0000	147.00	No Ice	2.71	2.61	0.06
			0.00			1/2"	2.95	2.84	0.08
			0.00			Ice	3.20	3.09	0.11
						1" Ice	3.72	3.61	0.17
						2" Ice	4.86	4.74	0.35
						4" Ice			
1900MHz RRH (65MHz)	C	From Leg	4.00	0.0000	147.00	No Ice	2.71	2.61	0.06
			0.00			1/2"	2.95	2.84	0.08
			0.00			Ice	3.20	3.09	0.11
						1" Ice	3.72	3.61	0.17
						2" Ice	4.86	4.74	0.35
						4" Ice			
800MHZ RRH	A	From Leg	4.00	0.0000	147.00	No Ice	2.49	2.07	0.05
			0.00			1/2"	2.71	2.27	0.07
			0.00			Ice	2.93	2.48	0.10
						1" Ice	3.41	2.93	0.16
						2" Ice	4.46	3.93	0.32
						4" Ice			
800MHZ RRH	B	From Leg	4.00	0.0000	147.00	No Ice	2.49	2.07	0.05
			0.00			1/2"	2.71	2.27	0.07
			0.00			Ice	2.93	2.48	0.10
						1" Ice	3.41	2.93	0.16
						2" Ice	4.46	3.93	0.32
						4" Ice			
800MHZ RRH	C	From Leg	4.00	0.0000	147.00	No Ice	2.49	2.07	0.05

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
			0.00				1/2"	2.71	2.27	0.07
			0.00				Ice	2.93	2.48	0.10
							1" Ice	3.41	2.93	0.16
							2" Ice	4.46	3.93	0.32
							4" Ice			
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00		0.0000	147.00	No Ice	7.13	4.96	0.08
			0.00				1/2"	7.66	5.75	0.13
			0.00				Ice	8.18	6.47	0.19
							1" Ice	9.26	8.01	0.34
							2" Ice	11.53	11.41	0.75
							4" Ice			
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00		0.0000	147.00	No Ice	7.13	4.96	0.08
			0.00				1/2"	7.66	5.75	0.13
			0.00				Ice	8.18	6.47	0.19
							1" Ice	9.26	8.01	0.34
							2" Ice	11.53	11.41	0.75
							4" Ice			
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00		0.0000	147.00	No Ice	7.13	4.96	0.08
			0.00				1/2"	7.66	5.75	0.13
			0.00				Ice	8.18	6.47	0.19
							1" Ice	9.26	8.01	0.34
							2" Ice	11.53	11.41	0.75
							4" Ice			
TD-RRH8x20-25	A	From Leg	4.00		0.0000	147.00	No Ice	4.72	1.70	0.07
			0.00				1/2"	5.01	1.92	0.10
			0.00				Ice	5.32	2.15	0.13
							1" Ice	5.95	2.62	0.20
							2" Ice	7.31	3.68	0.40
							4" Ice			
TD-RRH8x20-25	B	From Leg	4.00		0.0000	147.00	No Ice	4.72	1.70	0.07
			0.00				1/2"	5.01	1.92	0.10
			0.00				Ice	5.32	2.15	0.13
							1" Ice	5.95	2.62	0.20
							2" Ice	7.31	3.68	0.40
							4" Ice			
TD-RRH8x20-25	C	From Leg	4.00		0.0000	147.00	No Ice	4.72	1.70	0.07
			0.00				1/2"	5.01	1.92	0.10
			0.00				Ice	5.32	2.15	0.13
							1" Ice	5.95	2.62	0.20
							2" Ice	7.31	3.68	0.40
							4" Ice			
Platform Mount [LP 712-1]	C	None			0.0000	147.00	No Ice	24.53	24.53	1.34
							1/2"	29.94	29.94	1.65
							Ice	35.35	35.35	1.96
							1" Ice	46.17	46.17	2.58
							2" Ice	67.81	67.81	3.82
							4" Ice			
Miscellaneous (NA507-1)	C	From Leg	0.00		0.0000	147.00	No Ice	4.80	4.80	0.25
			0.00				1/2"	6.70	6.70	0.29
			-4.00				Ice	8.60	8.60	0.34
							1" Ice	12.40	12.40	0.44
							2" Ice	20.00	20.00	0.64
							4" Ice			
***										
Celwave APXV18-206515L-03 w/Mount Pipe	A	From Face	0.50		0.0000	135.00	No Ice	3.48	3.24	0.04
			0.00				1/2"	3.90	3.97	0.07
			0.00				Ice	4.31	4.64	0.11
							1" Ice	5.23	6.03	0.21
							2" Ice	7.27	9.01	0.51
							4" Ice			
Celwave APXV18-206515L-03 w/Mount Pipe	B	From Face	0.50		0.0000	135.00	No Ice	3.48	3.24	0.04
			0.00				1/2"	3.90	3.97	0.07
			0.00				Ice	4.31	4.64	0.11
							1" Ice	5.23	6.03	0.21
							2" Ice	7.27	9.01	0.51

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			
Celwave APXV18-206515L-03 w/Mount Pipe	C	From Face	0.50 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.48 3.90 4.31 5.23 7.27	3.24 3.97 4.64 6.03 9.01	0.04 0.07 0.11 0.21 0.51
Pipe Mount [PM 601-3]	C	None		0.0000	135.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice 4" Ice	4.39 5.48 6.57 8.75 13.11	4.39 5.48 6.57 8.75 13.11	0.20 0.24 0.28 0.36 0.53
***									
(4) 2.375" OD x 6' Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.03 0.04 0.05 0.09 0.23
(4) 2.375" OD x 6' Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.03 0.04 0.05 0.09 0.23
(4) 2.375" OD x 6' Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.03 0.04 0.05 0.09 0.23
Platform Mount [LP 712-1]	C	None		0.0000	126.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
***									
(2) LPA-80080/4CF w/ Mount Pipe	A	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice 4" Ice	2.86 3.22 3.59 4.45 6.32	7.23 7.92 8.63 10.11 13.34	0.03 0.08 0.13 0.25 0.61
(2) LPA-80063/6CF w/ Mount Pipe	B	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice 4" Ice	10.58 11.24 11.87 13.16 15.87	10.67 11.93 12.91 14.92 19.16	0.05 0.14 0.25 0.48 1.09
(2) APL868013 w/ Mount Pipe	C	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice 4" Ice	3.10 3.48 3.88 4.76 6.66	4.92 5.60 6.28 7.71 10.83	0.02 0.06 0.11 0.22 0.54
BXA-70063-6CF-2 w/ Mount Pipe	A	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
BXA-70063-6CF-2 w/ Mount Pipe	B	From Face	4.00 0.00	0.0000	116.00	No Ice 1/2"	7.97 8.61	5.80 6.95	0.04 0.10

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
			0.00			Ice	9.22	7.82	0.17
						1" Ice	10.46	9.60	0.34
						2" Ice	13.07	13.37	0.80
						4" Ice			
BXA-70063/6CF-2 w/ Mount Pipe	C	From Face	4.00	0.0000	116.00	No Ice	7.97	5.40	0.04
			0.00			1/2"	8.61	6.55	0.10
			0.00			Ice	9.22	7.41	0.17
						1" Ice	10.46	9.18	0.33
						2" Ice	13.07	12.93	0.79
						4" Ice			
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	A	From Face	4.00	0.0000	116.00	No Ice	3.18	3.35	0.03
			0.00			1/2"	3.56	3.97	0.06
			0.00			Ice	3.97	4.60	0.10
						1" Ice	4.86	5.90	0.19
						2" Ice	6.77	8.89	0.49
						4" Ice			
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	B	From Face	4.00	0.0000	116.00	No Ice	3.18	3.35	0.03
			0.00			1/2"	3.56	3.97	0.06
			0.00			Ice	3.97	4.60	0.10
						1" Ice	4.86	5.90	0.19
						2" Ice	6.77	8.89	0.49
						4" Ice			
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	C	From Face	4.00	0.0000	116.00	No Ice	3.18	3.35	0.03
			0.00			1/2"	3.56	3.97	0.06
			0.00			Ice	3.97	4.60	0.10
						1" Ice	4.86	5.90	0.19
						2" Ice	6.77	8.89	0.49
						4" Ice			
(2) FD9R6004/2C-3L	A	From Face	4.00	0.0000	116.00	No Ice	0.37	0.08	0.00
			0.00			1/2"	0.45	0.14	0.01
			0.00			Ice	0.54	0.20	0.01
						1" Ice	0.75	0.34	0.02
						2" Ice	1.28	0.74	0.06
						4" Ice			
(2) FD9R6004/2C-3L	B	From Face	4.00	0.0000	116.00	No Ice	0.37	0.08	0.00
			0.00			1/2"	0.45	0.14	0.01
			0.00			Ice	0.54	0.20	0.01
						1" Ice	0.75	0.34	0.02
						2" Ice	1.28	0.74	0.06
						4" Ice			
(2) FD9R6004/2C-3L	C	From Face	4.00	0.0000	116.00	No Ice	0.37	0.08	0.00
			0.00			1/2"	0.45	0.14	0.01
			0.00			Ice	0.54	0.20	0.01
						1" Ice	0.75	0.34	0.02
						2" Ice	1.28	0.74	0.06
						4" Ice			
(2) ClearGain Dual Band 800/1900 MHz	B	From Face	4.00	0.0000	116.00	No Ice	1.54	0.80	0.02
			0.00			1/2"	1.71	0.94	0.03
			0.00			Ice	1.89	1.08	0.05
						1" Ice	2.27	1.39	0.08
						2" Ice	3.14	2.11	0.18
						4" Ice			
BXA-171063-12CF-EDIN-2 w/ Mount Pipe	A	From Leg	4.00	0.0000	116.00	No Ice	5.03	5.29	0.04
			0.00			1/2"	5.58	6.46	0.09
			0.00			Ice	6.10	7.35	0.14
						1" Ice	7.17	9.15	0.27
						2" Ice	9.44	12.95	0.68
						4" Ice			
BXA-171063-12CF-EDIN-2 w/ Mount Pipe	B	From Leg	4.00	0.0000	116.00	No Ice	5.03	5.29	0.04
			0.00			1/2"	5.58	6.46	0.09
			0.00			Ice	6.10	7.35	0.14
						1" Ice	7.17	9.15	0.27
						2" Ice	9.44	12.95	0.68
						4" Ice			
BXA-171063-12CF-EDIN-2	C	From Leg	4.00	0.0000	116.00	No Ice	5.03	5.29	0.04

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
w/ Mount Pipe			0.00			1/2"	5.58	6.46	0.09
			0.00			Ice	6.10	7.35	0.14
						1" Ice	7.17	9.15	0.27
						2" Ice	9.44	12.95	0.68
						4" Ice			
RRH2x40-AWS	A	From Leg	4.00	0.0000	116.00	No Ice	2.98	1.60	0.04
			0.00			1/2"	3.24	1.82	0.06
			0.00			Ice	3.50	2.06	0.08
						1" Ice	4.07	2.56	0.14
						2" Ice	5.30	3.66	0.29
						4" Ice			
RRH2x40-AWS	B	From Leg	4.00	0.0000	116.00	No Ice	2.98	1.60	0.04
			0.00			1/2"	3.24	1.82	0.06
			0.00			Ice	3.50	2.06	0.08
						1" Ice	4.07	2.56	0.14
						2" Ice	5.30	3.66	0.29
						4" Ice			
RRH2x40-AWS	C	From Leg	4.00	0.0000	116.00	No Ice	2.98	1.60	0.04
			0.00			1/2"	3.24	1.82	0.06
			0.00			Ice	3.50	2.06	0.08
						1" Ice	4.07	2.56	0.14
						2" Ice	5.30	3.66	0.29
						4" Ice			
DB-T1-6Z-8AB-0Z	A	From Leg	4.00	0.0000	116.00	No Ice	5.60	2.33	0.04
			0.00			1/2"	5.92	2.56	0.08
			0.00			Ice	6.24	2.79	0.12
						1" Ice	6.91	3.28	0.21
						2" Ice	8.37	4.37	0.45
						4" Ice			
Platform Mount [LP 712-1]	C	None		0.0000	116.00	No Ice	24.53	24.53	1.34
						1/2"	29.94	29.94	1.65
						Ice	35.35	35.35	1.96
						1" Ice	46.17	46.17	2.58
						2" Ice	67.81	67.81	3.82
						4" Ice			
***									
(2) Powerwave Technologies 7770 w/ Mount Pipe	A	From Face	4.00	0.0000	106.00	No Ice	6.01	4.42	0.07
			0.00			1/2"	6.46	5.08	0.12
			2.00			Ice	6.93	5.74	0.18
						1" Ice	7.89	7.13	0.32
						2" Ice	9.94	10.41	0.70
						4" Ice			
(2) Powerwave Technologies 7770 w/ Mount Pipe	B	From Face	4.00	0.0000	106.00	No Ice	6.01	4.42	0.07
			0.00			1/2"	6.46	5.08	0.12
			2.00			Ice	6.93	5.74	0.18
						1" Ice	7.89	7.13	0.32
						2" Ice	9.94	10.41	0.70
						4" Ice			
(2) Powerwave Technologies 7770 w/ Mount Pipe	C	From Face	4.00	0.0000	106.00	No Ice	6.01	4.42	0.07
			0.00			1/2"	6.46	5.08	0.12
			2.00			Ice	6.93	5.74	0.18
						1" Ice	7.89	7.13	0.32
						2" Ice	9.94	10.41	0.70
						4" Ice			
AM-X-CD-14-65-00T-RET w/ Mount Pipe	A	From Face	4.00	0.0000	106.00	No Ice	5.74	4.02	0.05
			0.00			1/2"	6.20	4.63	0.10
			2.00			Ice	6.66	5.28	0.15
						1" Ice	7.62	6.68	0.27
						2" Ice	9.67	9.74	0.63
						4" Ice			
AM-X-CD-14-65-00T-RET w/ Mount Pipe	B	From Face	4.00	0.0000	106.00	No Ice	5.74	4.02	0.05
			0.00			1/2"	6.20	4.63	0.10
			2.00			Ice	6.66	5.28	0.15
						1" Ice	7.62	6.68	0.27
						2" Ice	9.67	9.74	0.63

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
						4" Ice			
AM-X-CD-14-65-00T-RET w/ Mount Pipe	C	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.74 6.20 6.66 7.62 9.67	4.02 4.63 5.28 6.68 9.74	0.05 0.10 0.15 0.27 0.63
(4) Powerwave Technologies LGP2140X	A	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.23 1.38 1.54 1.89 2.69	0.37 0.48 0.60 0.87 1.51	0.02 0.02 0.03 0.06 0.14
(4) Powerwave Technologies LGP2140X	B	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.23 1.38 1.54 1.89 2.69	0.37 0.48 0.60 0.87 1.51	0.02 0.02 0.03 0.06 0.14
(4) Powerwave Technologies LGP2140X	C	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.23 1.38 1.54 1.89 2.69	0.37 0.48 0.60 0.87 1.51	0.02 0.02 0.03 0.06 0.14
DC6-48-60-18-8F	A	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.80 3.04 3.54 4.66	2.57 2.80 3.04 3.54 4.66	0.02 0.04 0.07 0.13 0.30
(2) RRUS-11	A	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	B	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	C	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
2.375" OD x 6' Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.03 0.04 0.05 0.09 0.23
2.375" OD x 6' Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.03 0.04 0.05 0.09 0.23
2.375" OD x 6' Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.03 0.04 0.05 0.09

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
						2" Ice	4.70	4.70	0.23
						4" Ice			
Platform Mount [LP 712-1]	C	None		0.0000	106.00	No Ice	24.53	24.53	1.34
						1/2" Ice	29.94	29.94	1.65
						1" Ice	35.35	35.35	1.96
						2" Ice	46.17	46.17	2.58
						4" Ice	67.81	67.81	3.82
***									
KS24019-L112A	A	From Face	3.00 / 0.00 / 1.00	0.0000	80.00	No Ice	0.10	0.10	0.01
						1/2" Ice	0.18	0.18	0.01
						1" Ice	0.26	0.26	0.01
						2" Ice	0.42	0.42	0.01
						4" Ice	0.74	0.74	0.02
Kathrein OG-860/1920/GPS-A	B	From Face	3.00 / 0.00 / 1.00	0.0000	80.00	No Ice	0.14	0.14	0.00
						1/2" Ice	0.23	0.23	0.00
						1" Ice	0.33	0.33	0.01
						2" Ice	0.57	0.57	0.02
						4" Ice	1.17	1.17	0.05
KS24019-L112A	C	From Face	3.00 / 0.00 / 1.00	0.0000	80.00	No Ice	0.10	0.10	0.01
						1/2" Ice	0.18	0.18	0.01
						1" Ice	0.26	0.26	0.01
						2" Ice	0.42	0.42	0.01
						4" Ice	0.74	0.74	0.02
Side Arm Mount [SO 701-3]	C	None		0.0000	80.00	No Ice	2.83	2.83	0.20
						1/2" Ice	3.92	3.92	0.24
						1" Ice	5.01	5.01	0.28
						2" Ice	7.19	7.19	0.36
						4" Ice	11.55	11.55	0.53

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 147.00-105.00	125.27	1.464	27	89.497	A	0.000	89.497	89.497	100.00	0.000	0.000
					B	0.000	89.497		100.00	0.000	0.000
					C	0.000	89.497		100.00	0.000	9.468
L2 105.00-89.75	97.26	1.362	25	38.046	A	0.000	38.046	38.046	100.00	0.000	0.000
					B	0.000	38.046		100.00	0.000	0.000
					C	0.000	38.046		100.00	0.000	4.561
L3 89.75-88.25	89.00	1.328	25	3.920	A	0.000	3.920	3.920	100.00	0.000	0.000
					B	0.000	3.920		100.00	0.000	0.000
					C	0.000	3.920		100.00	0.000	0.945
L4 88.25-86.00	87.12	1.32	24	5.940	A	0.000	5.940	5.940	100.00	0.000	0.000
					B	0.000	5.940		100.00	0.000	0.000
					C	0.000	5.940		100.00	0.000	1.417
L5 86.00-84.25	85.12	1.311	24	4.670	A	0.000	4.670	4.670	100.00	0.000	0.000
					B	0.000	4.670		100.00	0.000	0.000
					C	0.000	4.670		100.00	0.000	1.102
L6 84.25-73.75	78.95	1.283	24	28.929	A	0.000	28.929	28.929	100.00	0.000	0.000
					B	0.000	28.929		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	28.929		100.00	0.000	6.613
L7 73.75-42.75	58.15	1.176	22	92.587	A	0.000	92.587	92.587	100.00	0.000	0.000
					B	0.000	92.587		100.00	0.000	0.000
					C	0.000	92.587		100.00	0.000	19.524
L8 42.75-8.25	25.10	1	19	116.796	A	0.000	116.796	116.796	100.00	0.000	0.000
					B	0.000	116.796		100.00	0.000	0.000
					C	0.000	116.796		100.00	0.000	21.728
L9 8.25-6.25	7.25	1	18	7.315	A	0.000	7.315	7.315	100.00	0.000	0.000
					B	0.000	7.315		100.00	0.000	0.000
					C	0.000	7.315		100.00	0.000	1.260
L10 6.25-0.00	3.11	1	18	23.223	A	0.000	23.223	23.223	100.00	0.000	0.000
					B	0.000	23.223		100.00	0.000	0.000
					C	0.000	23.223		100.00	0.000	3.936

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.00-105.00	125.27	1.464	5	0.8802	95.658	A	0.000	95.658	95.658	100.00	0.000	0.000
						B	0.000	95.658		100.00	0.000	0.000
						C	0.000	95.658		100.00	0.000	22.143
L2 105.00-89.75	97.26	1.362	5	0.8539	40.283	A	0.000	40.283	40.283	100.00	0.000	0.000
						B	0.000	40.283		100.00	0.000	0.000
						C	0.000	40.283		100.00	0.000	10.116
L3 89.75-88.25	89.00	1.328	5	0.8448	4.131	A	0.000	4.131	4.131	100.00	0.000	0.000
						B	0.000	4.131		100.00	0.000	0.000
						C	0.000	4.131		100.00	0.000	1.795
L4 88.25-86.00	87.12	1.32	5	0.8427	6.256	A	0.000	6.256	6.256	100.00	0.000	0.000
						B	0.000	6.256		100.00	0.000	0.000
						C	0.000	6.256		100.00	0.000	2.689
L5 86.00-84.25	85.12	1.311	5	0.8403	4.915	A	0.000	4.915	4.915	100.00	0.000	0.000
						B	0.000	4.915		100.00	0.000	0.000
						C	0.000	4.915		100.00	0.000	2.087
L6 84.25-73.75	78.95	1.283	5	0.8328	30.387	A	0.000	30.387	30.387	100.00	0.000	0.000
						B	0.000	30.387		100.00	0.000	0.000
						C	0.000	30.387		100.00	0.000	12.452
L7 73.75-42.75	58.15	1.176	4	0.8028	96.890	A	0.000	96.890	96.890	100.00	0.000	0.000
						B	0.000	96.890		100.00	0.000	0.000
						C	0.000	96.890		100.00	0.000	36.762
L8 42.75-8.25	25.10	1	4	0.7500	121.412	A	0.000	121.412	121.412	100.00	0.000	0.000
						B	0.000	121.412		100.00	0.000	0.000
						C	0.000	121.412		100.00	0.000	39.968
L9 8.25-6.25	7.25	1	4	0.7500	7.565	A	0.000	7.565	7.565	100.00	0.000	0.000
						B	0.000	7.565		100.00	0.000	0.000
						C	0.000	7.565		100.00	0.000	2.221
L10 6.25-0.00	3.11	1	4	0.7500	24.005	A	0.000	24.005	24.005	100.00	0.000	0.000
						B	0.000	24.005		100.00	0.000	0.000
						C	0.000	24.005		100.00	0.000	6.939

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.00-105.00	125.27	1.464	9	89.497	A	0.000	89.497	89.497	100.00	0.000	0.000
					B	0.000	89.497		100.00	0.000	0.000
					C	0.000	89.497		100.00	0.000	9.468
L2 105.00-89.75	97.26	1.362	9	38.046	A	0.000	38.046	38.046	100.00	0.000	0.000
					B	0.000	38.046		100.00	0.000	0.000
					C	0.000	38.046		100.00	0.000	4.561
L3 89.75-88.25	89.00	1.328	8	3.920	A	0.000	3.920	3.920	100.00	0.000	0.000
					B	0.000	3.920		100.00	0.000	0.000
					C	0.000	3.920		100.00	0.000	0.945
L4 88.25-86.00	87.12	1.32	8	5.940	A	0.000	5.940	5.940	100.00	0.000	0.000
					B	0.000	5.940		100.00	0.000	0.000
					C	0.000	5.940		100.00	0.000	1.417
L5 86.00-84.25	85.12	1.311	8	4.670	A	0.000	4.670	4.670	100.00	0.000	0.000
					B	0.000	4.670		100.00	0.000	0.000
					C	0.000	4.670		100.00	0.000	1.102
L6 84.25-73.75	78.95	1.283	8	28.929	A	0.000	28.929	28.929	100.00	0.000	0.000
					B	0.000	28.929		100.00	0.000	0.000
					C	0.000	28.929		100.00	0.000	6.613
L7 73.75-42.75	58.15	1.176	7	92.587	A	0.000	92.587	92.587	100.00	0.000	0.000
					B	0.000	92.587		100.00	0.000	0.000
					C	0.000	92.587		100.00	0.000	19.524
L8 42.75-8.25	25.10	1	6	116.796	A	0.000	116.796	116.796	100.00	0.000	0.000
					B	0.000	116.796		100.00	0.000	0.000
					C	0.000	116.796		100.00	0.000	21.728
L9 8.25-6.25	7.25	1	6	7.315	A	0.000	7.315	7.315	100.00	0.000	0.000
					B	0.000	7.315		100.00	0.000	0.000
					C	0.000	7.315		100.00	0.000	1.260
L10 6.25-0.00	3.11	1	6	23.223	A	0.000	23.223	23.223	100.00	0.000	0.000
					B	0.000	23.223		100.00	0.000	0.000
					C	0.000	23.223		100.00	0.000	3.936

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
15	Dead+Wind 0 deg+Ice
16	Dead+Wind 30 deg+Ice
17	Dead+Wind 60 deg+Ice
18	Dead+Wind 90 deg+Ice
19	Dead+Wind 120 deg+Ice
20	Dead+Wind 150 deg+Ice
21	Dead+Wind 180 deg+Ice
22	Dead+Wind 210 deg+Ice
23	Dead+Wind 240 deg+Ice
24	Dead+Wind 270 deg+Ice
25	Dead+Wind 300 deg+Ice
26	Dead+Wind 330 deg+Ice
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service

Comb. No.	Description
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	147 - 105	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.48	-0.35	0.98
			Max. Mx	5	-8.42	-337.31	1.73
			Max. My	2	-8.39	-1.46	338.91
			Max. Vy	11	-16.27	337.27	-1.34
			Max. Vx	2	-16.44	-1.46	338.91
			Max. Torque	12			-2.87
L2	105 - 89.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.60	0.42	0.85
			Max. Mx	11	-13.45	742.73	-5.13
			Max. My	2	-13.43	-5.16	747.45
			Max. Vy	11	-22.44	742.73	-5.13
			Max. Vx	2	-22.61	-5.16	747.45
			Max. Torque	12			-2.85
L3	89.75 - 88.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.88	0.46	0.83
			Max. Mx	11	-13.67	776.49	-5.44
			Max. My	2	-13.65	-5.45	781.45
			Max. Vy	11	-22.58	776.49	-5.44
			Max. Vx	2	-22.75	-5.45	781.45
			Max. Torque	12			-2.81
L4	88.25 - 86	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-25.45	0.52	0.79
			Max. Mx	11	-14.15	827.54	-5.89
			Max. My	2	-14.13	-5.89	832.87
			Max. Vy	11	-22.80	827.54	-5.89
			Max. Vx	2	-22.97	-5.89	832.87
			Max. Torque	12			-2.80
L5	86 - 84.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-25.90	0.57	0.76
			Max. Mx	11	-14.51	867.59	-6.25
			Max. My	2	-14.49	-6.24	873.21
			Max. Vy	11	-22.98	867.59	-6.25
			Max. Vx	2	-23.15	-6.24	873.21
			Max. Torque	12			-2.79
L6	84.25 - 73.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-27.70	0.76	0.65
			Max. Mx	11	-15.96	1013.36	-7.52
			Max. My	2	-15.95	-7.45	1019.98
			Max. Vy	11	-23.71	1013.36	-7.52
			Max. Vx	2	-23.89	-7.45	1019.98
			Max. Torque	12			-2.78
L7	73.75 - 42.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-37.25	1.72	0.10
			Max. Mx	11	-24.07	1781.08	-13.76
			Max. My	2	-24.06	-13.42	1792.65
			Max. Vy	11	-26.52	1781.08	-13.76
			Max. Vx	2	-26.69	-13.42	1792.65
			Max. Torque	12			-2.73
L8	42.75 - 8.25	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-51.52	3.06	-0.68
			Max. Mx	11	-36.69	2880.89	-21.75
			Max. My	8	-36.68	22.50	-2898.72
			Max. Vy	11	-29.40	2880.89	-21.75
			Max. Vx	8	29.57	22.50	-2898.72
			Max. Torque	11			-2.60
L9	8.25 - 6.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-52.26	3.13	-0.72
			Max. Mx	11	-37.35	2939.80	-22.15
			Max. My	8	-37.35	22.91	-2957.96
			Max. Vy	11	-29.53	2939.80	-22.15
			Max. Vx	8	29.70	22.91	-2957.96
			Max. Torque	11			-2.49
L10	6.25 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-54.57	3.35	-0.85
			Max. Mx	11	-39.43	3125.63	-23.41
			Max. My	8	-39.43	24.18	-3144.82
			Max. Vy	11	-29.95	3125.63	-23.41
			Max. Vx	8	30.12	24.18	-3144.82
			Max. Torque	11			-2.49

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	54.57	-0.00	-0.00
	Max. H_x	11	39.45	29.93	-0.19
	Max. H_z	2	39.45	-0.19	30.10
	Max. M_x	2	3144.72	-0.19	30.10
	Max. M_z	5	3123.95	-29.93	0.19
	Max. Torsion	5	2.47	-29.93	0.19
	Min. Vert	2	39.45	-0.19	30.10
	Min. H_x	5	39.45	-29.93	0.19
	Min. H_z	8	39.45	0.19	-30.10
	Min. M_x	8	-3144.82	0.19	-30.10
	Min. M_z	11	-3125.63	29.93	-0.19
	Min. Torsion	11	-2.47	29.93	-0.19

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	39.45	-0.00	-0.00	0.06	0.81	0.00
Dead+Wind 0 deg - No Ice	39.45	0.19	-30.10	-3144.72	-22.50	0.39
Dead+Wind 30 deg - No Ice	39.45	15.14	-26.17	-2735.24	-1581.77	-0.89
Dead+Wind 60 deg - No Ice	39.45	26.02	-15.22	-1592.65	-2717.01	-1.94
Dead+Wind 90 deg - No Ice	39.45	29.93	-0.19	-23.27	-3123.95	-2.47
Dead+Wind 120 deg - No Ice	39.45	25.83	14.88	1552.40	-2693.74	-2.33
Dead+Wind 150 deg - No Ice	39.45	14.80	25.97	2712.10	-1541.38	-1.57
Dead+Wind 180 deg - No Ice	39.45	-0.19	30.10	3144.82	24.18	-0.39
Dead+Wind 210 deg - No Ice	39.45	-15.14	26.17	2735.34	1583.44	0.89
Dead+Wind 240 deg - No Ice	39.45	-26.02	15.22	1592.77	2718.67	1.94
Dead+Wind 270 deg - No Ice	39.45	-29.93	0.19	23.41	3125.63	2.47
Dead+Wind 300 deg - No Ice	39.45	-25.83	-14.88	-1552.27	2695.44	2.33
Dead+Wind 330 deg - No Ice	39.45	-14.80	-25.97	-2711.98	1543.08	1.57
Dead+Ice	54.57	0.00	0.00	0.85	3.35	0.00
Dead+Wind 0 deg+Ice	54.57	0.04	-7.45	-799.87	-0.95	-0.01
Dead+Wind 30 deg+Ice	54.57	3.74	-6.47	-694.83	-398.41	-0.25
Dead+Wind 60 deg+Ice	54.57	6.44	-3.76	-403.39	-688.17	-0.41

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 90 deg+Ice	54.57	7.41	-0.04	-3.64	-792.59	-0.47
Dead+Wind 120 deg+Ice	54.57	6.40	3.69	397.31	-683.70	-0.40
Dead+Wind 150 deg+Ice	54.57	3.67	6.43	692.02	-390.66	-0.22
Dead+Wind 180 deg+Ice	54.57	-0.04	7.45	801.53	7.99	0.01
Dead+Wind 210 deg+Ice	54.57	-3.74	6.47	696.49	405.45	0.25
Dead+Wind 240 deg+Ice	54.57	-6.44	3.76	405.05	695.21	0.41
Dead+Wind 270 deg+Ice	54.57	-7.41	0.04	5.30	799.64	0.47
Dead+Wind 300 deg+Ice	54.57	-6.40	-3.69	-395.65	690.74	0.40
Dead+Wind 330 deg+Ice	54.57	-3.67	-6.43	-690.36	397.71	0.22
Dead+Wind 0 deg - Service	39.45	0.07	-10.41	-1089.29	-7.24	0.14
Dead+Wind 30 deg - Service	39.45	5.24	-9.05	-947.55	-547.43	-0.31
Dead+Wind 60 deg - Service	39.45	9.00	-5.27	-551.71	-940.70	-0.68
Dead+Wind 90 deg - Service	39.45	10.36	-0.07	-8.04	-1081.51	-0.86
Dead+Wind 120 deg - Service	39.45	8.94	5.15	537.81	-932.62	-0.82
Dead+Wind 150 deg - Service	39.45	5.12	8.99	939.56	-533.42	-0.55
Dead+Wind 180 deg - Service	39.45	-0.07	10.41	1089.38	8.92	-0.14
Dead+Wind 210 deg - Service	39.45	-5.24	9.05	947.64	549.11	0.31
Dead+Wind 240 deg - Service	39.45	-9.00	5.27	551.81	942.38	0.68
Dead+Wind 270 deg - Service	39.45	-10.36	0.07	8.13	1083.19	0.86
Dead+Wind 300 deg - Service	39.45	-8.94	-5.15	-537.71	934.30	0.82
Dead+Wind 330 deg - Service	39.45	-5.12	-8.99	-939.46	535.10	0.55

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-39.45	0.00	0.00	39.45	0.00	0.000%
2	0.19	-39.45	-30.10	-0.19	39.45	30.10	0.004%
3	15.14	-39.45	-26.17	-15.14	39.45	26.17	0.000%
4	26.02	-39.45	-15.22	-26.02	39.45	15.22	0.000%
5	29.94	-39.45	-0.19	-29.93	39.45	0.19	0.002%
6	25.83	-39.45	14.88	-25.83	39.45	-14.88	0.000%
7	14.80	-39.45	25.97	-14.80	39.45	-25.97	0.000%
8	-0.19	-39.45	30.10	0.19	39.45	-30.10	0.004%
9	-15.14	-39.45	26.17	15.14	39.45	-26.17	0.000%
10	-26.02	-39.45	15.22	26.02	39.45	-15.22	0.000%
11	-29.94	-39.45	0.19	29.93	39.45	-0.19	0.002%
12	-25.83	-39.45	-14.88	25.83	39.45	14.88	0.000%
13	-14.80	-39.45	-25.97	14.80	39.45	25.97	0.000%
14	0.00	-54.57	0.00	-0.00	54.57	-0.00	0.000%
15	0.04	-54.57	-7.45	-0.04	54.57	7.45	0.002%
16	3.74	-54.57	-6.47	-3.74	54.57	6.47	0.002%
17	6.44	-54.57	-3.76	-6.44	54.57	3.76	0.002%
18	7.41	-54.57	-0.04	-7.41	54.57	0.04	0.002%
19	6.40	-54.57	3.69	-6.40	54.57	-3.69	0.002%
20	3.68	-54.57	6.43	-3.67	54.57	-6.43	0.002%
21	-0.04	-54.57	7.45	0.04	54.57	-7.45	0.002%
22	-3.74	-54.57	6.47	3.74	54.57	-6.47	0.002%
23	-6.44	-54.57	3.76	6.44	54.57	-3.76	0.002%
24	-7.41	-54.57	0.04	7.41	54.57	-0.04	0.002%
25	-6.40	-54.57	-3.69	6.40	54.57	3.69	0.002%
26	-3.68	-54.57	-6.43	3.67	54.57	6.43	0.002%
27	0.07	-39.45	-10.42	-0.07	39.45	10.41	0.005%
28	5.24	-39.45	-9.05	-5.24	39.45	9.05	0.001%
29	9.00	-39.45	-5.27	-9.00	39.45	5.27	0.001%
30	10.36	-39.45	-0.07	-10.36	39.45	0.07	0.005%
31	8.94	-39.45	5.15	-8.94	39.45	-5.15	0.001%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
32	5.12	-39.45	8.99	-5.12	39.45	-8.99	0.001%
33	-0.07	-39.45	10.42	0.07	39.45	-10.41	0.005%
34	-5.24	-39.45	9.05	5.24	39.45	-9.05	0.001%
35	-9.00	-39.45	5.27	9.00	39.45	-5.27	0.001%
36	-10.36	-39.45	0.07	10.36	39.45	-0.07	0.005%
37	-8.94	-39.45	-5.15	8.94	39.45	5.15	0.001%
38	-5.12	-39.45	-8.99	5.12	39.45	8.99	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	14	0.00004653	0.00013912
3	Yes	18	0.00000001	0.00009621
4	Yes	18	0.00000001	0.00010000
5	Yes	15	0.00000001	0.00013888
6	Yes	18	0.00000001	0.00008988
7	Yes	18	0.00000001	0.00009650
8	Yes	14	0.00004653	0.00006346
9	Yes	18	0.00000001	0.00009838
10	Yes	18	0.00000001	0.00009456
11	Yes	15	0.00000001	0.00008859
12	Yes	18	0.00000001	0.00009762
13	Yes	18	0.00000001	0.00009100
14	Yes	6	0.00000001	0.00000001
15	Yes	14	0.00009795	0.00002631
16	Yes	14	0.00009783	0.00009608
17	Yes	14	0.00009783	0.00010996
18	Yes	14	0.00000001	0.00003546
19	Yes	14	0.00000001	0.00008677
20	Yes	14	0.00000001	0.00010511
21	Yes	14	0.00009790	0.00002590
22	Yes	14	0.00009778	0.00010578
23	Yes	14	0.00009779	0.00009310
24	Yes	14	0.00009793	0.00003392
25	Yes	14	0.00009783	0.00011108
26	Yes	14	0.00009784	0.00009131
27	Yes	13	0.00011899	0.00007838
28	Yes	15	0.00000001	0.00008125
29	Yes	15	0.00000001	0.00009141
30	Yes	13	0.00011900	0.00012165
31	Yes	15	0.00000001	0.00007167
32	Yes	15	0.00000001	0.00008785
33	Yes	13	0.00011898	0.00007380
34	Yes	15	0.00000001	0.00008680
35	Yes	15	0.00000001	0.00007755
36	Yes	13	0.00011900	0.00011035
37	Yes	15	0.00000001	0.00009114
38	Yes	15	0.00000001	0.00007395

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 105	33.284	34	1.9027	0.0054
L2	108.75 - 89.75	18.791	34	1.6284	0.0047
L3	89.75 - 88.25	12.812	34	1.3352	0.0028
L4	88.25 - 86	12.397	34	1.3053	0.0026
L5	86 - 84.25	11.789	34	1.2762	0.0025
L6	84.25 - 73.75	11.326	34	1.2532	0.0024

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L7	78 - 42.75	9.748	34	1.1575	0.0021
L8	47.5 - 8.25	3.666	34	0.7138	0.0010
L9	8.25 - 6.25	0.107	34	0.1234	0.0001
L10	6.25 - 0	0.061	34	0.0935	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	APXVSPP18-C-A20 w/ Mount Pipe	34	33.284	1.9027	0.0055	34507
135.00	Celwave APXV18-206515L-03 w/Mount Pipe	34	28.554	1.8376	0.0055	14377
126.00	(4) 2.375" OD x 6' Mount Pipe	34	25.078	1.7804	0.0055	8215
116.00	(2) LPA-80080/4CF w/ Mount Pipe	34	21.357	1.7012	0.0052	5564
106.00	(2) Powerwave Technologies 7770 w/ Mount Pipe	34	17.853	1.5966	0.0045	4155
80.00	KS24019-L112A	34	10.240	1.1890	0.0022	4077

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 105	95.853	9	5.4838	0.0154
L2	108.75 - 89.75	54.155	9	4.6953	0.0136
L3	89.75 - 88.25	36.938	9	3.8511	0.0080
L4	88.25 - 86	35.743	9	3.7648	0.0076
L5	86 - 84.25	33.991	9	3.6808	0.0072
L6	84.25 - 73.75	32.655	9	3.6146	0.0069
L7	78 - 42.75	28.108	9	3.3386	0.0059
L8	47.5 - 8.25	10.575	9	2.0593	0.0028
L9	8.25 - 6.25	0.307	9	0.3562	0.0004
L10	6.25 - 0	0.176	9	0.2698	0.0003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	APXVSPP18-C-A20 w/ Mount Pipe	9	95.853	5.4838	0.0160	12191
135.00	Celwave APXV18-206515L-03 w/Mount Pipe	9	82.246	5.2974	0.0161	5078
126.00	(4) 2.375" OD x 6' Mount Pipe	9	72.247	5.1336	0.0158	2900
116.00	(2) LPA-80080/4CF w/ Mount Pipe	9	61.542	4.9049	0.0149	1962
106.00	(2) Powerwave Technologies 7770 w/ Mount Pipe	9	51.454	4.6039	0.0129	1463
80.00	KS24019-L112A	9	29.526	3.4296	0.0062	1426

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	147 - 105 (1)	TP29.141x22x0.25	42.00	0.00	0.0	36.000	22.4191	-8.38	807.09	0.010
L2	105 - 89.75 (2)	TP31.2343x28.0034x0.3125	19.00	0.00	0.0	36.000	30.6705	-13.42	1104.14	0.012
L3	89.75 - 88.25 (3)	TP31.4893x31.2343x0.3125	1.50	0.00	0.0	35.532	30.9235	-13.64	1098.77	0.012
L4	88.25 - 86 (4)	TP31.8719x31.4893x0.5085	2.25	0.00	0.0	34.302	50.6160	-14.12	1736.23	0.008
L5	86 - 84.25 (5)	TP32.1695x31.8719x0.5063	1.75	0.00	0.0	33.978	50.8827	-14.48	1728.89	0.008
L6	84.25 - 73.75 (6)	TP33.955x32.1695x0.455	10.50	0.00	0.0	34.980	47.3360	-15.93	1655.81	0.010
L7	73.75 - 42.75 (7)	TP38.601x32.3223x0.537	35.25	0.00	0.0	34.554	63.4392	-24.05	2192.08	0.011
L8	42.75 - 8.25 (8)	TP43.7172x36.6809x0.5757	39.25	0.00	0.0	34.740	78.8258	-36.68	2738.41	0.013
L9	8.25 - 6.25 (9)	TP44.0573x43.7172x0.596	2.00	0.00	0.0	34.464	82.2200	-37.35	2833.63	0.013
L10	6.25 - 0 (10)	TP45.12x44.0573x0.5918	6.25	0.00	0.0	34.422	83.6336	-39.43	2878.84	0.014

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	147 - 105 (1)	TP29.141x22x0.25	339.88	26.120	36.000	0.726	0.00	0.000	36.000	0.000
L2	105 - 89.75 (2)	TP31.2343x28.0034x0.3125	750.83	38.586	36.000	1.072	0.00	0.000	36.000	0.000
L3	89.75 - 88.25 (3)	TP31.4893x31.2343x0.3125	785.03	39.683	35.532	1.117	0.00	0.000	35.532	0.000
L4	88.25 - 86 (4)	TP31.8719x31.4893x0.5085	836.74	25.845	34.302	0.753	0.00	0.000	34.302	0.000
L5	86 - 84.25 (5)	TP32.1695x31.8719x0.5063	877.31	26.695	33.978	0.786	0.00	0.000	33.978	0.000
L6	84.25 - 73.75 (6)	TP33.955x32.1695x0.455	1024.89	32.315	34.980	0.924	0.00	0.000	34.980	0.000
L7	73.75 - 42.75 (7)	TP38.601x32.3223x0.537	1801.72	37.351	34.554	1.081	0.00	0.000	34.554	0.000
L8	42.75 - 8.25 (8)	TP43.7172x36.6809x0.5757	2913.41	41.889	34.740	1.206	0.00	0.000	34.740	0.000
L9	8.25 - 6.25 (9)	TP44.0573x43.7172x0.596	2972.92	40.694	34.464	1.181	0.00	0.000	34.464	0.000
L10	6.25 - 0 (10)	TP45.12x44.0573x0.5918	3160.60	41.495	34.422	1.205	0.00	0.000	34.422	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	147 - 105 (1)	TP29.141x22x0.25	16.57	0.739	24.000	0.062	0.02	0.001	24.000	0.000
L2	105 - 89.75 (2)	TP31.2343x28.0034x0.3125	22.75	0.742	24.000	0.062	0.63	0.016	24.000	0.001
L3	89.75 - 88.25 (3)	TP31.4893x31.2343x0.3125	22.89	0.740	23.688	0.062	0.63	0.016	23.688	0.001
L4	88.25 - 86 (4)	TP31.8719x31.4893x0.5085	23.11	0.457	22.868	0.040	0.64	0.010	22.868	0.000
L5	86 - 84.25 (5)	TP32.1695x31.8719x0.5063	23.29	0.458	22.652	0.040	0.65	0.010	22.652	0.000
L6	84.25 - 73.75	TP33.955x32.1695x0.455	24.02	0.507	23.320	0.044	0.66	0.010	23.320	0.000

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 $\frac{f_{vt}}{F_{vt}}$
L7	73.75 - 42.75 (6)	TP38.601x32.3223x0.537	26.82	0.423	23.036	0.037	0.75	0.008	23.036	0.000
L8	42.75 - 8.25 (7)	TP43.7172x36.6809x0.57	29.70	0.377	23.160	0.033	0.87	0.006	23.160	0.000
L9	8.25 - 6.25 (8)	57 TP44.0573x43.7172x0.59	29.83	0.363	22.976	0.032	0.87	0.006	22.976	0.000
L10	6.25 - 0 (9)	6 TP45.12x44.0573x0.5918	30.25	0.362	22.948	0.032	0.89	0.006	22.948	0.000

Pole Interaction Design Data

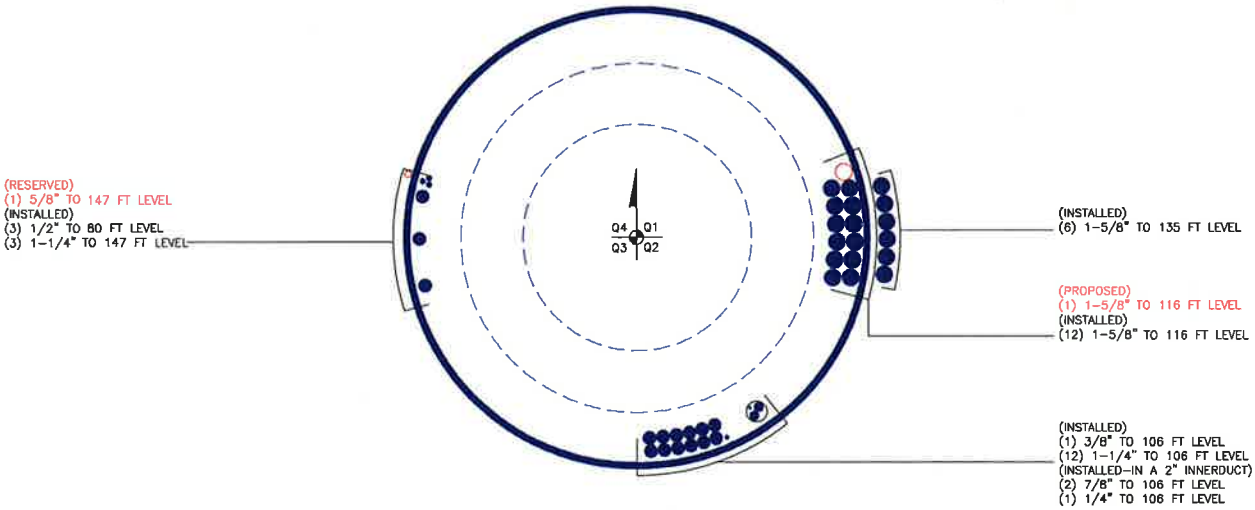
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	147 - 105 (1)	0.010	0.726	0.000	0.062	0.000	0.737 ✔	1.333	H1-3+VT ✔
L2	105 - 89.75 (2)	0.012	1.072	0.000	0.062	0.001	1.085 ✔	1.333	H1-3+VT ✔
L3	89.75 - 88.25 (3)	0.012	1.117	0.000	0.062	0.001	1.130 ✔	1.333	H1-3+VT ✔
L4	88.25 - 86 (4)	0.008	0.753	0.000	0.040	0.000	0.762 ✔	1.333	H1-3+VT ✔
L5	86 - 84.25 (5)	0.008	0.786	0.000	0.040	0.000	0.794 ✔	1.333	H1-3+VT ✔
L6	84.25 - 73.75 (6)	0.010	0.924	0.000	0.044	0.000	0.934 ✔	1.333	H1-3+VT ✔
L7	73.75 - 42.75 (7)	0.011	1.081	0.000	0.037	0.000	1.092 ✔	1.333	H1-3+VT ✔
L8	42.75 - 8.25 (8)	0.013	1.206	0.000	0.033	0.000	1.219 ✔	1.333	H1-3+VT ✔
L9	8.25 - 6.25 (9)	0.013	1.181	0.000	0.032	0.000	1.194 ✔	1.333	H1-3+VT ✔
L10	6.25 - 0 (10)	0.014	1.205	0.000	0.032	0.000	1.219 ✔	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	147 - 105	Pole	TP29.141x22x0.25	1	-8.38	1075.85	55.3	Pass
L2	105 - 89.75	Pole	TP31.2343x28.0034x0.3125	2	-13.42	1471.82	81.4	Pass
L3	89.75 - 88.25	Pole	TP31.4893x31.2343x0.3125	3	-13.64	1464.66	84.8	Pass
L4	88.25 - 86	Pole	TP31.8719x31.4893x0.5085	4	-14.12	2314.39	57.2	Pass
L5	86 - 84.25	Pole	TP32.1695x31.8719x0.5063	5	-14.48	2304.61	59.6	Pass
L6	84.25 - 73.75	Pole	TP33.955x32.1695x0.455	6	-15.93	2207.19	70.1	Pass
L7	73.75 - 42.75	Pole	TP38.601x32.3223x0.537	7	-24.05	2922.04	81.9	Pass
L8	42.75 - 8.25	Pole	TP43.7172x36.6809x0.5757	8	-36.68	3650.30	91.5	Pass
L9	8.25 - 6.25	Pole	TP44.0573x43.7172x0.596	9	-37.35	3777.23	89.6	Pass
L10	6.25 - 0	Pole	TP45.12x44.0573x0.5918	10	-39.43	3837.49	91.5	Pass
							Summary	
						Pole (L8)	91.5	Pass
						RATING =	**91.5**	**Pass**

APPENDIX B

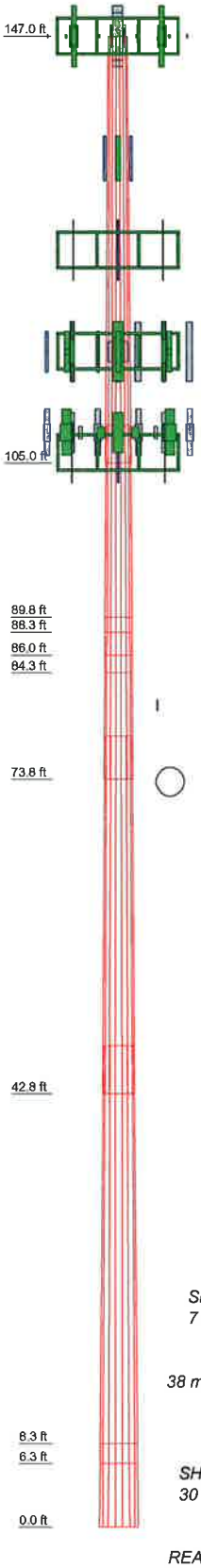
BASE LEVEL DRAWING

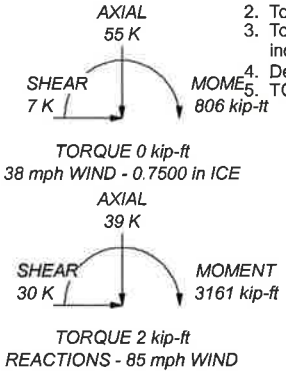

(RESERVED)
(1) 5/8" TO 147 FT LEVEL
(INSTALLED)
(3) 1/2" TO 80 FT LEVEL
(3) 1-1/4" TO 147 FT LEVEL
Q4
Q1
Q3
Q2
(INSTALLED)
(6) 1-5/8" TO 135 FT LEVEL
(PROPOSED)
(1) 1-5/8" TO 116 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 116 FT LEVEL
(INSTALLED)
(1) 3/8" TO 106 FT LEVEL
(12) 1-1/4" TO 106 FT LEVEL
(INSTALLED-IN A 2" INNERDUCT)
(2) 7/8" TO 106 FT LEVEL
(1) 1/4" TO 106 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9	10
Length (ft)	42.00	19.00	2.50	2.25	1.75	10.50	35.25	39.25	2.00	6.25
Number of Sides	18	18	18	18	18	18	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3125	0.3125	0.3125	0.4550	0.5370	0.5757	0.5940	0.5918
Socket Length (ft)						4.25	4.75			
Top Dia (in)	22.0000	28.0034	28.6143	29.2252	29.8361	32.1695	32.3223	36.6809	43.7172	44.0573
Bot Dia (in)	29.1410	31.2343	31.8452	32.4561	33.0670	33.9550	38.6010	43.7172	44.0573	45.1200
Grade	A607-60					Reinf 56.63 ksi	Reinf 58.30 ksi	Reinf 57.59 ksi	Reinf 57.90 ksi	Reinf 57.44 ksi
Weight (K)	2.9	1.9	0.2	0.2	0.3	1.7	7.1	9.7	0.6	1.8





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXVSPP18-C-A20 w/ Mount Pipe	147	(2) FD9R6004/2C-3L	116
APXVSPP18-C-A20 w/ Mount Pipe	147	(2) FD9R6004/2C-3L	116
APXVSPP18-C-A20 w/ Mount Pipe	147	(2) FD9R6004/2C-3L	116
800 EXTERNAL NOTCH FILTER	147	(2) ClearGain Dual Band 800/1900 MHz	116
800 EXTERNAL NOTCH FILTER	147		
800 EXTERNAL NOTCH FILTER	147	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	116
(3) ACU-A20-N	147		
(3) ACU-A20-N	147	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	116
(3) ACU-A20-N	147		
1900MHz RRH (65MHz)	147	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	116
1900MHz RRH (65MHz)	147	RRH2x40-AWS	116
1900MHz RRH (65MHz)	147	RRH2x40-AWS	116
800MHZ RRH	147	RRH2x40-AWS	116
800MHZ RRH	147	DB-T1-6Z-8AB-0Z	116
800MHZ RRH	147	Platform Mount [LP 712-1]	116
APXVTM14-C-120 w/ Mount Pipe	147	(2) Powerwave Technologies 7770 w/ Mount Pipe	106
APXVTM14-C-120 w/ Mount Pipe	147		
APXVTM14-C-120 w/ Mount Pipe	147	(2) Powerwave Technologies 7770 w/ Mount Pipe	106
TD-RRH8x20-25	147		
TD-RRH8x20-25	147	(2) Powerwave Technologies 7770 w/ Mount Pipe	106
TD-RRH8x20-25	147		
Platform Mount [LP 712-1]	147	AM-X-CD-14-65-00T-RET w/ Mount Pipe	106
Miscellaneous (NA507-1)	147		
Celwave APXV18-206515L-03 w/Mount Pipe	135	AM-X-CD-14-65-00T-RET w/ Mount Pipe	106
Celwave APXV18-206515L-03 w/Mount Pipe	135	AM-X-CD-14-65-00T-RET w/ Mount Pipe	106
Celwave APXV18-206515L-03 w/Mount Pipe	135	(4) Powerwave Technologies LGP2140X	106
		(4) Powerwave Technologies LGP2140X	106
Pipe Mount [PM 601-3]	135		
(4) 2.375" OD x 6' Mount Pipe	126	(4) Powerwave Technologies LGP2140X	106
(4) 2.375" OD x 6' Mount Pipe	126		
(4) 2.375" OD x 6' Mount Pipe	126	DC6-48-60-18-8F	106
Platform Mount [LP 712-1]	126	(2) RRUS-11	106
(2) LPA-80080/4CF w/ Mount Pipe	116	(2) RRUS-11	106
(2) LPA-80063/6CF w/ Mount Pipe	116	(2) RRUS-11	106
(2) APL868013 w/ Mount Pipe	116	2.375" OD x 6' Mount Pipe	106
BXA-70063-6CF-2 w/ Mount Pipe	116	2.375" OD x 6' Mount Pipe	106
BXA-70063-6CF-2 w/ Mount Pipe	116	2.375" OD x 6' Mount Pipe	106
BXA-70063/6CF-2 w/ Mount Pipe	116	Platform Mount [LP 712-1]	106
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	116	KS24019-L112A	80
		Kathrein OG-860/1920/GPS-A	80
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	116	KS24019-L112A	80
		Side Arm Mount [SO 701-3]	80
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	116		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	Reinf 57.59 ksi	58 ksi	72 ksi
Reinf 59.22 ksi	59 ksi	75 ksi	Reinf 57.90 ksi	58 ksi	73 ksi
Reinf 57.17 ksi	57 ksi	72 ksi	Reinf 57.44 ksi	57 ksi	72 ksi
Reinf 56.63 ksi	57 ksi	71 ksi	Reinf 57.37 ksi	57 ksi	72 ksi
Reinf 58.30 ksi	58 ksi	73 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: 91.5%

Paul J. Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job:	147 ft Monopole / Secondino Property
Project:	PJF 37514-0035 / BU 876316
Client: CCI	Drawn by: Joey Meinerding App'd:
Code: TIA/EIA-222-F	Date: 05/02/14 Scale: NTS
Path:	Dwg No. E-1

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#: *876316*
Site Name: *Secondino Property*
App #:

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	52	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	53	in
Thick:	3	in
Grade:	60	ksi
Clip Distance:	0	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:	45.12	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	3161	ft-kips
Unfactored Axial, P:	39	kips
Unfactored Shear, V:	30	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	179.9 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	92.3% Pass

Base Plate Results Flexural Check

Base Plate Stress:	41.5 ksi
Allowable PL Bending Stress:	60.0 ksi
Base Plate Stress Ratio:	69.2% Pass

PL Ref. Data
Yield Line (in): 29.83
Max PL Length: 29.83

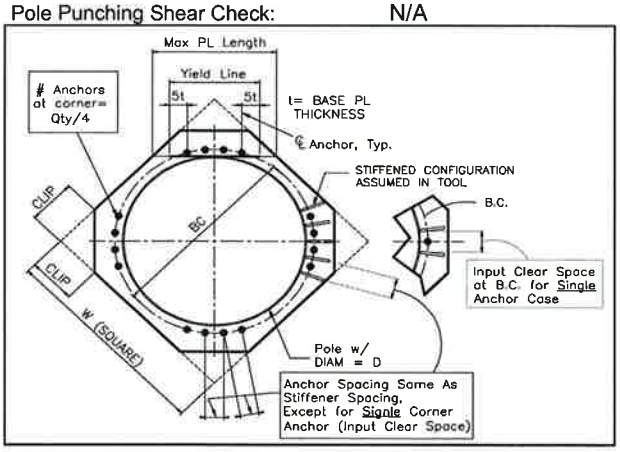
N/A - Unstiffened

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



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

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Job Number: 37514-0035 R1
Site Number: 876316
Site Name: Secondino Property

Page: 1
By: JWM
Date: 5/2/2014

DRILLED PIER SOIL AND STEEL ANALYSIS - TIA/EIA-222-F

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	3161.0		k-ft
Shear, V =	30.0		kips
Axial Load, P =	39.0		kips
OTM =	3176.0	0.0	k-ft @ Ground

Safety Factors / Load Factors / Φ Factors

Tower Type =	Monopole DP
ACI Code =	ACI 318-02
Seismic Design Category =	D
Reference Standard =	TIA/EIA-222-F
Use 1.3 Load Factor?	Yes
Load Factor =	1.30

Drilled Pier Parameters

Diameter =	7	ft
Height Above Grade =	0.5	ft
Depth Below Grade =	22.5	ft
fc' =	3	ksi
εc =	0.003	in/in
Mat Ftdn. Cap Width =		ft
Mat Ftdn. Cap Length =		ft
Depth Below Grade =		ft

	Safety Factor	Φ Factor
Soil Lateral Resistance =	2.00	0.75
Skin Friction =	2.00	0.75
End Bearing =	2.00	0.75
Concrete Wt. Resist Uplift =	1.25	

Load Combinations Checked per TIA/EIA-222-F

1. Ult. Skin Friction/2.00 + Ult. End Bearing/2.00 + Effective Soil Wt. - Buoyant Conc. Wt. ≥ Comp.
2. Ult. Skin Friction/2.00 + Buoyant Conc. Wt./1.25 ≥ Uplift
3. Ult. Skin Friction/1.50 + Buoyant Conc. Wt./1.50 ≥ Uplift

Steel Parameters

Number of Bars =	32	
Rebar Size =	#11	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#5	
Side Clear Cover to Ties =	4	in

Soil Parameters

Water Table Depth =	7.50	ft
Depth to Ignore Soil =	3.50	ft
Depth to Full Cohesion =	0	ft
Full Cohesion Starts at?	Ground	

Above Full Cohesion Lateral Resistance = 4(Cohesion)(Dia)(H)
Below Full Cohesion Lateral Resistance = 8(Cohesion)(Dia)(H)

Direct Embed Pole Shaft Parameters

Dia @ Grade =		in
Dia @ Depth Below Grade =		in
Number of Sides =		
Thickness =		in
Fy =		ksi
Backfill Condition =		

Maximum Capacity Ratios

Maximum Soil Ratio =	110.0%
Maximum Steel Ratio =	105.0%

Define Soil Layers

Note: Cohesion = Undrained Shear Strength = Unconfined Compressive Strength / 2

Layer	Thickness ft	Unit Weight pcf	Cohesion psf	Friction Angle degrees	Soil Type	Ultimate End Bearing psf	Comp. Ult. Skin Friction psf	Tension Ult. Skin Friction psf	Depth ft
1	5	100	0	36	Sand				5
2	2.5	135	0	36	Sand				7.5
3	18.5	135	0	36	Sand	16000			26
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	15.91	ft, from Grade
Bending Moment, M =	3653.39	k-ft, from COR
Resisting Moment, Ma =	3986.43	k-ft, from COR

MOMENT RATIO = 91.6% OK

Shear, V =	30.00	kips
Resisting Shear, Va =	32.73	kips

SHEAR RATIO = 91.6% OK

Soil Results: Uplift

Uplift, T =	0.00	kips
Allowable Uplift Cap., Ta =	77.40	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, C =	39.00	kips
Allowable Comp. Cap., Ca =	285.27	kips

COMPRESSION RATIO = 13.7% OK

Steel Results (ACI 318-02):

Minimum Steel Area =	18.47	sq in
Actual Steel Area =	49.92	sq in
Allowable Min Axial, Pa =	-2073.60	kips, Where Ma = 0 k-ft
Allowable Max Axial, Pa =	6799.77	kips, Where Ma = 0 k-ft

Axial Load, P =	70.75	kips @ 5.00 ft Below Grade
Moment, M =	3309.32	k-ft @ 5.00 ft Below Grade
Allowable Moment, Ma =	5821.80	k-ft

MOMENT RATIO = 56.8% OK

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#: *876316*
Site Name: *Secondino Property*
App #:

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

Pier Properties

Concrete:

Pier Diameter =	7.0	ft
Concrete Area =	5541.8	in^2

Reinforcement:

Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	6.11	ft
Vert. Cage Diameter =	73.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	32	
As Total=	49.92	in^2
A s/ Aconc, Rho:	0.0090	0.90%

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

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.90%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	8839.70	kips
at Mu=(ϕ=0.65)Mn=	5309.39	ft-kips
Max Tu, (φ=0.9) Tn =	2695.68	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	3309.32	ft-kips (* Note)
Max. Service Shaft P:	70.75	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:	4302.116	ft-kips
1.30	Pu:	91.975	kips

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	

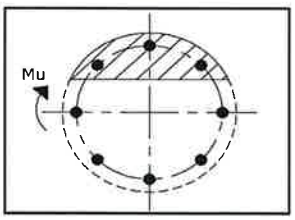
Seismic Properties

Seismic Design Category =	D	
Seismic Risk =	**High**	

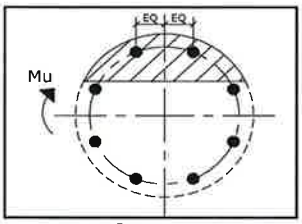
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **2**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**17.10**	in
Extreme Steel Strain, εt:	**0.0108**	
	εt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	91.98	kips
Drilled Shaft Moment Capacity, φMn:	**7568.34**	ft-kips
Drilled Shaft Superimposed Mu:	**4302.12**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**56.8%**