ROBINSON & COLE LLP

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

June 16, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
4 Oliver Road, Enfield, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 149-foot level on an existing 160-foot tower at 4 Oliver Road in Enfield, Connecticut (the "Property"). The tower is owned by Crown Castle. Cellco's use of the tower was approved by the Council in 1991. Cellco now intends to modify its facility by replacing one (1) 700 MHz antennas with one (1) model BXA-70063-6CF, 700 MHz antenna and adding three (3) model 742 213V01, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 149-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 attached to the outside the monopole. Included in Attachment 1 are specifications for Cellco's replacement antenna, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being sent to Matthew W. Coppler, Town Manager for the Town of Enfield. A copy of this notice is also being sent to Oliver Road Holding 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).

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement and new antennas and RRHs will be installed at the 149-foot level on the existing 160-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 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:
Matthew W. Coppler, Enfield Town Manger
Oliver Road Holding LLC
Sandy M. Carter

ATTACHMENT 1

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

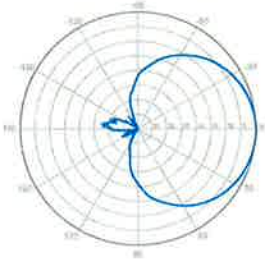
Replace "X" with desired electrical downtilt.

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

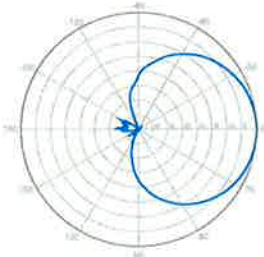
Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
IM3 (2x20W carriers)	< -153 dBc	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m^2 Side: 0.24 m^2	Front: 5.5 ft^2 Side: 2.6 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X

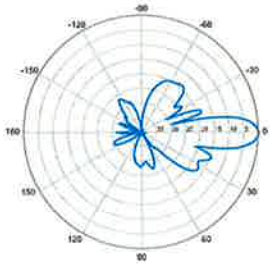


Horizontal | 750 MHz

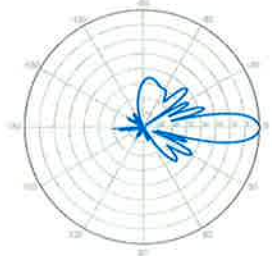


Horizontal | 850 MHz

BXA-70063-6CF-EDIN-0

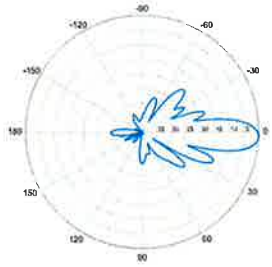


0° | Vertical | 750 MHz

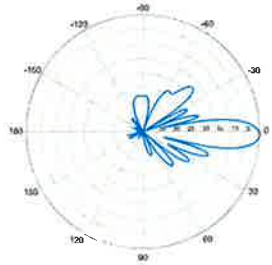


0° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-2



2° | Vertical | 750 MHz



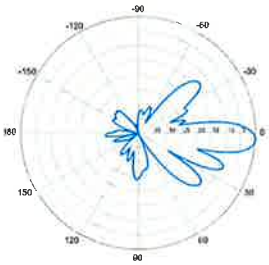
2° | Vertical | 850 MHz

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

BXA-70063-6CF-EDIN-X

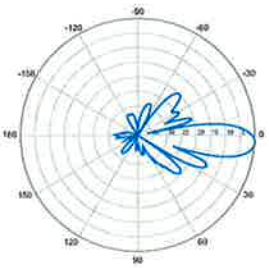
X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3



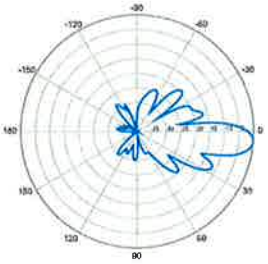
3° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-4

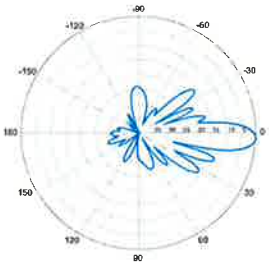


4° | Vertical | 750 MHz

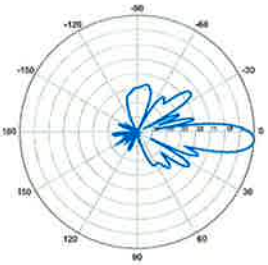
BXA-70063-6CF-EDIN-5



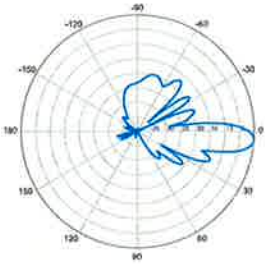
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

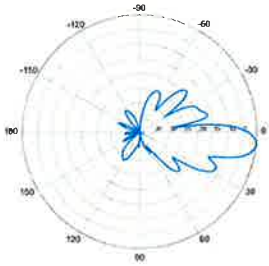


4° | Vertical | 850 MHz



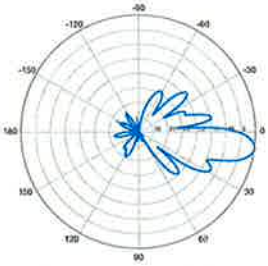
5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6



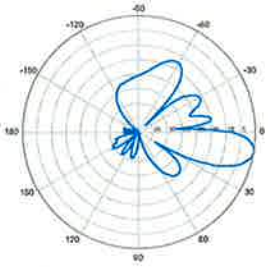
6° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-8

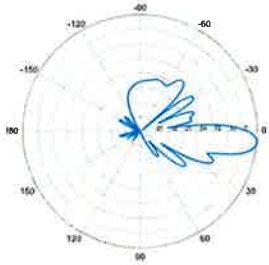


8° | Vertical | 750 MHz

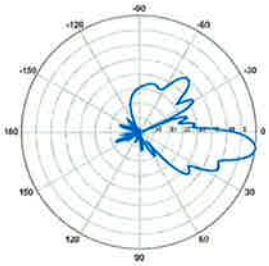
BXA-70063-6CF-EDIN-10



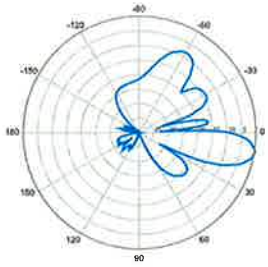
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz

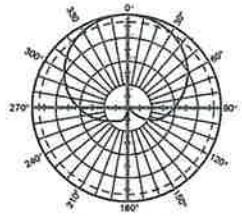
KATHREIN
SCALA DIVISION

742 213V01

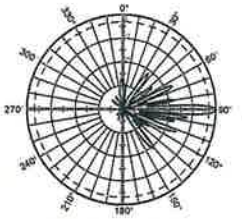
65° Panel Antenna

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° 18	2° 18	4° 16	6° T 15 dB	0° 18	2° 18	4° 17	6° T 16 dB	0° 18	2° 18	4° 18	6° T 18 dB

11271-B
936.3740/b

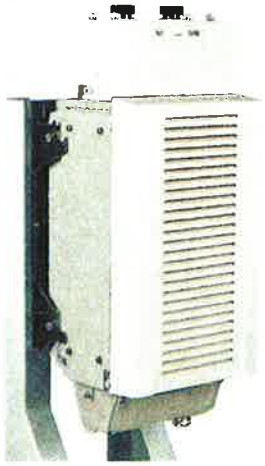
*Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

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

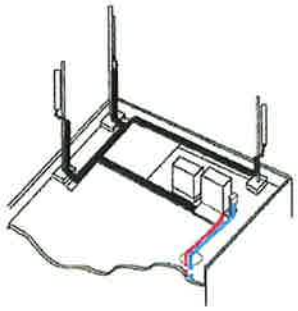
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

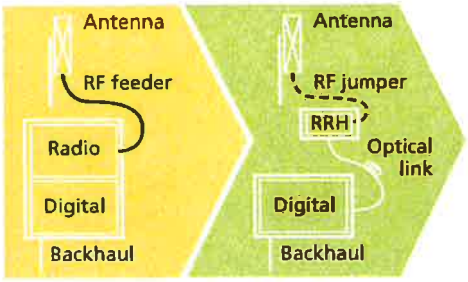
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

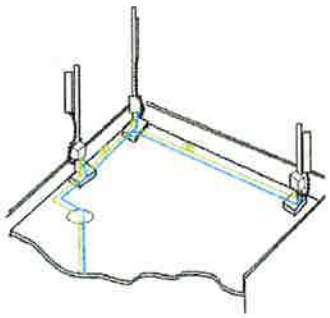
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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

CPG2809100912 (09)

Alcatel·Lucent

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Mechanical Properties			
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
Electrical Properties			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	.068 (0.205)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Fiber Optic Properties			
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
DC Power / Wire Properties			
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Operation			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

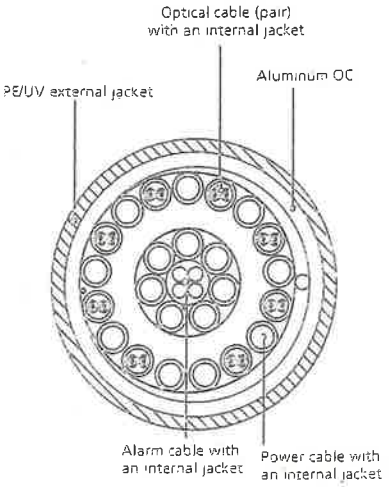


Figure 2: Construction Detail

- This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Enfield								
Tower Height: 160Ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	2	565	160	0.0159	880	0.5867	2.71%	
*AT&T UMTS	2	875	160	0.0246	1900	1.0000	2.46%	
*AT&T GSM	1	283	160	0.0040	880	0.5867	0.68%	
*AT&T GSM	4	525	160	0.0295	1900	1.0000	2.95%	
*AT&T LTE	1	1375	160	0.0193	734	0.4893	3.95%	
*T-Mobile GSM/UMTS	2	12	117	0.0006	1950	1.0000	0.06%	
*T-Mobile UMTS	2	12	117	0.0006	2100	1.0000	0.06%	
*T-Mobile LTE	2	24	117	0.0013	2100	1.0000	0.13%	
*Clearwire	2	153	137	0.0059	2496	1.0000	0.59%	
*Clearwire	1	211	139	0.0039	11 GHz	1.0000	0.39%	
*MetroPCS CDMA	3	727	106	0.0698	2135	1.0000	6.98%	
*MetroPCS LTE	1	1200	106	0.0384	2130	1.0000	3.84%	
*Sprint CDMA/LTE	3	347.5	135	0.0206	1900	1.0000	2.06%	
*Sprint CDMA/LTE	1	195	135	0.0038	850	0.5667	0.68%	
*Sprint CDMA/LTE	2	195	135	0.0077	2500	1.0000	0.77%	
*Nextel	1	541.67	130	0.0115	851	0.5673	2.03%	
*XM Sat Radio	1	292.72	95	0.0117	2330	1.0000	1.17%	
*Page Net	1	510.47	110	0.0152	930	0.6200	2.45%	
Verizon	**11**	**408**	**149**	**0.0727**	**1970**	**1.0000**	**7.27%**	
Verizon	**9**	**386**	**149**	**0.0563**	**869**	**0.5793**	**9.71%**	
Verizon	**1**	**1750**	**149**	**0.0283**	**2145**	**1.0000**	**2.83%**	
Verizon	**1**	**1050**	**149**	**0.0170**	**698**	**0.4653**	**3.65%**	
								57.41%
* Source: Siting Council								

ATTACHMENT 3

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

Date: **April 10, 2014**

Steve Tuttle
Crown Castle
8 Parkmeadow Drive
Pittsford, NY 14534

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	NA
	Carrier Site Name:	Enfield
Crown Castle Designation:	**Crown Castle BU Number:**	806373
	Crown Castle Site Name:	HRT 101 943232
	Crown Castle JDE Job Number:	268251
	Crown Castle Work Order Number:	739836
	Crown Castle Application Number:	210604 Rev. 0
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-1266-R3
Site Data:	**4 Oliver Road, ENFIELD, Hartford County, CT** **Latitude *41° 57' 36.2"*, Longitude *-72° 35' 32.3"*** **160 Foot - Monopole Tower**	

Dear Steve Tuttle,

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 633295, in accordance with application 210604, 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 80 mph with no ice, 37.6 mph with 1 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:

Morgan Scroggy, E.I.
Structural Designer

tnxTower Report - version 6.1.4.1

APR 1 0 2014

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 160 ft Monopole tower designed by VALMONT in November of 1991. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-E.

The tower has been modified per reinforcement drawings prepared by PJF, in July of 2012. The modification consists of a 10-ft shaft extension, shaft reinforcing from 0' to 121'-3", and (3) post installed anchors and brackets.

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 80 mph with no ice, 37.6 mph with 1 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
149.0	149.0	3	alcatel lucent	RRH2x40-AWS	1	1-5/8	-
		1	antel	BXA-70063/6CF w/ Mount Pipe			
		3	kathrein	742 213 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
158.0	163.0	3	andrew	SBNH-1D6565C w/ Mount Pipe	1 2 12	3/8 3/4 1-5/8	1
		3	ericsson	RRUS-11			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6		LGP13519			
		6		LGP21401			
		1	raycap	DC6-48-60-18-8F			
	158.0	1	tower mounts	Platform Mount [LP 303-1]			
149.0	149.0	1	antel	BXA-70063/6CFx4 w/ Mount Pipe	-	-	3
		1	antel	BXA-185063/8CF w/ Mount Pipe	12	7/8	1
		2	antel	BXA-185090/8CFx2 w/ Mount Pipe			
		1	antel	BXA-70063/6CFx4 w/ Mount Pipe			
		1	antel	BXA-70063/6CFx6 w/ Mount Pipe			
		2	antel	LPA-80063/4CF w/ Mount Pipe			
		4	antel	LPA-80080/4CF w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 602-1]			
137.0	138.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz	-	-	1
	137.0	1	tower mounts	Side Arm Mount [SO 102-3]			
	135.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
135.0	139.0	1	andrew	VHLP2.5-11	-	-	1
		1	dragonwave	HORIZON COMPACT			
	135.0	3	alcatel lucent	TD-RRH8x20-25	1	5/8	2
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		3	argus technologies	LLPX310R-V1 w/ Mount Pipe	3 6 3	1-1/4 1/4 1/2	1
		1	motorola	TIMING 2000			
		1	rfs celwave	APXV9ERR18-C-A20 w/ Mount Pipe			
		2	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	samsung telecom	WIMAX DAP HEAD			
		1	tower mounts	Platform Mount [LP 602-1]			
126.0	127.0	9	decibel	DB844H90E-XY w/ Mount Pipe	9	7/8	3
	126.0	1	tower mounts	T-Arm Mount [TA 901-3]			
116.0	117.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1	1-5/8	2
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
	116.0	1	tower mounts	Side Arm Mount [SO 702-3]			
		-	-	-	6 6	1-5/8 1-1/4	1
106.0	108.0	3	andrew	ATM200-A20	1 6	5/16 7/8	1
		3	andrew	HBX-6516DS-VTM w/ Mount Pipe			
	106.0	1	tower mounts	T-Arm Mount [TA 602-3]			
50.0	50.0	1	symmetricom	58532A	1	1/2	2
		1	tower mounts	Platform Mount [LP 301-1]			
47.0	48.0	1	lucent	KS24019-L112A	1	1/2	1
	47.0	1	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed, Not Included in the SA

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH Engineering 07/26/2007	821582	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	SAC Engineering, Inc. 11/16/1991	821581	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont 11/09/1991	822743	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37512-1571 BP, 07/24/2012	3277409	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) Monopole was fabricated and installed in accordance with the manufacturer's specifications.
2) Monopole has been properly maintained in accordance with manufacturer's specifications.
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	160 - 150.5	Pole	TP20x20x0.25	1	-2.13	434.22	27.8	Pass
L2	150.5 - 150	Pole	TP20.3x20x0.25	2	-2.16	440.81	28.2	Pass
L3	150 - 120	Pole	TP26.4495x20.3x0.25	3	-8.15	1096.44	87.7	Pass
L4	120 - 111.75	Pole	TP28.1407x26.4495x0.3593	4	-9.93	1614.78	75.9	Pass
L5	111.75 - 97.1667	Pole	TP31.13x28.1407x0.3876	5	-12.42	1854.26	82.7	Pass
L6	97.1667 - 75	Pole	TP35.1757x29.364x0.4931	6	-18.97	2762.15	85.9	Pass
L7	75 - 49.0833	Pole	TP40.49x35.1757x0.4792	7	-23.99	3011.45	96.3	Pass
L8	49.0833 - 37.75	Pole	TP42.0625x38.3183x0.5349	8	-31.81	3603.58	94.7	Pass
L9	37.75 - 0	Pole	TP49.8x42.0625x0.5589	9	-44.71	4606.70	93.4	Pass
							Summary	
						Pole (L7)	96.3	Pass
						RATING =	**96.3**	**Pass**

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1, 2	Anchor Rods	0	94.7	Pass
1	Base Plate	0	64.4	Pass
1	Base Foundation – Steel	0	68.2	Pass
1, 3	Base Foundation Soil Interaction	0	86.0	Pass
1	Extension Connection	150	21.5	Pass

Structure Rating (max from all components) =	**96.3%**

Notes:

1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Worst case scenario between existing and post installed anchors.
3) 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.

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 Hartford County, Connecticut.
2) Basic wind speed of 80.00 mph.
3) Nominal ice thickness of 1.0000 in.
4) Ice thickness is considered to increase with height.
5) Ice density of 56.00 pcf.
6) A wind speed of 37.60 mph is used in combination with ice.
7) Temperature drop of 50.00 °F.
8) Deflections calculated using a wind speed of 50.00 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	160.0000-150.5000	9.5000	0.00	Round	20.0000	20.0000	0.2500		A53-B-35 (35 ksi)
L2	150.5000-150.0000	0.5000	0.00	Round	20.0000	20.3000	0.2500		A53-B-35 (35 ksi)
L3	150.0000-120.0000	30.0000	0.00	12	20.3000	26.4495	0.2500	1.0000	A572-65 (65 ksi)
L4	120.0000-111.7500	8.2500	0.00	12	26.4495	28.1407	0.3593	1.4373	Reinf 62.81 ksi (63 ksi)
L5	111.7500-97.1667	14.5833	4.83	12	28.1407	31.1300	0.3876	1.5506	Reinf 62.43 ksi (62 ksi)
L6	97.1667-75.0000	27.0000	0.00	12	29.3640	35.1757	0.4931	1.9725	Reinf 62.71 ksi (63 ksi)
L7	75.0000-49.0833	25.9167	5.92	12	35.1757	40.4900	0.4792	1.9170	Reinf 62.89 ksi (63 ksi)
L8	49.0833-37.7500	17.2500	0.00	12	38.3183	42.0625	0.5349	2.1397	Reinf 62.99 ksi (63 ksi)
L9	37.7500-0.0000	37.7500		12	42.0625	49.8000	0.5589	2.2355	Reinf 65.00 ksi (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	20.0000	15.5116	756.4335	6.9832	10.0000	75.6434	1512.8671	7.7512	0.0000	0
	20.0000	15.5116	756.4335	6.9832	10.0000	75.6434	1512.8671	7.7512	0.0000	0
L2	20.0000	15.5116	756.4335	6.9832	10.0000	75.6434	1512.8671	7.7512	0.0000	0
	20.3000	15.7472	791.4264	7.0893	10.1500	77.9730	1582.8528	7.8689	0.0000	0
L3	21.0161	16.1403	828.1804	7.1779	10.5154	78.7588	1678.1181	7.9437	4.7704	19.082
	27.3826	21.0906	1847.8314	9.3794	13.7009	134.8698	3744.2073	10.3802	6.4185	25.674
L4	27.3826	30.1875	2622.8142	9.3403	13.7009	191.4343	5314.5326	14.8574	6.1255	17.047
	29.1333	32.1442	3166.6053	9.9457	14.5769	217.2351	6416.4008	15.8204	6.5787	18.308
L5	29.1333	34.6413	3405.6553	9.9356	14.5769	233.6344	6900.7809	17.0494	6.5028	16.775
	32.2281	38.3726	4628.9450	11.0058	16.1253	287.0603	9379.4975	18.8858	7.3040	18.842
L6	31.4769	45.8434	4877.3224	10.3358	15.2105	320.6542	9882.7774	22.5627	6.5480	13.278
	36.4165	55.0717	8455.4346	12.4163	18.2210	464.0490	17133.002 8	27.1046	8.1055	16.437
L7	36.4165	53.5419	8227.1470	12.4213	18.2210	451.5201	16670.430 3	26.3517	8.1427	16.991
	41.9183	61.7427	12616.104 7	14.3239	20.9738	601.5168	25563.648 5	30.3879	9.5670	19.963
L8	40.9996	65.0797	11858.567 1	13.5264	19.8489	597.4430	24028.671 9	32.0302	8.8357	16.518
	43.5463	71.5288	15744.911 2	14.8669	21.7884	722.6292	31903.458 7	35.2043	9.8392	18.394
L9	43.5463	74.6883	16421.414 1	14.8583	21.7884	753.6780	33274.237 1	36.7593	9.7750	17.491
	51.5568	88.6124	27424.369 5	17.6283	25.7964	1063.1084	55569.207 7	43.6123	11.8486	21.201

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
2" Rigid Conduit (1-1/2" Thick-wall Conduit)	C	No	CaAa (Out Of Face)	158.0000 - 0.0000	1	No Ice	0.0000	2.60
						1/2" Ice	0.0000	4.07
						1" Ice	0.0000	6.14
						2" Ice	0.0000	12.13
						4" Ice	0.0000	31.43
FB-L98B-002-75000(3/8")	C	No	CaAa (Out Of Face)	158.0000 - 0.0000	1	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.60
						1" Ice	0.0000	1.76
						2" Ice	0.0000	5.91
						4" Ice	0.0000	21.53
WR-VG86ST-BRD(3/4)	C	No	CaAa (Out Of Face)	158.0000 - 0.0000	2	No Ice	0.0000	0.59
						1/2" Ice	0.0000	1.37
						1" Ice	0.0000	2.76
						2" Ice	0.0000	7.37
						4" Ice	0.0000	23.92
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	158.0000 - 0.0000	3	No Ice	0.1980	0.82
						1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46
						2" Ice	0.5980	10.54
						4" Ice	0.9980	30.04
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	158.0000 - 0.0000	9	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.54
						4" Ice	0.0000	30.04
**								
LDF5-50A(7/8")	C	No	Inside Pole	149.0000 - 0.0000	12	No Ice	0.0000	0.33
						1/2" Ice	0.0000	0.33
						1" Ice	0.0000	0.33
						2" Ice	0.0000	0.33
						4" Ice	0.0000	0.33
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	149.0000 - 0.0000	1	No Ice	0.1980	1.30
						1/2" Ice	0.2980	2.81
						1" Ice	0.3980	4.94

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						2" Ice	0.5980	11.02
						4" Ice	0.9980	30.52
**								
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	135.0000 - 0.0000	3	No Ice	0.0000	0.14
						1/2" Ice	0.0000	0.76
						1" Ice	0.0000	2.00
						2" Ice	0.0000	6.30
						4" Ice	0.0000	22.23
LDF1-50A(1/4")	C	No	Inside Pole	135.0000 - 0.0000	6	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.06
						1" Ice	0.0000	0.06
						2" Ice	0.0000	0.06
						4" Ice	0.0000	0.06
2" Conduit	C	No	CaAa (Out Of Face)	135.0000 - 0.0000	1	No Ice	0.2000	0.95
						1/2" Ice	0.3000	2.48
						1" Ice	0.4000	4.62
						2" Ice	0.6000	10.72
						4" Ice	1.0000	30.27
HB058-M12-XXXF(5/8")	C	No	CaAa (Out Of Face)	135.0000 - 0.0000	1	No Ice	0.0000	0.24
						1/2" Ice	0.0000	1.06
						1" Ice	0.0000	2.49
						2" Ice	0.0000	7.18
						4" Ice	0.0000	23.89
HB114-1-08U4-M5J(1 1/4")	C	No	Inside Pole	135.0000 - 0.0000	3	No Ice	0.0000	1.08
						1/2" Ice	0.0000	1.08
						1" Ice	0.0000	1.08
						2" Ice	0.0000	1.08
						4" Ice	0.0000	1.08
**								
**								
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	116.0000 - 0.0000	6	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
						2" Ice	0.0000	10.54
						4" Ice	0.0000	30.04
LDF6-50A(1-1/4")	C	No	CaAa (Out Of Face)	116.0000 - 0.0000	6	No Ice	0.0000	0.66
						1/2" Ice	0.0000	1.91
						1" Ice	0.0000	3.78
						2" Ice	0.0000	9.33
						4" Ice	0.0000	27.78
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	C	No	CaAa (Out Of Face)	116.0000 - 0.0000	1	No Ice	0.0000	1.07
						1/2" Ice	0.0000	2.37
						1" Ice	0.0000	4.28
						2" Ice	0.0000	9.93
						4" Ice	0.0000	28.56
**								
FXL 780 PE(7/8)	C	No	CaAa (Out Of Face)	106.0000 - 0.0000	6	No Ice	0.0000	0.25
						1/2" Ice	0.0000	1.22
						1" Ice	0.0000	2.80
						2" Ice	0.0000	7.80
						4" Ice	0.0000	25.12
ATCB-B01(5/16)	C	No	CaAa (Out Of Face)	106.0000 - 0.0000	1	No Ice	0.0000	0.07
						1/2" Ice	0.0000	0.57
						1" Ice	0.0000	1.68
						2" Ice	0.0000	5.73
						4" Ice	0.0000	21.16
**								
FLC 12-50J(1/2")	C	No	CaAa (Out Of Face)	50.0000 - 0.0000	1	No Ice	0.0000	0.17
						1/2" Ice	0.0000	0.87
						1" Ice	0.0000	2.17
						2" Ice	0.0000	6.62
						4" Ice	0.0000	22.85
**								
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	47.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.84
						1" Ice	0.0000	2.14
						2" Ice	0.0000	6.58
						4" Ice	0.0000	22.78

****

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	113.5000 - 0.0000	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00
						2" Ice	0.6111	0.00
						4" Ice	1.0556	0.00
3/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	121.2500 - 113.5000	1	No Ice	0.1250	0.00
						1/2" Ice	0.2361	0.00
						1" Ice	0.3472	0.00
						2" Ice	0.5694	0.00
						4" Ice	1.0139	0.00

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
SBNH-1D6565C w/ Mount Pipe	A	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice	11.5561	9.7151	0.10
						1/2" Ice	12.2227	11.1857	0.19
						1" Ice	12.8929	12.5942	0.28
						2" Ice	14.2911	14.8689	0.51
						4" Ice	17.4280	19.6184	1.15
SBNH-1D6565C w/ Mount Pipe	B	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice	11.5561	9.7151	0.10
						1/2" Ice	12.2227	11.1857	0.19
						1" Ice	12.8929	12.5942	0.28
						2" Ice	14.2911	14.8689	0.51
						4" Ice	17.4280	19.6184	1.15
SBNH-1D6565C w/ Mount Pipe	C	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice	11.5561	9.7151	0.10
						1/2" Ice	12.2227	11.1857	0.19
						1" Ice	12.8929	12.5942	0.28
						2" Ice	14.2911	14.8689	0.51
						4" Ice	17.4280	19.6184	1.15
RRUS-11	A	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice	3.2486	1.3726	0.05
						1/2" Ice	3.4905	1.5510	0.07
						1" Ice	3.7411	1.7380	0.09
						2" Ice	4.2682	2.1381	0.15
						4" Ice	5.4260	3.0418	0.31
RRUS-11	B	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice	3.2486	1.3726	0.05
						1/2" Ice	3.4905	1.5510	0.07
						1" Ice	3.7411	1.7380	0.09
						2" Ice	4.2682	2.1381	0.15
						4" Ice	5.4260	3.0418	0.31
RRUS-11	C	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice	3.2486	1.3726	0.05
						1/2" Ice	3.4905	1.5510	0.07
						1" Ice	3.7411	1.7380	0.09
						2" Ice	4.2682	2.1381	0.15
						4" Ice	5.4260	3.0418	0.31
DC6-48-60-18-8F	A	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice	2.5667	2.5667	0.02
						1/2" Ice	2.7978	2.7978	0.04
						1" Ice	3.0377	3.0377	0.07
						2" Ice	3.5432	3.5432	0.13
						4" Ice	4.6580	4.6580	0.30
(2) 7770.00 w/ Mount Pipe	A	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice	6.1194	4.2543	0.06
						1/2" Ice	6.6258	5.0137	0.10
						1" Ice	7.1283	5.7109	0.16
						2" Ice	8.1643	7.1553	0.29
						4" Ice	10.3599	10.4117	0.66

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			
(2) 7770.00 w/ Mount Pipe	B	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	C	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.1194 6.6258 7.1283 8.1643 10.3599	4.2543 5.0137 5.7109 7.1553 10.4117	0.06 0.10 0.16 0.29 0.66
(2) LGP13519	A	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07
(2) LGP13519	B	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07
(2) LGP13519	C	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3379 0.4220 0.5147 0.7260 1.2523	0.2074 0.2804 0.3621 0.5513 1.0335	0.01 0.01 0.01 0.02 0.07
(2) LGP21401	A	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	B	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	C	From Face	4.0000 0.00 5.00	0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.2880 1.4453 1.6112 1.9690 2.7882	0.2326 0.3134 0.4028 0.6076 1.1210	0.01 0.02 0.03 0.05 0.14
Platform Mount [LP 303-1]	C	None		0.0000	158.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.6600 18.8700 23.0800 31.5000 48.3400	14.6600 18.8700 23.0800 31.5000 48.3400	1.25 1.48 1.71 2.18 3.10
***									
742 213 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.3729 5.9502 6.5014 7.6106 9.9329	4.6203 6.0004 6.9816 8.8524 12.7940	0.05 0.09 0.15 0.28 0.68
742 213 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice	5.3729 5.9502 6.5014	4.6203 6.0004 6.9816	0.05 0.09 0.15

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
						1" Ice	7.6106	8.8524	0.28
						2" Ice	9.9329	12.7940	0.68
						4" Ice			
742 213 w/ Mount Pipe	C	From Leg	4.0000	0.0000	149.0000	No Ice	5.3729	4.6203	0.05
			0.00			1/2"	5.9502	6.0004	0.09
			0.00			Ice	6.5014	6.9816	0.15
						1" Ice	7.6106	8.8524	0.28
						2" Ice	9.9329	12.7940	0.68
						4" Ice			
RRH2x40-AWS	A	From Leg	4.0000	0.0000	149.0000	No Ice	2.9764	1.5960	0.04
			0.00			1/2"	3.2363	1.8239	0.06
			0.00			Ice	3.5048	2.0605	0.08
						1" Ice	4.0678	2.5596	0.14
						2" Ice	5.2975	3.6614	0.29
						4" Ice			
RRH2x40-AWS	B	From Leg	4.0000	0.0000	149.0000	No Ice	2.9764	1.5960	0.04
			0.00			1/2"	3.2363	1.8239	0.06
			0.00			Ice	3.5048	2.0605	0.08
						1" Ice	4.0678	2.5596	0.14
						2" Ice	5.2975	3.6614	0.29
						4" Ice			
RRH2x40-AWS	C	From Leg	4.0000	0.0000	149.0000	No Ice	2.9764	1.5960	0.04
			0.00			1/2"	3.2363	1.8239	0.06
			0.00			Ice	3.5048	2.0605	0.08
						1" Ice	4.0678	2.5596	0.14
						2" Ice	5.2975	3.6614	0.29
						4" Ice			
DB-T1-6Z-8AB-0Z	A	From Leg	4.0000	0.0000	149.0000	No Ice	5.6000	2.3333	0.04
			0.00			1/2"	5.9154	2.5580	0.08
			0.00			Ice	6.2395	2.7914	0.12
						1" Ice	6.9136	3.2840	0.21
						2" Ice	8.3654	4.3728	0.45
						4" Ice			
(2) LPA-80063/4CF w/ Mount Pipe	A	From Face	4.0000	0.0000	149.0000	No Ice	7.2481	7.2599	0.04
			0.00			1/2"	7.7190	7.9574	0.10
			0.00			Ice	8.2003	8.6723	0.18
						1" Ice	9.1945	10.1556	0.34
						2" Ice	11.3199	13.3910	0.80
						4" Ice			
(2) LPA-80080/4CF w/ Mount Pipe	B	From Face	4.0000	0.0000	149.0000	No Ice	2.8561	7.2274	0.03
			0.00			1/2"	3.2195	7.9217	0.08
			0.00			Ice	3.5922	8.6338	0.13
						1" Ice	4.4498	10.1119	0.25
						2" Ice	6.3182	13.3391	0.61
						4" Ice			
(2) LPA-80080/4CF w/ Mount Pipe	C	From Face	4.0000	0.0000	149.0000	No Ice	2.8561	7.2274	0.03
			0.00			1/2"	3.2195	7.9217	0.08
			0.00			Ice	3.5922	8.6338	0.13
						1" Ice	4.4498	10.1119	0.25
						2" Ice	6.3182	13.3391	0.61
						4" Ice			
BXA-70063/6CFx6 w/ Mount Pipe	A	From Face	4.0000	0.0000	149.0000	No Ice	7.9686	5.3981	0.04
			0.00			1/2"	8.6091	6.5465	0.10
			0.00			Ice	9.2158	7.4089	0.17
						1" Ice	10.4591	9.1837	0.33
						2" Ice	13.0655	12.9333	0.79
						4" Ice			
BXA-70063/6CF w/ Mount Pipe	B	From Face	4.0000	0.0000	149.0000	No Ice	7.9795	5.4071	0.04
			0.00			1/2"	8.6208	6.5581	0.10
			0.00			Ice	9.2281	7.4216	0.17
						1" Ice	10.4727	9.1985	0.33
						2" Ice	13.0817	12.9523	0.79
						4" Ice			
BXA-70063/6CFx4 w/ Mount Pipe	C	From Face	4.0000	0.0000	149.0000	No Ice	7.9686	5.3981	0.04
			0.00			1/2"	8.6091	6.5465	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	9.2158	7.4089	0.17
						1" Ice	10.4591	9.1837	0.33
						2" Ice	13.0655	12.9333	0.79
						4" Ice			
BXA-185063/8CF w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.1811 3.5589 3.9627 4.8550 6.7735	2.9966 3.6145 4.2361 5.5293 8.4233	0.03 0.06 0.09 0.19 0.47
BXA-185090/8CFx2 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.1574 3.5312 3.9415 4.8273 6.7342	3.3303 3.9423 4.5633 5.8553 8.8407	0.03 0.06 0.10 0.19 0.49
BXA-185090/8CFx2 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.1574 3.5312 3.9415 4.8273 6.7342	3.3303 3.9423 4.5633 5.8553 8.8407	0.03 0.06 0.10 0.19 0.49
(2) FD9R6004/2C-3L	A	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	B	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	C	From Face	4.0000 0.00 0.00	0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.3665 0.4506 0.5433 0.7546 1.2808	0.0846 0.1362 0.1965 0.3430 0.7396	0.00 0.01 0.01 0.02 0.06
Platform Mount [LP 602-1]	C	None		0.0000	149.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	32.0300 38.7100 45.3900 58.7500 85.4700	32.0300 38.7100 45.3900 58.7500 85.4700	1.34 1.80 2.26 3.17 5.00
***									
LLPX310R-V1 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.0651 5.4798 5.9052 6.7881 8.7045	2.9834 3.5263 4.0859 5.3127 8.1308	0.05 0.08 0.13 0.23 0.54
LLPX310R-V1 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.0651 5.4798 5.9052 6.7881 8.7045	2.9834 3.5263 4.0859 5.3127 8.1308	0.05 0.08 0.13 0.23 0.54
LLPX310R-V1 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.0651 5.4798 5.9052 6.7881 8.7045	2.9834 3.5263 4.0859 5.3127 8.1308	0.05 0.08 0.13 0.23 0.54

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
WIMAX DAP HEAD	A	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.8044 1.9877 2.1795 2.5891 3.5121	0.7778 0.9182 1.0673 1.3914 2.1432	0.03 0.04 0.06 0.09 0.20
WIMAX DAP HEAD	B	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.8044 1.9877 2.1795 2.5891 3.5121	0.7778 0.9182 1.0673 1.3914 2.1432	0.03 0.04 0.06 0.09 0.20
WIMAX DAP HEAD	C	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.8044 1.9877 2.1795 2.5891 3.5121	0.7778 0.9182 1.0673 1.3914 2.1432	0.03 0.04 0.06 0.09 0.20
HORIZON COMPACT	C	From Face	4.0000 0.00 4.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.8409 0.9658 1.0993 1.3922 2.0819	0.4295 0.5249 0.6289 0.8629 1.4345	0.01 0.02 0.03 0.05 0.12
TIMING 2000	A	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.1258 0.1771 0.2370 0.3827 0.7778	0.1258 0.1771 0.2370 0.3827 0.7778	0.00 0.00 0.01 0.01 0.05
APXVSPP18-C-A20 w/ Mount Pipe	A	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.23 0.41 0.91
APXV9ERR18-C-A20 w/ Mount Pipe	B	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	7.4708 8.6564 9.5559 11.3884 15.5274	0.09 0.16 0.24 0.42 0.94
APXVSPP18-C-A20 w/ Mount Pipe	C	From Face	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.4975 9.1490 9.7672 11.0311 13.6786	6.9458 8.1266 9.0212 10.8440 14.8507	0.08 0.15 0.23 0.41 0.91
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.1342 7.6618 8.1830 9.2563 11.5262	4.9591 5.7544 6.4723 8.0099 11.4120	0.08 0.13 0.19 0.34 0.75
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.1342 7.6618 8.1830 9.2563 11.5262	4.9591 5.7544 6.4723 8.0099 11.4120	0.08 0.13 0.19 0.34 0.75
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	135.0000	No Ice 1/2" Ice 1" Ice 2" Ice	7.1342 7.6618 8.1830 9.2563 11.5262	4.9591 5.7544 6.4723 8.0099 11.4120	0.08 0.13 0.19 0.34 0.75

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			
TD-RRH8x20-25	A	From Leg	4.0000	0.0000	135.0000		No Ice	4.7198	1.7027	0.07
			0.00				1/2" Ice	5.0138	1.9196	0.10
			0.00				1" Ice	5.3165	2.1453	0.13
							2" Ice	5.9478	2.6224	0.20
							4" Ice	7.3141	3.6805	0.40
TD-RRH8x20-25	B	From Leg	4.0000	0.0000	135.0000		No Ice	4.7198	1.7027	0.07
			0.00				1/2" Ice	5.0138	1.9196	0.10
			0.00				1" Ice	5.3165	2.1453	0.13
							2" Ice	5.9478	2.6224	0.20
							4" Ice	7.3141	3.6805	0.40
TD-RRH8x20-25	C	From Leg	4.0000	0.0000	135.0000		No Ice	4.7198	1.7027	0.07
			0.00				1/2" Ice	5.0138	1.9196	0.10
			0.00				1" Ice	5.3165	2.1453	0.13
							2" Ice	5.9478	2.6224	0.20
							4" Ice	7.3141	3.6805	0.40
Platform Mount [LP 602-1]	C	None		0.0000	135.0000		No Ice	32.0300	32.0300	1.34
							1/2" Ice	38.7100	38.7100	1.80
							1" Ice	45.3900	45.3900	2.26
							2" Ice	58.7500	58.7500	3.17
							4" Ice	85.4700	85.4700	5.00
***										
800MHz 2X50W RRH W/FILTER	A	From Face	2.0000	0.0000	137.0000		No Ice	2.4014	2.2536	0.06
			0.00				1/2" Ice	2.6131	2.4602	0.09
			-2.00				1" Ice	2.8335	2.6753	0.11
							2" Ice	3.3002	3.1316	0.17
							4" Ice	4.3372	4.1479	0.34
800MHz 2X50W RRH W/FILTER	B	From Face	2.0000	0.0000	137.0000		No Ice	2.4014	2.2536	0.06
			0.00				1/2" Ice	2.6131	2.4602	0.09
			-2.00				1" Ice	2.8335	2.6753	0.11
							2" Ice	3.3002	3.1316	0.17
							4" Ice	4.3372	4.1479	0.34
800MHz 2X50W RRH W/FILTER	C	From Face	2.0000	0.0000	137.0000		No Ice	2.4014	2.2536	0.06
			0.00				1/2" Ice	2.6131	2.4602	0.09
			-2.00				1" Ice	2.8335	2.6753	0.11
							2" Ice	3.3002	3.1316	0.17
							4" Ice	4.3372	4.1479	0.34
PCS 1900MHz 4x45W-65MHz	A	From Face	2.0000	0.0000	137.0000		No Ice	2.7087	2.6111	0.06
			0.00				1/2" Ice	2.9477	2.8475	0.08
			1.00				1" Ice	3.1953	3.0925	0.11
							2" Ice	3.7164	3.6084	0.17
							4" Ice	4.8623	4.7439	0.35
PCS 1900MHz 4x45W-65MHz	B	From Face	2.0000	0.0000	137.0000		No Ice	2.7087	2.6111	0.06
			0.00				1/2" Ice	2.9477	2.8475	0.08
			1.00				1" Ice	3.1953	3.0925	0.11
							2" Ice	3.7164	3.6084	0.17
							4" Ice	4.8623	4.7439	0.35
PCS 1900MHz 4x45W-65MHz	C	From Face	2.0000	0.0000	137.0000		No Ice	2.7087	2.6111	0.06
			0.00				1/2" Ice	2.9477	2.8475	0.08
			1.00				1" Ice	3.1953	3.0925	0.11
							2" Ice	3.7164	3.6084	0.17
							4" Ice	4.8623	4.7439	0.35
Side Arm Mount [SO 102-3]	C	None		0.0000	137.0000		No Ice	3.0000	3.0000	0.08
							1/2" Ice	3.4800	3.4800	0.11
							1" Ice	3.9600	3.9600	0.14

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
						1" Ice	4.9200	4.9200	0.20
						2" Ice	6.8400	6.8400	0.32
						4" Ice			
***									
***									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	6.8253	5.6424	0.11
						1/2" Ice	7.3471	6.4800	0.17
						1" Ice	7.8631	7.2567	0.23
						2" Ice	8.9261	8.8640	0.38
						4" Ice	11.1755	12.2932	0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	6.8253	5.6424	0.11
						1/2" Ice	7.3471	6.4800	0.17
						1" Ice	7.8631	7.2567	0.23
						2" Ice	8.9261	8.8640	0.38
						4" Ice	11.1755	12.2932	0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	6.8253	5.6424	0.11
						1/2" Ice	7.3471	6.4800	0.17
						1" Ice	7.8631	7.2567	0.23
						2" Ice	8.9261	8.8640	0.38
						4" Ice	11.1755	12.2932	0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	6.8155	5.6334	0.11
						1/2" Ice	7.3373	6.4717	0.17
						1" Ice	7.8532	7.2478	0.23
						2" Ice	8.9160	8.8537	0.38
						4" Ice	11.1650	12.2804	0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	6.8155	5.6334	0.11
						1/2" Ice	7.3373	6.4717	0.17
						1" Ice	7.8532	7.2478	0.23
						2" Ice	8.9160	8.8537	0.38
						4" Ice	11.1650	12.2804	0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	6.8155	5.6334	0.11
						1/2" Ice	7.3373	6.4717	0.17
						1" Ice	7.8532	7.2478	0.23
						2" Ice	8.9160	8.8537	0.38
						4" Ice	11.1650	12.2804	0.81
KRY 112 144/1	A	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						1" Ice	0.5941	0.3511	0.02
						2" Ice	0.8145	0.5326	0.03
						4" Ice	1.3590	0.9992	0.08
KRY 112 144/1	B	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						1" Ice	0.5941	0.3511	0.02
						2" Ice	0.8145	0.5326	0.03
						4" Ice	1.3590	0.9992	0.08
KRY 112 144/1	C	From Face	4.0000 0.00 1.00	0.0000	116.0000	No Ice	0.4083	0.2042	0.01
						1/2" Ice	0.4969	0.2733	0.01
						1" Ice	0.5941	0.3511	0.02
						2" Ice	0.8145	0.5326	0.03
						4" Ice	1.3590	0.9992	0.08
Side Arm Mount [SO 702-3]	C	None		0.0000	116.0000	No Ice	3.2200	3.2200	0.08
						1/2" Ice	4.1500	4.1500	0.11
						1" Ice	5.0800	5.0800	0.15
						2" Ice	6.9400	6.9400	0.21
						4" Ice	10.6600	10.6600	0.34

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
***									
HBX-6516DS-VTM w/ Mount Pipe	A	From Face	4.0000 0.00 2.00	0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.5975 3.9981 4.4346 5.3677 7.3611	3.2406 3.9135 4.5638 5.9143 8.8773	0.03 0.06 0.10 0.20 0.50
HBX-6516DS-VTM w/ Mount Pipe	B	From Face	4.0000 0.00 2.00	0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.5975 3.9981 4.4346 5.3677 7.3611	3.2406 3.9135 4.5638 5.9143 8.8773	0.03 0.06 0.10 0.20 0.50
HBX-6516DS-VTM w/ Mount Pipe	C	From Face	4.0000 0.00 2.00	0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.5975 3.9981 4.4346 5.3677 7.3611	3.2406 3.9135 4.5638 5.9143 8.8773	0.03 0.06 0.10 0.20 0.50
ATM200-A20	A	From Face	4.0000 0.00 2.00	0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.2178 0.2921 0.3751 0.5669 1.0543	0.1633 0.2331 0.3115 0.4943 0.9636	0.00 0.00 0.01 0.02 0.06
ATM200-A20	B	From Face	4.0000 0.00 2.00	0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.2178 0.2921 0.3751 0.5669 1.0543	0.1633 0.2331 0.3115 0.4943 0.9636	0.00 0.00 0.01 0.02 0.06
ATM200-A20	C	From Face	4.0000 0.00 2.00	0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.2178 0.2921 0.3751 0.5669 1.0543	0.1633 0.2331 0.3115 0.4943 0.9636	0.00 0.00 0.01 0.02 0.06
T-Arm Mount [TA 602-3]	C	None		0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.5900 15.4400 19.2900 26.9900 42.3900	11.5900 15.4400 19.2900 26.9900 42.3900	0.77 0.99 1.21 1.64 2.50
2.375" OD x 6' Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4250 1.9250 2.2939 3.0596 4.7022	1.4250 1.9250 2.2939 3.0596 4.7022	0.03 0.04 0.05 0.09 0.23
2.375" OD x 6' Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4250 1.9250 2.2939 3.0596 4.7022	1.4250 1.9250 2.2939 3.0596 4.7022	0.03 0.04 0.05 0.09 0.23
2.375" OD x 6' Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	106.0000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.4250 1.9250 2.2939 3.0596 4.7022	1.4250 1.9250 2.2939 3.0596 4.7022	0.03 0.04 0.05 0.09 0.23
***									
58532A	C	From Face	2.0000 0.00 0.00	0.0000	50.0000	No Ice 1/2" Ice	0.2209 0.2897 0.3672	0.2209 0.2897 0.3672	0.00 0.00 0.01

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
						1" Ice	0.5481	0.5481	0.02
						2" Ice	1.0137	1.0137	0.06
						4" Ice			
Platform Mount [LP 301-1]	C	None		0.0000	50.0000	No Ice	30.1000	30.1000	1.59
						1/2" Ice	40.8000	40.8000	2.03
						1" Ice	51.5000	51.5000	2.47
						2" Ice	72.9000	72.9000	3.35
						4" Ice	115.7000	115.7000	5.11
***									
KS24019-L112A	B	From Face	2.0000 0.00 1.00	0.0000	47.0000	No Ice	0.1556	0.1556	0.01
						1/2" Ice	0.2247	0.2247	0.01
						1" Ice	0.3025	0.3025	0.01
						2" Ice	0.4840	0.4840	0.02
						4" Ice	0.9506	0.9506	0.06
Side Arm Mount [SO 701-1]	B	None		0.0000	47.0000	No Ice	0.8500	1.6700	0.07
						1/2" Ice	1.1400	2.3400	0.08
						1" Ice	1.4300	3.0100	0.09
						2" Ice	2.0100	4.3500	0.12
						4" Ice	3.1700	7.0300	0.18
**********									

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
VHLP2.5-11	C	Paraboloid w/Shroud (HP)	From Leg	4.0000 0.00 4.00	-27.0000		135.0000	2.9167	No Ice	6.6800	0.05
									1/2" Ice	7.0700	0.08
									1" Ice	7.4600	0.12
									2" Ice	8.2300	0.19
									4" Ice	9.7800	0.34

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 160.0000-150.5000	155.2500	1.556	25.50	15.833	A	0.000	15.833	15.833	100.00	0.000	0.000
					B	0.000	15.833		100.00	0.000	0.000
					C	0.000	15.833		100.00	0.000	4.455
L2 150.5000-150.0000	150.2494	1.542	25.26	0.840	A	0.000	0.840	0.840	100.00	0.000	0.000
					B	0.000	0.840		100.00	0.000	0.000
					C	0.000	0.840		100.00	0.000	0.297
L3 150.0000-120.0000	134.3423	1.493	24.47	58.437	A	0.000	58.437	58.437	100.00	0.000	0.000
					B	0.000	58.437		100.00	0.000	0.000
					C	0.000	58.437		100.00	0.000	26.718
L4 120.0000-111.7500	115.8324	1.432	23.45	18.765	A	0.000	18.765	18.765	100.00	0.000	0.000
					B	0.000	18.765		100.00	0.000	0.000
					C	0.000	18.765		100.00	0.000	9.288
L5 111.7500-97.1667	104.3358	1.389	22.76	36.015	A	0.000	36.015	36.015	100.00	0.000	0.000
					B	0.000	36.015		100.00	0.000	0.000
					C	0.000	36.015		100.00	0.000	16.897

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
L6 97.1667-75.0000	85.8146	1.314	21.53	60.571	A	0.000	60.571	60.571	100.00	0.000	0.000
					B	0.000	60.571		100.00	0.000	0.000
					C	0.000	60.571		100.00	0.000	25.684
L7 75.0000-49.0833	61.7383	1.196	19.60	81.709	A	0.000	81.709	81.709	100.00	0.000	0.000
					B	0.000	81.709		100.00	0.000	0.000
					C	0.000	81.709		100.00	0.000	30.029
L8 49.0833-37.7500	43.3598	1.081	17.71	38.564	A	0.000	38.564	38.564	100.00	0.000	0.000
					B	0.000	38.564		100.00	0.000	0.000
					C	0.000	38.564		100.00	0.000	13.132
L9 37.7500-0.0000	18.3451	1	16.38	144.492	A	0.000	144.492	144.492	100.00	0.000	0.000
					B	0.000	144.492		100.00	0.000	0.000
					C	0.000	144.492		100.00	0.000	43.740

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 160.0000-150.5000	155.2500	1.556	5.63	1.2042	17.740	A	0.000	17.740	17.740	100.00	0.000	0.000
						B	0.000	17.740		100.00	0.000	0.000
						C	0.000	17.740		100.00	0.000	9.874
L2 150.5000-150.0000	150.2494	1.542	5.58	1.1995	0.940	A	0.000	0.940	0.940	100.00	0.000	0.000
						B	0.000	0.940		100.00	0.000	0.000
						C	0.000	0.940		100.00	0.000	0.657
L3 150.0000-120.0000	134.3423	1.493	5.41	1.1835	64.354	A	0.000	64.354	64.354	100.00	0.000	0.000
						B	0.000	64.354		100.00	0.000	0.000
						C	0.000	64.354		100.00	0.000	58.765
L4 120.0000-111.7500	115.8324	1.432	5.18	1.1626	20.364	A	0.000	20.364	20.364	100.00	0.000	0.000
						B	0.000	20.364		100.00	0.000	0.000
						C	0.000	20.364		100.00	0.000	21.011
L5 111.7500-97.1667	104.3358	1.389	5.03	1.1481	38.806	A	0.000	38.806	38.806	100.00	0.000	0.000
						B	0.000	38.806		100.00	0.000	0.000
						C	0.000	38.806		100.00	0.000	37.362
L6 97.1667-75.0000	85.8146	1.314	4.76	1.1215	64.812	A	0.000	64.812	64.812	100.00	0.000	0.000
						B	0.000	64.812		100.00	0.000	0.000
						C	0.000	64.812		100.00	0.000	56.790
L7 75.0000-49.0833	61.7383	1.196	4.33	1.0781	86.365	A	0.000	86.365	86.365	100.00	0.000	0.000
						B	0.000	86.365		100.00	0.000	0.000
						C	0.000	86.365		100.00	0.000	64.178
L8 49.0833-37.7500	43.3598	1.081	3.91	1.0333	40.600	A	0.000	40.600	40.600	100.00	0.000	0.000
						B	0.000	40.600		100.00	0.000	0.000
						C	0.000	40.600		100.00	0.000	28.065
L9 37.7500-0.0000	18.3451	1	3.62	1.0000	150.784	A	0.000	150.784	150.784	100.00	0.000	0.000
						B	0.000	150.784		100.00	0.000	0.000
						C	0.000	150.784		100.00	0.000	89.879

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 160.0000-150.5000	155.2500	1.556	9.96	15.833	A	0.000	15.833	15.833	100.00	0.000	0.000
					B	0.000	15.833		100.00	0.000	0.000
					C	0.000	15.833		100.00	0.000	4.455
L2 150.5000-150.0000	150.2494	1.542	9.87	0.840	A	0.000	0.840	0.840	100.00	0.000	0.000
					B	0.000	0.840		100.00	0.000	0.000
					C	0.000	0.840		100.00	0.000	0.297
L3 150.0000-	134.3423	1.493	9.56	58.437	A	0.000	58.437	58.437	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
120.0000					B	0.000	58.437		100.00	0.000	0.000
					C	0.000	58.437		100.00	0.000	26.718
L4 120.0000-111.7500	115.8324	1.432	9.16	18.765	A	0.000	18.765	18.765	100.00	0.000	0.000
					B	0.000	18.765		100.00	0.000	0.000
					C	0.000	18.765		100.00	0.000	9.288
L5 111.7500-97.1667	104.3358	1.389	8.89	36.015	A	0.000	36.015	36.015	100.00	0.000	0.000
					B	0.000	36.015		100.00	0.000	0.000
					C	0.000	36.015		100.00	0.000	16.897
L6 97.1667-75.0000	85.8146	1.314	8.41	60.571	A	0.000	60.571	60.571	100.00	0.000	0.000
					B	0.000	60.571		100.00	0.000	0.000
					C	0.000	60.571		100.00	0.000	25.684
L7 75.0000-49.0833	61.7383	1.196	7.65	81.709	A	0.000	81.709	81.709	100.00	0.000	0.000
					B	0.000	81.709		100.00	0.000	0.000
					C	0.000	81.709		100.00	0.000	30.029
L8 49.0833-37.7500	43.3598	1.081	6.92	38.564	A	0.000	38.564	38.564	100.00	0.000	0.000
					B	0.000	38.564		100.00	0.000	0.000
					C	0.000	38.564		100.00	0.000	13.132
L9 37.7500-0.0000	18.3451	1	6.40	144.492	A	0.000	144.492	144.492	100.00	0.000	0.000
					B	0.000	144.492		100.00	0.000	0.000
					C	0.000	144.492		100.00	0.000	43.740

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
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 Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 150.5	52.449	37	3.0371	0.0081
L2	150.5 - 150	46.436	37	2.9983	0.0074
L3	150 - 120	46.122	37	2.9945	0.0074
L4	120 - 111.75	28.841	37	2.3913	0.0039
L5	111.75 - 97.1667	24.872	37	2.2018	0.0033
L6	102 - 75	20.608	37	1.9724	0.0027
L7	75 - 49.0833	10.860	37	1.4336	0.0017
L8	55 - 37.75	5.791	37	0.9886	0.0011
L9	37.75 - 0	2.687	37	0.6925	0.0007

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
158.0000	SBNH-1D6565C w/ Mount Pipe	37	51.178	3.0321	0.0084	13400
149.0000	742 213 w/ Mount Pipe	37	45.497	2.9858	0.0076	5871
139.0000	VHLP2.5-11	37	39.381	2.8354	0.0063	3434
137.0000	800MHz 2X50W RRH W/FILTER	37	38.195	2.7945	0.0061	3182
135.0000	LLPX310R-V1 w/ Mount Pipe	37	37.025	2.7510	0.0058	2965
116.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	37	26.869	2.2992	0.0037	2174
106.0000	HBX-6516DS-VTM w/ Mount Pipe	37	22.308	2.0653	0.0030	2867
50.0000	58532A	37	4.763	0.8951	0.0010	3070
47.0000	KS24019-L112A	37	4.192	0.8435	0.0009	2805

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 150.5	133.262	12	7.7266	0.0210
L2	150.5 - 150	118.032	12	7.6284	0.0193
L3	150 - 120	117.238	12	7.6187	0.0191
L4	120 - 111.75	73.414	12	6.0900	0.0101
L5	111.75 - 97.1667	63.329	12	5.6089	0.0085
L6	102 - 75	52.490	12	5.0258	0.0069
L7	75 - 49.0833	27.685	12	3.6547	0.0043
L8	55 - 37.75	14.769	12	2.5212	0.0027
L9	37.75 - 0	6.855	12	1.7664	0.0018

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
158.0000	SBNH-1D6565C w/ Mount Pipe	12	130.043	7.7140	0.0212	5455
149.0000	742 213 w/ Mount Pipe	12	115.653	7.5967	0.0192	2401
139.0000	VHLP2.5-11	12	100.154	7.2158	0.0160	1399
137.0000	800MHz 2X50W RRH W/FILTER	12	97.148	7.1122	0.0154	1295
135.0000	LLPX310R-V1 w/ Mount Pipe	12	94.180	7.0021	0.0147	1205
116.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	12	68.406	5.8562	0.0093	874
106.0000	HBX-6516DS-VTM w/ Mount Pipe	12	56.813	5.2618	0.0076	1147
50.0000	58532A	12	12.147	2.2830	0.0024	1209
47.0000	KS24019-L112A	12	10.691	2.1515	0.0023	1104

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	160 - 150.5 (1)	TP20x20x0.25	9.5000	0.0000	0.0	21.000	15.5116	-2.13	325.74	0.007
L2	150.5 - 150 (2)	TP20.3x20x0.25	0.5000	0.0000	0.0	21.000	15.7472	-2.16	330.69	0.007
L3	150 - 120 (3)	TP26.4495x20.3x0.25	30.0000	0.0000	0.0	39.000	21.0906	-8.15	822.53	0.010
L4	120 - 111.75 (4)	TP28.1407x26.4495x0.3593	8.2500	0.0000	0.0	37.686	32.1442	-9.93	1211.39	0.008
L5	111.75 - 97.1667 (5)	TP31.13x28.1407x0.3876	14.5833	0.0000	0.0	37.458	37.1360	-12.42	1391.04	0.009
L6	97.1667 - 75 (6)	TP35.1757x29.364x0.4931	27.0000	0.0000	0.0	37.626	55.0717	-18.97	2072.13	0.009
L7	75 - 49.0833 (7)	TP40.49x35.1757x0.4792	25.9167	0.0000	0.0	37.734	59.8705	-23.99	2259.15	0.011
L8	49.0833 - 37.75 (8)	TP42.0625x38.3183x0.5349	17.2500	0.0000	0.0	37.794	71.5288	-31.81	2703.36	0.012
L9	37.75 - 0 (9)	TP49.8x42.0625x0.5589	37.7500	0.0000	0.0	39.000	88.6124	-44.71	3455.89	0.013

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	160 - 150.5 (1)	TP20x20x0.25	52.91	8.394	23.100	0.363	0.00	0.000	23.100	0.000
L2	150.5 - 150 (2)	TP20.3x20x0.25	55.42	8.529	23.100	0.369	0.00	0.000	23.100	0.000
L3	150 - 120 (3)	TP26.4495x20.3x0.25	507.48	45.153	39.000	1.158	0.00	0.000	39.000	0.000
L4	120 - 111.75 (4)	TP28.1407x26.4495x0.3593	684.18	37.794	37.686	1.003	0.00	0.000	37.686	0.000
L5	111.75 - 97.1667 (5)	TP31.13x28.1407x0.3876	917.15	40.953	37.458	1.093	0.00	0.000	37.458	0.000
L6	97.1667 - 75 (6)	TP35.1757x29.364x0.4931	1651.37	42.703	37.626	1.135	0.00	0.000	37.626	0.000
L7	75 - 49.0833 (7)	TP40.49x35.1757x0.4792	2261.38	47.997	37.734	1.272	0.00	0.000	37.734	0.000
L8	49.0833 - 37.75 (8)	TP42.0625x38.3183x0.5349	2845.29	47.249	37.794	1.250	0.00	0.000	37.794	0.000
L9	37.75 - 0 (9)	TP49.8x42.0625x0.5589	4257.52	48.057	39.000	1.232	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	160 - 150.5 (1)	TP20x20x0.25	5.00	0.322	14.000	0.046	0.26	0.020	14.000	0.001
L2	150.5 - 150 (2)	TP20.3x20x0.25	5.03	0.320	14.000	0.046	0.25	0.019	14.000	0.001
L3	150 - 120 (3)	TP26.4495x20.3x0.25	19.77	0.937	26.000	0.073	0.55	0.023	26.000	0.001
L4	120 - 111.75 (4)	TP28.1407x26.4495x0.3593	22.65	0.705	25.124	0.057	0.64	0.017	25.124	0.001
L5	111.75 - 97.1667 (5)	TP31.13x28.1407x0.3876	25.16	0.678	24.972	0.055	0.75	0.016	24.972	0.001
L6	97.1667 - 75 (6)	TP35.1757x29.364x0.4931	29.16	0.530	25.084	0.043	1.09	0.013	25.084	0.001
L7	75 - 49.0833 (7)	TP40.49x35.1757x0.4792	31.85	0.532	25.156	0.043	1.35	0.013	25.156	0.001
L8	49.0833 -	TP42.0625x38.3183x0.53	35.26	0.493	25.196	0.040	1.59	0.012	25.196	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 $\frac{f_{vt}}{F_{vt}}$
	37.75 (8)	49								
L9	37.75 - 0 (9)	TP49.8x42.0625x0.5589	39.61	0.447	26.000	0.035	2.10	0.011	26.000	0.000

Pole Interaction Design Data

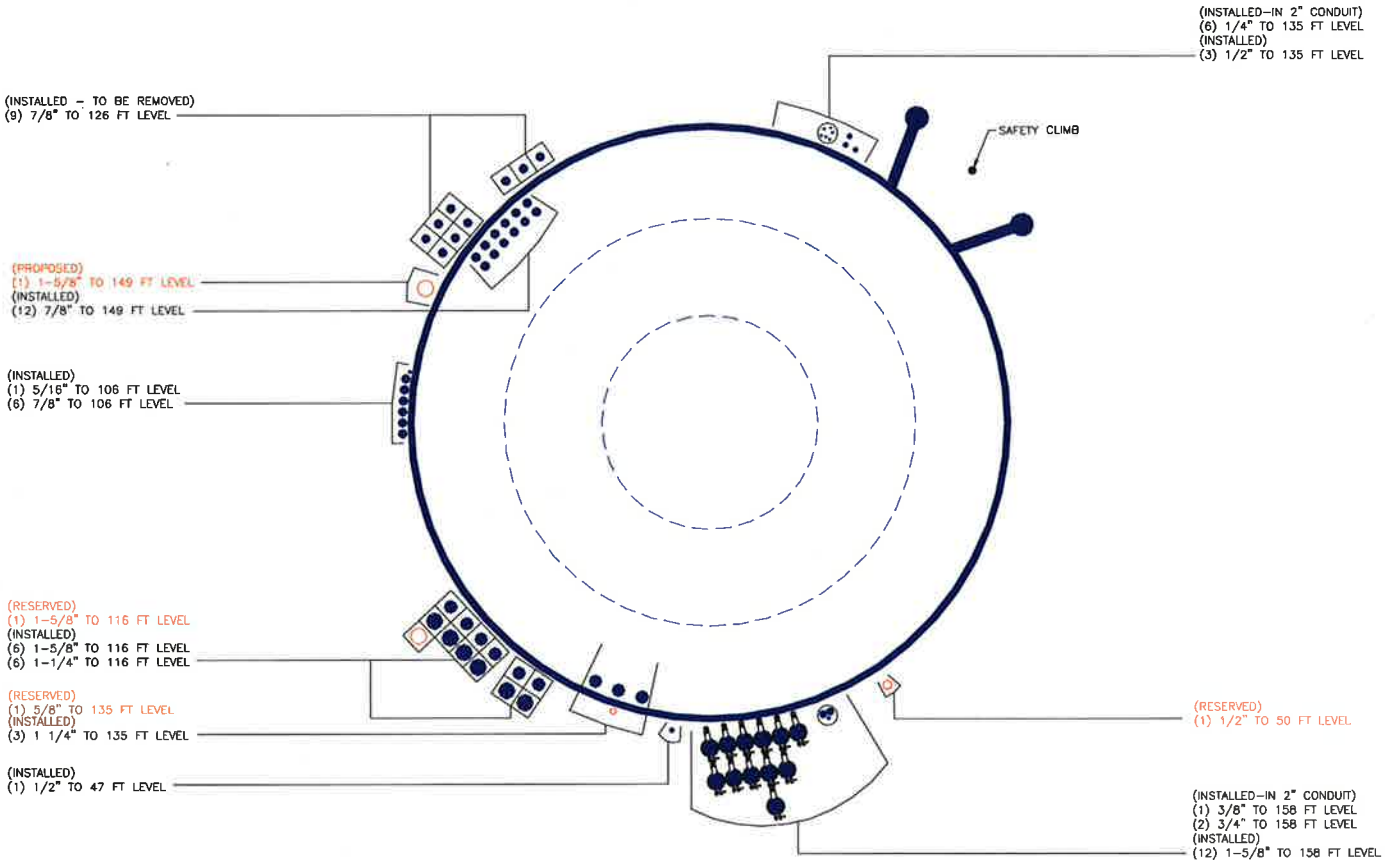
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	160 - 150.5 (1)	0.007	0.363	0.000	0.046	0.001	0.371 ✔	1.333	H1-3+VT ✔
L2	150.5 - 150 (2)	0.007	0.369	0.000	0.046	0.001	0.376 ✔	1.333	H1-3+VT ✔
L3	150 - 120 (3)	0.010	1.158	0.000	0.073	0.001	1.169 ✔	1.333	H1-3+VT ✔
L4	120 - 111.75 (4)	0.008	1.003	0.000	0.057	0.001	1.012 ✔	1.333	H1-3+VT ✔
L5	111.75 - 97.1667 (5)	0.009	1.093	0.000	0.055	0.001	1.103 ✔	1.333	H1-3+VT ✔
L6	97.1667 - 75 (6)	0.009	1.135	0.000	0.043	0.001	1.145 ✔	1.333	H1-3+VT ✔
L7	75 - 49.0833 (7)	0.011	1.272	0.000	0.043	0.001	1.283 ✔	1.333	H1-3+VT ✔
L8	49.0833 - 37.75 (8)	0.012	1.250	0.000	0.040	0.000	1.262 ✔	1.333	H1-3+VT ✔
L9	37.75 - 0 (9)	0.013	1.232	0.000	0.035	0.000	1.245 ✔	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	160 - 150.5	Pole	TP20x20x0.25	1	-2.13	434.22	27.8	Pass
L2	150.5 - 150	Pole	TP20.3x20x0.25	2	-2.16	440.81	28.2	Pass
L3	150 - 120	Pole	TP26.4495x20.3x0.25	3	-8.15	1096.44	87.7	Pass
L4	120 - 111.75	Pole	TP28.1407x26.4495x0.3593	4	-9.93	1614.78	75.9	Pass
L5	111.75 - 97.1667	Pole	TP31.13x28.1407x0.3876	5	-12.42	1854.26	82.7	Pass
L6	97.1667 - 75	Pole	TP35.1757x29.364x0.4931	6	-18.97	2762.15	85.9	Pass
L7	75 - 49.0833	Pole	TP40.49x35.1757x0.4792	7	-23.99	3011.45	96.3	Pass
L8	49.0833 - 37.75	Pole	TP42.0625x38.3183x0.5349	8	-31.81	3603.58	94.7	Pass
L9	37.75 - 0	Pole	TP49.8x42.0625x0.5589	9	-44.71	4606.70	93.4	Pass
							Summary	
							Pole (L7) 96.3	Pass
							RATING = **96.3**	**Pass**

APPENDIX B

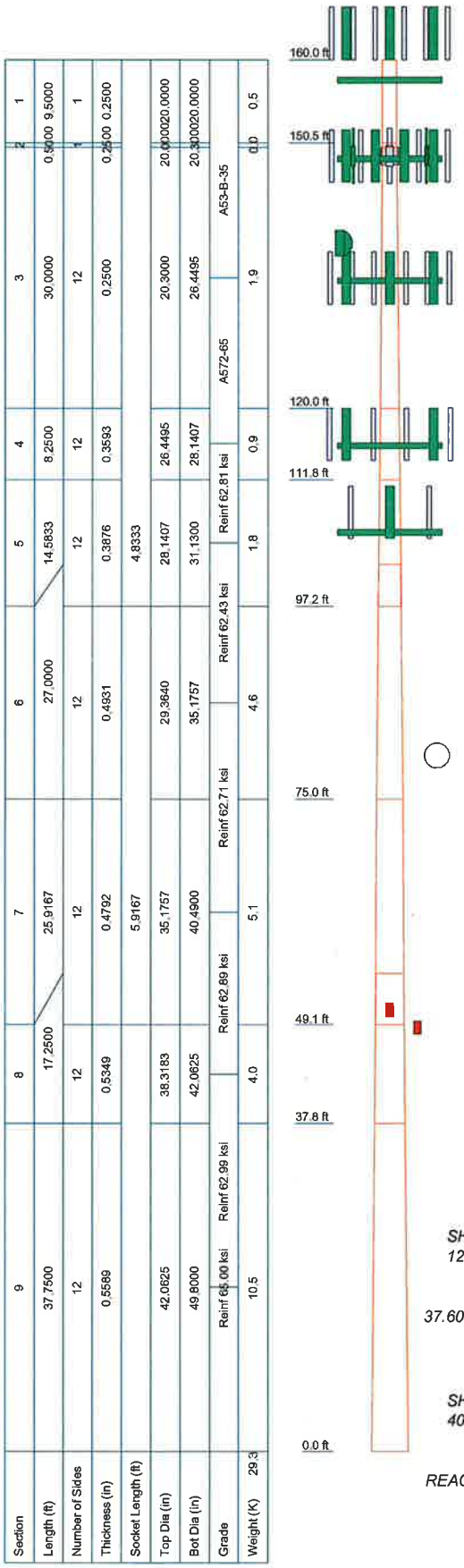
BASE LEVEL DRAWING

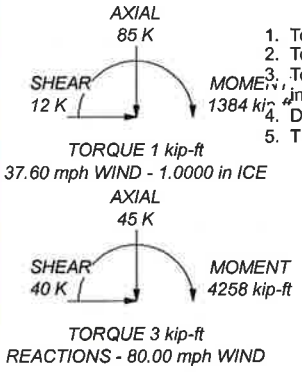

(INSTALLED–IN 2" CONDUIT)
(6) 1/4" TO 135 FT LEVEL
(INSTALLED)
(3) 1/2" TO 135 FT LEVEL
SAFETY CLIMB
(INSTALLED – TO BE REMOVED)
(9) 7/8" TO 126 FT LEVEL
(PROPOSED)
(1) 1-5/8" TO 149 FT LEVEL
(INSTALLED)
(12) 7/8" TO 149 FT LEVEL
(INSTALLED)
(1) 5/16" TO 106 FT LEVEL
(6) 7/8" TO 106 FT LEVEL
(RESERVED)
(1) 1-5/8" TO 116 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 116 FT LEVEL
(6) 1-1/4" TO 116 FT LEVEL
(RESERVED)
(1) 5/8" TO 135 FT LEVEL
(INSTALLED)
(3) 1 1/4" TO 135 FT LEVEL
(INSTALLED)
(1) 1/2" TO 47 FT LEVEL
(RESERVED)
(1) 1/2" TO 50 FT LEVEL
(INSTALLED–IN 2" CONDUIT)
(1) 3/8" TO 158 FT LEVEL
(2) 3/4" TO 158 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 158 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Program Version 6.1.4.1 - 12/17/2013 File:G:/TOWER/375_Crown_Castle/2013/37513-1266 BU 806373/WO 739836 BU 806373 (Phase 7808)/37513-1266 R3.eri





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
SBNH-1D6565C w/ Mount Pipe	158	APXVSPP18-C-A20 w/ Mount Pipe	135
SBNH-1D6565C w/ Mount Pipe	158	APXVTM14-C-120 w/ Mount Pipe	135
SBNH-1D6565C w/ Mount Pipe	158	APXVTM14-C-120 w/ Mount Pipe	135
RRUS-11	158	APXVTM14-C-120 w/ Mount Pipe	135
RRUS-11	158	TD-RRH8x20-25	135
RRUS-11	158	TD-RRH8x20-25	135
DC6-48-60-18-8F	158	TD-RRH8x20-25	135
(2) 7770.00 w/ Mount Pipe	158	Platform Mount [LP 602-1]	135
(2) 7770.00 w/ Mount Pipe	158	LLPX310R-V1 w/ Mount Pipe	135
(2) 7770.00 w/ Mount Pipe	158	LLPX310R-V1 w/ Mount Pipe	135
(2) LGP13519	158	LLPX310R-V1 w/ Mount Pipe	135
(2) LGP13519	158	WIMAX DAP HEAD	135
(2) LGP13519	158	WIMAX DAP HEAD	135
(2) LGP21401	158	WIMAX DAP HEAD	135
(2) LGP21401	158	HORIZON COMPACT	135
(2) LGP21401	158	VHLP2.5-11	135
Platform Mount [LP 303-1]	158	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	116
742 213 w/ Mount Pipe	149		
742 213 w/ Mount Pipe	149	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	116
742 213 w/ Mount Pipe	149		
RRH2x40-AWS	149	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	116
RRH2x40-AWS	149		
RRH2x40-AWS	149	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	116
DB-T1-6Z-8AB-0Z	149		
(2) LPA-80063/4CF w/ Mount Pipe	149	KRY 112 144/1	116
(2) LPA-80080/4CF w/ Mount Pipe	149	KRY 112 144/1	116
BXA-70063/6CFx6 w/ Mount Pipe	149	KRY 112 144/1	116
BXA-70063/6CF w/ Mount Pipe	149	Side Arm Mount [SO 702-3]	116
BXA-70063/6CFx4 w/ Mount Pipe	149	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	116
BXA-185063/8CF w/ Mount Pipe	149		
BXA-185090/8CFx2 w/ Mount Pipe	149	HBX-6516DS-VTM w/ Mount Pipe	106
BXA-185090/8CFx2 w/ Mount Pipe	149	HBX-6516DS-VTM w/ Mount Pipe	106
(2) FD9R6004/2C-3L	149	ATM200-A20	106
(2) FD9R6004/2C-3L	149	ATM200-A20	106
(2) FD9R6004/2C-3L	149	ATM200-A20	106
Platform Mount [LP 602-1]	149	T-Arm Mount [TA 602-3]	106
800MHz 2X50W RRH W/FILTER	137	2.375" OD x 6' Mount Pipe	106
800MHz 2X50W RRH W/FILTER	137	2.375" OD x 6' Mount Pipe	106
800MHz 2X50W RRH W/FILTER	137	2.375" OD x 6' Mount Pipe	106
PCS 1900MHz 4x45W-65MHz	137	HBX-6516DS-VTM w/ Mount Pipe	106
PCS 1900MHz 4x45W-65MHz	137	Platform Mount [LP 301-1]	50
PCS 1900MHz 4x45W-65MHz	137	58532A	50
Side Arm Mount [SO 102-3]	137	Side Arm Mount [SO 701-1]	47
TIMING 2000	135	KS24019-L112A	47
APXVSPP18-C-A20 w/ Mount Pipe	135		
APXV9ERR18-C-A20 w/ Mount Pipe	135		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	58 ksi	Reinf 62.71 ksi	63 ksi	79 ksi
A572-65	65 ksi	80 ksi	Reinf 62.89 ksi	63 ksi	79 ksi
Reinf 62.81 ksi	63 ksi	79 ksi	Reinf 62.99 ksi	63 ksi	79 ksi
Reinf 62.43 ksi	62 ksi	79 ksi	Reinf 65.00 ksi	65 ksi	65 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80.00 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 37.60 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50.00 mph wind.
5. TOWER RATING: 96.3%

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

Job: *160' Monopole / HRT 101 943232*			
Project: *PJF 37513-1266-R3 / BU 806373*			
Client: Crown Castle	Drawn by: Morgan Scroggy	App'd:	
Code: TIA/EIA-222-F	Date: 04/10/14	Scale: NTS	
Path:		Dwg No. E-1	

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

Page 1 of 1
By MLS Date: 4/9/2014
Project 37513-1266-R3
Client Crown Castle
PROJ# BU 806373

Rev. Date: 3/22/2014

Channel Jump Analysis

Revision = ASD Passing = 100% Design/Analysis = Analysis @ 150 ft - 0 in elevation

TNX Tower Output @ Connection:			
Moment	=	55.42	k-ft
Axial	=	2.16	kips
Shear	=	5.03	kips
Design Capacity	=	100.0%	
Pole Geometry:			
Diameter	=	20.3	in
Thickness	=	1/4	in
Fu	=	80	ksi
Extension Geometry:			
Diameter	=	20	in
Thickness	=	1/4	in
Height	=	10	ft
Fu	=	60	ksi
Channel Jump Information			
Number of Legs	=	3	
Unbraced Length	=	18	in
K	=	2.10	
Channel Circle	=	22.54	in
Type	=	MC10X28.5	

	Extension	Pole
Bolt Type	M20 AJAX	M20 AJAX
Bolt Qty.	6	6
Spacing (in)	3	3
End Dist. (in)	3	3

Design Reactions

Moment k-ft	Axial kips	Shear kips
55.42	2.16	5.03

Load Distribution

Moment of Inertia, I in^2	My / I kips	Axial / Leg kips
190.52	39.340	0.720

Member Forces

Tension kips	Comp. kips	Moment @ 0° k-in	Major Axis M k-in	Minor Axis M k-in
38.62	40.06	45.27	19.60	11.32

Flexural Strength

Mn k-in	Mn/Ωb k-in	M_r k-in	Capacity
1500	1197.6	45.27	3.8%

Tensial Strength

P_{n1} kips	P_{n2} kips	Pnt/Ωt kips	P_{rt} kips	Capacity
418.5	508.66	376.65	38.62	10.3%

Compression Strength

$4.71*\sqrt{(E/F_y)}$	KL/r	F_e ksi	F_{cr} ksi	Pnc/Ωc kips	P_{rc} kips	Capacity
113.43	32.59	269.54	46.26	309.17	40.06	13.0%

Channel Properties

x in	Web Thk in
1.120	0.425
Area in2	**Depth in**
8.37	10.000
r in	**E ksi**
1.160	29000
Zx in3	**Zy in3**
30.00	7.590
Fy ksi	**Fu ksi**
50.00	65.00

Combined Strength

Flexure + Tension (H1-1b)				Flexure + Compression (H1-1b)			
Prt / Pnt	Prt / 2*Pnt	Mr / Mn	Capacity	Prc / Pnc	Prc / 2*Pnc	Mr / Mn	Capacity
0.103	0.051	0.038	8.9%	0.130	0.065	0.038	10.3%

Bolt Check

Location	Tube Comp. kips	e in	Shear on Bolt kips	Tension on Bolt kips	Shear Capacity kips	Tension Capacity kips	Bearing Capacity kips	Limit Capacity
Top	40.1	1.27	6.68	1.88	31.00	26.67	26.67	21.5%
Bottom	40.1	1.12	6.68	1.66	31.00	25.00	25.00	21.5%

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

v4.1 - Effective 7-3-12

Date: 7/24/2012
PJF Project: 37513-1266-R3
Client Ref. # BU 806373
Site Name: HRT 101 943232
Description: 160' Monopole
Owner: CROWN
Engineer: MLS

Asymmetric Anchor Rod Analysis

Moment =	4258	k-ft	TIA Ref.	F	Location =	Base Plate	
Axial =	45.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	40.0	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G
Anchor Qty =	19						

** For Post Installed Anchors: Check anchors for embedment, epoxy/grout bond, and capacity based on proof load. **

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	2.250	#18J A615 Gr 75	75	100	0.0	58.06	0.00	3.98	184.57	179.83	179.83	0.00	195.00	92.2%
2	2.250	#18J A615 Gr 75	75	100	22.5	58.06	0.00	3.98	180.77	176.03	176.03	0.00	195.00	90.3%
3	2.250	#18J A615 Gr 75	75	100	45.0	58.06	0.00	3.98	178.53	173.80	173.80	0.00	195.00	89.1%
4	2.250	#18J A615 Gr 75	75	100	67.5	58.06	0.00	3.98	178.83	174.09	174.09	0.00	195.00	89.3%
5	2.250	#18J A615 Gr 75	75	100	90.0	58.06	0.00	3.98	181.09	176.35	176.35	0.00	195.00	90.4%
6	2.250	#18J A615 Gr 75	75	100	112.5	58.06	0.00	3.98	183.61	178.87	178.87	0.00	195.00	91.7%
7	2.250	#18J A615 Gr 75	75	100	135.0	58.06	0.00	3.98	184.71	179.97	179.97	0.00	195.00	92.3%
8	2.250	#18J A615 Gr 75	75	100	157.5	58.06	0.00	3.98	183.70	178.96	178.96	0.00	195.00	91.8%
9	2.250	#18J A615 Gr 75	75	100	180.0	58.06	0.00	3.98	181.21	176.47	176.47	0.00	195.00	90.5%
10	2.250	#18J A615 Gr 75	75	100	202.5	58.06	0.00	3.98	178.90	174.16	174.16	0.00	195.00	89.3%
11	2.250	#18J A615 Gr 75	75	100	225.0	58.06	0.00	3.98	178.49	173.75	173.75	0.00	195.00	89.1%
12	2.250	#18J A615 Gr 75	75	100	247.5	58.06	0.00	3.98	180.63	175.89	175.89	0.00	195.00	90.2%
13	2.250	#18J A615 Gr 75	75	100	270.0	58.06	0.00	3.98	184.39	179.65	179.65	0.00	195.00	92.1%
14	2.250	#18J A615 Gr 75	75	100	292.5	58.06	0.00	3.98	187.87	183.14	183.14	0.00	195.00	93.9%
15	2.250	#18J A615 Gr 75	75	100	315.0	58.06	0.00	3.98	189.31	184.58	184.58	0.00	195.00	94.7%
16	2.250	#18J A615 Gr 75	75	100	337.5	58.06	0.00	3.98	187.99	183.25	183.25	0.00	195.00	94.0%
17	2.250	A193 Gr B7	105	125	22.5	63.00	0.00	3.98	195.68	190.94	190.94	0.00	218.68	87.3%
18	2.250	A193 Gr B7	105	125	135.5	63.00	0.00	3.98	200.22	195.49	195.49	0.00	218.68	89.4%
19	2.250	A193 Gr B7	105	125	248.5	63.00	0.00	3.98	195.68	190.94	190.94	0.00	218.68	87.3%
								75.61						

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

TIA Rev F

Site Data

BU#: *806373*
Site Name: *HRT 101 943232*
App #:
Pole Manufacturer: *Other*

Reactions			
Moment:	3618	ft-kips	Reactions modified to account for post-installed anchors
Axial:	37.9	kips	
Shear:	33.7	kips	

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

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	58.06	in

Anchor Rod Results

		Rigid
Maximum Rod Tension:	184.6 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	94.7% **Pass**	

Plate Data		
Diam:	64.06	in
Thick:	2.75	in
Grade:	60	ksi
Single-Rod B-eff:	10.01	in

Base Plate Results Flexural Check

		Rigid
Base Plate Stress:	38.7 ksi	Service ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	64.4% **Pass**	Y.L. Length: 29.85

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

n/a

Stiffener Results

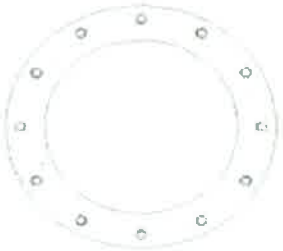
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	49.8	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor	
ASIF:	1.333



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

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

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

Job Number: 37513-1266-R3
Site Number: 806373
Site Name: HRT 101 943232

By: MLS
Date: 4/10/2014

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

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	4258.0		k-ft
Shear, V =	40.0		kips
Axial Load, P =	45.0		kips
OTM =	4298.0	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 =	1	ft
Depth Below Grade =	24.5	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 =	36	
Rebar Size =	#11	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#4	
Side Clear Cover to Ties =	3	in

Soil Parameters

Water Table Depth =	5.00	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 =	100.0%
Maximum Steel Ratio =	100.0%

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	3.5	100							3.5
2	0.5	100	0	28	Sand	78000			4
3	1	125	0	42	Sand	78000			5
4	26.5	127.4	0	42	Sand	78000			31.5
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	17.36	ft, from Grade	Shear, V =	40.00	kips
Bending Moment, M =	4992.41	k-ft, from COR	Resisting Shear, Va =	46.53	kips
Resisting Moment, Ma =	5807.71	k-ft, from COR			
MOMENT RATIO =	**86.0%**	**OK**	**SHEAR RATIO =**	**86.0%**	**OK**

Soil Results: Uplift

Uplift, T =	0.00	kips
Allowable Uplift Cap., Ta =	80.30	kips
UPLIFT RATIO =	**0.0%**	**OK**

Soil Results: Compression

Compression, C =	45.00	kips
Allowable Comp. Cap., Ca =	1469.50	kips
COMPRESSION RATIO =	**3.1%**	**OK**

Steel Results (ACI 318-02):

Minimum Steel Area =	18.47	sq in
Actual Steel Area =	56.16	sq in
Allowable Min Axial, Pa =	-2332.80	kips, Where Ma = 0 k-ft
Allowable Max Axial, Pa =	6943.16	kips, Where Ma = 0 k-ft

Axial Load, P =	81.32	kips @ 5.50 ft Below Grade
Moment, M =	4486.19	k-ft @ 5.50 ft Below Grade
Allowable Moment, Ma =	6577.04	k-ft
MOMENT RATIO =	**68.2%**	**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#: *806373*
Site Name: *HRT 101 943232*
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**=	3.00	in
Horiz. **Tie** Bar Size=	4	
Vert. Cage Diameter =	6.30	ft
Vert. Cage Diameter =	75.59	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	36	
As Total=	56.16	in^2
A s/ Aconc, Rho:	0.0101	1.01%

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:	1.01%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	9026.11	kips
at Mu=(ϕ=0.65)Mn=	5472.88	ft-kips
Max Tu, (φ=0.9) Tn =	3032.64	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	4486.19	ft-kips (* Note)
Max. Service Shaft P:	81.32	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:	5832.047	ft-kips
1.30	Pu:	105.716	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

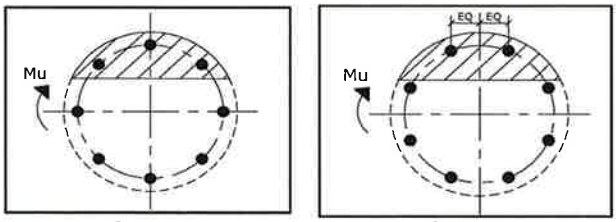
Seismic Properties

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: **17.67** in
Extreme Steel Strain, εt: **0.0105**
εt > 0.0050, Tension Controlled
Reduction Factor,φ: **0.900**

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	105.72	kips
Drilled Shaft Moment Capacity, φMn:	**8550.15**	ft-kips
Drilled Shaft Superimposed Mu:	**5832.05**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**68.2%**