Robinson+Cole

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Also admitted in Massachusetts

September 25, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
200 Stanley Street, New Britain, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 102-foot level of the existing 192-foot tower at 200 Stanley Street in New Britain, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of this tower in 2002. Cellco now intends to replace six (6) of its existing antennas with three (3) model SBNHH-1D65B, 700/2100 MHz antennas and three (3) model SBNHH-1D65B, 1900 MHz antennas, all at the same level on the tower. Cellco also intends to replace three (3) existing remote radio heads ("RRHs"), and install six (6) new RRHs and two (2) HYBRIFLEX™ fiber optic antenna cables. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cables.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Erin Stewart, Mayor of the City of New Britain. A copy of this letter is also being sent to Downes Investments LLC, the owner of the Property and Crown, the tower owner.

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 antennas and RRH's will be located on its existing platform at the 102-foot level on the tower.

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

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

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

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

6. The tower and 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:
Erin Stewart, New Britain Mayor
Downes Investments LLC
Veronica Harris, Crown Castle
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

Andrew® Tri-band Antenna, 698–896 and 2x 1695–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS, dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol® | Teletilt®
Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Performance Note	Outdoor usage

Product Specifications

SBNHH-1D65B

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.4 km/h | 150.0 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male
RET System	Teletilt®

Packed Dimensions

Depth	299.0 mm | 11.8 in
Length	1970.0 mm | 77.6 in
Width	409.0 mm | 16.1 in
Shipping Weight	31.0 kg | 68.3 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

Product Specifications

SBNHH-1D65B

BSAMNT-1 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

Alcatel-Lucent B13 Remote Radio Head 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity and up to 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

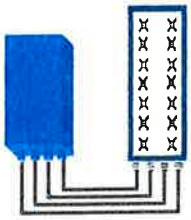
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

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Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

		RRH2x60
RF Output Power		2x60W
Instantaneous Bandwidth		20MHz
Transmitter		2 TX
Receiver	1900 HW version 1900A HW version	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3
Features		AISG 2.0 for RET/TMA
		Internal Smart Bias-T
Power		-48VDC
CPRI Ports		2 CPRI Rate 3 Ports
External Alarms		4 External User Alarms
Monitor Ports		TX
Environmental		GR487 Compliance
RF Connectors		7/16 DIN (top mounted)

** Not a Verizon Wireless deployed product

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (downward facing)
Dimensions	22"(h) x 12"(w)x 9.4" (d)**
Weight	55lb**

**- Includes solar shield but not mounting brackets (8 lbs.)

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ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2X60-AWS FOR BAND 4 APPLICATIONS

The Alcatel-Lucent RRH2x60-AWS is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.

A distributed Node B expands the 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 a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent RRH2x60-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.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-AWS is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

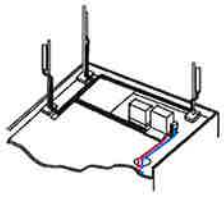
EASY INSTALLATION

The RRH2x60-AWS includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

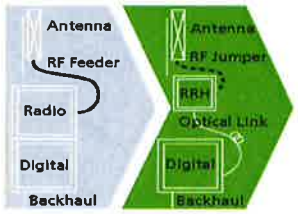
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-AWS is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

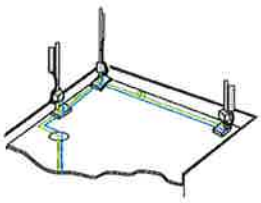
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 510x285x186mm (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 250W @2x60W

RF Characteristics

- Frequency band: 1710-1755, UL / 2110-2155 MHz, DL (3GPP band 4)
- Output power: 2x60W at antenna connectors
- Technology supported: LTE
- Instantaneous bandwidth: 45 MHz
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

AT THE SPEED OF IDEAS™

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 CELLFLEX³ 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)
Optical properties			
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
DC Power cable properties			
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Environmental			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

¹ This data is provisional and subject to change

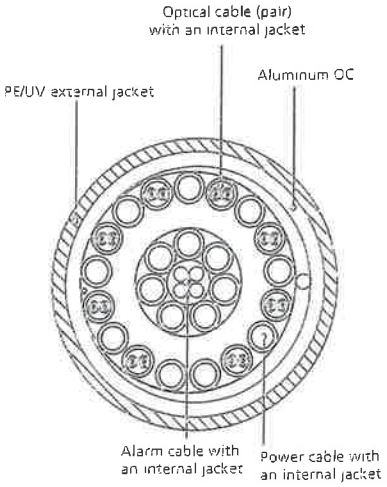


Figure 2: Construction Detail

ATTACHMENT 2

	General	Power	Density					
Site Name: New Britain 4								
Tower Height: 192Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	2	1077	195	0.0204	1900	1.0000	2.04%	
*AT&T UMTS	2	565	195	0.0107	880	0.5867	1.82%	
*AT&T GSM	1	283	195	0.0027	880	0.5867	0.46%	
*AT&T GSM	4	646	195	0.0244	1900	1.0000	2.44%	
*AT&T LTE	1	1615	195	0.0153	734	0.4893	3.12%	
*Clearwire	2	153	175	0.0036	2496	1.0000	0.36%	
*Clearwire	1	211	175	0.0025	11 GHz	1.0000	0.25%	
*MetroPCS CDMA	3	727	185	0.0229	2135	1.0000	2.29%	
*MetroPCS LTE	1	1200	185	0.0126	2130	1.0000	1.26%	
Verizon PCS	**2**	**399**	**102**	**0.0276**	**1970**	**1.0000**	**2.76%**	
Verizon Cellular	**8**	**380**	**102**	**0.1051**	**869**	**0.5793**	**18.14%**	
Verizon AWS	**1**	**3500**	**102**	**0.1210**	**2145**	**1.0000**	**12.10%**	
Verizon 700	**1**	**2100**	**102**	**0.0726**	**746**	**0.4973**	**14.59%**	
								61.62%
* Source: Siting Council								

ATTACHMENT 3

Date: **June 24, 2015**

Veronica Harris
Crown Castle
1200 McArthur Blvd
Mahwah, NJ 07430

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	119669
	Carrier Site Name:	New Britain 4, CT
Crown Castle Designation:	**Crown Castle BU Number:**	803843
	Crown Castle Site Name:	CT NEW BRITAIN 4 CAC 803843
	Crown Castle JDE Job Number:	338053
	Crown Castle Work Order Number:	1078532
	Crown Castle Application Number:	300815 Rev. 1
Engineering Firm Designation:	**Aero Solutions LLC Project Number:**	003-15-0489
Site Data:	**200 Stanley Street, New Britain, Hartford County, CT**	
	Latitude *41° 39' 16.4"*, Longitude *-72° 46' 9.59"*	
	192 Foot - Monopole Tower	

Dear Veronica Harris,

Aero Solutions LLC is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 799146, in accordance with application 300815, revision 1.

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

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

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 80 mph fastest mile.

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

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

Structural analysis prepared by: Sina Erturk

Respectfully submitted by:

Shraddha Dharia, P.E.
Structural Engineer
CT PE#: PEN0028187
Expires: 01/31/2016

STATE OF CONNECTICUT
SHRADDHA A. DHARIA
No. 28187
LICENSED
PROFESSIONAL ENGINEER

6.24.2015

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 192 ft Monopole tower designed by SUMMIT in April of 2001. The tower was originally designed for a wind speed of 80 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 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
100.0	102.0	3	alcatel lucent	RRH2X60-AWS	2	1-5/8"	
		3	alcatel lucent	RRH2X60-PCS			
		3	alcatel lucent	RRH2x60-700			
		9	andrew	SBNHH-1D65B w/ Mount Pipe			
	100.0	1	rfs celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing 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
193.0	195.0	1	andrew	SBNH-1D6565C w/ Mount Pipe	1 2 6	3/8" 3/4" 1-5/8"	1
		6	ericsson	RRUS-11			
		3	kathrein	800 10121 w/ Mount Pipe			
		1	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		1	powerwave technologies	P65-17-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
	193.0	1	tower mounts	Platform Mount [LP 712-1]			
185.0	185.0	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1-5/8"	1
		1	tower mounts	Platform Mount [LP 712-1]			
175.0	177.0	1	andrew	PX2F-52	1 3 3 3	5/16" 1/4" 5/8" 1/2"	1
		2	andrew	VHLP2-23			
		2	dragonwave	HORIZON COMPACT			
	176.0	3	argus technologies	LLPX310R w/ Mount Pipe			
		3	samsung telecommunications	WIMAX DAP HEAD			
	175.0	1	motorola	TIMING 2000			
		1	tower mounts	Side Arm Mount [SO 101-			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
				3]			
100.0	102.0	2	andrew	LNX-6512DS-T4M w/ Mount Pipe			2
		1	antel	BXA-185090/8CF w/ Mount Pipe			
		2	antel	BXA-80080/4CF w/ Mount Pipe	12	1-5/8"	1
		1	antel	BXA-80090/4CF w/ Mount Pipe			
		6	rfs celwave	APL868013-42T0 w/ Mount Pipe			2
		6	rfs celwave	FD9R6004/2C-3L			
	100.0	1	tower mounts	Pipe Mount [PM 601-3]			1
		1	tower mounts	T-Arm Mount [TA 602-3]			

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

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
192	192	1		Panel Antennas (CAAA=75 sq ft)		
185	185	1		Panel Antennas (CAAA=75 sq ft)		
175	175	1		Panel Antennas (CAAA=75 sq ft)		
165	165	1		Microwave w/ Mount (CAAA = 110 sq ft)		
155	155	1		Panel Antennas (CAAA=75 sq ft)		
145	145	1		Panel Antennas (CAAA=75 sq ft)		
135	135	1		Microwave w/ Mount (CAAA = 110 sq ft)		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti	2384583	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Paul J. Ford	1118798	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Paul J. Ford	925033	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	192 - 151.25	Pole	TP39.245x26x0.3125	1	-8.52	1923.73	22.8	Pass
L2	151.25 - 111.25	Pole	TP51.621x36.9948x0.4375	2	-17.44	3542.45	24.3	Pass
L3	111.25 - 72.75	Pole	TP63.259x48.6333x0.5	3	-32.79	4963.31	26.8	Pass
L4	72.75 - 35.75	Pole	TP74.285x59.6589x0.5625	4	-50.51	6563.60	27.6	Pass
L5	35.75 - 0	Pole	TP84.78x70.1535x0.5625	5	-76.90	7816.75	30.3	Pass
							Summary	
						Pole (L5)	30.3	Pass
						Rating =	30.3	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	42.2	Pass
1	Base Plate	0	36.7	Pass
1	Base Foundation	0	37.8	Pass
1,2	Base Foundation Soil Interaction	0	45.0	Pass

Structure Rating (max from all components) =	45%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) It is unknown whether the foundation is a drilled shaft or pier and pad. Both designs were analyzed and determined to be sufficient.

4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5
Length (ft)	40.75	45.00	45.00	45.00	45.00
Number of Sides	18	18	18	18	18
Thickness (in)	0.3125	0.4375	0.5000	0.5625	0.5625
Socket Length (ft)	5.00	6.50	8.00	9.25	
Top Dia (in)	26.0000	36.9948	48.6333	59.6589	70.1535
Bot Dia (in)	39.2450	51.6210	63.2590	74.2850	84.7800
Grade			A607-65		
Weight (K)	4.4	9.3	13.5	18.2	21.0

66.4

AXIAL
103 K

SHEAR
9 K

MOMENT
1094 kip-ft

TORQUE 1 kip-ft
38 mph WIND - 1.0000 in ICE

AXIAL
77 K

SHEAR
34 K

MOMENT
3971 kip-ft

TORQUE 2 kip-ft
REACTIONS - 80 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
800 10121 w/ Mount Pipe	193	TIMING 2000	175
SBNH-1D6565C w/ Mount Pipe	193	WIMAX DAP HEAD	175
(2) LGP21401	193	HORIZON COMPACT	175
(2) RRUS-11	193	Side Arm Mount [SO 101-3]	175
DC6-48-60-18-8F	193	6' x 2" Mount Pipe	175
800 10121 w/ Mount Pipe	193	6' x 2" Mount Pipe	175
P65-17-XLH-RR w/ Mount Pipe	193	6' x 2" Mount Pipe	175
(2) LGP21401	193	VHLP2-23	175
(2) RRUS-11	193	PX2F-52	175
800 10121 w/ Mount Pipe	193	VHLP2-23	175
AM-X-CD-16-65-00T-RET w/ Mount Pipe	193	DB-T1-6Z-8AB-0Z	100
		RRH2x60-700	100
(2) LGP21401	193	RRH2X60-PCS	100
(2) RRUS-11	193	BXA-80080/4CF w/ Mount Pipe	100
Platform Mount [LP 712-1]	193	(3) SBNHH-1D65B w/ Mount Pipe	100
(2) 6' x 2" Mount Pipe	193	RRH2X60-AWS	100
(2) 6' x 2" Mount Pipe	193	RRH2x60-700	100
(2) 6' x 2" Mount Pipe	193	RRH2X60-PCS	100
APXV18-206517S-C w/ Mount Pipe	185	BXA-80090/4CF w/ Mount Pipe	100
APXV18-206517S-C w/ Mount Pipe	185	(3) SBNHH-1D65B w/ Mount Pipe	100
APXV18-206517S-C w/ Mount Pipe	185	RRH2X60-AWS	100
Platform Mount [LP 712-1]	185	RRH2X60-PCS	100
(3) 6' x 2" Mount Pipe	185	RRH2x60-700	100
(3) 6' x 2" Mount Pipe	185	T-Arm Mount [TA 602-3]	100
(3) 6' x 2" Mount Pipe	185	Pipe Mount [PM 601-3]	100
LLPX310R w/ Mount Pipe	175	4' x 6' Ice Shield	100
WIMAX DAP HEAD	175	4' x 6' Ice Shield	100
HORIZON COMPACT	175	4' x 6' Ice Shield	100
LLPX310R w/ Mount Pipe	175	BXA-80080/4CF w/ Mount Pipe	100
WIMAX DAP HEAD	175	(3) SBNHH-1D65B w/ Mount Pipe	100
LLPX310R w/ Mount Pipe	175	RRH2X60-AWS	100

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 30.3%

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

Job: ***BU#803843 CT NEW BRITAIN 4 CAC 8038***		
Project: ***Existing 192 ft. Monopole***		
Client: Crown Castle	Drawn by: Serturk	App'd:
Code: TIA/EIA-222-F	Date: 06/24/15	Scale: NTS
Path:		Dwg No. E-1

Tower Input Data

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

3) Tower is located in Hartford County, Connecticut.
4) Basic wind speed of 80 mph.
5) Nominal ice thickness of 1.0000 in.
6) Ice thickness is considered to increase with height.
7) Ice density of 56 pcf.
8) A wind speed of 38 mph is used in combination with ice.
9) Temperature drop of 50 °F.
10) Deflections calculated using a wind speed of 50 mph.
11) A non-linear (P-delta) analysis was used.
12) Pressures are calculated at each section.
13) Stress ratio used in pole design is 1.333.
14) 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	192.00-151.25	40.75	5.00	18	26.0000	39.2450	0.3125	1.2500	A607-65 (65 ksi)
L2	151.25-111.25	45.00	6.50	18	36.9948	51.6210	0.4375	1.7500	A607-65 (65 ksi)
L3	111.25-72.75	45.00	8.00	18	48.6333	63.2590	0.5000	2.0000	A607-65 (65 ksi)
L4	72.75-35.75	45.00	9.25	18	59.6589	74.2850	0.5625	2.2500	A607-65 (65 ksi)
L5	35.75-0.00	45.00		18	70.1535	84.7800	0.5625	2.2500	A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	26.4011	25.4788	2124.0264	9.1191	13.2080	160.8136	4250.8477	12.7418	4.0260	12.883
	39.8504	38.6162	7394.8824	13.8210	19.9365	370.9225	14799.4952	19.3118	6.3571	20.343
L2	39.2158	50.7644	8571.2950	12.9779	18.7934	456.0805	17153.8684	25.3870	5.7411	13.122
	52.4173	71.0747	23524.0650	18.1701	26.2235	897.0616	47079.0836	35.5441	8.3153	19.006
L3	51.5288	76.3876	22358.9901	17.0873	24.7057	905.0122	44747.4007	38.2011	7.6795	15.359
	64.2349	99.5985	49561.2695	22.2794	32.1356	1542.2557	99187.7529	49.8087	10.2536	20.507
L4	63.2195	105.5092	46553.2019	20.9792	30.3067	1536.0691	93167.6598	52.7646	9.5100	16.907
	75.4310	131.6223	90378.9022	26.1715	37.7368	2394.9818	180876.7273	65.8237	12.0842	21.483
L5	74.2887	124.2461	76019.7620	24.7048	35.6380	2133.1104	152139.5527	62.1348	11.3570	20.19
	86.0879	150.3598	134732.9861	29.8972	43.0682	3128.3606	269643.2573	75.1942	13.9313	24.767

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_r	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 192.00-151.25				1	1	1		
L2 151.25-111.25				1	1	1		
L3 111.25-72.75				1	1	1		
L4 72.75-35.75				1	1	1		
L5 35.75-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

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
***								
LDF7-50A(1-5/8")	A	No	Inside Pole	192.00 - 0.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
FB-L98B-002-75000(3/8")	A	No	Inside Pole	192.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	A	No	Inside Pole	192.00 - 0.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
						2" Ice	0.00	0.58

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						4" Ice	0.00	0.58
2" Flex Conduit	A	No	Inside Pole	192.00 - 0.00	1	No Ice	0.00	0.32
						1/2" Ice	0.00	0.32
						1" Ice	0.00	0.32
						2" Ice	0.00	0.32
						4" Ice	0.00	0.32
***								
LCF158-50JL(1-5/8")	C	No	Inside Pole	185.00 - 0.00	6	No Ice	0.00	0.52
						1/2" Ice	0.00	0.52
						1" Ice	0.00	0.52
						2" Ice	0.00	0.52
						4" Ice	0.00	0.52
***								
FSJ1-50A(1/4")	B	No	Inside Pole	175.00 - 0.00	3	No Ice	0.00	0.04
						1/2" Ice	0.00	0.04
						1" Ice	0.00	0.04
						2" Ice	0.00	0.04
						4" Ice	0.00	0.04
FSJ4-50B(1/2")	B	No	Inside Pole	175.00 - 0.00	3	No Ice	0.00	0.14
						1/2" Ice	0.00	0.14
						1" Ice	0.00	0.14
						2" Ice	0.00	0.14
						4" Ice	0.00	0.14
HJ4.5-50(5/8")	B	No	Inside Pole	175.00 - 0.00	3	No Ice	0.00	0.40
						1/2" Ice	0.00	0.40
						1" Ice	0.00	0.40
						2" Ice	0.00	0.40
						4" Ice	0.00	0.40
9207(5/16")	B	No	Inside Pole	175.00 - 0.00	1	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
						2" Ice	0.00	0.60
						4" Ice	0.00	0.60
2" Flex Conduit	B	No	Inside Pole	175.00 - 0.00	2	No Ice	0.00	0.32
						1/2" Ice	0.00	0.32
						1" Ice	0.00	0.32
						2" Ice	0.00	0.32
						4" Ice	0.00	0.32
***								
LDF7-50A(1-5/8")	A	No	Inside Pole	100.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
HB158-1-08U8-S8J18(1-5/8)	A	No	Inside Pole	100.00 - 0.00	2	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
						2" Ice	0.00	1.30
						4" Ice	0.00	1.30
***								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	192.00-151.25	A	0.000	0.000	0.000	0.000	0.26
		B	0.000	0.000	0.000	0.000	0.07
		C	0.000	0.000	0.000	0.000	0.11
L2	151.25-111.25	A	0.000	0.000	0.000	0.000	0.26
		B	0.000	0.000	0.000	0.000	0.12
		C	0.000	0.000	0.000	0.000	0.12
L3	111.25-72.75	A	0.000	0.000	0.000	0.000	0.59
		B	0.000	0.000	0.000	0.000	0.12
		C	0.000	0.000	0.000	0.000	0.12
L4	72.75-35.75	A	0.000	0.000	0.000	0.000	0.70

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B	0.000	0.000	0.000	0.000	0.11
		C	0.000	0.000	0.000	0.000	0.12
L5	35.75-0.00	A	0.000	0.000	0.000	0.000	0.68
		B	0.000	0.000	0.000	0.000	0.11
		C	0.000	0.000	0.000	0.000	0.11

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	192.00-151.25	A	1.218	0.000	0.000	0.000	0.000	0.26
		B		0.000	0.000	0.000	0.000	0.07
		C		0.000	0.000	0.000	0.000	0.11
L2	151.25-111.25	A	1.179	0.000	0.000	0.000	0.000	0.26
		B		0.000	0.000	0.000	0.000	0.12
		C		0.000	0.000	0.000	0.000	0.12
L3	111.25-72.75	A	1.130	0.000	0.000	0.000	0.000	0.59
		B		0.000	0.000	0.000	0.000	0.12
		C		0.000	0.000	0.000	0.000	0.12
L4	72.75-35.75	A	1.061	0.000	0.000	0.000	0.000	0.70
		B		0.000	0.000	0.000	0.000	0.11
		C		0.000	0.000	0.000	0.000	0.12
L5	35.75-0.00	A	1.000	0.000	0.000	0.000	0.000	0.68
		B		0.000	0.000	0.000	0.000	0.11
		C		0.000	0.000	0.000	0.000	0.11

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	192.00-151.25	0.0000	0.0000	0.0000	0.0000
L2	151.25-111.25	0.0000	0.0000	0.0000	0.0000
L3	111.25-72.75	0.0000	0.0000	0.0000	0.0000
L4	72.75-35.75	0.0000	0.0000	0.0000	0.0000
L5	35.75-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

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
***									
800 10121 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.69 6.18 6.68 7.70 9.86	4.60 5.35 6.05 7.53 10.83	0.07 0.11 0.17 0.30 0.68
SBNH-1D6565C w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.0000	193.00	No Ice 1/2" Ice 1" Ice	11.68 12.40 13.14 14.60	9.84 11.37 12.91 15.27	0.10 0.19 0.29 0.52

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	17.87	20.14	1.17
						4" Ice			
(2) LGP21401	A	From Leg	4.00 0.00 2.00	0.0000	193.00	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02
						1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) RRUS-11	A	From Leg	4.00 0.00 2.00	0.0000	193.00	No Ice	3.25	1.37	0.05
						1/2" Ice	3.49	1.55	0.07
						1" Ice	3.74	1.74	0.09
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
DC6-48-60-18-8F	A	From Leg	4.00 0.00 2.00	0.0000	193.00	No Ice	2.57	2.57	0.02
						1/2" Ice	2.80	2.80	0.04
						1" Ice	3.04	3.04	0.07
						2" Ice	3.54	3.54	0.13
						4" Ice	4.66	4.66	0.30
800 10121 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	-10.0000	193.00	No Ice	5.69	4.60	0.07
						1/2" Ice	6.18	5.35	0.11
						1" Ice	6.68	6.05	0.17
						2" Ice	7.70	7.53	0.30
						4" Ice	9.86	10.83	0.68
P65-17-XLH-RR w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	-10.0000	193.00	No Ice	11.70	8.94	0.09
						1/2" Ice	12.42	10.45	0.18
						1" Ice	13.15	11.99	0.27
						2" Ice	14.64	14.31	0.50
						4" Ice	17.91	19.14	1.13
(2) LGP21401	B	From Leg	4.00 0.00 2.00	-10.0000	193.00	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02
						1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) RRUS-11	B	From Leg	4.00 0.00 2.00	-10.0000	193.00	No Ice	3.25	1.37	0.05
						1/2" Ice	3.49	1.55	0.07
						1" Ice	3.74	1.74	0.09
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
800 10121 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	193.00	No Ice	5.69	4.60	0.07
						1/2" Ice	6.18	5.35	0.11
						1" Ice	6.68	6.05	0.17
						2" Ice	7.70	7.53	0.30
						4" Ice	9.86	10.83	0.68
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.0000	193.00	No Ice	8.50	6.30	0.07
						1/2" Ice	9.15	7.48	0.14
						1" Ice	9.77	8.37	0.21
						2" Ice	11.03	10.18	0.38
						4" Ice	13.68	14.02	0.87
(2) LGP21401	C	From Leg	4.00 0.00 2.00	0.0000	193.00	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02
						1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) RRUS-11	C	From Leg	4.00 0.00 2.00	0.0000	193.00	No Ice	3.25	1.37	0.05
						1/2" Ice	3.49	1.55	0.07
						1" Ice	3.74	1.74	0.09

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
							1" Ice	4.27	2.14	0.15
							2" Ice	5.43	3.04	0.31
							4" Ice			
Platform Mount [LP 712-1]	C	None			0.0000	193.00	No Ice	24.53	24.53	1.34
							1/2" Ice	29.94	29.94	1.65
							1" Ice	35.35	35.35	1.96
							2" Ice	46.17	46.17	2.58
							4" Ice	67.81	67.81	3.82
(2) 6' x 2" Mount Pipe	A	From Leg	4.00	0.00	0.0000	193.00	No Ice	1.43	1.43	0.02
			0.00				1/2" Ice	1.92	1.92	0.03
							1" Ice	2.29	2.29	0.05
							2" Ice	3.06	3.06	0.09
							4" Ice	4.70	4.70	0.23
(2) 6' x 2" Mount Pipe	B	From Leg	4.00	0.00	0.0000	193.00	No Ice	1.43	1.43	0.02
			0.00				1/2" Ice	1.92	1.92	0.03
							1" Ice	2.29	2.29	0.05
							2" Ice	3.06	3.06	0.09
							4" Ice	4.70	4.70	0.23
(2) 6' x 2" Mount Pipe	C	From Leg	4.00	0.00	0.0000	193.00	No Ice	1.43	1.43	0.02
			0.00				1/2" Ice	1.92	1.92	0.03
							1" Ice	2.29	2.29	0.05
							2" Ice	3.06	3.06	0.09
							4" Ice	4.70	4.70	0.23
***										
APXV18-206517S-C w/ Mount Pipe	A	From Leg	4.00	0.00	30.0000	185.00	No Ice	5.40	4.70	0.05
			0.00				1/2" Ice	5.96	5.86	0.10
							1" Ice	6.48	6.73	0.15
							2" Ice	7.55	8.51	0.28
							4" Ice	9.92	12.28	0.68
APXV18-206517S-C w/ Mount Pipe	B	From Leg	4.00	0.00	30.0000	185.00	No Ice	5.40	4.70	0.05
			0.00				1/2" Ice	5.96	5.86	0.10
							1" Ice	6.48	6.73	0.15
							2" Ice	7.55	8.51	0.28
							4" Ice	9.92	12.28	0.68
APXV18-206517S-C w/ Mount Pipe	C	From Leg	4.00	0.00	30.0000	185.00	No Ice	5.40	4.70	0.05
			0.00				1/2" Ice	5.96	5.86	0.10
							1" Ice	6.48	6.73	0.15
							2" Ice	7.55	8.51	0.28
							4" Ice	9.92	12.28	0.68
Platform Mount [LP 712-1]	C	None			0.0000	185.00	No Ice	24.53	24.53	1.34
							1/2" Ice	29.94	29.94	1.65
							1" Ice	35.35	35.35	1.96
							2" Ice	46.17	46.17	2.58
							4" Ice	67.81	67.81	3.82
(3) 6' x 2" Mount Pipe	A	From Leg	4.00	0.00	0.0000	185.00	No Ice	1.43	1.43	0.02
			0.00				1/2" Ice	1.92	1.92	0.03
							1" Ice	2.29	2.29	0.05
							2" Ice	3.06	3.06	0.09
							4" Ice	4.70	4.70	0.23
(3) 6' x 2" Mount Pipe	B	From Leg	4.00	0.00	0.0000	185.00	No Ice	1.43	1.43	0.02
			0.00				1/2" Ice	1.92	1.92	0.03
							1" Ice	2.29	2.29	0.05
							2" Ice	3.06	3.06	0.09
							4" Ice	4.70	4.70	0.23
(3) 6' x 2" Mount Pipe	C	From Leg	4.00		0.0000	185.00	No Ice	1.43	1.43	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 0.00			1/2" Ice 1" Ice 2" Ice 4" Ice	1.92 2.29 3.06 4.70	1.92 2.29 3.06 4.70	0.03 0.05 0.09 0.23
***									
LLPX310R w/ Mount Pipe	A	From Leg	3.00 0.00 1.00	30.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.07 5.48 5.91 6.79 8.70	2.98 3.53 4.09 5.31 8.13	0.05 0.08 0.13 0.23 0.54
WIMAX DAP HEAD	A	From Leg	3.00 0.00 1.00	30.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.80 1.99 2.18 2.59 3.51	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
HORIZON COMPACT	A	From Leg	3.00 0.00 2.00	30.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.84 0.97 1.10 1.39 2.08	0.43 0.52 0.63 0.86 1.43	0.01 0.02 0.03 0.05 0.12
LLPX310R w/ Mount Pipe	B	From Leg	3.00 0.00 1.00	30.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.07 5.48 5.91 6.79 8.70	2.98 3.53 4.09 5.31 8.13	0.05 0.08 0.13 0.23 0.54
WIMAX DAP HEAD	B	From Leg	3.00 0.00 1.00	30.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.80 1.99 2.18 2.59 3.51	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
LLPX310R w/ Mount Pipe	C	From Leg	3.00 0.00 1.00	30.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.07 5.48 5.91 6.79 8.70	2.98 3.53 4.09 5.31 8.13	0.05 0.08 0.13 0.23 0.54
TIMING 2000	C	From Leg	3.00 0.00 0.00	30.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.13 0.18 0.24 0.38 0.78	0.13 0.18 0.24 0.38 0.78	0.00 0.00 0.01 0.01 0.05
WIMAX DAP HEAD	C	From Leg	3.00 0.00 1.00	30.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.80 1.99 2.18 2.59 3.51	0.78 0.92 1.07 1.39 2.14	0.03 0.04 0.06 0.09 0.20
HORIZON COMPACT	C	From Leg	3.00 0.00 2.00	30.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.84 0.97 1.10 1.39 2.08	0.43 0.52 0.63 0.86 1.43	0.01 0.02 0.03 0.05 0.12
Side Arm Mount [SO 101-3]	C	None		0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice	7.50 8.90 10.30 13.10 18.70	7.50 8.90 10.30 13.10 18.70	0.25 0.33 0.41 0.58 0.90

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			
6' x 2" Mount Pipe	A	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23
6' x 2" Mount Pipe	B	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23
6' x 2" Mount Pipe	C	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23
***									
BXA-80080/4CF w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.49 5.94 6.40 7.35 9.39	4.03 4.65 5.30 6.70 9.78	0.03 0.08 0.13 0.25 0.60
(3) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.40 8.95 9.51 10.66 13.06	6.82 7.78 8.61 10.33 14.12	0.06 0.13 0.20 0.38 0.86
RRH2X60-AWS	A	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.96 4.27 4.60 5.27 6.72	1.82 2.08 2.36 2.96 4.25	0.06 0.08 0.11 0.17 0.35
DB-T1-6Z-8AB-0Z	A	From Leg	4.00 0.00 0.00	30.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.60 5.92 6.24 6.91 8.37	2.33 2.56 2.79 3.28 4.37	0.04 0.08 0.12 0.21 0.45
RRH2x60-700	A	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.96 4.27 4.60 5.27 6.72	1.82 2.08 2.36 2.96 4.25	0.06 0.08 0.11 0.17 0.35
RRH2X60-PCS	A	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.79 3.02 3.52 4.61	2.01 2.22 2.43 2.89 3.92	0.06 0.08 0.10 0.16 0.31
BXA-80080/4CF w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.49 5.94 6.40 7.35 9.39	4.03 4.65 5.30 6.70 9.78	0.03 0.08 0.13 0.25 0.60
(3) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice 1/2" Ice	8.40 8.95 9.51	6.82 7.78 8.61	0.06 0.13 0.20

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	10.66	10.33	0.38
						2" Ice	13.06	14.12	0.86
						4" Ice			
RRH2X60-AWS	B	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice	3.96	1.82	0.06
						1/2" Ice	4.27	2.08	0.08
						1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
RRH2x60-700	B	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice	3.96	1.82	0.06
						1/2" Ice	4.27	2.08	0.08
						1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
RRH2X60-PCS	B	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice	2.57	2.01	0.06
						1/2" Ice	2.79	2.22	0.08
						1" Ice	3.02	2.43	0.10
						2" Ice	3.52	2.89	0.16
						4" Ice	4.61	3.92	0.31
BXA-80090/4CF w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice	3.97	3.88	0.03
						1/2" Ice	4.39	4.49	0.07
						1" Ice	4.83	5.12	0.11
						2" Ice	5.73	6.50	0.22
						4" Ice	7.67	9.54	0.54
(3) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice	8.40	6.82	0.06
						1/2" Ice	8.95	7.78	0.13
						1" Ice	9.51	8.61	0.20
						2" Ice	10.66	10.33	0.38
						4" Ice	13.06	14.12	0.86
RRH2X60-AWS	C	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice	3.96	1.82	0.06
						1/2" Ice	4.27	2.08	0.08
						1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
RRH2X60-PCS	C	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice	2.57	2.01	0.06
						1/2" Ice	2.79	2.22	0.08
						1" Ice	3.02	2.43	0.10
						2" Ice	3.52	2.89	0.16
						4" Ice	4.61	3.92	0.31
RRH2x60-700	C	From Leg	4.00 0.00 2.00	30.0000	100.00	No Ice	3.96	1.82	0.06
						1/2" Ice	4.27	2.08	0.08
						1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
T-Arm Mount [TA 602-3]	C	None		0.0000	100.00	No Ice	11.59	11.59	0.77
						1/2" Ice	15.44	15.44	0.99
						1" Ice	19.29	19.29	1.21
						2" Ice	26.99	26.99	1.64
						4" Ice	42.39	42.39	2.50
Pipe Mount [PM 601-3]	C	None		0.0000	100.00	No Ice	4.39	4.39	0.20
						1/2" Ice	5.48	5.48	0.24
						1" Ice	6.57	6.57	0.28
						2" Ice	8.75	8.75	0.36
						4" Ice	13.11	13.11	0.53
4' x 6' Ice Shield	A	From Leg	2.00 0.00	0.0000	100.00	No Ice	1.40	0.47	0.03
						1/2" Ice	1.73	0.64	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	2.08	0.82	0.17
						1" Ice	2.79	0.12	0.33
						2" Ice	4.32	0.21	0.75
						4" Ice			
4' x 6' Ice Shield	B	From Leg	2.00	0.0000	100.00	No Ice	1.40	0.47	0.03
			0.00			1/2"	1.73	0.64	0.10
			0.00			Ice	2.08	0.82	0.17
						1" Ice	2.79	0.12	0.33
						2" Ice	4.32	0.21	0.75
						4" Ice			
4' x 6' Ice Shield	C	From Leg	2.00	0.0000	100.00	No Ice	1.40	0.47	0.03
			0.00			1/2"	1.73	0.64	0.10
			0.00			Ice	2.08	0.82	0.17
						1" Ice	2.79	0.12	0.33
						2" Ice	4.32	0.21	0.75
						4" Ice			
***									

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
VHLP2-23	A	Paraboloid w/Shroud (HP)	From Leg	3.00	30.0000		175.00	2.17	No Ice	3.72	0.03
				0.00					1/2" Ice	4.01	0.05
				2.00					1" Ice	4.30	0.07
									2" Ice	4.88	0.11
									4" Ice	6.04	0.20
PX2F-52	B	Paraboloid w/Radome	From Leg	3.00	60.0000		175.00	2.09	No Ice	3.44	0.02
				0.00					1/2" Ice	3.72	0.04
				2.00					1" Ice	3.99	0.06
									2" Ice	4.55	0.09
									4" Ice	5.67	0.17
VHLP2-23	C	Paraboloid w/Shroud (HP)	From Leg	3.00	30.0000		175.00	2.17	No Ice	3.72	0.03
				0.00					1/2" Ice	4.01	0.05
				2.00					1" Ice	4.30	0.07
									2" Ice	4.88	0.11
									4" Ice	6.04	0.20
***											

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

Comb. No.	Description
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 Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	192 - 151.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.62	-0.14	0.77
			Max. Mx	5	-8.52	-328.34	3.75
			Max. My	2	-8.53	-2.45	322.46
			Max. Vy	5	11.61	-328.34	3.75
			Max. Vx	8	11.46	3.47	-322.29
			Max. Torque	6			0.86
L2	151.25 - 111.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-27.38	-0.14	0.77
			Max. Mx	5	-17.44	-847.25	8.97
			Max. My	8	-17.45	8.63	-835.41
			Max. Vy	5	15.45	-847.25	8.97
			Max. Vx	8	15.30	8.63	-835.41
			Max. Torque	11			-0.86
L3	111.25 - 72.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-49.68	-0.23	1.66
			Max. Mx	5	-32.79	-1598.19	15.29
			Max. My	8	-32.80	14.65	-1582.83
			Max. Vy	5	24.53	-1598.19	15.29
			Max. Vx	8	24.49	14.65	-1582.83
			Max. Torque	11			-1.79
L4	72.75 - 35.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-71.19	-0.23	1.66
			Max. Mx	5	-50.51	-2550.31	22.09
			Max. My	8	-50.52	21.39	-2533.68
			Max. Vy	5	28.67	-2550.31	22.09
			Max. Vx	8	28.64	21.39	-2533.68
			Max. Torque	11			-1.78
L5	35.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-102.68	-0.23	1.66

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	5	-76.90	-3953.44	30.56
			Max. My	8	-76.90	29.81	-3935.26
			Max. Vy	5	33.69	-3953.44	30.56
			Max. Vx	8	33.66	29.81	-3935.26
			Max. Torque	11			-1.78

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	102.68	0.00	0.00
	Max. H_x	11	76.91	33.65	-0.19
	Max. H_z	2	76.91	-0.14	33.63
	Max. M_x	2	3933.57	-0.14	33.63
	Max. M_z	5	3953.44	-33.68	0.19
	Max. Torsion	5	1.55	-33.68	0.19
	Min. Vert	29	76.91	-11.43	6.62
	Min. H_x	5	76.91	-33.68	0.19
	Min. H_z	8	76.91	0.19	-33.65
	Min. M_x	8	-3935.26	0.19	-33.65
	Min. M_z	11	-3947.74	33.65	-0.19
	Min. Torsion	11	-1.78	33.65	-0.19

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear$_x$ K	Shear$_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	76.91	0.04	0.00	-0.50	-0.04	0.00
Dead+Wind 0 deg - No Ice	76.91	0.14	-33.63	-3933.57	-21.00	-0.21
Dead+Wind 30 deg - No Ice	76.91	17.04	-29.17	-3411.63	-2008.64	-0.59
Dead+Wind 60 deg - No Ice	76.91	29.26	-16.94	-1985.33	-3438.51	-1.24
Dead+Wind 90 deg - No Ice	76.91	33.68	-0.19	-30.56	-3953.44	-1.55
Dead+Wind 120 deg - No Ice	76.91	29.13	16.64	1936.52	-3418.77	-1.29
Dead+Wind 150 deg - No Ice	76.91	16.73	29.05	3393.09	-1959.92	-0.34
Dead+Wind 180 deg - No Ice	76.91	-0.19	33.65	3935.26	29.81	0.33
Dead+Wind 210 deg - No Ice	76.91	-17.00	29.18	3412.39	2001.49	0.98
Dead+Wind 240 deg - No Ice	76.91	-29.23	16.92	1981.24	3431.99	1.58
Dead+Wind 270 deg - No Ice	76.91	-33.65	0.19	29.32	3947.74	1.78
Dead+Wind 300 deg - No Ice	76.91	-29.09	-16.70	-1948.48	3412.09	1.43
Dead+Wind 330 deg - No Ice	76.91	-16.74	-29.07	-3397.89	1961.99	0.64
Dead+Ice+Temp	102.68	0.00	0.00	-1.66	-0.23	0.00
Dead+Wind 0 deg+Ice+Temp	102.68	0.03	-8.74	-1085.13	-5.72	-0.02
Dead+Wind 30 deg+Ice+Temp	102.68	4.43	-7.58	-941.26	-552.64	-0.14
Dead+Wind 60 deg+Ice+Temp	102.68	7.60	-4.40	-548.20	-946.34	-0.34
Dead+Wind 90 deg+Ice+Temp	102.68	8.75	-0.05	-9.61	-1088.24	-0.45
Dead+Wind 120 deg+Ice+Temp	102.68	7.57	4.33	532.22	-941.19	-0.39
Dead+Wind 150 deg+Ice+Temp	102.68	4.35	7.55	933.25	-539.86	-0.14
Dead+Wind 180 deg+Ice+Temp	102.68	-0.05	8.75	1082.40	7.58	0.05
Dead+Wind 210 deg+Ice+Temp	102.68	-4.42	7.58	938.28	550.26	0.24
Dead+Wind 240 deg+Ice+Temp	102.68	-7.60	4.40	543.93	944.13	0.43

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 270 deg+Ice+Temp	102.68	-8.75	0.05	6.10	1086.25	0.51
Dead+Wind 300 deg+Ice+Temp	102.68	-7.56	-4.34	-538.58	938.94	0.43
Dead+Wind 330 deg+Ice+Temp	102.68	-4.35	-7.56	-937.71	539.94	0.22
Dead+Wind 0 deg - Service	76.91	0.05	-13.14	-1536.98	-8.21	-0.08
Dead+Wind 30 deg - Service	76.91	6.65	-11.39	-1333.08	-784.69	-0.23
Dead+Wind 60 deg - Service	76.91	11.43	-6.62	-775.89	-1343.28	-0.49
Dead+Wind 90 deg - Service	76.91	13.16	-0.07	-12.25	-1544.44	-0.60
Dead+Wind 120 deg - Service	76.91	11.38	6.50	756.20	-1335.56	-0.50
Dead+Wind 150 deg - Service	76.91	6.54	11.35	1325.22	-765.66	-0.13
Dead+Wind 180 deg - Service	76.91	-0.07	13.14	1537.02	11.64	0.13
Dead+Wind 210 deg - Service	76.91	-6.64	11.40	1332.76	781.89	0.38
Dead+Wind 240 deg - Service	76.91	-11.42	6.61	773.67	1340.72	0.62
Dead+Wind 270 deg - Service	76.91	-13.14	0.07	11.15	1542.20	0.70
Dead+Wind 300 deg - Service	76.91	-11.37	-6.52	-761.49	1332.94	0.56
Dead+Wind 330 deg - Service	76.91	-6.54	-11.36	-1327.71	766.45	0.25

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-76.91	0.00	-0.04	76.91	0.00	0.046%
2	0.14	-76.91	-33.63	-0.14	76.91	33.63	0.000%
3	17.04	-76.91	-29.17	-17.04	76.91	29.17	0.000%
4	29.26	-76.91	-16.94	-29.26	76.91	16.94	0.000%
5	33.68	-76.91	-0.19	-33.68	76.91	0.19	0.000%
6	29.13	-76.91	16.64	-29.13	76.91	-16.64	0.000%
7	16.73	-76.91	29.05	-16.73	76.91	-29.05	0.000%
8	-0.19	-76.91	33.65	0.19	76.91	-33.65	0.000%
9	-17.00	-76.91	29.18	17.00	76.91	-29.18	0.000%
10	-29.23	-76.91	16.92	29.23	76.91	-16.92	0.000%
11	-33.65	-76.91	0.19	33.65	76.91	-0.19	0.000%
12	-29.09	-76.91	-16.70	29.09	76.91	16.70	0.000%
13	-16.74	-76.91	-29.07	16.74	76.91	29.07	0.000%
14	0.00	-102.68	0.00	0.00	102.68	0.00	0.000%
15	0.03	-102.68	-8.74	-0.03	102.68	8.74	0.000%
16	4.43	-102.68	-7.58	-4.43	102.68	7.58	0.000%
17	7.60	-102.68	-4.40	-7.60	102.68	4.40	0.000%
18	8.75	-102.68	-0.05	-8.75	102.68	0.05	0.000%
19	7.57	-102.68	4.33	-7.57	102.68	-4.33	0.000%
20	4.35	-102.68	7.55	-4.35	102.68	-7.55	0.000%
21	-0.05	-102.68	8.75	0.05	102.68	-8.75	0.000%
22	-4.42	-102.68	7.58	4.42	102.68	-7.58	0.000%
23	-7.60	-102.68	4.40	7.60	102.68	-4.40	0.000%
24	-8.75	-102.68	0.05	8.75	102.68	-0.05	0.000%
25	-7.56	-102.68	-4.34	7.56	102.68	4.34	0.000%
26	-4.35	-102.68	-7.56	4.35	102.68	7.56	0.000%
27	0.05	-76.91	-13.14	-0.05	76.91	13.14	0.000%
28	6.65	-76.91	-11.39	-6.65	76.91	11.39	0.000%
29	11.43	-76.91	-6.62	-11.43	76.91	6.62	0.000%
30	13.16	-76.91	-0.07	-13.16	76.91	0.07	0.000%
31	11.38	-76.91	6.50	-11.38	76.91	-6.50	0.000%
32	6.54	-76.91	11.35	-6.54	76.91	-11.35	0.000%
33	-0.07	-76.91	13.14	0.07	76.91	-13.14	0.000%
34	-6.64	-76.91	11.40	6.64	76.91	-11.40	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
35	-11.42	-76.91	6.61	11.42	76.91	-6.61	0.000%
36	-13.14	-76.91	0.07	13.14	76.91	-0.07	0.000%
37	-11.37	-76.91	-6.52	11.37	76.91	6.52	0.000%
38	-6.54	-76.91	-11.36	6.54	76.91	11.36	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00018476
2	Yes	4	0.00000001	0.00002241
3	Yes	4	0.00000001	0.00019476
4	Yes	4	0.00000001	0.00020577
5	Yes	4	0.00000001	0.00003500
6	Yes	4	0.00000001	0.00018026
7	Yes	4	0.00000001	0.00019154
8	Yes	4	0.00000001	0.00002350
9	Yes	4	0.00000001	0.00020240
10	Yes	4	0.00000001	0.00018620
11	Yes	4	0.00000001	0.00003306
12	Yes	4	0.00000001	0.00020218
13	Yes	4	0.00000001	0.00018506
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00039437
16	Yes	4	0.00000001	0.00040310
17	Yes	4	0.00000001	0.00040437
18	Yes	4	0.00000001	0.00039632
19	Yes	4	0.00000001	0.00039832
20	Yes	4	0.00000001	0.00039641
21	Yes	4	0.00000001	0.00039218
22	Yes	4	0.00000001	0.00040042
23	Yes	4	0.00000001	0.00040171
24	Yes	4	0.00000001	0.00039524
25	Yes	4	0.00000001	0.00039941
26	Yes	4	0.00000001	0.00039889
27	Yes	4	0.00000001	0.00000995
28	Yes	4	0.00000001	0.00001965
29	Yes	4	0.00000001	0.00002104
30	Yes	4	0.00000001	0.00001091
31	Yes	4	0.00000001	0.00001839
32	Yes	4	0.00000001	0.00001953
33	Yes	4	0.00000001	0.00000999
34	Yes	4	0.00000001	0.00002062
35	Yes	4	0.00000001	0.00001889
36	Yes	4	0.00000001	0.00001102
37	Yes	4	0.00000001	0.00002097
38	Yes	4	0.00000001	0.00001881

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	192 - 151.25	13.554	29	0.6917	0.0019
L2	156.25 - 111.25	8.738	29	0.5636	0.0008
L3	117.75 - 72.75	4.824	29	0.3977	0.0004
L4	80.75 - 35.75	2.241	29	0.2584	0.0002
L5	45 - 0	0.711	29	0.1404	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
193.00	800 10121 w/ Mount Pipe	29	13.554	0.6917	0.0019	76307
185.00	APXV18-206517S-C w/ Mount Pipe	29	12.566	0.6681	0.0016	54505
177.00	VHLP2-23	29	11.451	0.6407	0.0013	25435
175.00	LLPX310R w/ Mount Pipe	29	11.176	0.6337	0.0013	22443
100.00	BXA-80080/4CF w/ Mount Pipe	29	3.456	0.3275	0.0003	15872

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	192 - 151.25	34.681	4	1.7694	0.0048
L2	156.25 - 111.25	22.361	4	1.4422	0.0020
L3	117.75 - 72.75	12.344	4	1.0178	0.0011
L4	80.75 - 35.75	5.737	4	0.6614	0.0006
L5	45 - 0	1.820	4	0.3593	0.0003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
193.00	800 10121 w/ Mount Pipe	4	34.681	1.7694	0.0048	29897
185.00	APXV18-206517S-C w/ Mount Pipe	4	32.153	1.7091	0.0042	21355
177.00	VHLP2-23	4	29.300	1.6390	0.0034	9965
175.00	LLPX310R w/ Mount Pipe	4	28.597	1.6212	0.0033	8793
100.00	BXA-80080/4CF w/ Mount Pipe	4	8.845	0.8382	0.0009	6205

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	192 - 151.25 (1)	TP39.245x26x0.3125	40.75	0.00	0.0	39.000	37.0042	-8.52	1443.16	0.006
L2	151.25 - 111.25 (2)	TP51.621x36.9948x0.4375	45.00	0.00	0.0	39.000	68.1410	-17.44	2657.50	0.007
L3	111.25 - 72.75 (3)	TP63.259x48.6333x0.5	45.00	0.00	0.0	39.000	95.4721	-32.79	3723.41	0.009
L4	72.75 - 35.75 (4)	TP74.285x59.6589x0.5625	45.00	0.00	0.0	39.000	126.2550	-50.51	4923.93	0.010
L5	35.75 - 0 (5)	TP84.78x70.1535x0.5625	45.00	0.00	0.0	39.000	150.3600	-76.90	5864.03	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	192 - 151.25 (1)	TP39.245x26x0.3125	329.49	11.613	39.000	0.298	0.00	0.000	39.000	0.000
L2	151.25 - 111.25 (2)	TP51.621x36.9948x0.4375	850.43	12.381	39.000	0.317	0.00	0.000	39.000	0.000
L3	111.25 - 72.75 (3)	TP63.259x48.6333x0.5	1604.93	13.595	39.000	0.349	0.00	0.000	39.000	0.000
L4	72.75 - 35.75 (4)	TP74.285x59.6589x0.5625	2561.63	13.954	39.000	0.358	0.00	0.000	39.000	0.000
L5	35.75 - 0 (5)	TP84.78x70.1535x0.5625	3970.50	15.230	39.000	0.391	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	192 - 151.25 (1)	TP39.245x26x0.3125	11.66	0.315	26.000	0.024	0.29	0.005	26.000	0.000
L2	151.25 - 111.25 (2)	TP51.621x36.9948x0.4375	15.50	0.227	26.000	0.017	0.29	0.002	26.000	0.000
L3	111.25 - 72.75 (3)	TP63.259x48.6333x0.5	24.66	0.258	26.000	0.020	1.24	0.005	26.000	0.000
L4	72.75 - 35.75 (4)	TP74.285x59.6589x0.5625	28.80	0.228	26.000	0.018	1.24	0.003	26.000	0.000
L5	35.75 - 0 (5)	TP84.78x70.1535x0.5625	33.82	0.225	26.000	0.017	1.24	0.002	26.000	0.000

Pole Interaction Design Data

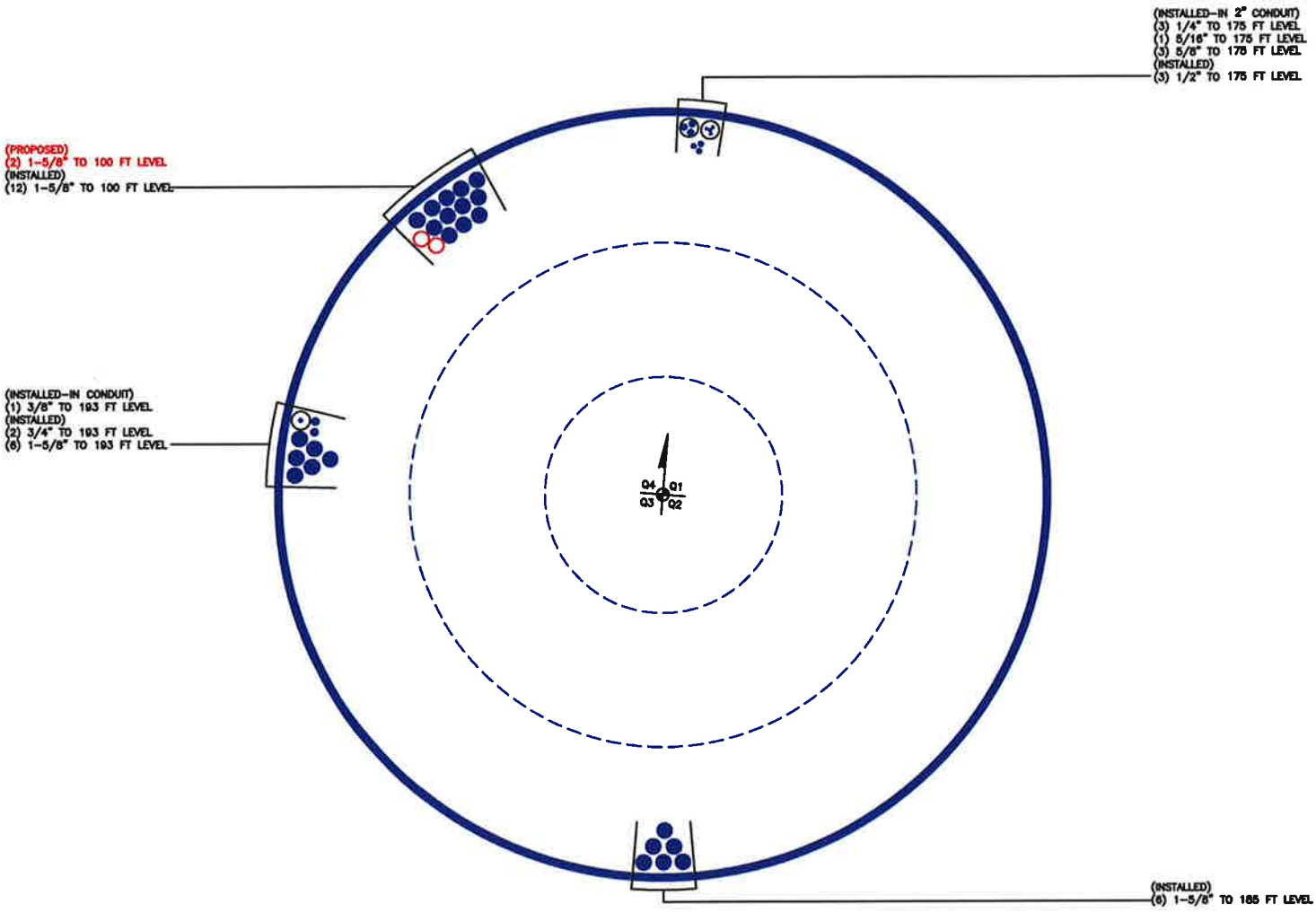
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	192 - 151.25 (1)	0.006	0.298	0.000	0.024	0.000	0.304 ✔	1.333	H1-3+VT ✔
L2	151.25 - 111.25 (2)	0.007	0.317	0.000	0.017	0.000	0.324 ✔	1.333	H1-3+VT ✔
L3	111.25 - 72.75 (3)	0.009	0.349	0.000	0.020	0.000	0.357 ✔	1.333	H1-3+VT ✔
L4	72.75 - 35.75 (4)	0.010	0.358	0.000	0.018	0.000	0.368 ✔	1.333	H1-3+VT ✔
L5	35.75 - 0 (5)	0.013	0.391	0.000	0.017	0.000	0.404 ✔	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	192 - 151.25	Pole	TP39.245x26x0.3125	1	-8.52	1923.73	22.8	Pass
L2	151.25 - 111.25	Pole	TP51.621x36.9948x0.4375	2	-17.44	3542.45	24.3	Pass
L3	111.25 - 72.75	Pole	TP63.259x48.6333x0.5	3	-32.79	4963.31	26.8	Pass
L4	72.75 - 35.75	Pole	TP74.285x59.6589x0.5625	4	-50.51	6563.60	27.6	Pass
L5	35.75 - 0	Pole	TP84.78x70.1535x0.5625	5	-76.90	7816.75	30.3	Pass
							Summary	
						Pole (L5)	30.3	Pass
						RATING =	**30.3**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(INSTALLED–IN 2" CONDUIT)
(3) 1/4" TO 175 FT LEVEL
(1) 5/16" TO 175 FT LEVEL
(3) 5/8" TO 175 FT LEVEL
(INSTALLED)
(3) 1/2" TO 175 FT LEVEL
(PROPOSED)
(2) 1–5/8" TO 100 FT LEVEL
(INSTALLED)
(12) 1–5/8" TO 100 FT LEVEL
(INSTALLED–IN CONDUIT)
(1) 3/8" TO 193 FT LEVEL
(INSTALLED)
(2) 3/4" TO 193 FT LEVEL
(6) 1–5/8" TO 193 FT LEVEL
Q4
Q1
Q3
Q2
(INSTALLED)
(6) 1–5/8" TO 185 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

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

Site Data

BU#: *803843*
Site Name: *CT NEW BRITAIN 4 CAC &*
App #: *300815 R1*

Anchor Rod Data		
Qty:	24	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	93	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	91	in
Thick:	3.25	in
Grade:	55	ksi
Clip Distance:	6	in

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

Pole Data		
Diam:	84.78	in
Thick:	0.5625	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	3970.50345	ft-kips
Unfactored Axial, P:	76.9004	kips
Unfactored Shear, V:	33.819416	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	82.2 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	42.2% **Pass**

Base Plate Results Flexural Check

Base Plate Stress:	20.2 ksi
Allowable PL Bending Stress:	55.0 ksi
Base Plate Stress Ratio:	36.7% **Pass**

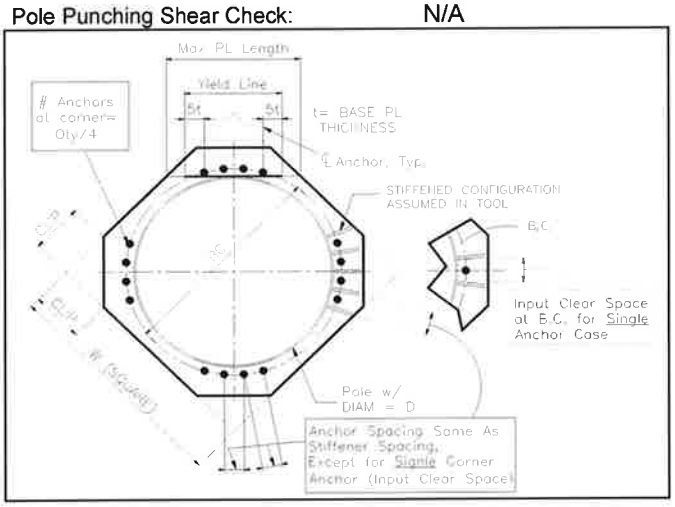
N/A - Unstiffened

Stiffener Results

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

Pole Results

Pole Punching Shear Check: N/A



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

(Bearing and Stability Checks) Tool for TIA Rev F or G - Application (MP, SST with unitbase)

Site Data

BU#: *803843*
Site Name: *CT NEW BRITAIN 4 CAC 803843*
App #: *300815 R1*

Enter Load Factors Below:		
For P (DL)	1.2	<---- Enter Factor
For P,V, and M (WL)	1.35	<---- Enter Factor

Pad & Pier Data		
Base PL Dist. Above Pier:	0	in
Pier Dist. Above Grade:	6	in
Pad Bearing Depth, D:	7	ft
Pad Thickness, T:	4	ft
Pad Width=Length, L:	32.5	ft
Pier Cross Section Shape:	Round	<--Pull Down
Enter Pier Diameter:	10	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	78.54	ft^2
Pier Height:	3.50	ft
Soil (above pad) Height:	3.00	ft

Soil Parameters		
Unit Weight, γ:	125.0	pcf
Ultimate Bearing Capacity, qn:	6.00	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	32.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	4.50	ksf
Passive Pres. Coeff., Kp	3.25	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	45.7	kips
Pad Force Location Above D:	1.73	ft
ϕ(Passive Pressure Moment):	79.14	ft-kips
Factored O.T. M(WL), "1.6W":	5702.6	ft-kips
Factored OT (MW-Msoil), M1	5623.46	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	1.87	ft
Sum of Soil Wedges Wt:	19.66	kips
Soil Wedges ecc, K1:	14.68	ft
Ftg+Soil above Pad wt:	1041.6	kips
Unfactored (Total ftg-soil Wt):	1061.29	kips
1.2D. **No Soil Wedges**.	1342.23	kips
0.9D. **With Soil Wedges**	1024.37	kips

Resistance due to Cohesion (Vertical)		
ϕ*(1/2*Cu)(Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	76.9004	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	33.81942	kips
Unfactored WL Moment, M:	3970.503	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	92.28048	kips
0.90	0.9D+1.6W, Pu:	69.21036	kips
1.35	Vu:	45.65621	kips
	Mu:	5360.18	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	1342.23	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	5623.46	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	4.19	ft
Orthogonal qu=	1.93	ksf
qu/ϕ*qn Ratio=	**42.80%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	2.96	ft
Diagonal qu=	1.90	ksf
qu/ϕ*qn Ratio=	**42.23%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	1024.37	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	5363.60	ft-kips

Orthogonal ecc3 = M2/P2 =	5.24	ft
Ortho Non Bearing Length,NBL=	10.47	ft
Orthogonal qu=	1.59	ksf
Diagonal qu=	1.63	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	3970.50		
M Orthogonal:	9723.13	**40.84%**	**Pass**
M Diagonal:	9377.51	**42.34%**	**Pass**

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#: *803843*
Site Name: *CT NEW BRITAIN 4 CAC 803843*
App #: *300815 R1*

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

Pier Properties

Concrete:

Pier Diameter =	10.0	ft
Concrete Area =	11309.7	in^2

Reinforcement:

Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	4	
Vert. Cage Diameter =	9.30	ft
Vert. Cage Diameter =	111.59	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	64	
As Total=	99.84	in^2
A s/ Aconc, Rho:	0.0088	0.88%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:

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

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.88%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	17979.33	kips
at Mu=(ϕ=0.65)Mn=	15804.14	ft-kips
Max Tu, (φ=0.9) Tn =	5391.36	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	4088.871	ft-kips **(* Note)**
Max. Service Shaft P:	76.9004	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:	5315.533	ft-kips
1.30	Pu:	99.97052	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

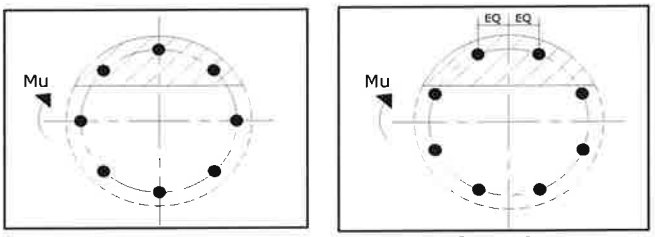
Seismic Properties

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:	**22.92**	in
Extreme Steel Strain, εt:	**0.0121**	
	εt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	99.97	kips
Drilled Shaft Moment Capacity, φMn:	**22152.26**	ft-kips
Drilled Shaft Superimposed Mu:	**5315.53**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**24.0%**

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Number	803843
Site Name	EW BRITAIN 4 CAC 803843

Caisson Analysis

Pier Properties		
Moment	3971	kip-ft
Shear	34	kip
Pier Diameter	10.0	ft
Height Above Grade	0.50	ft
Depth Below Grade	28.50	ft
Donut Diameter		ft
Donut Depth		ft

Analysis Properties		
TIA Code	F	
Soil Safety Factor	2.00	
Water Table Depth	13.0	ft
Ignored Soil Depth	5.0	ft
Cohesion Based on	PLS Caisson	
Max Soil Capacity	110%	

Soil Properties

Layer	Top of Soil Layer (ft)	Layer Thickness (ft)	Bottom of Soil Layer (ft)	Soil Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Soil.Layer	*Soil.Top*	*Soil.Thick*	*Soil.Bottom*	*Soil.Weight*	*Soil.Cohesion*	*Soil.Phi*
1	0.00	15	15.00	115	0	30
2	15.00	14	29.00	135	0	34
3						
4						
5						
6						
7						
8						
9						
10						

Critical Depths Below Grade		
Rotation Axis	20.55	ft
Zero Shear	7.35	ft

Results		
Soil Capacity	45.0%	OK
Max Pier Moment	4199	kip-ft

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

V1.0

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

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

Site Data

BU#: *803843*
Site Name: *CT NEW BRITAIN 4 CAC 803843*
App #: *300815 R1*

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

Maximum Shaft Superimposed Forces		
TIA Revision:	F	
Max. Service Shaft M:	4198.829	ft-kips (* Note)
Max. Service Shaft P:	76.9004	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:	5458.477	ft-kips
1.30	Pu:	99.97052	kips

Pier Properties		
Concrete:		
Pier Diameter =	10.0	ft
Concrete Area =	11309.7	in^2
Reinforcement:		
Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	9.11	ft
Vert. Cage Diameter =	109.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	40	
As Total=	62.4	in^2
A s/ Aconc, Rho:	0.0055	0.55%

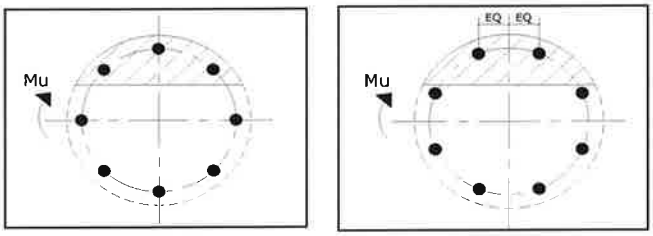
Material Properties		
Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	
ACI 318 Code		
Select Analysis ACI Code=	2002	
Seismic Properties		
Seismic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

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

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:
(3)*(Sqrt(f'c)/Fy: 0.0027
200 / Fy: 0.0033

Results:

Governing Orientation Case: **1**



Case 1 Case 2

Dist. From Edge to Neutral Axis: **18.69** in
Extreme Steel Strain, ϵt: **0.0154**
ϵt > 0.0050, Tension Controlled
Reduction Factor,φ: **0.900**

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.55%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	16860.84	kips
at Mu=(ϕ=0.65)Mn=	14761.44	ft-kips
Max Tu, (φ=0.9) Tn =	3369.6	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	99.97	kips
Drilled Shaft Moment Capacity, φMn:	**14449.69**	ft-kips
Drilled Shaft Superimposed Mu:	**5458.48**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**37.8%**