Robinson+Cole

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Also admitted in Massachusetts

December 17, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
1439 Voluntown Road, Griswold, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 157-foot level of the existing 179.5-foot tower at 1439 Voluntown Road in Griswold, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of the tower in 2007. Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model LNX-6514DS, 700 MHz antennas; three (3) model HBXX-6516DS, 1900 MHz antennas; and adding three (3) model HBXX-6517DS, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 157-foot level on the tower. Cellco also intends to install nine (9) remote radio heads ("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 Griswold's First Selectman, Kevin Skulczyck. A copy of this letter is also being sent to Robert E. and Mildred Rose, the owners 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 RRHs will be located at the 157-foot level on the 180-foot tower.

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

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

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind 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:
Kevin Skulczyck, Griswold First Selectman
Robert E. and Mildred Rose
Crown
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

POWERED BY ANDREW

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.7	16.3
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Horizontal Tolerance, degrees	±3	±3
Beamwidth, Vertical, degrees	12.5	11.2
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	20	20
CPR at Sector, dB	10	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°

Mechanical Specifications

Color | Radome Material	Light gray | Fiberglass, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1847.0 mm x 301.0 mm x 181.0 mm | 72.7 in x 11.9 in x 7.1 in
Net Weight	17.6 kg | 38.8 lb
Model with factory installed AISG 2.0 RET	LNX-6514DS-A1M

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

HBXX-6516DS-VTM

Andrew® Quad Port Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Each DualPol® array can be independently adjusted for greater flexibility
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Great solution to maximize network coverage and capacity

Electrical Specifications

Frequency Band, MHz	**1710–1880**	**1850–1990**	**1920–2180**
Gain, dBi	17.7	18.0	18.0
Beamwidth, Horizontal, degrees	67	66	64
Beamwidth, Vertical, degrees	7.5	7.0	6.6
Beam Tilt, degrees	0–10	0–10	0–10
USLS, dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
CPR at Boresight, dB	22	22	21
CPR at Sector, dB	8	9	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**1710–1880**	**1850–1990**	**1920–2180**
Gain by all Beam Tilts, average, dBi	17.2	17.2	17.5
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.3	±0.5
Gain by Beam Tilt, average, dBi	0 ° | 17.0 5 ° | 17.3 10 ° | 17.0	0 ° | 17.1 5 ° | 17.4 10 ° | 17.0	0 ° | 17.4 5 ° | 17.7 10 ° | 17.2
Beamwidth, Horizontal Tolerance, degrees	±2.7	±2.3	±3.5
Beamwidth, Vertical Tolerance, degrees	±0.5	±0.4	±0.4
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	26	26	26
CPR at Boresight, dB	22	22	22
CPR at Sector, dB	9	9	9

* 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® quad
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2180 MHz

Product Specifications

HBXX-6516DS-VTM

Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	4
Wind Loading, maximum	419.0 N @ 150 km/h 94.2 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	166.0 mm | 6.5 in
Length	1297.0 mm | 51.1 in
Width	305.0 mm | 12.0 in
Net Weight	13.9 kg | 30.6 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	HBXX-6516DS-A2M
RET System	Teletilt®

Packed Dimensions

Depth	294.0 mm | 11.6 in
Length	1609.0 mm | 63.3 in
Width	409.0 mm | 16.1 in
Shipping Weight	25.1 kg | 55.3 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

600899A-2 — 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

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

HBXX-6517DS-VTM

Andrew® Quad Port Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Superior azimuth tracking and pattern symmetry with excellent passive intermodulation suppression

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain, dBi	19.0	19.1	19.2
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
CPR at Boresight, dB	21	22	21
CPR at Sector, dB	10	11	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4	0 ° | 18.4	0 ° | 18.7
	3 ° | 18.7	3 ° | 18.7	3 ° | 18.9
	6 ° | 18.4	6 ° | 18.5	6 ° | 18.6
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9

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General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® quad
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2180 MHz

Product Specifications

HBXX-6517DS-VTM

Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	166.0 mm | 6.5 in
Length	1903.0 mm | 74.9 in
Width	305.0 mm | 12.0 in
Net Weight	19.5 kg | 43.0 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	HBXX-6517DS-A2M
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

600899A-2 — 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.

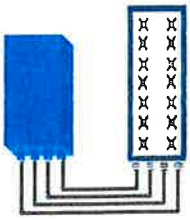
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

Alcatel·Lucent

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

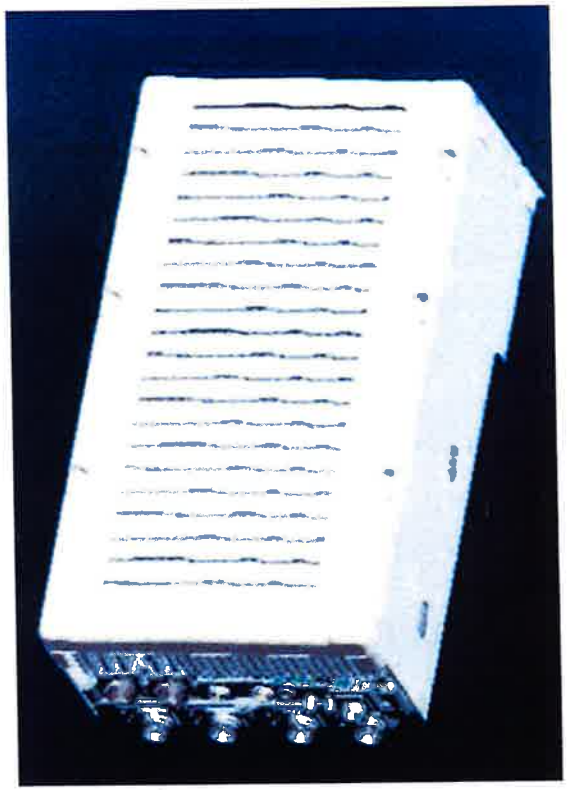
Alcatel·Lucent

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.)

Alcatel·Lucent

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.

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.

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).

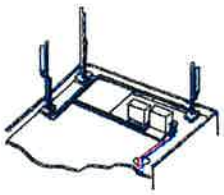
The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

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.

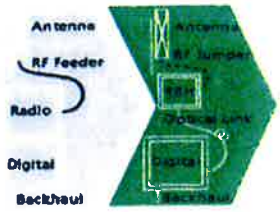
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

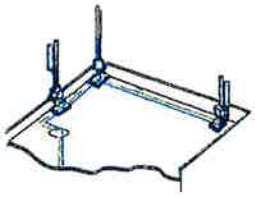
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

- 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
- 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.

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 CELLFLEX² accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

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

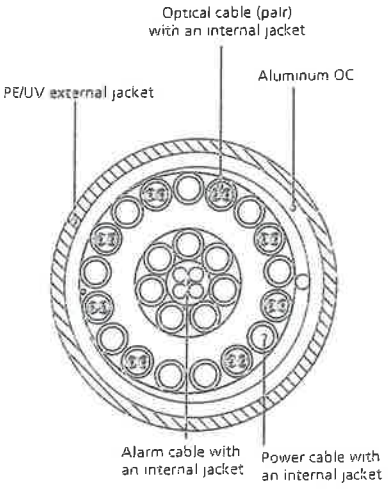


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Griswold E								
Tower Height: 179.5Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Sprint	11	250	177	0.0316	1962.5	1.0000	3.16%	
*AT&T UMTS	2	565	169	0.0142	880	0.5867	2.42%	
*AT&T UMTS	2	875	169	0.0220	1900	1.0000	2.20%	
*AT&T GSM	1	283	169	0.0036	880	0.5867	0.61%	
*AT&T GSM	4	525	169	0.0264	1900	1.0000	2.64%	
*AT&T LTE	1	1615	167	0.0208	734	0.4893	4.26%	
Verizon PCS	**11**	**304**	**157**	**0.0488**	**1970**	**1.0000**	**4.88%**	
Verizon Cellular	**9**	**287**	**157**	**0.0377**	**869**	**0.5793**	**6.50%**	
Verizon AWS	**1**	**2674**	**157**	**0.0390**	**2145**	**1.0000**	**3.90%**	
Verizon 700	**1**	**1048**	**157**	**0.0153**	**746**	**0.4973**	**3.07%**	
								33.65%
* Source: Siting Council								

ATTACHMENT 3

Date: **December 11, 2015**

Darcy Tarr
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Black & Veatch Corp.
6800 W. 115th Street Suite 2292
Overland Park, KS 66211
(913) 458-7245

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate** **Carrier Site Name:**	 Griswold East CT
Crown Castle Designation:	**Crown Castle BU Number:** **Crown Castle Site Name:**	876367 WAPPINGERS FALLS / BOB'S ANTIQ
	Crown Castle JDE Job Number: **Crown Castle Work Order Number:** **Crown Castle Application Number:**	337923 1164908 300583 Rev. 4
Engineering Firm Designation:	**Black & Veatch Corp. Project Number:**	182896
Site Data:	**1439 Voluntown Rd, Griswold, New London County, CT** **Latitude *41° 34' 33.99"*, Longitude *-71° 53' 16.96"*** **179.5 Foot - Monopole Tower**	

Dear Darcy Tarr,

Black & Veatch Corp. 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 853857, in accordance with application 300583, revision 4.

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 85 mph fastest mile.

We at *Black & Veatch Corp.* 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: Avinash B. Gaikwad / Josh Riley

Respectfully submitted by:

STATE OF CONNECTICUT
PING JIANG
30767
LICENSED
PROFESSIONAL ENGINEER

12/11/2015

Ping Jiang, P.E.
Professional Engineer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 179.5 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in January of 2000. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
155.0	157.0	3	alcatel lucent	RRH2X60-AWS	2	1 5/8	1
		3	alcatel lucent	RRH2X60-PCS			
		3	alcatel lucent	RRH2x60-700			
		3	commscope	HBXX-6516DS-A2M w/ Mount Pipe			
		3	commscope	HBXX-6517DS-A2M w/ Mount Pipe			
		3	commscope	LNX-6514DS-A1M w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

Notes:
1) Refer Appendix B for detailed coax layout

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
178.0	180.0	6	decibel	DB980H90E-M w/ Mount Pipe	6	1 5/8	1
	178.0	1	cci tower mounts	Platform Mount [LP 601-1]			
167.0	167.0	1	cci tower mounts	Side Arm Mount [SO 102-3]	-	-	1
		6	ericsson	RRUS 11 B12			
164.0	166.5	6	powerwave technologies	7770.00 w/ Mount Pipe	12 1 2	1-1/4 3/8 7/16	1
		6	powerwave technologies	LGP 17201			
		6	powerwave technologies	LGP21901			
	166.0	1	andrew	SBNH-1D6565C w/ Mount Pipe			
		1	kmw communications	AM-X-CD-14-65-00T-RET w/ Mount Pipe			
		1	kmw	AM-X-CD-17-65-00T-RET			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
			communications	w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
	164.0	1	cci tower mounts	Platform Mount [LP 303-1]			
155.0	157.0	6	andrew	CBC721-DF	-	-	1
		3	antel	BXA-171063-8BF-EDIN-2 w/ Mount Pipe	6	1 5/8	2
		3	antel	BXA-70063-6CF-EDIN-2 w/ Mount Pipe			
		2	antel	LPA-80063/4CF w/ Mount Pipe	6	1 5/8	1
		4	antel	LPA-80080/4CF w/ Mount Pipe			
	155.0	1	cci tower mounts	Platform Mount [LP 303-1]			
63.0	63.0	1	cci tower mounts	Side Arm Mount [SO 701-1]	1	1/2	1
		1	unknown	GPS	1	3/8	

Notes:
1) Existing Equipment
2) Equipment To Be Removed; not considered in this analysis

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)
187.5	187.5	12	decibel	DB980H90-EM	-	-
177.5	177.5	12	decibel	DB980H90-EM	-	-
167.5	167.5	12	decibel	DB980H90-EM	-	-
157.5	157.5	12	decibel	DB980H90-EM	-	-
147.5	147.5	12	decibel	DB980H90-EM	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Criscuolo Shepard Associates, P.C.	1613525	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineered Endeavors, Inc.	1613910	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Engineered Endeavors, Inc.	1999079	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Black & Veatch Corp.	5763468	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. Black & Veatch Corp. 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	179.5 - 129.76	Pole	TP31.852x19.59x0.313	1	-9.897	1569.381	59.7	Pass
L2	129.76 - 84.61	Pole	TP42.261x30.123x0.375	2	-17.980	2504.320	74.8	Pass
L3	84.61 - 40.73	Pole	TP52.229x40.097x0.438	3	-29.496	3614.856	72.0	Pass
L4	40.73 - 0	Pole	TP61.25x49.636x0.5	4	-41.657	4711.035	66.2	Pass
							Summary	
						Pole (L2)	74.8	Pass
						Rating =	74.8	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	70.5	Pass
1	Base Plate	0	78.2	Pass
1	Base Foundation	0	80.7	Pass
1	Base Foundation Soil Interaction	0	67.0	Pass

Structure Rating (max from all components) =	80.7%

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

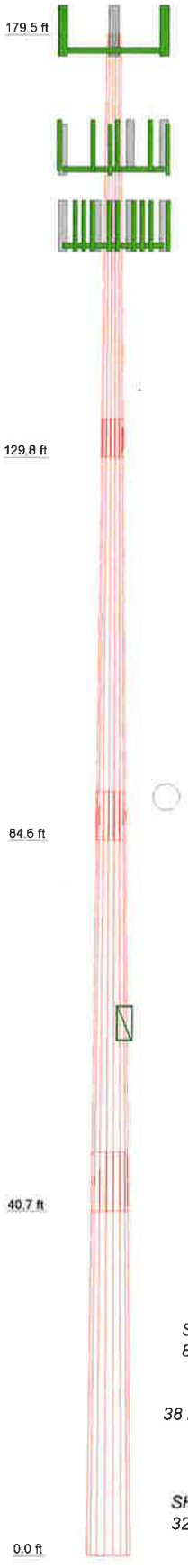
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4
Length (ft)	49.740	49.630	49.660	47.760
Number of Sides	18	18	18	18
Thickness (in)	0.313	0.375	0.438	0.500
Socket Length (ft)	4.480	5.780	7.030	
Top Dia (in)	19.590	30.123	40.097	49.636
Bot Dia (in)	31.852	42.261	52.229	61.250
Grade	A572-65			
Weight (K)	4.3	7.2	10.7	14.2



AXIAL
62 K

SHEAR
8 K

MOMENT
1002 kip-ft

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

AXIAL
47 K

SHEAR
32 K

MOMENT
4077 kip-ft

TORQUE 2 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Transition Ladder	178	6' x 2" Mount Pipe	164
Platform Mount [LP 601-1]	178	6' x 2" Mount Pipe	164
DB980H90E-M w/ Mount Pipe	178	6' x 2" Mount Pipe	164
DB980H90E-M w/ Mount Pipe	178	Platform Mount [LP 303-1]	155
DB980H90E-M w/ Mount Pipe	178	LPA-80080/4CF w/ Mount Pipe	155
DB980H90E-M w/ Mount Pipe	178	HBXX-6516DS-A2M w/ Mount Pipe	155
DB980H90E-M w/ Mount Pipe	178	LNX-6514DS-A1M w/ Mount Pipe	155
DB980H90E-M w/ Mount Pipe	178	HBXX-6517DS-A2M w/ Mount Pipe	155
(2) 4' x 2" Pipe Mount	178	LPA-80080/4CF w/ Mount Pipe	155
(2) 4' x 2" Pipe Mount	178	(2) CBC721-DF	155
(2) 4' x 2" Pipe Mount	178	RRH2X60-PCS	155
Side Arm Mount [SO 102-3]	167	RRH2x60-700	155
4'x4" Pipe Mount	167	RRH2X60-AWS	155
4'x4" Pipe Mount	167	LPA-80080/4CF w/ Mount Pipe	155
4'x4" Pipe Mount	167	HBXX-6516DS-A2M w/ Mount Pipe	155
(2) RRUS 11 B12	167	LNX-6514DS-A1M w/ Mount Pipe	155
(2) RRUS 11 B12	167	HBXX-6517DS-A2M w/ Mount Pipe	155
(2) RRUS 11 B12	167	LPA-80080/4CF w/ Mount Pipe	155
Platform Mount [LP 303-1]	164	(2) CBC721-DF	155
AM-X-CD-14-65-00T-RET w/ Mount Pipe	164	RRH2X60-PCS	155
		RRH2x60-700	155
7770.00 w/ Mount Pipe	164	RRH2X60-AWS	155
7770.00 w/ Mount Pipe	164	LPA-80063/4CF w/ Mount Pipe	155
(4) LGP 17201	164	HBXX-6516DS-A2M w/ Mount Pipe	155
AM-X-CD-17-65-00T-RET w/ Mount Pipe	164	LNX-6514DS-A1M w/ Mount Pipe	155
		HBXX-6517DS-A2M w/ Mount Pipe	155
7770.00 w/ Mount Pipe	164	LPA-80063/4CF w/ Mount Pipe	155
7770.00 w/ Mount Pipe	164	(2) CBC721-DF	155
(4) LGP 17201	164	RRH2X60-PCS	155
DC6-48-60-18-8F	164	RRH2x60-700	155
SBNH-1D6565C w/ Mount Pipe	164	RRH2X60-AWS	155
7770.00 w/ Mount Pipe	164	DB-T1-6Z-8AB-0Z	155
7770.00 w/ Mount Pipe	164	Side Arm Mount [SO 701-1]	63
(4) LGP 17201	164	GPS	63

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 74.8%

BLACK & VEATCH
Building a world of difference.

Black & Veatch Corp.
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Overland Park, KS 66211
Phone: (913) 458-7245
FAX: (913) 458-8136

Job: WAPPINGERS FALLS / BOB'S ANTIQ (BU#8763			
Project: 182896 (876367.1164908)			
Client: Crown Castle	Drawn by: Josh Riley	App'd:	
Code: TIA/EIA-222-F	Date: 12/11/15	Scale: NTS	
Path: C:\Users\n858f62\Desktop\876367.1164908 (VER)\876367.1164908 Structural Analysis.eri		Dwg No. E-1	

Tower Input Data

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

2) Tower is located in New London County, Connecticut.
3) Basic wind speed of 85 mph.
4) Nominal ice thickness of 0.750 in.
5) Ice thickness is considered to increase with height.
6) Ice density of 56.000 pcf.
7) A wind speed of 38 mph is used in combination with ice.
8) Temperature drop of 50.000 °F.
9) Deflections calculated using a wind speed of 50 mph.
10) A non-linear (P-delta) analysis was used.
11) Pressures are calculated at each section.
12) Stress ratio used in pole design is 1.333.
13) 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	179.500-129.760	49.740	4.480	18	19.590	31.852	0.313	1.250	A572-65 (65 ksi)
L2	129.760-84.610	49.630	5.780	18	30.123	42.261	0.375	1.500	A572-65 (65 ksi)
L3	84.610-40.730	49.660	7.030	18	40.097	52.229	0.438	1.750	A572-65 (65 ksi)
L4	40.730-0.000	47.760		18	49.636	61.250	0.500	2.000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	19.892	19.121	897.732	6.844	9.952	90.209	1796.645	9.562	2.898	9.273
	32.344	31.283	3931.580	11.197	16.181	242.976	7868.332	15.645	5.056	16.179
L2	31.700	35.407	3958.573	10.560	15.302	258.690	7922.354	17.707	4.642	12.378
	42.913	49.855	11050.430	14.869	21.469	514.727	22115.401	24.932	6.778	18.074
L3	42.150	55.073	10943.923	14.079	20.369	537.272	21902.247	27.542	6.287	14.371
	53.035	71.919	24372.095	18.386	26.532	918.584	48776.260	35.966	8.422	19.251
L4	52.138	77.980	23786.205	17.443	25.215	943.324	47603.708	38.997	7.856	15.712
	62.195	96.410	44952.435	21.566	31.115	1444.719	89964.020	48.214	9.900	19.8

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 179.500-129.760				1	1	1		
L2 129.760-84.610				1	1	1		
L3 84.610-40.730				1	1	1		
L4 40.730-0.000				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 klf
***										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
Safety Line 3/8	C	No	CaAa (Out Of Face)	179.500 - 8.000	1	No Ice	0.037	0.000
						1/2" Ice	0.137	0.001
						1" Ice	0.238	0.001
						2" Ice	0.437	0.002
						4" Ice	0.838	0.004
***								
LDF7-50A(1-5/8")	C	No	Inside Pole	178.000 - 7.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
***								
LDF6-50A(1-1/4")	B	No	Inside Pole	164.000 - 3.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
FB-L98B-002-75000(3/8")	B	No	Inside Pole	164.000 - 3.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
WR-VG122ST-BRDA(7/16)	B	No	Inside Pole	164.000 - 3.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
2" innerduct conduit	B	No	Inside Pole	164.000 - 3.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
***								
FLC 158-50J(1-5/8")	A	No	Inside Pole	155.000 - 6.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
HB158-1-08U8-S8J18(1-5/8)	A	No	Inside Pole	155.000 - 6.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
***								
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	63.000 - 7.000	1	No Ice	0.063	0.000
						1/2" Ice	0.163	0.001
						1" Ice	0.263	0.002
						2" Ice	0.463	0.007
						4" Ice	0.863	0.023
LDF2-50A(3/8")	C	No	CaAa (Out Of Face)	63.000 - 7.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.002
						2" Ice	0.000	0.006
						4" Ice	0.000	0.022
***								

Feed Line/Linear Appurtenances Section Areas

Tower Section n	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	179.500-129.760	A	0.000	0.000	0.000	0.000	0.205
		B	0.000	0.000	0.000	0.000	0.290
		C	0.000	0.000	0.000	1.865	0.248
L2	129.760-84.610	A	0.000	0.000	0.000	0.000	0.367
		B	0.000	0.000	0.000	0.000	0.382
		C	0.000	0.000	0.000	1.693	0.232
L3	84.610-40.730	A	0.000	0.000	0.000	0.000	0.356
		B	0.000	0.000	0.000	0.000	0.371
		C	0.000	0.000	0.000	3.049	0.231
L4	40.730-0.000	A	0.000	0.000	0.000	0.000	0.282
		B	0.000	0.000	0.000	0.000	0.319
		C	0.000	0.000	0.000	3.352	0.181

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	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	179.500-129.760	A	0.902	0.000	0.000	0.000	0.000	0.205
		B		0.000	0.000	0.000	0.000	0.290
		C		0.000	0.000	0.000	10.834	0.296
L2	129.760-84.610	A	0.863	0.000	0.000	0.000	0.000	0.367
		B		0.000	0.000	0.000	0.000	0.382
		C		0.000	0.000	0.000	9.834	0.275
L3	84.610-40.730	A	0.810	0.000	0.000	0.000	0.000	0.356
		B		0.000	0.000	0.000	0.000	0.371
		C		0.000	0.000	0.000	14.468	0.339
L4	40.730-0.000	A	0.750	0.000	0.000	0.000	0.000	0.282
		B		0.000	0.000	0.000	0.000	0.319

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
		C		0.000	0.000	0.000	14.113	0.304

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	179.500-129.760	-0.048	0.028	-0.241	0.139
L2	129.760-84.610	-0.048	0.028	-0.253	0.146
L3	84.610-40.730	-0.091	0.053	-0.390	0.225
L4	40.730-0.000	-0.103	0.060	-0.402	0.232

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
Transition Ladder	C	From Leg	2.000 0.000 -2.000	0.000	178.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.000 8.000 10.000 14.000 22.000	6.000 8.000 10.000 14.000 22.000	0.160 0.240 0.320 0.480 0.800
***									
Platform Mount [LP 601-1]	C	None		0.000	178.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	28.470 33.590 38.710 48.950 69.430	28.470 33.590 38.710 48.950 69.430	1.122 1.514 1.905 2.689 4.255
DB980H90E-M w/ Mount Pipe	A	From Face	3.000 -6.000 2.000	0.000	178.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.036 4.499 4.947 5.870 8.046	3.619 4.481 5.219 6.744 9.995	0.030 0.066 0.109 0.216 0.549
DB980H90E-M w/ Mount Pipe	A	From Face	3.000 6.000 2.000	0.000	178.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.036 4.499 4.947 5.870 8.046	3.619 4.481 5.219 6.744 9.995	0.030 0.066 0.109 0.216 0.549
DB980H90E-M w/ Mount Pipe	B	From Face	3.000 -6.000 2.000	0.000	178.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.036 4.499 4.947 5.870 8.046	3.619 4.481 5.219 6.744 9.995	0.030 0.066 0.109 0.216 0.549
DB980H90E-M w/ Mount Pipe	B	From Face	3.000 6.000 2.000	0.000	178.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.036 4.499 4.947 5.870 8.046	3.619 4.481 5.219 6.744 9.995	0.030 0.066 0.109 0.216 0.549
DB980H90E-M w/ Mount Pipe	C	From Face	3.000 -6.000 2.000	0.000	178.000	No Ice 1/2" Ice	4.036 4.499 4.947	3.619 4.481 5.219	0.030 0.066 0.109

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	5.870	6.744	0.216
						2" Ice	8.046	9.995	0.549
						4" Ice			
DB980H90E-M w/ Mount Pipe	C	From Face	3.000 6.000 2.000	0.000	178.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.036 4.499 4.947 5.870 8.046	3.619 4.481 5.219 6.744 9.995	0.030 0.066 0.109 0.216 0.549
(2) 4' x 2" Pipe Mount	A	From Face	3.000 0.000 2.000	0.000	178.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.785 1.028 1.281 1.814 3.111	0.785 1.028 1.281 1.814 3.111	0.029 0.035 0.044 0.072 0.167
(2) 4' x 2" Pipe Mount	B	From Face	3.000 0.000 2.000	0.000	178.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.785 1.028 1.281 1.814 3.111	0.785 1.028 1.281 1.814 3.111	0.029 0.035 0.044 0.072 0.167
(2) 4' x 2" Pipe Mount	C	From Face	3.000 0.000 2.000	0.000	178.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.785 1.028 1.281 1.814 3.111	0.785 1.028 1.281 1.814 3.111	0.029 0.035 0.044 0.072 0.167
***									
Side Arm Mount [SO 102-3]	C	None		0.000	167.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.000 3.480 3.960 4.920 6.840	3.000 3.480 3.960 4.920 6.840	0.081 0.111 0.141 0.201 0.321
4'x4" Pipe Mount	A	From Leg	0.500 0.000 0.000	0.000	167.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.322 1.577 1.840 2.456 3.889	1.322 1.577 1.840 2.456 3.889	0.044 0.057 0.073 0.115 0.242
4'x4" Pipe Mount	B	From Leg	0.500 0.000 0.000	0.000	167.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.322 1.577 1.840 2.456 3.889	1.322 1.577 1.840 2.456 3.889	0.044 0.057 0.073 0.115 0.242
4'x4" Pipe Mount	C	From Leg	0.500 0.000 0.000	0.000	167.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.322 1.577 1.840 2.456 3.889	1.322 1.577 1.840 2.456 3.889	0.044 0.057 0.073 0.115 0.242
(2) RRUS 11 B12	A	From Leg	1.500 0.000 0.000	-5.000	167.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.306 3.550 3.802 4.334 5.501	1.361 1.540 1.728 2.130 3.038	0.051 0.072 0.095 0.153 0.314
(2) RRUS 11 B12	B	From Leg	1.500 0.000 0.000	-5.000	167.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.306 3.550 3.802 4.334 5.501	1.361 1.540 1.728 2.130 3.038	0.051 0.072 0.095 0.153 0.314
(2) RRUS 11 B12	C	From Leg	1.500	-15.000	167.000	No Ice	3.306	1.361	0.051

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000 0.000			1/2" Ice 1" Ice 2" Ice 4" Ice	3.550 3.802 4.334 5.501	1.540 1.728 2.130 3.038	0.072 0.095 0.153 0.314
***									
Platform Mount [LP 303-1]	C	None		0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.660 18.870 23.080 31.500 48.340	14.660 18.870 23.080 31.500 48.340	1.250 1.481 1.713 2.175 3.101
AM-X-CD-14-65-00T-RET w/ Mount Pipe	A	From Leg	3.000 -6.000 2.000	-5.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.744 6.198 6.661 7.618 9.668	4.015 4.633 5.276 6.678 9.744	0.055 0.100 0.151 0.274 0.630
7770.00 w/ Mount Pipe	A	From Leg	3.000 2.000 2.500	-5.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665
7770.00 w/ Mount Pipe	A	From Leg	3.000 6.000 2.500	-5.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665
(4) LGP 17201	A	From Leg	3.000 0.000 2.500	-5.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.946 2.134 2.330 2.749 3.690	0.518 0.640 0.770 1.056 1.733	0.031 0.042 0.055 0.089 0.193
AM-X-CD-17-65-00T-RET w/ Mount Pipe	B	From Leg	3.000 -6.000 2.000	-5.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.549 12.267 12.995 14.447 17.709	8.938 10.450 11.986 14.313 19.144	0.092 0.177 0.272 0.496 1.120
7770.00 w/ Mount Pipe	B	From Leg	3.000 -2.000 2.500	-5.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665
7770.00 w/ Mount Pipe	B	From Leg	3.000 6.000 2.500	-5.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665
(4) LGP 17201	B	From Leg	3.000 0.000 2.500	-5.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.946 2.134 2.330 2.749 3.690	0.518 0.640 0.770 1.056 1.733	0.031 0.042 0.055 0.089 0.193
DC6-48-60-18-8F	B	From Leg	3.000 0.000 2.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice	2.567 2.798 3.038 3.543 4.658	2.567 2.798 3.038 3.543 4.658	0.019 0.041 0.067 0.129 0.299

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			
SBNH-1D6565C w/ Mount Pipe	C	From Leg	3.000 -6.000 2.000	-15.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.683 12.404 13.135 14.601 17.875	9.842 11.366 12.914 15.267 20.139	0.099 0.189 0.288 0.522 1.167
7770.00 w/ Mount Pipe	C	From Leg	3.000 -2.000 2.500	-15.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665
7770.00 w/ Mount Pipe	C	From Leg	3.000 6.000 2.500	-15.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	0.055 0.103 0.157 0.287 0.665
(4) LGP 17201	C	From Leg	3.000 0.000 2.500	-15.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.946 2.134 2.330 2.749 3.690	0.518 0.640 0.770 1.056 1.733	0.031 0.042 0.055 0.089 0.193
6' x 2" Mount Pipe	A	From Leg	3.000 0.000 2.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
6' x 2" Mount Pipe	B	From Leg	3.000 0.000 2.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
6' x 2" Mount Pipe	C	From Leg	3.000 0.000 2.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
***									
Platform Mount [LP 303-1]	C	None		0.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.660 18.870 23.080 31.500 48.340	14.660 18.870 23.080 31.500 48.340	1.250 1.481 1.713 2.175 3.101
LPA-80080/4CF w/ Mount Pipe	A	From Leg	3.000 -6.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.856 3.220 3.592 4.450 6.318	7.227 7.922 8.634 10.112 13.339	0.030 0.076 0.128 0.253 0.613
HBXX-6516DS-A2M w/ Mount Pipe	A	From Leg	3.000 -2.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.176 6.655 7.137 8.134 10.256	4.525 5.205 5.899 7.373 10.556	0.050 0.099 0.154 0.287 0.667
LNX-6514DS-A1M w/ Mount Pipe	A	From Leg	3.000 0.000 2.000	-20.000	155.000	No Ice 1/2" Ice	8.648 9.305 9.930	7.082 8.273 9.185	0.065 0.134 0.211

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	11.204	11.023	0.393
						2" Ice	13.872	15.063	0.902
						4" Ice			
HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	3.000 2.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.976 9.647 10.291 11.595 14.321	6.963 8.182 9.144 11.022 15.027	0.067 0.137 0.215 0.398 0.914
LPA-80080/4CF w/ Mount Pipe	A	From Leg	3.000 6.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.856 3.220 3.592 4.450 6.318	7.227 7.922 8.634 10.112 13.339	0.030 0.076 0.128 0.253 0.613
(2) CBC721-DF	A	From Leg	3.000 0.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.449 0.542 0.644 0.873 1.436	0.120 0.184 0.258 0.430 0.879	0.004 0.007 0.011 0.023 0.070
RRH2X60-PCS	A	From Leg	3.000 0.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.567 2.791 3.025 3.517 4.606	2.011 2.218 2.435 2.894 3.915	0.055 0.075 0.099 0.155 0.313
RRH2x60-700	A	From Leg	3.000 0.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	1.816 2.075 2.360 2.957 4.253	0.060 0.083 0.109 0.173 0.354
RRH2X60-AWS	A	From Leg	3.000 0.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	2.158 2.441 2.733 3.342 4.665	0.060 0.084 0.112 0.180 0.369
LPA-80080/4CF w/ Mount Pipe	B	From Leg	3.000 -6.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.856 3.220 3.592 4.450 6.318	7.227 7.922 8.634 10.112 13.339	0.030 0.076 0.128 0.253 0.613
HBXX-6516DS-A2M w/ Mount Pipe	B	From Leg	3.000 -2.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.176 6.655 7.137 8.134 10.256	4.525 5.205 5.899 7.373 10.556	0.050 0.099 0.154 0.287 0.667
LNX-6514DS-A1M w/ Mount Pipe	B	From Leg	3.000 0.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.648 9.305 9.930 11.204 13.872	7.082 8.273 9.185 11.023 15.063	0.065 0.134 0.211 0.393 0.902
HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	3.000 2.000 2.000	-20.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.976 9.647 10.291 11.595 14.321	6.963 8.182 9.144 11.022 15.027	0.067 0.137 0.215 0.398 0.914
LPA-80080/4CF w/ Mount Pipe	B	From Leg	3.000 6.000	-20.000	155.000	No Ice 1/2"	2.856 3.220	7.227 7.922	0.030 0.076

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
			2.000			Ice	3.592	8.634	0.128
						1" Ice	4.450	10.112	0.253
						2" Ice	6.318	13.339	0.613
						4" Ice			
(2) CBC721-DF	B	From Leg	3.000	-20.000	155.000	No Ice	0.449	0.120	0.004
			0.000			1/2"	0.542	0.184	0.007
			2.000			Ice	0.644	0.258	0.011
						1" Ice	0.873	0.430	0.023
						2" Ice	1.436	0.879	0.070
						4" Ice			
RRH2X60-PCS	B	From Leg	3.000	-20.000	155.000	No Ice	2.567	2.011	0.055
			0.000			1/2"	2.791	2.218	0.075
			2.000			Ice	3.025	2.435	0.099
						1" Ice	3.517	2.894	0.155
						2" Ice	4.606	3.915	0.313
						4" Ice			
RRH2x60-700	B	From Leg	3.000	-20.000	155.000	No Ice	3.957	1.816	0.060
			0.000			1/2"	4.272	2.075	0.083
			2.000			Ice	4.596	2.360	0.109
						1" Ice	5.271	2.957	0.173
						2" Ice	6.722	4.253	0.354
						4" Ice			
RRH2X60-AWS	B	From Leg	3.000	-20.000	155.000	No Ice	3.957	2.158	0.060
			3.000			1/2"	4.272	2.441	0.084
			2.000			Ice	4.596	2.733	0.112
						1" Ice	5.271	3.342	0.180
						2" Ice	6.722	4.665	0.369
						4" Ice			
LPA-80063/4CF w/ Mount Pipe	C	From Leg	3.000	-20.000	155.000	No Ice	7.248	7.260	0.038
			-6.000			1/2"	7.719	7.957	0.104
			2.000			Ice	8.200	8.672	0.176
						1" Ice	9.195	10.156	0.344
						2" Ice	11.320	13.391	0.796
						4" Ice			
HBXX-6516DS-A2M w/ Mount Pipe	C	From Leg	3.000	-20.000	155.000	No Ice	6.176	4.525	0.050
			-2.000			1/2"	6.655	5.205	0.099
			2.000			Ice	7.137	5.899	0.154
						1" Ice	8.134	7.373	0.287
						2" Ice	10.256	10.556	0.667
						4" Ice			
LNX-6514DS-A1M w/ Mount Pipe	C	From Leg	3.000	-20.000	155.000	No Ice	8.648	7.082	0.065
			0.000			1/2"	9.305	8.273	0.134
			2.000			Ice	9.930	9.185	0.211
						1" Ice	11.204	11.023	0.393
						2" Ice	13.872	15.063	0.902
						4" Ice			
HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	3.000	-20.000	155.000	No Ice	8.976	6.963	0.067
			2.000			1/2"	9.647	8.182	0.137
			2.000			Ice	10.291	9.144	0.215
						1" Ice	11.595	11.022	0.398
						2" Ice	14.321	15.027	0.914
						4" Ice			
LPA-80063/4CF w/ Mount Pipe	C	From Leg	3.000	-20.000	155.000	No Ice	7.248	7.260	0.038
			6.000			1/2"	7.719	7.957	0.104
			2.000			Ice	8.200	8.672	0.176
						1" Ice	9.195	10.156	0.344
						2" Ice	11.320	13.391	0.796
						4" Ice			
(2) CBC721-DF	C	From Leg	3.000	-20.000	155.000	No Ice	0.449	0.120	0.004
			0.000			1/2"	0.542	0.184	0.007
			2.000			Ice	0.644	0.258	0.011
						1" Ice	0.873	0.430	0.023
						2" Ice	1.436	0.879	0.070
						4" Ice			
RRH2X60-PCS	C	From Leg	3.000	-20.000	155.000	No Ice	2.567	2.011	0.055

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000				1/2"	2.791	2.218	0.075
			2.000				Ice	3.025	2.435	0.099
							1" Ice	3.517	2.894	0.155
							2" Ice	4.606	3.915	0.313
							4" Ice			
RRH2x60-700	C	From Leg	3.000		-20.000	155.000	No Ice	3.957	1.816	0.060
			0.000				1/2"	4.272	2.075	0.083
			2.000				Ice	4.596	2.360	0.109
							1" Ice	5.271	2.957	0.173
							2" Ice	6.722	4.253	0.354
							4" Ice			
RRH2X60-AWS	C	From Leg	3.000		-20.000	155.000	No Ice	3.957	2.158	0.060
			0.000				1/2"	4.272	2.441	0.084
			2.000				Ice	4.596	2.733	0.112
							1" Ice	5.271	3.342	0.180
							2" Ice	6.722	4.665	0.369
							4" Ice			
DB-T1-6Z-8AB-0Z	C	From Leg	3.000		-20.000	155.000	No Ice	5.600	2.333	0.044
			0.000				1/2"	5.915	2.558	0.080
			2.000				Ice	6.240	2.791	0.120
							1" Ice	6.914	3.284	0.213
							2" Ice	8.365	4.373	0.455
							4" Ice			
***										
Side Arm Mount [SO 701-1]	B	From Leg	0.000		0.000	63.000	No Ice	0.850	1.670	0.065
			0.000				1/2"	1.140	2.340	0.079
			0.000				Ice	1.430	3.010	0.093
							1" Ice	2.010	4.350	0.121
							2" Ice	3.170	7.030	0.177
							4" Ice			
GPS	B	From Leg	3.000		0.000	63.000	No Ice	0.175	0.175	0.000
			0.000				1/2"	0.238	0.238	0.002
			0.000				Ice	0.309	0.309	0.005
							1" Ice	0.477	0.477	0.014
							2" Ice	0.918	0.918	0.053
							4" Ice			
***										

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

Comb. No.	Description
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	179.5 - 129.76	Pole	Max Tension	30	0.000	0.000	0.000
			Max. Compression	14	-18.989	0.200	-1.911
			Max. Mx	11	-9.975	563.610	-7.853
			Max. My	8	-9.923	7.404	-574.174
			Max. Vy	11	-19.569	563.610	-7.853
			Max. Vx	8	19.910	7.404	-574.174
			Max. Torque	3			-2.536
L2	129.76 - 84.61	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-28.547	0.268	-1.958
			Max. Mx	11	-18.031	1505.018	-21.460
			Max. My	8	-17.997	20.928	-1530.593
			Max. Vy	11	-23.400	1505.018	-21.460
			Max. Vx	8	23.742	20.928	-1530.593
			Max. Torque	4			-1.853
L3	84.61 - 40.73	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-41.929	0.294	-2.163
			Max. Mx	11	-29.521	2587.571	-34.861
			Max. My	8	-29.504	34.139	-2628.095
			Max. Vy	11	-27.342	2587.571	-34.861
			Max. Vx	8	27.696	34.139	-2628.095
			Max. Torque	4			-1.977
L4	40.73 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-61.725	0.604	-2.341
			Max. Mx	11	-46.902	3991.177	-49.930
			Max. My	8	-46.902	49.220	-4048.424
			Max. Vy	11	-31.397	3991.177	-49.930
			Max. Vx	8	31.741	49.220	-4048.424
			Max. Torque	4			-1.976

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	22	61.725	3.758	-6.512
	Max. H_x	11	46.917	31.374	-0.310
	Max. H_z	2	46.917	-0.310	31.719
	Max. M_x	2	4046.643	-0.310	31.719
	Max. M_z	5	3990.840	-31.374	0.310
	Max. Torsion	10	1.958	27.326	-16.128
	Min. Vert	1	46.917	0.000	0.000
	Min. H_x	5	46.917	-31.374	0.310
	Min. H_z	8	46.917	0.310	-31.719
	Min. M_x	8	-4048.424	0.310	-31.719
	Min. M_z	11	-3991.177	31.374	-0.310
	Min. Torsion	4	-1.975	-27.326	16.128

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	46.917	0.000	0.000	0.849	0.158	-0.000
Dead+Wind 0 deg - No Ice	46.917	0.310	-31.719	-4046.643	-48.867	0.914
Dead+Wind 30 deg - No Ice	46.917	15.956	-27.624	-3528.843	-2037.684	1.668
Dead+Wind 60 deg - No Ice	46.917	27.326	-16.128	-2065.365	-3480.534	1.975
Dead+Wind 90 deg - No Ice	46.917	31.374	-0.310	-48.162	-3990.840	1.747
Dead+Wind 120 deg - No Ice	46.917	27.016	15.591	1982.304	-3431.694	1.045
Dead+Wind 150 deg - No Ice	46.917	15.419	27.314	3481.779	-1952.857	0.064
Dead+Wind 180 deg - No Ice	46.917	-0.310	31.719	4048.424	49.220	-0.927
Dead+Wind 210 deg - No Ice	46.917	-15.956	27.624	3530.613	2038.039	-1.665
Dead+Wind 240 deg - No Ice	46.917	-27.326	16.128	2067.128	3480.881	-1.958
Dead+Wind 270 deg - No Ice	46.917	-31.374	0.310	49.930	3991.177	-1.733
Dead+Wind 300 deg - No Ice	46.917	-27.016	-15.591	-1980.525	3432.028	-1.048
Dead+Wind 330 deg - No Ice	46.917	-15.419	-27.314	-3479.993	1953.200	-0.081
Dead+Ice+Temp	61.725	-0.000	0.000	2.341	0.604	0.000
Dead+Wind 0 deg+Ice+Temp	61.725	0.064	-7.482	-991.839	-9.447	0.083
Dead+Wind 30 deg+Ice+Temp	61.725	3.758	-6.512	-863.663	-498.938	0.348
Dead+Wind 60 deg+Ice+Temp	61.725	6.446	-3.796	-503.411	-854.572	0.519
Dead+Wind 90 deg+Ice+Temp	61.725	7.406	-0.064	-7.608	-981.059	0.551
Dead+Wind 120 deg+Ice+Temp	61.725	6.382	3.686	490.896	-844.504	0.435
Dead+Wind 150 deg+Ice+Temp	61.725	3.648	6.448	858.524	-481.494	0.202
Dead+Wind 180 deg+Ice+Temp	61.725	-0.064	7.482	996.770	10.697	-0.084
Dead+Wind 210 deg+Ice+Temp	61.725	-3.758	6.512	868.593	500.188	-0.348
Dead+Wind 240 deg+Ice+Temp	61.725	-6.446	3.796	508.340	855.823	-0.518
Dead+Wind 270 deg+Ice+Temp	61.725	-7.406	0.064	12.537	982.309	-0.550
Dead+Wind 300 deg+Ice+Temp	61.725	-6.382	-3.686	-485.966	845.753	-0.435
Dead+Wind 330 deg+Ice+Temp	61.725	-3.648	-6.448	-853.594	482.744	-0.203
Dead+Wind 0 deg - Service	46.917	0.107	-10.975	-1401.244	-16.820	0.321
Dead+Wind 30 deg - Service	46.917	5.521	-9.559	-1221.886	-705.793	0.583
Dead+Wind 60 deg - Service	46.917	9.455	-5.581	-714.888	-1205.607	0.689
Dead+Wind 90 deg - Service	46.917	10.856	-0.107	-16.092	-1382.339	0.609
Dead+Wind 120 deg - Service	46.917	9.348	5.395	687.262	-1188.625	0.365
Dead+Wind 150 deg - Service	46.917	5.335	9.451	1206.703	-676.369	0.024
Dead+Wind 180 deg -	46.917	-0.107	10.975	1403.044	17.162	-0.323

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
Service						
Dead+Wind 210 deg - Service	46.917	-5.521	9.559	1223.685	706.136	-0.583
Dead+Wind 240 deg - Service	46.917	-9.455	5.581	716.686	1205.949	-0.686
Dead+Wind 270 deg - Service	46.917	-10.856	0.107	17.890	1382.680	-0.607
Dead+Wind 300 deg - Service	46.917	-9.348	-5.395	-685.462	1188.965	-0.366
Dead+Wind 330 deg - Service	46.917	-5.335	-9.451	-1204.902	676.710	-0.026

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	0.000	-46.917	0.000	0.000	46.917	0.000	0.000%
2	0.310	-46.917	-31.719	-0.310	46.917	31.719	0.000%
3	15.956	-46.917	-27.624	-15.956	46.917	27.624	0.000%
4	27.326	-46.917	-16.128	-27.326	46.917	16.128	0.000%
5	31.374	-46.917	-0.310	-31.374	46.917	0.310	0.000%
6	27.016	-46.917	15.591	-27.016	46.917	-15.591	0.000%
7	15.419	-46.917	27.314	-15.419	46.917	-27.314	0.000%
8	-0.310	-46.917	31.719	0.310	46.917	-31.719	0.000%
9	-15.956	-46.917	27.624	15.956	46.917	-27.624	0.000%
10	-27.326	-46.917	16.128	27.326	46.917	-16.128	0.000%
11	-31.374	-46.917	0.310	31.374	46.917	-0.310	0.000%
12	-27.016	-46.917	-15.591	27.016	46.917	15.591	0.000%
13	-15.419	-46.917	-27.314	15.419	46.917	27.314	0.000%
14	0.000	-61.725	0.000	0.000	61.725	-0.000	0.000%
15	0.064	-61.725	-7.482	-0.064	61.725	7.482	0.000%
16	3.758	-61.725	-6.512	-3.758	61.725	6.512	0.000%
17	6.445	-61.725	-3.796	-6.446	61.725	3.796	0.000%
18	7.406	-61.725	-0.064	-7.406	61.725	0.064	0.000%
19	6.382	-61.725	3.686	-6.382	61.725	-3.686	0.000%
20	3.648	-61.725	6.448	-3.648	61.725	-6.448	0.000%
21	-0.064	-61.725	7.482	0.064	61.725	-7.482	0.000%
22	-3.758	-61.725	6.512	3.758	61.725	-6.512	0.000%
23	-6.445	-61.725	3.796	6.446	61.725	-3.796	0.000%
24	-7.406	-61.725	0.064	7.406	61.725	-0.064	0.000%
25	-6.382	-61.725	-3.686	6.382	61.725	3.686	0.000%
26	-3.648	-61.725	-6.448	3.648	61.725	6.448	0.000%
27	0.107	-46.917	-10.975	-0.107	46.917	10.975	0.000%
28	5.521	-46.917	-9.559	-5.521	46.917	9.559	0.000%
29	9.455	-46.917	-5.581	-9.455	46.917	5.581	0.000%
30	10.856	-46.917	-0.107	-10.856	46.917	0.107	0.000%
31	9.348	-46.917	5.395	-9.348	46.917	-5.395	0.000%
32	5.335	-46.917	9.451	-5.335	46.917	-9.451	0.000%
33	-0.107	-46.917	10.975	0.107	46.917	-10.975	0.000%
34	-5.521	-46.917	9.559	5.521	46.917	-9.559	0.000%
35	-9.455	-46.917	5.581	9.455	46.917	-5.581	0.000%
36	-10.856	-46.917	0.107	10.856	46.917	-0.107	0.000%
37	-9.348	-46.917	-5.395	9.348	46.917	5.395	0.000%
38	-5.335	-46.917	-9.451	5.335	46.917	9.451	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00054960

3	Yes	5	0.00000001	0.00034262
4	Yes	5	0.00000001	0.00032281
5	Yes	4	0.00000001	0.00021205
6	Yes	5	0.00000001	0.00032119
7	Yes	5	0.00000001	0.00031655
8	Yes	4	0.00000001	0.00014540
9	Yes	5	0.00000001	0.00032525
10	Yes	5	0.00000001	0.00034318
11	Yes	4	0.00000001	0.00074506
12	Yes	5	0.00000001	0.00031027
13	Yes	5	0.00000001	0.00031666
14	Yes	4	0.00000001	0.00000899
15	Yes	5	0.00000001	0.00010766
16	Yes	5	0.00000001	0.00012718
17	Yes	5	0.00000001	0.00012567
18	Yes	5	0.00000001	0.00010679
19	Yes	5	0.00000001	0.00012441
20	Yes	5	0.00000001	0.00012448
21	Yes	5	0.00000001	0.00010876
22	Yes	5	0.00000001	0.00012777
23	Yes	5	0.00000001	0.00012812
24	Yes	5	0.00000001	0.00010704
25	Yes	5	0.00000001	0.00012261
26	Yes	5	0.00000001	0.00012373
27	Yes	4	0.00000001	0.00007471
28	Yes	4	0.00000001	0.00066535
29	Yes	4	0.00000001	0.00058512
30	Yes	4	0.00000001	0.00007497
31	Yes	4	0.00000001	0.00060034
32	Yes	4	0.00000001	0.00058095
33	Yes	4	0.00000001	0.00005137
34	Yes	4	0.00000001	0.00059676
35	Yes	4	0.00000001	0.00067058
36	Yes	4	0.00000001	0.00010452
37	Yes	4	0.00000001	0.00055458
38	Yes	4	0.00000001	0.00057990

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	179.5 - 129.76 (1)	TP31.852x19.59x0.313	49.740	0.000	0.0	39.000	30.188	-9.897	1177.330	0.008
L2	129.76 - 84.61 (2)	TP42.261x30.123x0.375	49.630	0.000	0.0	39.000	48.172	-17.980	1878.710	0.010
L3	84.61 - 40.73 (3)	TP52.229x40.097x0.438	49.660	0.000	0.0	39.000	69.534	-29.496	2711.820	0.011
L4	40.73 - 0 (4)	TP61.25x49.636x0.5	47.760	0.000	0.0	39.000	90.619	-41.657	3534.160	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	179.5 - 129.76 (1)	TP31.852x19.59x0.313	577.825	30.657	39.000	0.786	0.000	0.000	39.000	0.000
L2	129.76 - 84.61 (2)	TP42.261x30.123x0.375	1542.175	38.521	39.000	0.988	0.000	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
L3	84.61 - 40.73 (3)	TP52.229x40.097x0.438	2647.433	37.008	39.000	0.949	0.000	0.000	39.000	0.000
L4	40.73 - 0 (4)	TP61.25x49.636x0.5	3607.408	33.933	39.000	0.870	0.000	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	179.5 - 129.76 (1)	TP31.852x19.59x0.313	20.091	0.666	26.000	0.051	1.570	0.041	26.000	0.002
L2	129.76 - 84.61 (2)	TP42.261x30.123x0.375	23.923	0.497	26.000	0.038	1.556	0.019	26.000	0.001
L3	84.61 - 40.73 (3)	TP52.229x40.097x0.438	27.883	0.401	26.000	0.031	1.690	0.012	26.000	0.000
L4	40.73 - 0 (4)	TP61.25x49.636x0.5	30.841	0.340	26.000	0.026	1.673	0.008	26.000	0.000

Pole Interaction Design Data

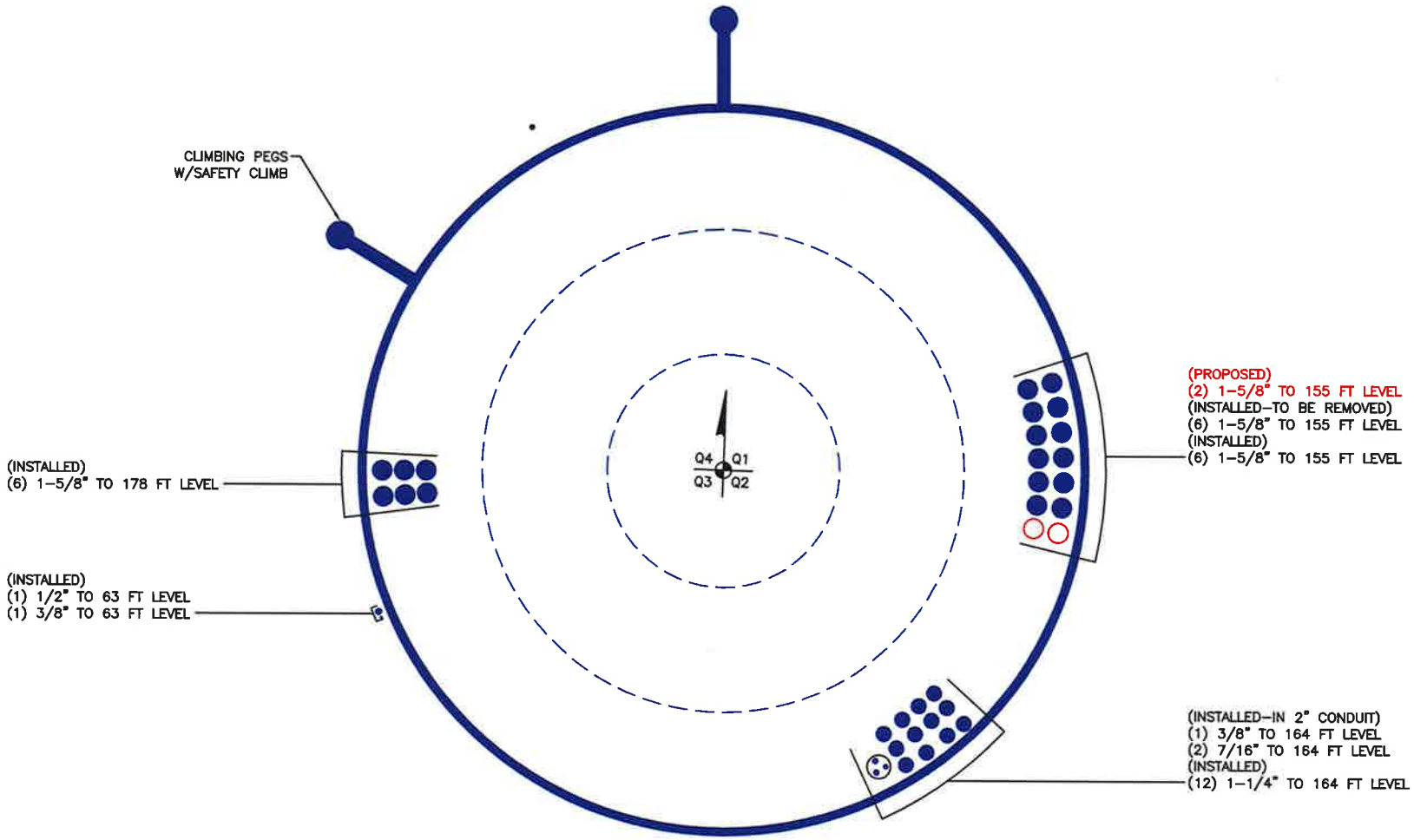
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	179.5 - 129.76 (1)	0.008	0.786	0.000	0.051	0.002	0.795 ✔	1.333	H1-3+VT ✔
L2	129.76 - 84.61 (2)	0.010	0.988	0.000	0.038	0.001	0.998 ✔	1.333	H1-3+VT ✔
L3	84.61 - 40.73 (3)	0.011	0.949	0.000	0.031	0.000	0.960 ✔	1.333	H1-3+VT ✔
L4	40.73 - 0 (4)	0.012	0.870	0.000	0.026	0.000	0.882 ✔	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	179.5 - 129.76	Pole	TP31.852x19.59x0.313	1	-9.897	1569.381	59.7	Pass
L2	129.76 - 84.61	Pole	TP42.261x30.123x0.375	2	-17.980	2504.320	74.8	Pass
L3	84.61 - 40.73	Pole	TP52.229x40.097x0.438	3	-29.496	3614.856	72.0	Pass
L4	40.73 - 0	Pole	TP61.25x49.636x0.5	4	-41.657	4711.035	66.2	Pass
							Summary	
						Pole (L2)	74.8	Pass
						RATING =	**74.8**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


CLIMBING PEGS
W/SAFETY CLIMB
(INSTALLED)
(6) 1-5/8" TO 178 FT LEVEL
(INSTALLED)
(1) 1/2" TO 63 FT LEVEL
(1) 3/8" TO 63 FT LEVEL
Q4
Q1
Q3
Q2
(PROPOSED)
(2) 1-5/8" TO 155 FT LEVEL
(INSTALLED-TO BE REMOVED)
(6) 1-5/8" TO 155 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 155 FT LEVEL
(INSTALLED-IN 2" CONDUIT)
(1) 3/8" TO 164 FT LEVEL
(2) 7/16" TO 164 FT LEVEL
(INSTALLED)
(12) 1-1/4" TO 164 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

BU#: *876367*
Site Name: *WAPPINGERS FALLS / BO*
App #: *300583 Rev.4*

Pole Manufacturer:	Other

Anchor Rod Data		
Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	70	in

Plate Data		
Diam:	76	in
Thick:	2.25	in
Grade:	60	ksi
Single-Rod B-eff:	9.72	in

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

Pole Data		
Diam:	61.25	in
Thick:	0.5	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	4077	ft-kips
Axial:	47	kips
Shear:	32	kips

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

Anchor Rod Results

Maximum Rod Tension:	137.4 Kips	Rigid
Allowable Tension:	195.0 Kips	Service, ASD
Anchor Rod Stress Ratio:	70.5% **Pass**	Fty*ASIF

Base Plate Results Flexural Check

Base Plate Stress:	46.9 ksi	Rigid
Allowable Plate Stress:	60.0 ksi	Service ASD
Base Plate Stress Ratio:	78.2% **Pass**	0.75*Fy*ASIF
		Y.L. Length: 33.89

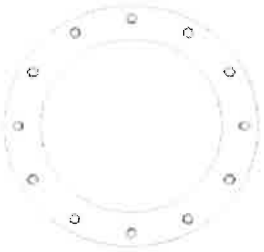
n/a

Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a



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

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

Monopole Pier and Pad Foundation

BU # : 876367
Site Name: WAPPINGERS FALLS / BOE
App. Number: 300583 Rev. 4

TIA-222 Revision: F

Design Reactions		
Shear, **S**:	32	kips
Moment, **M**:	4077	ft-kips
Tower Height, **H**:	179.5	ft
Tower Weight, **Wt**:	47	kips
Base Diameter, **BD**:	5.10	ft

Foundation Dimensions		
Depth, **D**:	6.5	ft
Pad Width, **W**:	27	ft
Neglected Depth, **N**:	0	ft
Thickness, **T**:	6.00	ft
Pier Diameter, **Pd**:	7.50	ft
Ext. Above Grade, **E**:	1.00	ft
BP Dist. Above Pier:	5	in.
Clear Cover, **Cc**:	3.0	in

Soil Properties		
Soil Unit Weight, **γ**:	0.100	kcf
Ult. Bearing Capacity, Bc:	17.3	ksf
Angle of Friction, **Φ**:	30	deg
Cohesion, **Co**:	0.000	ksf
Passive Pressure, **Pp**:	0.000	ksf
Base Friction, **μ**:	0.50	

Material Properties		
Rebar Yield Strength, **Fy**:	60000	psi
Concrete Strength, **F'c**:	4000	psi
Concrete Unit Weight, **δc**:	0.150	kcf
Seismic Zone, **z**:	1	

Rebar Properties		
Pier Rebar Size, **Sp**:	11	
Pier Rebar Quanity, **mp**:	24	21
Pad Rebar Size, **Spad**:	11	
Pad Rebar Quanity, **mpad**:	108	14
Pier Tie Size, **St**:	4	4
Tie Quanity, **mt**:	2	3

Design Checks	Capacity/ Availability	Demand/ Limits	Check
Req'd Pier Diam.(ft)	7.5	7.1	**OK**
Overturning (ft-kips)	6085.20	4077.00	**67.0%**
Shear Capacity (kips)	187.02	32.00	**17.1%**
Bearing (ksf)	12.98	2.79	**21.5%**
Pad Shear - 1-way (kips)	2099.21	310.65	**14.8%**
Pad Shear - 2-way (kips)	6444.03	125.71	**2.0%**
Pad Moment Capacity (k-ft)	48299.92	1823.71	**3.8%**
Pier Moment Capacity (k-ft)	5110.63	4125.00	**80.7%**

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

Site Data

BU#: *876367*
Site Name: *WAPPINGERS FALLS / BOB'S ANTIQ*
App #: *300583 Rev. 4*

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:	5	in
Pier Dist. Above Grade:	12	in
Pad Bearing Depth, D:	6.5	ft
Pad Thickness, T:	6.00	ft
Pad Width=Length, L:	27	ft
Pier Cross Section Shape:	Square	<--Pull Down
Enter Pier Side Width:	7.50	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	56.25	ft^2
Pier Height:	1.50	ft
Soil (above pad) Height:	0.50	ft

Soil Parameters		
Unit Weight, γ:	100.0	pcf
Ultimate Bearing Capacity, qn:	17.30	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	30.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	12.98	ksf
Passive Pres. Coeff., Kp	3.00	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	43.2	kips
Pad Force Location Above D:	2.14	ft
ϕ(Passive Pressure Moment):	92.57	ft-kips
Factored O.T. M(WL), "1.6W":	5846.0	ft-kips
Factored OT (MW-Msoil), M1	5753.38	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	0.29	ft
Sum of Soil Wedges Wt:	0.37	kips
Soil Wedges ecc, K1:	10.89	ft
Ftg+Soil above Pad wt:	702.4	kips
Unfactored (Total ftg-soil Wt):	702.76	kips
1.2D. **No Soil Wedges.**	899.27	kips
0.9D. **With Soil Wedges**	674.78	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:	47	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	32	kips
Unfactored WL Moment, M:	4077	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	56.4	kips
0.90	0.9D+1.6W, Pu:	42.3	kips
1.35	Vu:	43.2	kips
	Mu:	5503.95	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	899.27	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	5753.38	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	6.40	ft
Orthogonal qu=	2.40	ksf
qu/ϕ*qn Ratio=	**18.52%**	Pass

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	4.52	ft
Diagonal qu=	2.79	ksf
qu/ϕ*qn Ratio=	**21.50%**	Pass

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	674.78	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	5749.80	ft-kips

Orthogonal ecc3 = M2/P2 =	8.52	ft
Ortho Non Bearing Length,NBL=	17.04	ft
Orthogonal qu=	2.51	ksf
Diagonal qu=	3.02	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	4077.00		
M Orthogonal:	6085.20	**67.00%**	Pass
M Diagonal:	6085.20	**67.00%**	Pass