Robinson+Cole

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

May 4, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
53 Slater Road, Manchester, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 113-foot level on an existing 155-foot monopole tower at 53 Slater Road in Manchester (the "Property"). The tower is owned by Crown Castle. Cellco's use of the tower was approved by the Council in 2002. Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model SBNHH-1D65B, 1900 MHz antennas and three (3) model SBNHH-1D65B, 2100 MHz antennas, all at the same 113-foot level on the tower. Cellco also intends to replace six (6) remote radio heads ("RRHs") and add three (3) additional RRHs, one (1) each behind its 700 MHz, 1900 MHz and 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable, attached to the outside of the monopole tower. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Scott Shanley, General Manager of the Town of Manchester. A copy of this letter is also being sent to 121 CT Avenue Associates, 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. The replacement antennas and RRHs will be installed on Cellco's existing antenna platform at the 113-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 General Power Density table with 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:
Scott Shanley, Manchester General Manager
121 CT Avenue Associates, LLC
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	1920–2180	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	1920–2180	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®

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

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.

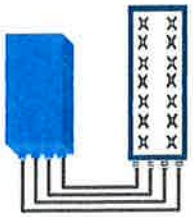
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the 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	2 Branch RX – LA6.0.1
	1900A HW version	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

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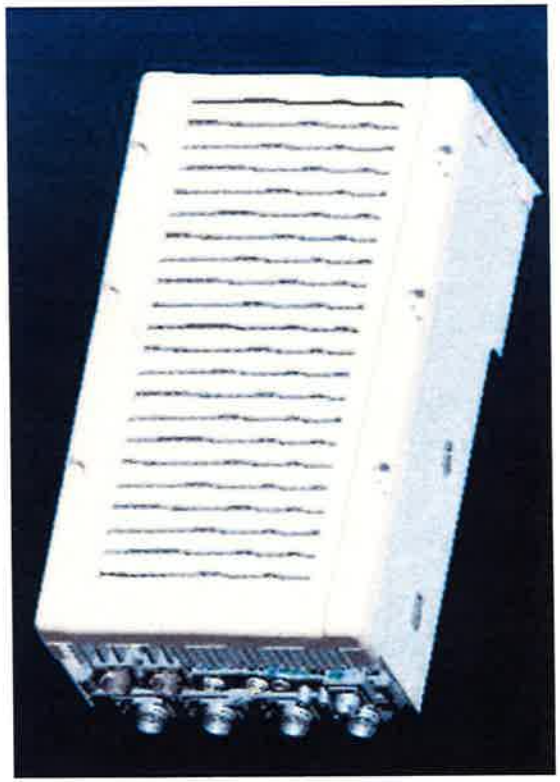
NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

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.

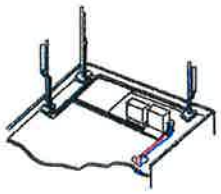
EASY INSTALLATION

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.

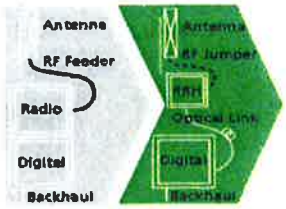
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

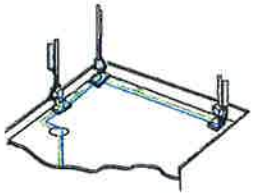
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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 CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-93-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

* This data is provisional and subject to change

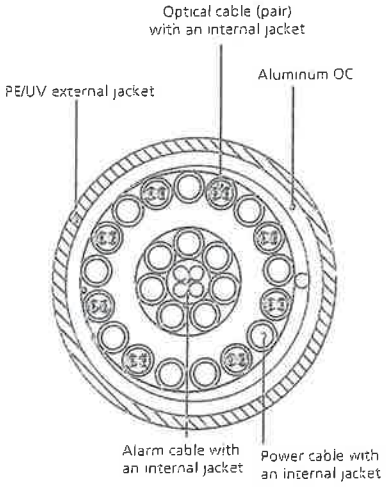


Figure 2: Construction Detail

ATTACHMENT 2

	General	Power	Density					
Site Name: Buckland (Manchester)								
Tower Height: 155Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
Nextel	9	100	78	0.0532	851	0.5673	9.38%	
*Sprint CDMA/LTE	4	347.5	155	0.0208	1900	1.0000	2.08%	
*Sprint CDMA/LTE	1	195	155	0.0029	850	0.5667	0.52%	
*Sprint CDMA/LTE	2	195	155	0.0058	2500	1.0000	0.58%	
*Clearwire	2	153	155	0.0046	2496	1.0000	0.46%	
*Clearwire	1	211	151	0.0033	11 GHz	1.0000	0.33%	
*AT&T UMTS	2	500	145	0.0171	880	0.5867	2.92%	
*AT&T UMTS	1	500	145	0.0086	1900	1.0000	0.86%	
*AT&T LTE	1	500	145	0.0086	2300	1.0000	0.86%	
*AT&T LTE	1	500	145	0.0086	1900	1.0000	0.86%	
*AT&T LTE	1	500	145	0.0086	700	0.4667	1.83%	
*MetroPCS CDMA	3	727	103	0.0739	2135	1.0000	7.39%	
*MetroPCS LTE	1	1200	103	0.0407	2130	1.0000	4.07%	
*T-Mobile GSM/UMTS	2	12	133	0.0005	1950	1.0000	0.05%	
*T-Mobile UMTS	2	12	133	0.0005	2100	1.0000	0.05%	
*T-Mobile LTE	2	24	133	0.0010	2100	1.0000	0.10%	
Verizon PCS	**11**	**446**	**113**	**0.1381**	**1970**	**1.0000**	**13.81%**	
Verizon Cellular	**9**	**408**	**113**	**0.1034**	**869**	**0.5793**	**17.85%**	
Verizon AWS	**1**	**1750**	**113**	**0.0493**	**2145**	**1.0000**	**4.93%**	
Verizon 700	**1**	**1050**	**113**	**0.0296**	**746**	**0.4973**	**5.95%**	
								74.85%
* Source: Siting Council								

ATTACHMENT 3

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

Date: **April 24, 2015**

Rebecca Klein
Crown Castle
525 Alderman Lane
Fort Mill, SC 29715
704.405.5625

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	876347
	Crown Castle Site Name:	BUCKLAND MALL
	Crown Castle JDE Job Number:	331292
	Crown Castle Work Order Number:	1047038
	Crown Castle Application Number:	293094 Rev. 0
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37515-1587.001.7805
Site Data:	**53 Slater Street, MANCHESTER, Hartford County, CT**	
	Latitude *41° 48' 18"*, Longitude *-72° 32' 1"*	
	155 Foot - Monopole Tower	

Dear Rebecca Klein,

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 780165, in accordance with application 293094, 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:

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

Joey Meinerding, E.I.
Structural Designer

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

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Subject: **Structural Analysis Report**

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	Carrier Site Number:	N/A
	Carrier Site Name:	N/A
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Respectfully submitted by:

Joey Meinerding, E.I.
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 155 ft. monopole tower designed by Summit in February of 2002. 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 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
113.0	113.0	3	alcatel lucent	RRH2X60-AWS	1	1-5/8	--
		3	alcatel lucent	RRH2X60-PCS			
		3	alcatel lucent	RRH2x60-700			
		6	commscope	SBNHH-1D65B w/ Mount Pipe			

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
155.0	155.0	3	alcatel lucent	TD-RRH8x20-25	3 5 1 1 3	5/16 1/2 5/8 3/4 1-1/4	1
		3	argus technologies	LPX310R w/ Mount Pipe			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		3	samsung telecommunications	WIMAX DAP HEAD			
		1	tower mounts	Platform Mount [LP 713-1]			
	151.0	1	andrew	VHLP1-23			
		1	andrew	VHLP2-11			
		1	andrew	VHLP2.5-18			
		3	dragonwave	HORIZON COMPACT			
153.0	153.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	--	--	1
		3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Pipe Mount [PM 601-3]			
145.0	145.0	3	ericsson	RRUS 11	--	--	1
		1	tower mounts	Pipe Mount [PM 601-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
143.0	143.0	3	ericsson	RRUS-11	1 2 6	3/8 3/4 1-1/4	1
		3	kathrein	800 10121 w/ Mount Pipe			
		6	kathrein	860 10025			
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	T-Arm Mount [TA 702-3]			
133.0	133.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1 12	1-1/4 1-5/8	1
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		1	tower mounts	Platform Mount [LP 403-1]			
113.0	113.0	3	alcatel lucent	RRH2X40-07-U	1	1-1/4	2
		3	alcatel lucent	RRH2x40-AWS			
		3	antel	BXA-171063-12BF w/ Mount Pipe			
		3	rymsa wireless	MG D3-800Tx w/ Mount Pipe			
		3	andrew	LNX-6512DS-T0M w/ Mount Pipe	13	1-5/8	1
		3	antel	BXA-70063/6CFx2 w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		1	tower mounts	Platform Mount [LP 1201-1]			
103.0	103.0	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
78.0	78.0	1	tower mounts	Platform Mount [LP 303-1]	--	--	1
60.0	60.0	1	tower mounts	Side Arm Mount [SO 701-1]	1	1/2	1

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

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 1204605EG1, 06/12/2012	1533476	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit/PJF, 3960/29298-597, 09/11/1998	1615406	CCISITES
4-TOWER MANUFACTURER DRAWINGS	SEA/PJF, A02-T0021, 02/18/2002	2068033	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.

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	155 - 115.5	Pole	TP29.31x22x0.25	1	-8.13	1080.07	57.9	Pass
L2	115.5 - 79.25	Pole	TP35.51x28.11x0.31	2	-16.74	1772.22	88.0	Pass
L3	79.25 - 43.75	Pole	TP41.46x34.06x0.38	3	-25.94	2481.90	97.7	Pass
L4	43.75 - 0	Pole	TP48.8x39.73x0.44	4	-39.93	3491.31	98.2	Pass
							Summary	
						Pole (L4)	98.2	Pass
						Rating =	98.2	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	91.2	Pass
1	Base Plate	0	78.4	Pass
1	Base Foundation Structural Steel	0	54.0	Pass
1	Base Foundation Soil Interaction	0	85.3	Pass

Structure Rating (max from all components) =	98.2%

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

4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Hartford County, Connecticut.
2) Basic wind speed of 80.0 mph.
3) Nominal ice thickness of 1.00 in.
4) Ice density of 56 pcf.
5) A wind speed of 37.6 mph is used in combination with ice.
6) Temperature drop of 50 °F.
7) Deflections calculated using a wind speed of 50.0 mph.
8) A non-linear (P-delta) analysis was used.
9) Pressures are calculated at each section.
10) Stress ratio used in pole design is 1.333.
11) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	155.00-115.50	39.50	3.75	18	22.00	29.31	0.25	1.00	A607-60 (60 ksi)
L2	115.50-79.25	40.00	4.50	18	28.11	35.51	0.31	1.25	A607-65 (65 ksi)
L3	79.25-43.75	40.00	5.25	18	34.06	41.46	0.38	1.50	A607-65 (65 ksi)
L4	43.75-0.00	49.00		18	39.73	48.80	0.44	1.75	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	22.34	17.26	1031.48	7.72	11.18	92.29	2064.32	8.63	3.43	13.728
	29.76	23.06	2459.70	10.32	14.89	165.21	4922.63	11.53	4.72	18.873

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
L2	29.25	27.58	2692.83	9.87	14.28	188.55	5389.20	13.79	4.40	14.074
	36.06	34.92	5466.10	12.50	18.04	302.98	10939.40	17.46	5.70	18.241
L3	35.43	40.09	5745.80	11.96	17.30	332.11	11499.17	20.05	5.33	14.224
	42.10	48.90	10425.54	14.58	21.06	495.05	20864.80	24.45	6.64	17.697
L4	41.33	54.57	10646.61	13.95	20.19	527.44	21307.22	27.29	6.22	14.225
	49.55	67.16	19844.89	17.17	24.79	800.51	39715.89	33.59	7.82	17.872

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 155.00-115.50				1	1	1		
L2 115.50-79.25				1	1	1		
L3 79.25-43.75				1	1	1		
L4 43.75-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
ATCB-B01-005(5/16)	C	No	Inside Pole	155.00 - 0.00	3	No Ice	0.00	0.07
						1/2" Ice	0.00	0.07
						1" Ice	0.00	0.07
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	155.00 - 0.00	5	No Ice	0.00	0.14
						1/2" Ice	0.00	0.76
						1" Ice	0.00	2.00
2" Conduit	C	No	CaAa (Out Of Face)	155.00 - 0.00	1	No Ice	0.00	1.16
						1/2" Ice	0.00	2.53
						1" Ice	0.00	4.51
2" Conduit	C	No	CaAa (Out Of Face)	155.00 - 0.00	1	No Ice	0.17	1.16
						1/2" Ice	0.27	2.53
						1" Ice	0.37	4.51
9776(3/4")	C	No	Inside Pole	155.00 - 0.00	1	No Ice	0.00	0.31
						1/2" Ice	0.00	0.31
						1" Ice	0.00	0.31
HB058-M12-XXXF(5/8")	C	No	Inside Pole	155.00 - 0.00	1	No Ice	0.00	0.24
						1/2" Ice	0.00	0.24
						1" Ice	0.00	0.24
HB114-1-08U4-M5J(1 1/4")	C	No	Inside Pole	155.00 - 0.00	3	No Ice	0.00	1.08
						1/2" Ice	0.00	1.08
						1" Ice	0.00	1.08
***								
LDF6-50A(1-1/4")	C	No	Inside Pole	143.00 - 0.00	6	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
FB-L98B-002-75000(3/8")	C	No	Inside Pole	143.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	143.00 - 0.00	2	No Ice	0.00	0.59
						1/2" Ice	0.00	0.59
						1" Ice	0.00	0.59
2" Conduit	C	No	Inside Pole	143.00 - 0.00	1	No Ice	0.00	1.16
						1/2" Ice	0.00	1.16
						1" Ice	0.00	1.16
***								
HB114-21U3M12-XXXF(1-1/4")	C	No	Inside Pole	133.00 - 0.00	1	No Ice	0.00	1.22
						1/2" Ice	0.00	1.22
						1" Ice	0.00	1.22
LCF158-50JA-A0(1 5/8")	C	No	Inside Pole	133.00 - 0.00	12	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
						1" Ice	0.00	0.08

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
***								
561(1-5/8")	C	No	Inside Pole	113.00 - 0.00	12	No Ice	0.00	1.35
						1/2" Ice	0.00	1.35
						1" Ice	0.00	1.35
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	113.00 - 0.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	113.00 - 0.00	1	No Ice	0.20	1.30
						1/2" Ice	0.30	2.81
						1" Ice	0.40	4.94
***								
AVA7-50(1-5/8)	C	No	CaAa (Out Of Face)	103.00 - 0.00	6	No Ice	0.00	0.70
						1/2" Ice	0.00	2.23
						1" Ice	0.00	4.38
***								
LDF4-50A(1/2")	C	No	Inside Pole	60.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15

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	155.00-115.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.873	0.49
L2	115.50-79.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	12.990	1.30
L3	79.25-43.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	13.206	1.37
L4	43.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	16.275	1.69

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	155.00-115.50	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	14.773	1.12
L2	115.50-79.25	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	26.990	2.53
L3	79.25-43.75	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	27.406	2.85
L4	43.75-0.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	33.775	3.52

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	155.00-115.50	-0.21	0.12	-0.39	0.22
L2	115.50-79.25	-0.41	0.24	-0.72	0.42
L3	79.25-43.75	-0.43	0.25	-0.77	0.45
L4	43.75-0.00	-0.44	0.25	-0.80	0.46

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
LPX310R w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	2.31 2.64 2.99	2.34 2.87 3.41	0.03 0.05 0.08
LPX310R w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	2.31 2.64 2.99	2.34 2.87 3.41	0.03 0.05 0.08
LPX310R w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	2.31 2.64 2.99	2.34 2.87 3.41	0.03 0.05 0.08
HORIZON COMPACT	A	From Leg	4.00 0.00 -4.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	0.84 0.97 1.10	0.43 0.52 0.63	0.01 0.02 0.03
HORIZON COMPACT	B	From Leg	4.00 0.00 -4.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	0.84 0.97 1.10	0.43 0.52 0.63	0.01 0.02 0.03
HORIZON COMPACT	C	From Leg	4.00 0.00 -4.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	0.84 0.97 1.10	0.43 0.52 0.63	0.01 0.02 0.03
WIMAX DAP HEAD	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
WIMAX DAP HEAD	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
WIMAX DAP HEAD	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	1.80 1.99 2.18	0.78 0.92 1.07	0.03 0.04 0.06
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.95 8.13 9.02	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.95 8.13 9.02	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.95 8.13 9.02	0.08 0.15 0.23
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice	7.13 7.66 8.18	4.96 5.75 6.47	0.08 0.13 0.19

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			
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	7.13 7.66 8.18	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	7.13 7.66 8.18	4.96 5.75 6.47	0.08 0.13 0.19
TD-RRH8x20-25	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	4.72 5.01 5.32	1.70 1.92 2.15	0.07 0.10 0.13
TD-RRH8x20-25	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	4.72 5.01 5.32	1.70 1.92 2.15	0.07 0.10 0.13
TD-RRH8x20-25	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	4.72 5.01 5.32	1.70 1.92 2.15	0.07 0.10 0.13
Platform Mount [LP 713-1]	C	None		0.000	155.00	No Ice 1/2" Ice 1" Ice	31.27 39.68 48.09	31.27 39.68 48.09	1.51 1.93 2.35
***									
800MHz 2X50W RRH W/FILTER	A	From Leg	1.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	B	From Leg	1.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	C	From Leg	1.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	0.06 0.09 0.11
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice	2.71 2.95 3.20	2.61 2.85 3.09	0.06 0.08 0.11
Pipe Mount [PM 601-3]	C	None		0.000	153.00	No Ice 1/2" Ice 1" Ice	4.39 5.48 6.57	4.39 5.48 6.57	0.20 0.24 0.28
***									
RRUS 11	A	From Leg	1.00 0.00 0.00	0.000	145.00	No Ice 1/2" Ice 1" Ice	3.26 3.50 3.75	1.38 1.56 1.74	0.05 0.07 0.10
RRUS 11	B	From Leg	1.00 0.00 0.00	0.000	145.00	No Ice 1/2" Ice 1" Ice	3.26 3.50 3.75	1.38 1.56 1.74	0.05 0.07 0.10
RRUS 11	C	From Leg	1.00 0.00	0.000	145.00	No Ice 1/2"	3.26 3.50	1.38 1.56	0.05 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	3.75	1.74	0.10
						1" Ice			
Pipe Mount [PM 601-3]	C	None		0.000	145.00	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
***									
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.30 7.48 8.37	0.07 0.14 0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.30 7.48 8.37	0.07 0.14 0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	8.50 9.15 9.77	6.30 7.48 8.37	0.07 0.14 0.21
800 10121 w/ Mount Pipe	A	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	6.03 6.71 7.30	4.95 6.02 6.81	0.07 0.12 0.18
800 10121 w/ Mount Pipe	B	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	6.03 6.71 7.30	4.95 6.02 6.81	0.07 0.12 0.18
800 10121 w/ Mount Pipe	C	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	6.03 6.71 7.30	4.95 6.02 6.81	0.07 0.12 0.18
(2) 860 10025	A	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.16 0.22 0.29	0.13 0.19 0.26	0.00 0.00 0.01
(2) 860 10025	B	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.16 0.22 0.29	0.13 0.19 0.26	0.00 0.00 0.01
(2) 860 10025	C	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.16 0.22 0.29	0.13 0.19 0.26	0.00 0.00 0.01
(2) LGP21401	A	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	1.29 1.45 1.61	0.36 0.48 0.60	0.01 0.02 0.03
(2) LGP21401	B	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	1.29 1.45 1.61	0.36 0.48 0.60	0.01 0.02 0.03
(2) LGP21401	C	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	1.29 1.45 1.61	0.36 0.48 0.60	0.01 0.02 0.03
RRUS-11	A	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
RRUS-11	B	From Leg	3.00 0.00 0.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.05 0.07 0.09
RRUS-11	C	From Leg	3.00 0.00	0.000	143.00	No Ice 1/2"	3.25 3.49	1.37 1.55	0.05 0.07

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	3.74	1.74	0.09
						1" Ice			
DC6-48-60-18-8F	A	From Leg	3.00	0.000	143.00	No Ice	1.47	1.47	0.02
			0.00			1/2"	1.67	1.67	0.04
			0.00			Ice	1.88	1.88	0.06
						1" Ice			
T-Arm Mount [TA 702-3]	C	None		0.000	143.00	No Ice	5.64	5.64	0.34
						1/2"	6.55	6.55	0.43
						Ice	7.46	7.46	0.52
						1" Ice			
***									
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00	0.000	133.00	No Ice	6.82	5.63	0.11
			0.00			1/2"	7.34	6.47	0.17
			0.00			Ice	7.85	7.25	0.23
						1" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00	0.000	133.00	No Ice	6.82	5.63	0.11
			0.00			1/2"	7.34	6.47	0.17
			0.00			Ice	7.85	7.25	0.23
						1" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00	0.000	133.00	No Ice	6.82	5.63	0.11
			0.00			1/2"	7.34	6.47	0.17
			0.00			Ice	7.85	7.25	0.23
						1" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00	0.000	133.00	No Ice	6.83	5.64	0.11
			0.00			1/2"	7.35	6.48	0.17
			0.00			Ice	7.86	7.26	0.23
						1" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00	0.000	133.00	No Ice	6.83	5.64	0.11
			0.00			1/2"	7.35	6.48	0.17
			0.00			Ice	7.86	7.26	0.23
						1" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00	0.000	133.00	No Ice	6.83	5.64	0.11
			0.00			1/2"	7.35	6.48	0.17
			0.00			Ice	7.86	7.26	0.23
						1" Ice			
KRY 112 144/1	A	From Leg	4.00	0.000	133.00	No Ice	0.41	0.20	0.01
			0.00			1/2"	0.50	0.27	0.01
			0.00			Ice	0.59	0.35	0.02
						1" Ice			
KRY 112 144/1	B	From Leg	4.00	0.000	133.00	No Ice	0.41	0.20	0.01
			0.00			1/2"	0.50	0.27	0.01
			0.00			Ice	0.59	0.35	0.02
						1" Ice			
KRY 112 144/1	C	From Leg	4.00	0.000	133.00	No Ice	0.41	0.20	0.01
			0.00			1/2"	0.50	0.27	0.01
			0.00			Ice	0.59	0.35	0.02
						1" Ice			
(2) 2.375" OD x 5' Mount Pipe	A	From Leg	4.00	0.000	133.00	No Ice	1.19	1.19	0.02
			0.00			1/2"	1.50	1.50	0.03
			0.00			Ice	1.81	1.81	0.04
						1" Ice			
(2) 2.375" OD x 5' Mount Pipe	B	From Leg	4.00	0.000	133.00	No Ice	1.19	1.19	0.02
			0.00			1/2"	1.50	1.50	0.03
			0.00			Ice	1.81	1.81	0.04
						1" Ice			
(2) 2.375" OD x 5' Mount Pipe	C	From Leg	4.00	0.000	133.00	No Ice	1.19	1.19	0.02
			0.00			1/2"	1.50	1.50	0.03
			0.00			Ice	1.81	1.81	0.04
						1" Ice			
Platform Mount [LP 403-1]	C	None		0.000	133.00	No Ice	18.85	18.85	1.50
						1/2"	24.30	24.30	1.80
						Ice	29.75	29.75	2.09
						1" Ice			
***									
BXA-70063/6CFx2 w/	A	From Leg	4.00	0.000	113.00	No Ice	7.97	5.40	0.04

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
Mount Pipe			0.00				1/2" Ice	8.61	6.55	0.10
			0.00				1" Ice	9.22	7.41	0.17
BXA-70063/6CFx2 w/ Mount Pipe	B	From Leg	4.00	0.00	0.000	113.00	No Ice	7.97	5.40	0.04
			0.00				1/2" Ice	8.61	6.55	0.10
			0.00				1" Ice	9.22	7.41	0.17
BXA-70063/6CFx2 w/ Mount Pipe	C	From Leg	4.00	0.00	0.000	113.00	No Ice	7.97	5.40	0.04
			0.00				1/2" Ice	8.61	6.55	0.10
			0.00				1" Ice	9.22	7.41	0.17
LNX-6512DS-T0M w/ Mount Pipe	A	From Leg	4.00	0.00	0.000	113.00	No Ice	5.85	4.55	0.05
			0.00				1/2" Ice	6.31	5.23	0.09
			0.00				1" Ice	6.77	5.91	0.15
LNX-6512DS-T0M w/ Mount Pipe	B	From Leg	4.00	0.00	0.000	113.00	No Ice	5.85	4.55	0.05
			0.00				1/2" Ice	6.31	5.23	0.09
			0.00				1" Ice	6.77	5.91	0.15
LNX-6512DS-T0M w/ Mount Pipe	C	From Leg	4.00	0.00	0.000	113.00	No Ice	5.85	4.55	0.05
			0.00				1/2" Ice	6.31	5.23	0.09
			0.00				1" Ice	6.77	5.91	0.15
DB-T1-6Z-8AB-0Z	A	From Leg	4.00	0.00	0.000	113.00	No Ice	5.60	2.33	0.04
			0.00				1/2" Ice	5.92	2.56	0.08
			0.00				1" Ice	6.24	2.79	0.12
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00	0.00	0.000	113.00	No Ice	8.64	7.07	0.07
			0.00				1/2" Ice	9.30	8.26	0.14
			0.00				1" Ice	9.92	9.18	0.21
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00	0.00	0.000	113.00	No Ice	8.64	7.07	0.07
			0.00				1/2" Ice	9.30	8.26	0.14
			0.00				1" Ice	9.92	9.18	0.21
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00	0.00	0.000	113.00	No Ice	8.64	7.07	0.07
			0.00				1/2" Ice	9.30	8.26	0.14
			0.00				1" Ice	9.92	9.18	0.21
RRH2X60-AWS	A	From Leg	4.00	0.00	0.000	113.00	No Ice	2.19	1.43	0.04
			0.00				1/2" Ice	2.40	1.61	0.06
			0.00				1" Ice	2.61	1.80	0.08
RRH2X60-AWS	B	From Leg	4.00	0.00	0.000	113.00	No Ice	2.19	1.43	0.04
			0.00				1/2" Ice	2.40	1.61	0.06
			0.00				1" Ice	2.61	1.80	0.08
RRH2X60-AWS	C	From Leg	4.00	0.00	0.000	113.00	No Ice	2.19	1.43	0.04
			0.00				1/2" Ice	2.40	1.61	0.06
			0.00				1" Ice	2.61	1.80	0.08
RRH2X60-PCS	A	From Leg	4.00	0.00	0.000	113.00	No Ice	2.57	2.01	0.06
			0.00				1/2" Ice	2.79	2.22	0.08
			0.00				1" Ice	3.02	2.43	0.10
RRH2X60-PCS	B	From Leg	4.00	0.00	0.000	113.00	No Ice	2.57	2.01	0.06
			0.00				1/2" Ice	2.79	2.22	0.08
			0.00				1" Ice	3.02	2.43	0.10
RRH2X60-PCS	C	From Leg	4.00	0.00	0.000	113.00	No Ice	2.57	2.01	0.06
			0.00				1/2" Ice	2.79	2.22	0.08
			0.00				1" Ice	3.02	2.43	0.10
RRH2x60-700	A	From Leg	4.00	0.00	0.000	113.00	No Ice	3.96	1.82	0.06
			0.00				1/2" Ice	4.27	2.08	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	4.60	2.36	0.11
						1" Ice			
RRH2x60-700	B	From Leg	4.00	0.000	113.00	No Ice	3.96	1.82	0.06
			0.00			1/2"	4.27	2.08	0.08
			0.00			Ice	4.60	2.36	0.11
						1" Ice			
RRH2x60-700	C	From Leg	4.00	0.000	113.00	No Ice	3.96	1.82	0.06
			0.00			1/2"	4.27	2.08	0.08
			0.00			Ice	4.60	2.36	0.11
						1" Ice			
Platform Mount [LP 1201-1]	C	None		0.000	113.00	No Ice	23.10	23.10	2.10
						1/2"	26.80	26.80	2.50
						Ice	30.50	30.50	2.90
						1" Ice			
***									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	1.00	0.000	103.00	No Ice	5.40	4.70	0.05
			0.00			1/2"	5.96	5.86	0.10
			0.00			Ice	6.48	6.73	0.15
						1" Ice			
APXV18-206517S-C w/ Mount Pipe	B	From Leg	1.00	0.000	103.00	No Ice	5.40	4.70	0.05
			0.00			1/2"	5.96	5.86	0.10
			0.00			Ice	6.48	6.73	0.15
						1" Ice			
APXV18-206517S-C w/ Mount Pipe	C	From Leg	1.00	0.000	103.00	No Ice	5.40	4.70	0.05
			0.00			1/2"	5.96	5.86	0.10
			0.00			Ice	6.48	6.73	0.15
						1" Ice			
Pipe Mount [PM 601-3]	C	None		0.000	103.00	No Ice	4.39	4.39	0.20
						1/2"	5.48	5.48	0.24
						Ice	6.57	6.57	0.28
						1" Ice			
***									
(4) 2.375" OD x 5' Mount Pipe	A	From Leg	4.00	0.000	78.00	No Ice	1.19	1.19	0.02
			0.00			1/2"	1.50	1.50	0.03
			0.00			Ice	1.81	1.81	0.04
						1" Ice			
(4) 2.375" OD x 5' Mount Pipe	B	From Leg	4.00	0.000	78.00	No Ice	1.19	1.19	0.02
			0.00			1/2"	1.50	1.50	0.03
			0.00			Ice	1.81	1.81	0.04
						1" Ice			
(4) 2.375" OD x 5' Mount Pipe	C	From Leg	4.00	0.000	78.00	No Ice	1.19	1.19	0.02
			0.00			1/2"	1.50	1.50	0.03
			0.00			Ice	1.81	1.81	0.04
						1" Ice			
Platform Mount [LP 303-1]	C	None		0.000	78.00	No Ice	14.66	14.66	1.25
						1/2"	18.87	18.87	1.48
						Ice	23.08	23.08	1.71
						1" Ice			
***									
2.375" OD x 4' Mount Pipe	C	From Leg	3.00	0.000	60.00	No Ice	0.87	0.87	0.02
			0.00			1/2"	1.11	1.11	0.03
			0.00			Ice	1.36	1.36	0.04
						1" Ice			
Side Arm Mount [SO 701-1]	C	None		0.000	60.00	No Ice	0.85	1.67	0.07
						1/2"	1.14	2.34	0.08
						Ice	1.43	3.01	0.09
						1" Ice			

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP1-23	A	Paraboloid w/o Radome	From Leg	4.00 0.00 -4.00	0.000		155.00	1.27	No Ice 1/2" Ice 1" Ice	1.28 1.45 1.62	0.01 0.02 0.03
VHLP2.5-18	B	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 -4.00	0.000		155.00	2.92	No Ice 1/2" Ice 1" Ice	6.68 7.07 7.46	0.05 0.08 0.12
VHLP2-11	C	Paraboloid w/o Radome	From Leg	4.00 0.00 -4.00	0.000		155.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.05 0.07

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 155.00-115.50	134.52	1.494	24	84.444	A	0.000	84.444	84.444	100.00	0.000	0.000
					B	0.000	84.444		100.00	0.000	0.000
					C	0.000	84.444		100.00	0.000	6.873
L2 115.50-79.25	96.99	1.361	22	97.153	A	0.000	97.153	97.153	100.00	0.000	0.000
					B	0.000	97.153		100.00	0.000	0.000
					C	0.000	97.153		100.00	0.000	12.990
L3 79.25-43.75	61.36	1.194	19	112.927	A	0.000	112.927	112.927	100.00	0.000	0.000
					B	0.000	112.927		100.00	0.000	0.000
					C	0.000	112.927		100.00	0.000	13.206
L4 43.75-0.00	21.22	1	16	163.162	A	0.000	163.162	163.162	100.00	0.000	0.000
					B	0.000	163.162		100.00	0.000	0.000
					C	0.000	163.162		100.00	0.000	16.275

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	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 155.00-115.50	134.52	1.494	5	1.00	91.028	A	0.000	91.028	91.028	100.00	0.000	0.000
						B	0.000	91.028		100.00	0.000	0.000
						C	0.000	91.028		100.00	0.000	14.773
L2 115.50-79.25	96.99	1.361	5	1.00	103.195	A	0.000	103.195	103.195	100.00	0.000	0.000
						B	0.000	103.195		100.00	0.000	0.000
						C	0.000	103.195		100.00	0.000	26.990
L3 79.25-43.75	61.36	1.194	4	1.00	118.844	A	0.000	118.844	118.844	100.00	0.000	0.000
						B	0.000	118.844		100.00	0.000	0.000
						C	0.000	118.844		100.00	0.000	27.406
L4 43.75-0.00	21.22	1	4	1.00	170.454	A	0.000	170.454	170.454	100.00	0.000	0.000
						B	0.000	170.454		100.00	0.000	0.000
						C	0.000	170.454		100.00	0.000	33.775

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 155.00-115.50	134.52	1.494	10	84.444	A	0.000	84.444	84.444	100.00	0.000	0.000
					B	0.000	84.444		100.00	0.000	0.000
					C	0.000	84.444		100.00	0.000	6.873
L2 115.50-79.25	96.99	1.361	9	97.153	A	0.000	97.153	97.153	100.00	0.000	0.000
					B	0.000	97.153		100.00	0.000	0.000
					C	0.000	97.153		100.00	0.000	12.990
L3 79.25-43.75	61.36	1.194	8	112.927	A	0.000	112.927	112.927	100.00	0.000	0.000
					B	0.000	112.927		100.00	0.000	0.000
					C	0.000	112.927		100.00	0.000	13.206
L4 43.75-0.00	21.22	1	6	163.162	A	0.000	163.162	163.162	100.00	0.000	0.000
					B	0.000	163.162		100.00	0.000	0.000
					C	0.000	163.162		100.00	0.000	16.275

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 Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	155 - 115.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-16.84	1	-1
			Max. Mx	5	-8.13	-359	1
			Max. My	2	-8.13	-1	357
			Max. Vy	5	14.22	-359	1
			Max. Vx	2	-14.17	-1	357
			Max. Torque	3			-1
L2	115.5 - 79.25	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-31.43	2	-1
			Max. Mx	11	-16.75	1087	8
			Max. My	2	-16.74	-2	1087
			Max. Vy	5	23.19	-1086	2
			Max. Vx	2	-23.27	-2	1087
			Max. Torque	3			-1
L3	79.25 - 43.75	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-43.86	5	-2
			Max. Mx	11	-25.94	1971	11
			Max. My	2	-25.94	-2	1974
			Max. Vy	5	26.89	-1970	3
			Max. Vx	2	-26.98	-2	1974
			Max. Torque	5			0
L4	43.75 - 0	Pole	Max Tension	1	0.00	0	0
			Max. Compression	14	-61.55	9	-5
			Max. Mx	11	-39.93	3360	16
			Max. My	2	-39.93	-3	3366
			Max. Vy	5	29.64	-3357	5
			Max. Vx	2	-29.72	-3	3366
			Max. Torque	5			0

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	61.55	-0.00	0.00
	Max. H_x	11	39.96	29.60	0.11
	Max. H_z	2	39.96	-0.03	29.68
	Max. M_x	2	3366	-0.03	29.68
	Max. M_z	5	3357	-29.60	0.04
	Max. Torsion	5	0	-29.60	0.04
	Min. Vert	2	39.96	-0.03	29.68
	Min. H_x	5	39.96	-29.60	0.04
	Min. H_z	8	39.96	-0.09	-29.63
	Min. M_x	8	-3359	-0.09	-29.63
	Min. M_z	11	-3360	29.60	0.11
	Min. Torsion	3	0	-14.91	25.62

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	39.96	-0.00	0.00	1	1	0
Dead+Wind 0 deg - No Ice	39.96	0.03	-29.68	-3366	-3	0
Dead+Wind 30 deg - No Ice	39.96	14.91	-25.62	-2901	-1695	0
Dead+Wind 60 deg - No Ice	39.96	25.69	-14.77	-1672	-2916	0
Dead+Wind 90 deg - No Ice	39.96	29.60	-0.04	-5	-3357	0
Dead+Wind 120 deg - No Ice	39.96	25.72	14.76	1671	-2921	0
Dead+Wind 150 deg - No Ice	39.96	14.79	25.63	2905	-1676	0

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+Wind 180 deg - No Ice	39.96	0.09	29.63	3359	-12	0
Dead+Wind 210 deg - No Ice	39.96	-14.69	25.69	2914	1664	0
Dead+Wind 240 deg - No Ice	39.96	-25.65	14.75	1669	2913	0
Dead+Wind 270 deg - No Ice	39.96	-29.60	-0.11	-16	3360	0
Dead+Wind 300 deg - No Ice	39.96	-25.65	-14.85	-1684	2912	0
Dead+Wind 330 deg - No Ice	39.96	-14.87	-25.64	-2904	1692	0
Dead+Ice+Temp	61.55	0.00	-0.00	5	9	0
Dead+Wind 0 deg+Ice+Temp	61.55	0.01	-8.30	-979	8	0
Dead+Wind 30 deg+Ice+Temp	61.55	4.17	-7.16	-844	-487	0
Dead+Wind 60 deg+Ice+Temp	61.55	7.18	-4.13	-484	-844	0
Dead+Wind 90 deg+Ice+Temp	61.55	8.28	-0.01	3	-973	0
Dead+Wind 120 deg+Ice+Temp	61.55	7.19	4.13	493	-845	0
Dead+Wind 150 deg+Ice+Temp	61.55	4.14	7.17	854	-481	0
Dead+Wind 180 deg+Ice+Temp	61.55	0.02	8.28	986	5	0
Dead+Wind 210 deg+Ice+Temp	61.55	-4.11	7.18	856	495	0
Dead+Wind 240 deg+Ice+Temp	61.55	-7.17	4.13	493	860	0
Dead+Wind 270 deg+Ice+Temp	61.55	-8.28	-0.03	0	991	0
Dead+Wind 300 deg+Ice+Temp	61.55	-7.17	-4.15	-487	860	0
Dead+Wind 330 deg+Ice+Temp	61.55	-4.16	-7.17	-844	503	0
Dead+Wind 0 deg - Service	39.96	0.01	-11.59	-1317	0	0
Dead+Wind 30 deg - Service	39.96	5.82	-10.01	-1135	-663	0
Dead+Wind 60 deg - Service	39.96	10.03	-5.77	-654	-1140	0
Dead+Wind 90 deg - Service	39.96	11.56	-0.01	-1	-1313	0
Dead+Wind 120 deg - Service	39.96	10.05	5.76	654	-1142	0
Dead+Wind 150 deg - Service	39.96	5.78	10.01	1137	-655	0
Dead+Wind 180 deg - Service	39.96	0.03	11.57	1315	-4	0
Dead+Wind 210 deg - Service	39.96	-5.74	10.04	1141	652	0
Dead+Wind 240 deg - Service	39.96	-10.02	5.76	654	1141	0
Dead+Wind 270 deg - Service	39.96	-11.56	-0.04	-6	1316	0
Dead+Wind 300 deg - Service	39.96	-10.02	-5.80	-659	1140	0
Dead+Wind 330 deg - Service	39.96	-5.81	-10.02	-1136	663	0

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-39.96	0.00	0.00	39.96	-0.00	0.000%
2	0.03	-39.96	-29.69	-0.03	39.96	29.68	0.007%
3	14.91	-39.96	-25.62	-14.91	39.96	25.62	0.000%
4	25.69	-39.96	-14.77	-25.69	39.96	14.77	0.000%
5	29.60	-39.96	-0.04	-29.60	39.96	0.04	0.007%
6	25.72	-39.96	14.76	-25.72	39.96	-14.76	0.000%
7	14.79	-39.96	25.63	-14.79	39.96	-25.63	0.000%
8	0.09	-39.96	29.63	-0.09	39.96	-29.63	0.007%
9	-14.69	-39.96	25.69	14.69	39.96	-25.69	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
10	-25.65	-39.96	14.75	25.65	39.96	-14.75	0.000%
11	-29.60	-39.96	-0.11	29.60	39.96	0.11	0.007%
12	-25.65	-39.96	-14.85	25.65	39.96	14.85	0.000%
13	-14.87	-39.96	-25.64	14.87	39.96	25.64	0.000%
14	0.00	-61.55	0.00	-0.00	61.55	0.00	0.001%
15	0.01	-61.55	-8.30	-0.01	61.55	8.30	0.002%
16	4.17	-61.55	-7.16	-4.17	61.55	7.16	0.001%
17	7.18	-61.55	-4.13	-7.18	61.55	4.13	0.001%
18	8.28	-61.55	-0.01	-8.28	61.55	0.01	0.001%
19	7.19	-61.55	4.13	-7.19	61.55	-4.13	0.001%
20	4.14	-61.55	7.17	-4.14	61.55	-7.17	0.001%
21	0.02	-61.55	8.29	-0.02	61.55	-8.28	0.002%
22	-4.11	-61.55	7.18	4.11	61.55	-7.18	0.001%
23	-7.17	-61.55	4.13	7.17	61.55	-4.13	0.001%
24	-8.28	-61.55	-0.03	8.28	61.55	0.03	0.002%
25	-7.17	-61.55	-4.15	7.17	61.55	4.15	0.001%
26	-4.16	-61.55	-7.17	4.16	61.55	7.17	0.001%
27	0.01	-39.96	-11.60	-0.01	39.96	11.59	0.003%
28	5.82	-39.96	-10.01	-5.82	39.96	10.01	0.001%
29	10.03	-39.96	-5.77	-10.03	39.96	5.77	0.001%
30	11.56	-39.96	-0.01	-11.56	39.96	0.01	0.003%
31	10.05	-39.96	5.76	-10.05	39.96	-5.76	0.001%
32	5.78	-39.96	10.01	-5.78	39.96	-10.01	0.001%
33	0.03	-39.96	11.57	-0.03	39.96	-11.57	0.003%
34	-5.74	-39.96	10.04	5.74	39.96	-10.04	0.001%
35	-10.02	-39.96	5.76	10.02	39.96	-5.76	0.001%
36	-11.56	-39.96	-0.04	11.56	39.96	0.04	0.003%
37	-10.02	-39.96	-5.80	10.02	39.96	5.80	0.001%
38	-5.81	-39.96	-10.02	5.81	39.96	10.02	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00007151	0.00009449
3	Yes	20	0.00000001	0.00006685
4	Yes	20	0.00000001	0.00006597
5	Yes	15	0.00007152	0.00010133
6	Yes	20	0.00000001	0.00006590
7	Yes	20	0.00000001	0.00006573
8	Yes	15	0.00007154	0.00010081
9	Yes	19	0.00000001	0.00014893
10	Yes	19	0.00000001	0.00014994
11	Yes	15	0.00007152	0.00010173
12	Yes	20	0.00000001	0.00006647
13	Yes	20	0.00000001	0.00006628
14	Yes	10	0.00000001	0.00001361
15	Yes	16	0.00008624	0.00010311
16	Yes	17	0.00000001	0.00008605
17	Yes	17	0.00000001	0.00008549
18	Yes	16	0.00008626	0.00010253
19	Yes	17	0.00000001	0.00008658
20	Yes	17	0.00000001	0.00008579
21	Yes	16	0.00008622	0.00010364
22	Yes	17	0.00000001	0.00008776
23	Yes	17	0.00000001	0.00008792
24	Yes	16	0.00008622	0.00010417
25	Yes	17	0.00000001	0.00008742
26	Yes	17	0.00000001	0.00008789
27	Yes	15	0.00007674	0.00004878
28	Yes	16	0.00000001	0.00012915
29	Yes	16	0.00000001	0.00012610
30	Yes	15	0.00007675	0.00004909
31	Yes	16	0.00000001	0.00012559

32	Yes	16	0.00000001	0.00012568
33	Yes	15	0.00007674	0.00004875
34	Yes	16	0.00000001	0.00012435
35	Yes	16	0.00000001	0.00012557
36	Yes	15	0.00007674	0.00004877
37	Yes	16	0.00000001	0.00012769
38	Yes	16	0.00000001	0.00012664

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	48.66	37	2.657	0.003
L2	119.25 - 79.25	29.58	37	2.335	0.001
L3	83.75 - 43.75	14.46	37	1.653	0.000
L4	49 - 0	4.91	37	0.925	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.00	LPX310R w/ Mount Pipe	37	48.66	2.657	0.003	24601
153.00	800MHz 2X50W RRH W/FILTER	37	47.55	2.644	0.003	24601
151.00	VHLP1-23	37	46.44	2.631	0.003	24601
145.00	RRUS 11	37	43.13	2.591	0.002	12300
143.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	37	42.03	2.577	0.002	10250
133.00	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	37	36.63	2.495	0.002	5590
113.00	BXA-70063/6CFx2 w/ Mount Pipe	37	26.57	2.239	0.001	3316
103.00	APXV18-206517S-C w/ Mount Pipe	37	22.06	2.056	0.001	3137
78.00	(4) 2.375" OD x 5' Mount Pipe	37	12.49	1.529	0.000	2718
60.00	2.375" OD x 4' Mount Pipe	37	7.30	1.149	0.000	2393

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	124.00	2	6.779	0.007
L2	119.25 - 79.25	75.45	2	5.960	0.002
L3	83.75 - 43.75	36.92	2	4.219	0.001
L4	49 - 0	12.54	2	2.363	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.00	LPX310R w/ Mount Pipe	2	124.00	6.779	0.007	9896
153.00	800MHz 2X50W RRH W/FILTER	2	121.17	6.746	0.007	9896
151.00	VHLP1-23	2	118.36	6.714	0.006	9896

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.00	RRUS 11	2	109.93	6.611	0.005	4947
143.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	2	107.14	6.575	0.005	4121
133.00	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	2	93.40	6.366	0.004	2245
113.00	BXA-70063/6CFx2 w/ Mount Pipe	2	67.79	5.714	0.002	1326
103.00	APXV18-206517S-C w/ Mount Pipe	2	56.29	5.249	0.002	1251
78.00	(4) 2.375" OD x 5' Mount Pipe	2	31.89	3.904	0.001	1075
60.00	2.375" OD x 4' Mount Pipe	2	18.63	2.935	0.000	942

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	155 - 115.5 (1)	TP29.31x22x0.25	39.50	0.00	0.0	36.00	22.51	-8.13	810.25	0.010
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	40.00	0.00	0.0	39.00	34.09	-16.74	1329.50	0.013
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	40.00	0.00	0.0	39.00	47.74	-25.94	1861.89	0.014
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	49.00	0.00	0.0	39.00	67.16	-39.93	2619.14	0.015

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	155 - 115.5 (1)	TP29.31x22x0.25	360	27.42	36.00	0.762	0	0.00	36.00	0.000
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	1089	45.24	39.00	1.160	0	0.00	39.00	0.000
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	1975	50.23	39.00	1.288	0	0.00	39.00	0.000
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	3366	50.46	39.00	1.294	0	0.00	39.00	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	155 - 115.5 (1)	TP29.31x22x0.25	14.24	0.63	24.00	0.053	0	0.00	24.00	0.000
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	23.24	0.68	26.00	0.052	0	0.01	26.00	0.000
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	26.95	0.56	26.00	0.043	0	0.00	26.00	0.000
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	29.72	0.44	26.00	0.034	0	0.00	26.00	0.000

Pole Interaction Design Data

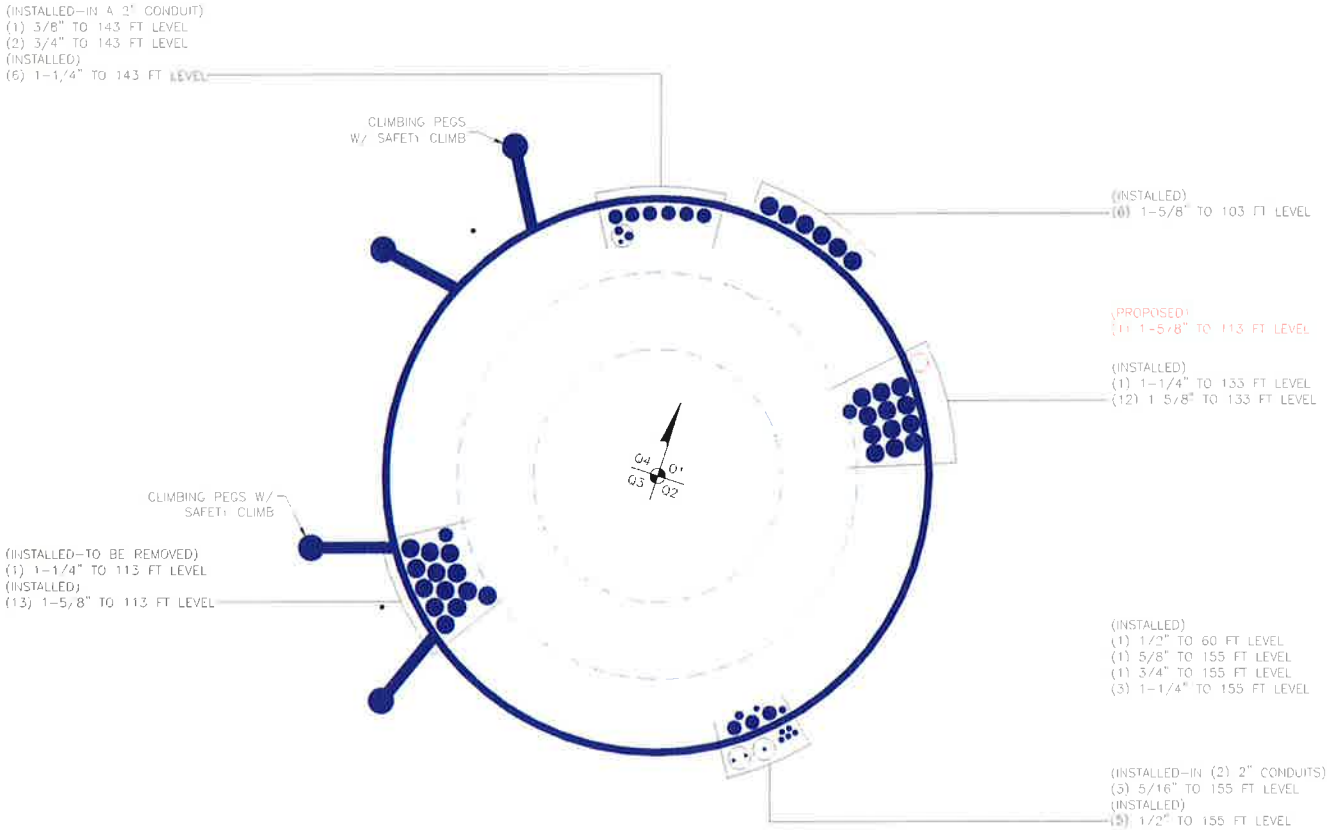
Section No.	Elevation ft	Ratio P / P_a	Ratio f_{bx} / F_{bx}	Ratio f_{by} / F_{by}	Ratio f_v / F_v	Ratio f_{vt} / F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	155 - 115.5 (1)	0.010	0.762	0.000	0.053	0.000	0.772 ✔	1.333	H1-3+VT ✔
L2	115.5 - 79.25 (2)	0.013	1.160	0.000	0.052	0.000	1.173 ✔	1.333	H1-3+VT ✔
L3	79.25 - 43.75 (3)	0.014	1.288	0.000	0.043	0.000	1.302 ✔	1.333	H1-3+VT ✔
L4	43.75 - 0 (4)	0.015	1.294	0.000	0.034	0.000	1.309 ✔	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	155 - 115.5	Pole	TP29.31x22x0.25	1	-8.13	1080.07	57.9	Pass
L2	115.5 - 79.25	Pole	TP35.51x28.11x0.31	2	-16.74	1772.22	88.0	Pass
L3	79.25 - 43.75	Pole	TP41.46x34.06x0.38	3	-25.94	2481.90	97.7	Pass
L4	43.75 - 0	Pole	TP48.8x39.73x0.44	4	-39.93	3491.31	98.2	Pass
							Summary	
						Pole (L4)	98.2	Pass
						RATING =	**98.2**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(INSTALLED–IN A 3" CONDUIT)
(1) 3/8" TO 143 FT LEVEL
(2) 3/4" TO 143 FT LEVEL
(INSTALLED)
(6) 1-1/4" TO 143 FT LEVEL
CLIMBING PEGS W/ SAFETY CLIMB
(INSTALLED)
(6) 1-5/8" TO 103 FT LEVEL
(PROPOSED)
(1) 1-5/8" TO 113 FT LEVEL
(INSTALLED)
(1) 1-1/4" TO 133 FT LEVEL
(12) 1 5/8" TO 133 FT LEVEL
Q4
Q1
Q3
Q2
CLIMBING PEGS W/ SAFETY CLIMB
(INSTALLED–TO BE REMOVED)
(1) 1-1/4" TO 113 FT LEVEL
(INSTALLED)
(13) 1-5/8" TO 113 FT LEVEL
(INSTALLED)
(1) 1/2" TO 60 FT LEVEL
(1) 5/8" TO 155 FT LEVEL
(1) 3/4" TO 155 FT LEVEL
(3) 1-1/4" TO 155 FT LEVEL
(INSTALLED–IN (2) 2" CONDUITS)
(3) 5/16" TO 155 FT LEVEL
(INSTALLED)
(5) 1/2" TO 155 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS