Robinson+Cole

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Also admitted in Massachusetts

November 11, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
1432 Old Waterbury Road, Southbury, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the top of the existing 226-foot tower at 1432 Old Waterbury Road in Southbury, Connecticut (the "Property"). The Property and tower are owned by Crown Castle ("Crown"). The Council approved Cellco's use of the existing tower in 1988 (Docket No. 88). Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model SBNHH-1D65B, 700/2100 MHz antennas and three (3) model SBNHH-1D65B, 1900 MHz antennas, all at the same level on the tower. Cellco also intends to install nine (9) remote radio heads ("RRHs") behind its antennas 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 Ed Edelson, First Selectman of the Town of Southbury. A copy of this letter is also being sent to Crown, the Property owner and 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. The replacement antennas and RRHs will be located at the top of the 226-foot tower.

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

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

4. The operation of the 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:
Ed Edelson, Southbury First Selectman
Crown Castle
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

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

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

Electrical Specifications

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

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, 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 km/h | 150 mph

Dimensions

Depth	180.0 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

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

Packed Dimensions

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

Regulatory Compliance/Certifications

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

Included Products

Product Specifications

SBNHH-1D65B

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

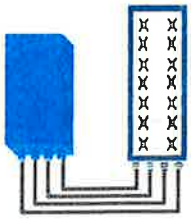
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

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)

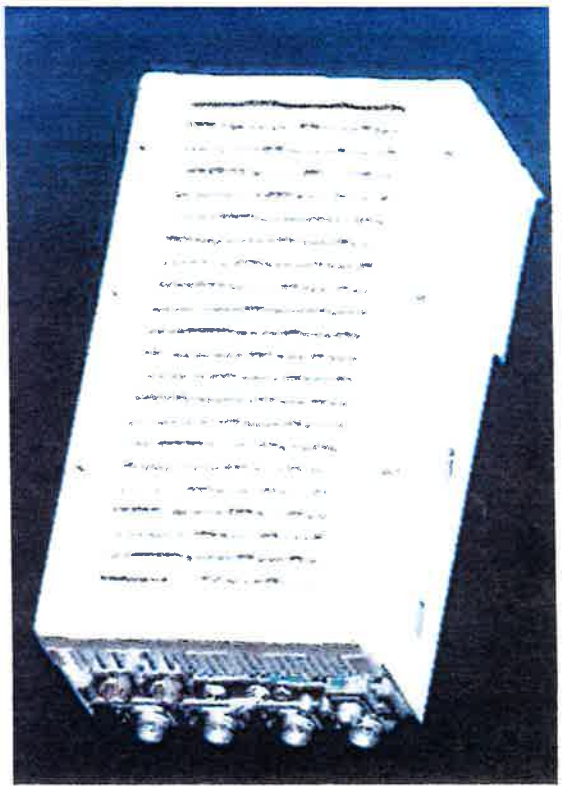
** Not a Verizon Wireless deployed product

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.)

B66A RRH 4X45 - PHYSICAL CHARACTERISTICS- TARGET 15.1

B4 RRH4x45-4R (AWS-Extension Band)	
Frequency Band	LR15.1 – B4 / LR16.1 B66 (AWS 1 and 3 only)
RF Output Power	2x90W/4x45W (SW configurable)
Operational range	2110-2180 MHz, DL/ 1710-1780 MHz UL
Instantaneous Bandwidth	70MHz
Configuration (HW readiness)	LTE: 2T2R, 2T4R, 4T4R
Carrier Bandwidths	5, 10, 15 and 20 MHz
Interfaces	2x CPRI Rate 7 Ports Antenna Connectors 4.3-10
AISG Support	AISG 2.0 for RET Internal Smart Bias T
Monitor Ports	NA (Spec An to replace ports)
Environmental	GR487 Compliance / GR3178 Compliance (with exceptions)
Mounting options	Pole/Wall
Connectors location	All bottom
External Alarms	4
Annual Return Rate (Target)	<2%
Operating Temperature	-40 C to +55 C (without solar load)

- Commercial Product Will include B66 support of AWS 1 and 3.
- Lower AWS 3 UL Not in 3GPP Band 66 Definition

Physical Dimensions – Not to Exceed		
	W/O Solar Shield	With Solar Shield
Dimensions HxWxD	H = 26in (H=660mm) W = 11.4in (W=290mm) D = 5.9in (D=150mm)	H = 26.6in (H=675mm) W = 12in (W=304mm) D = 6.8n (D=173mm)
Volume	29l	35.5l
Weight		64lbs / 29kg

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

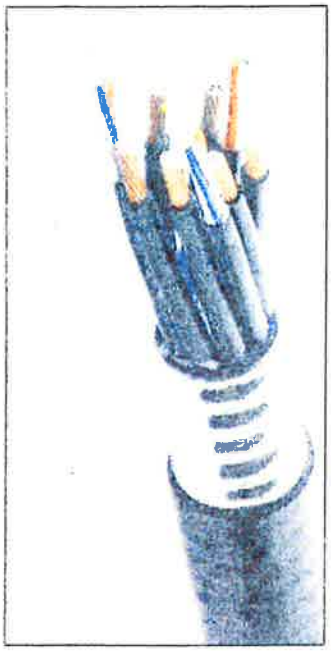


Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

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

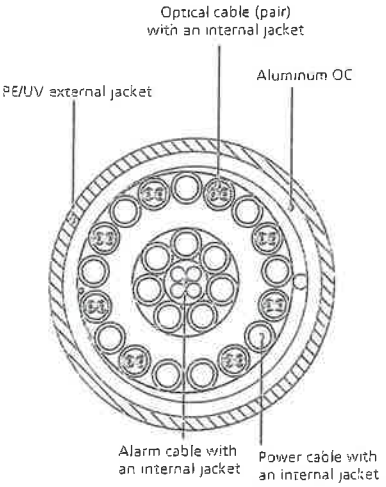


Figure 2: Construction Detail

¹ This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Southbury								
Tower Height: 226'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	1	500	195	0.0050	880	0.5867	0.09%	
*AT&T UMTS	2	500	195	0.0101	1900	1.0000	0.10%	
*AT&T LTE	1	500	195	0.0050	700	0.4667	0.11%	
*AT&T LTE	1	500	195	0.0050	1900	1.0000	0.05%	
*AT&T GSM	1	296	195	0.0030	880	0.5867	0.05%	
*AT&T GSM	1	427	195	0.0043	1900	1.0000	0.04%	
*Pocket (now MetroPCS)	3	631	165	0.0269	2130	1.0000	0.27%	
*Sprint CDMA/LTE	2	693	175	0.0175	1900	1.0000	0.17%	
*Sprint CDMA/LTE	1	390	175	0.0049	850	0.5667	0.09%	
*Sprint CDMA/LTE	2	693	175	0.0175	2500	1.0000	0.17%	
*T-Mobile GSM	8	170	207	0.0121	1945	1.0000	0.12%	
*T-Mobile UMTS	2	605	207	0.0108	2100	1.0000	0.11%	
*Nextel	9	100	220	0.0071	851	0.5673	0.12%	
Verizon	**11**	**315**	**228**	**0.0240**	**1970**	**1.0000**	**2.40%**	
Verizon	**9**	**305**	**228**	**0.0190**	**869**	**0.5793**	**3.28%**	
Verizon	**1**	**2244**	**228**	**0.0155**	**2145**	**1.0000**	**1.55%**	
Verizon	**1**	**1050**	**228**	**0.0073**	**746**	**0.4973**	**1.46%**	
								10.2%
* Source: Siting Council								

ATTACHMENT 3

Date: **September 01, 2015**

Holly Haas
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Aero Solutions, LLC.
5555 Central Avenue, Suite 100
Boulder, CO.80301
(720)-304-6882

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate** **Carrier Site Name:**	 Southbury
Crown Castle Designation:	**Crown Castle BU Number:** **Crown Castle Site Name:** **Crown Castle JDE Job Number:** **Crown Castle Work Order Number:** **Crown Castle Application Number:**	806358 NHV 109 943107 342548 1114343 305854 Rev. 3
Engineering Firm Designation:	**Aero Solutions, LLC. Project Number:**	003-15-0558R1
Site Data:	**1432 Old Waterbury Road, SOUTHBURY, New Haven County, CT** **Latitude *41° 29' 36.92"*, Longitude *-73° 9' 54.98"*** **226 Foot - Monopole Tower**	

Dear Holly Haas,

Aero Solutions, LLC. is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 821774, in accordance with application 305854, revision 3.

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

LC7: Existing + Reserved + Proposed Equipment ***Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

***The structure has sufficient capacity once the loading changes described in the Recommendations section of this report are completed.**

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.

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

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

Structural analysis prepared by: Rudolf Oplatka, E.I.

Respectfully submitted by:
Shraddha Dharia, P.E.
Structural Engineer
CT PE#: PEN0028187
Expires: 1/31/2016

9.3.2015

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 226 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in July of 1999. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

The tower has been modified per reinforcement drawings prepared by VS, in January of 2007. Reinforcement consists of addition of base plate stiffeners. The tower was later reinforced per reinforcement drawings prepared by B&T, in November of 2012. Reinforcement consists of addition of shaft reinforcement members between 124' and 134'.

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
226.0	228.0	3	alcatel lucent	RRH2X60-1900	2	1-5/8"	
		3	alcatel lucent	RRH2x60-700			
		3	alcatel lucent	RRH4X45-AWS4 B66			
		6	commscope	SBNHH-1D65B w/ Mount Pipe			
		2	rfs celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
226.0	230.0	1	tower mounts	Miscellaneous [NA 507-1]			1
	228.0	6	antel	LPA-80080/6CF w/ Mount Pipe			
		3	powerwave technologies	P65.16.XL.2 w/ Mount Pipe	2	1-5/8"	3
		6	rfs celwave	FD9R6004/2C-3L			1
		3	rymsa wireless	MG D3-800Tx w/ Mount Pipe			3
		1	tower mounts	Side Arm Mount [SO 202-3]	10	1-5/8"	1
	226.0	1	tower mounts	Platform Mount [LP 712-1]			
220.0	221.0	2	decibel	DB846F65ZAXY w/ Mount Pipe	12	1-5/8"	3
		10	decibel	DB846G90A-XY w/ Mount Pipe			
	220.0	1	tower mounts	Platform Mount [LP 712-1]			
	216.0	1	tower mounts	Transition Ladder			
205.0	207.0	3	ems wireless	RR65-18-02DP w/ Mount Pipe	12	1-5/8"	1

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		6	nokia	CS72993.07			
		3	rfs celwave	ATMPP1412D-1CWA			
	205.0	1	tower mounts	Platform Mount [LP 712-1]			
193.0	195.0	3	cci antennas	OPA-65R-LCUU-H6 w/ Mount Pipe			2
		3	communication components inc.	DTMABP7819VG12A			1
		3	ericsson	RRUS 11			
		3	ericsson	RRUS 12-B2			2
		3	ericsson	RRUS A2 MODULE			
		3	kathrein	800 10121 w/ Mount Pipe	1 2 12	3/8" 5/8" 1-1/4"	1
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
	193.0	3	communication components inc.	DTMABP7819VG12A			
		6	kathrein	860 10025			
		1	tower mounts	Platform Mount [LP 712-1]			
185.0	187.0	3	decibel	978QNB120E-M w/ Mount Pipe	1 12	1/2" 1-5/8"	1
		6	ems wireless	FV90-16-02DP w/ Mount Pipe			
		3	nokia	CS72993.07			
		3	rfs celwave	APXV18-206517S-C w/ Mount Pipe			
	185.0	1	tower mounts	Platform Mount [LP 712-1]			
176.0	177.0	3	alcatel lucent	TME-800MHZ RRH			1
	176.0	1	tower mounts	Side Arm Mount [SO 102-3]			
	173.0	3	alcatel lucent	TME-1900MHz RRH (65MHz)			
175.0	175.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	3	1-1/4"	1
		9	rfs celwave	ACU-A20-N			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 1201-1]			
72.0	73.0	1	gps	GPS_A	1	1/2"	1
	72.0	1	tower mounts	Side Arm Mount [SO 701-1]			

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

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
230	230	12	swedcom	ALP 9212		
220	220	12	swedcom	ALP 9212		
205	205	12	ems wireless	RR65-18-02		
195	195	12	swedcom	ALP 9212		
185	185	9	decibel	DB980		
175	175	12	allgon	7184.05		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	East Coast Drilling & Boring	217688	CCISITES
4-POST-MODIFICATION INSPECTION	VS	1863184	CCISITES
4-POST-MODIFICATION INSPECTION	TEP	4062849	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEI	821496	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEI	821494	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) The tower was reinforced per the referenced drawings.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	226 - 197.961	Pole	TP28.6437x21.5x0.1875	1	-5.12	848.23	59.1	Pass
L2	197.961 - 162.932	Pole	TP37.108x27.229x0.375	2	-17.28	2192.64	71.1	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L3	162.932 - 132	Pole	TP44.1835x35.0602x0.4375	3	-27.11	3158.04	86.1	Pass
L4	132 - 120.305	Pole	TP47.1416x44.1835x0.5755	4	-28.90	3443.19	83.6	Pass
L5	120.305 - 79.2108	Pole	TP56.6581x44.6496x0.5	5	-44.07	4475.01	86.6	Pass
L6	79.2108 - 39.1405	Pole	TP65.7875x53.7404x0.5625	6	-61.35	5767.52	81.2	Pass
L7	39.1405 - 0	Pole	TP74.5x62.457x0.5625	7	-70.21	5948.55	84.0	Pass
							Summary	
						Pole (L5)	86.6	Pass
						Rating =	86.6	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	87.2	Pass
1	Base Plate	0	57.9	Pass
1	Base Foundation	0	88.6	Pass
1	Base Foundation Soil Interaction	0	33.1	Pass

Structure Rating (max from all components) =	88.6%

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

4.1) Recommendations

The tower and foundation have sufficient capacity to carry the existing, reserved, and proposed loading. In order for the results of this analysis to be considered valid the loading modification listed below must be completed.

Loading Changes:

1.) Removal of all antennas, feed lines, and mounts at 220 ft.

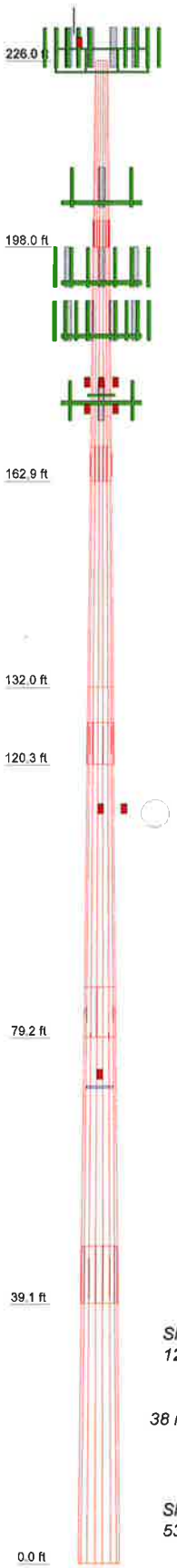
No structural modifications are required at this time, provided that the above listed changes are implemented.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5	6	7
Length (ft)	28.04	39.11	36.07	11.70	47.49	47.65	47.86
Number of Sides	18	18	18	18	18	18	18
Thickness (in)	0.1875	0.3750	0.4375	0.5755	0.5000	0.5625	0.5625
Socket Length (ft)	4.08	5.14		6.39	7.58	8.72	
Top Dia (in)	21.5000	27.2290	35.0602	44.1835	44.6496	53.7404	62.4570
Bot Dia (in)	28.6437	37.1080	44.1835	47.1416	56.6581	65.7875	74.5000
Grade	A572-65				52.435572ksi	A572-65	
Weight (K)	1.4	5.0	6.7	3.2	12.9	17.1	19.7

66.1



AXIAL
118 K

SHEAR
12 K

MOMENT
2118 kip

TORQUE 3 kip-ft
38 mph WIND - 0.7500 in ICE

AXIAL
89 K

SHEAR
53 K

MOMENT
8486 kip

TORQUE 8 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Flash Beacon Lighting	226	(2) 860 10025	193
Lightning Rod 5/8x4'	226	(2) 860 10025	193
LPA-80080/6CF w/ Mount Pipe	226	RRUS 11	193
LPA-80080/6CF w/ Mount Pipe	226	RRUS 11	193
(2) FD9R6004/2C-3L	226	RRUS 11	193
RRH2X60-1900	226	OPA-65R-LCUU-H6 w/ Mount Pipe	193
RRH2x60-700	226	OPA-65R-LCUU-H6 w/ Mount Pipe	193
RRH4X45-AWS4 B66	226	OPA-65R-LCUU-H6 w/ Mount Pipe	193
SBNHH-1D65B w/ Mount Pipe	226	RRUS A2 MODULE	193
SBNHH-1D65B w/ Mount Pipe	226	RRUS A2 MODULE	193
LPA-80080/6CF w/ Mount Pipe	226	RRUS A2 MODULE	193
LPA-80080/6CF w/ Mount Pipe	226	RRUS 12-B2	193
(2) FD9R6004/2C-3L	226	RRUS 12-B2	193
RRH2X60-1900	226	RRUS 12-B2	193
RRH2x60-700	226	DC6-48-60-18-8F	193
RRH4X45-AWS4 B66	226	Transition Ladder	193
SBNHH-1D65B w/ Mount Pipe	226	Platform Mount [LP 712-1]	193
SBNHH-1D65B w/ Mount Pipe	226	APXV18-206517S-C w/ Mount Pipe	185
LPA-80080/6CF w/ Mount Pipe	226	APXV18-206517S-C w/ Mount Pipe	185
LPA-80080/6CF w/ Mount Pipe	226	APXV18-206517S-C w/ Mount Pipe	185
(2) FD9R6004/2C-3L	226	978QNB120E-M w/ Mount Pipe	185
RRH2X60-1900	226	978QNB120E-M w/ Mount Pipe	185
RRH2x60-700	226	978QNB120E-M w/ Mount Pipe	185
RRH4X45-AWS4 B66	226	(2) FV90-16-02DP w/ Mount Pipe	185
SBNHH-1D65B w/ Mount Pipe	226	(2) FV90-16-02DP w/ Mount Pipe	185
SBNHH-1D65B w/ Mount Pipe	226	(2) FV90-16-02DP w/ Mount Pipe	185
(2) DB-T1-6Z-8AB-0Z	226	CS72993.07	185
Transition Ladder	226	CS72993.07	185
Side Arm Mount [SO 202-3]	226	CS72993.07	185
Miscellaneous [NA 507-1]	226	Transition Ladder	185
Platform Mount [LP 712-1]	226	Platform Mount [LP 712-1]	185
(2) CS72993.07	205	TME-1900MHz RRH (65MHz)	176
(2) CS72993.07	205	TME-1900MHz RRH (65MHz)	176
(2) CS72993.07	205	TME-1900MHz RRH (65MHz)	176
RR65-18-02DP w/ Mount Pipe	205	TME-800MHZ RRH	176
RR65-18-02DP w/ Mount Pipe	205	TME-800MHZ RRH	176
RR65-18-02DP w/ Mount Pipe	205	TME-800MHZ RRH	176
ATMPP1412D-1CWA	205	6' x 2" Mount Pipe	176
ATMPP1412D-1CWA	205	6' x 2" Mount Pipe	176
ATMPP1412D-1CWA	205	6' x 2" Mount Pipe	176
Transition Ladder	205	Side Arm Mount [SO 102-3]	176
Platform Mount [LP 712-1]	205	APXVSPP18-C-A20 w/ Mount Pipe	175
AM-X-CD-16-65-00T-RET w/ Mount Pipe	193	APXVSPP18-C-A20 w/ Mount Pipe	175
		APXVSPP18-C-A20 w/ Mount Pipe	175
AM-X-CD-16-65-00T-RET w/ Mount Pipe	193	800 EXTERNAL NOTCH FILTER	175
		800 EXTERNAL NOTCH FILTER	175
AM-X-CD-16-65-00T-RET w/ Mount Pipe	193	800 EXTERNAL NOTCH FILTER	175
		(3) ACU-A20-N	175
800 10121 w/ Mount Pipe	193	(3) ACU-A20-N	175
800 10121 w/ Mount Pipe	193	(3) ACU-A20-N	175
800 10121 w/ Mount Pipe	193	(2) 6' x 2" Mount Pipe	175
DTMABP7819VG12A	193	(2) 6' x 2" Mount Pipe	175
DTMABP7819VG12A	193	(2) 6' x 2" Mount Pipe	175
DTMABP7819VG12A	193	Platform Mount [LP 1201-1]	175
DTMABP7819VG12A	193	Honeywill Side-Light	113
DTMABP7819VG12A	193	Honeywill Side-Light	113
DTMABP7819VG12A	193	GPS_A	72
(2) 860 10025	193	Side Arm Mount [SO 701-1]	72

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	52.435572ksi	52 ksi	67 ksi

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 86.6%

Aero Solutions, LLC.
5555 Central Avenue, Suite 100
Boulder, CO.80301
Phone: (720)-304-6882
FAX: (720)-304-6883

Job: **BU#806358 NHV 109 943107**
Project: **Existing 226 ft. Monopole**
Client: Crown Castle | Drawn by: roplatka | App'd:
Code: TIA/EIA-222-F | Date: 09/01/15 | Scale: N
Path: | Dwg No.

Tower Input Data

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

4) Tower is located in New Haven County, Connecticut.
5) Basic wind speed of 85 mph.
6) Nominal ice thickness of 0.7500 in.
7) Ice thickness is considered to increase with height.
8) Ice density of 56 pcf.
9) A wind speed of 38 mph is used in combination with ice.
10) Temperature drop of 50 °F.
11) Deflections calculated using a wind speed of 50 mph.
12) A non-linear (P-delta) analysis was used.
13) Pressures are calculated at each section.
14) Stress ratio used in pole design is 1.333.
15) 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	226.00-197.96	28.04	4.08	18	21.5000	28.6437	0.1875	0.7500	A572-65 (65 ksi)
L2	197.96-162.93	39.11	5.14	18	27.2290	37.1080	0.3750	1.5000	A572-65 (65 ksi)
L3	162.93-132.00	36.07	0.00	18	35.0602	44.1835	0.4375	1.7500	A572-65 (65 ksi)
L4	132.00-120.30	11.70	6.39	18	44.1835	47.1416	0.5755	2.3019	52.435572ksi (52 ksi)
L5	120.30-79.21	47.49	7.58	18	44.6496	56.6581	0.5000	2.0000	A572-65 (65 ksi)
L6	79.21-39.14	47.65	8.72	18	53.7404	65.7875	0.5625	2.2500	A572-65 (65 ksi)
L7	39.14-0.00	47.86		18	62.4570	74.5000	0.5625	2.2500	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
L1	21.8317	12.6836	727.8616	7.5659	10.9220	66.6418	1456.6810	6.3430	3.4540	18.421
	29.0856	16.9350	1732.5124	10.1020	14.5510	119.0648	3467.3045	8.4691	4.7113	25.127
L2	28.6958	31.9630	2912.0863	9.5332	13.8323	210.5272	5828.0044	15.9845	4.1323	11.019
	37.6805	43.7215	7453.2354	13.0402	18.8509	395.3790	14916.2779	21.8649	5.8710	15.656
L3	36.9206	48.0779	7281.2065	12.2910	17.8106	408.8141	14571.9937	24.0435	5.4006	12.344
	44.8651	60.7467	14687.1069	15.5298	22.4452	654.3541	29393.5394	30.3791	7.0063	16.014
L4	44.8651	79.6525	19136.7800	15.4808	22.4452	852.6002	38298.7406	39.8338	6.7635	11.753
	47.8688	85.0557	23301.3527	16.5310	23.9479	973.0006	46633.3659	42.5359	7.2841	12.658
L5	46.9800	70.0653	17254.1420	15.6731	22.6820	760.6984	34530.9875	35.0393	6.9783	13.957
	57.5321	89.1229	35510.0754	19.9361	28.7823	1233.7463	71066.8759	44.5699	9.0918	18.184
L6	56.5161	94.9425	33920.4171	18.8782	27.3001	1242.4998	67885.4675	47.4803	8.4683	15.055
	66.8024	116.4511	62590.6069	23.1549	33.4201	1872.8460	125263.5722	58.2366	10.5886	18.824
L7	65.6494	110.5049	53483.9762	21.9726	31.7282	1685.6937	107038.3279	55.2630	10.0024	17.782
	75.6493	132.0062	91171.9378	26.2478	37.8460	2409.0244	182463.8419	66.0156	12.1220	21.55

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 226.00-197.96				1	1	1		
L2 197.96-162.93				1	1	1		
L3 162.93-132.00				1	1	1		
L4 132.00-120.30				1	1	0.982348		
L5 120.30-79.21				1	1	1		
L6 79.21-39.14				1	1	1		
L7 39.14-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight plf

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
**								
561(1-5/8")	B	No	Inside Pole	226.00 - 8.00	10	No Ice	0.00	1.35
						1/2" Ice	0.00	1.35
						1" Ice	0.00	1.35
						2" Ice	0.00	1.35
						4" Ice	0.00	1.35
HB158-1-08U8-S8J18(1-5/8)	B	No	Inside Pole	226.00 - 8.00	2	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
						2" Ice	0.00	1.30
						4" Ice	0.00	1.30
**								
**								
LDF7-50A(1-5/8")	B	No	Inside Pole	205.00 - 3.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
**								
LDF6-50A(1-1/4")	C	No	Inside Pole	193.00 - 8.00	9	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
LDF6-50A(1-1/4")	C	No	CaAa (Out Of Face)	185.00 - 8.00	3	No Ice	0.00	0.66
						1/2" Ice	0.00	1.91
						1" Ice	0.00	3.78
						2" Ice	0.00	9.33
						4" Ice	0.00	27.78
LDF6-50A(1-1/4")	C	No	CaAa (Out Of Face)	193.00 - 185.00	2	No Ice	0.00	0.66
						1/2" Ice	0.00	1.91
						1" Ice	0.00	3.78
						2" Ice	0.00	9.33
						4" Ice	0.00	27.78
LDF6-50A(1-1/4")	C	No	CaAa (Out Of Face)	193.00 - 185.00	1	No Ice	0.16	0.66
						1/2" Ice	0.25	1.91
						1" Ice	0.35	3.78
						2" Ice	0.55	9.33
						4" Ice	0.95	27.78
FB-L98-002-XXX(3/8)	C	No	Inside Pole	193.00 - 8.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
WR-VG82ST-BRDA(5/8")	C	No	Inside Pole	193.00 - 8.00	2	No Ice	0.00	0.31
						1/2" Ice	0.00	0.31
						1" Ice	0.00	0.31
						2" Ice	0.00	0.31
						4" Ice	0.00	0.31
2" Rigid Conduit	C	No	Inside Pole	193.00 - 8.00	1	No Ice	0.00	2.80
						1/2" Ice	0.00	2.80
						1" Ice	0.00	2.80
						2" Ice	0.00	2.80
						4" Ice	0.00	2.80
**								
LDF4-50A(1/2")	C	No	CaAa (Out Of Face)	185.00 - 8.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.84
						1" Ice	0.00	2.14
						2" Ice	0.00	6.58
						4" Ice	0.00	22.78
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	185.00 - 8.00	1	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
						2" Ice	0.60	10.55
						4" Ice	1.00	30.04
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	185.00 - 8.00	5	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
						2" Ice	0.00	10.54

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						4" Ice	0.00	30.04
LDF7-50A(1-5/8")	C	No	Inside Pole	185.00 - 8.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
**								
HB114-1-0813U4-M5J(1 1/4")	A	No	Inside Pole	175.00 - 8.00	3	No Ice	0.00	1.20
						1/2" Ice	0.00	1.20
						1" Ice	0.00	1.20
						2" Ice	0.00	1.20
						4" Ice	0.00	1.20
**								
LDF4-50A(1/2")	A	No	Inside Pole	72.00 - 8.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
**								
MS600	A	No	CaAa (Out Of Face)	134.00 - 124.00	1	No Ice	0.17	0.00
						1/2" Ice	0.17	0.00
						1" Ice	0.17	0.00
						2" Ice	0.17	0.00
						4" Ice	0.17	0.00
**								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	226.00-197.96	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.52
		C	0.000	0.000	0.000	0.000	0.00
L2	197.96-162.93	A	0.000	0.000	0.000	0.000	0.04
		B	0.000	0.000	0.000	0.000	0.91
		C	0.000	0.000	0.000	5.609	0.56
L3	162.93-132.00	A	0.000	0.000	0.000	0.333	0.11
		B	0.000	0.000	0.000	0.000	0.80
		C	0.000	0.000	0.000	6.125	0.66
L4	132.00-120.30	A	0.000	0.000	0.000	1.334	0.04
		B	0.000	0.000	0.000	0.000	0.30
		C	0.000	0.000	0.000	2.316	0.25
L5	120.30-79.21	A	0.000	0.000	0.000	0.000	0.15
		B	0.000	0.000	0.000	0.000	1.07
		C	0.000	0.000	0.000	8.137	0.88
L6	79.21-39.14	A	0.000	0.000	0.000	0.000	0.15
		B	0.000	0.000	0.000	0.000	1.04
		C	0.000	0.000	0.000	7.934	0.86
L7	39.14-0.00	A	0.000	0.000	0.000	0.000	0.12
		B	0.000	0.000	0.000	0.000	0.86
		C	0.000	0.000	0.000	6.166	0.67

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	226.00-197.96	A	0.937	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.52
		C		0.000	0.000	0.000	0.000	0.00
L2	197.96-162.93	A	0.919	0.000	0.000	0.000	0.000	0.04
		B		0.000	0.000	0.000	0.000	0.91

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	11.245	1.31
L3	162.93-132.00	A	0.897	0.000	0.000	0.000	0.333	0.11
		B		0.000	0.000	0.000	0.000	0.80
		C		0.000	0.000	0.000	11.811	1.59
L4	132.00-120.30	A	0.881	0.000	0.000	0.000	1.334	0.04
		B		0.000	0.000	0.000	0.000	0.30
		C		0.000	0.000	0.000	4.376	0.58
L5	120.30-79.21	A	0.856	0.000	0.000	0.000	0.000	0.15
		B		0.000	0.000	0.000	0.000	1.07
		C		0.000	0.000	0.000	15.376	2.05
L6	79.21-39.14	A	0.804	0.000	0.000	0.000	0.000	0.15
		B		0.000	0.000	0.000	0.000	1.04
		C		0.000	0.000	0.000	14.795	1.96
L7	39.14-0.00	A	0.750	0.000	0.000	0.000	0.000	0.12
		B		0.000	0.000	0.000	0.000	0.86
		C		0.000	0.000	0.000	11.175	1.46

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	226.00-197.96	0.0000	0.0000	0.0000	0.0000
L2	197.96-162.93	-0.2013	0.1162	-0.3626	0.2093
L3	162.93-132.00	-0.2421	0.1232	-0.4266	0.2311
L4	132.00-120.30	-0.2377	-0.0192	-0.4166	0.0954
L5	120.30-79.21	-0.2459	0.1419	-0.4334	0.2502
L6	79.21-39.14	-0.2475	0.1429	-0.4356	0.2515
L7	39.14-0.00	-0.1963	0.1134	-0.3409	0.1968

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
**									
Flash Beacon Lighting	C	From Leg	3.00 0.00 2.00	0.0000	226.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.70 3.10 3.50 4.30 5.90	2.70 3.10 3.50 4.30 5.90	0.05 0.07 0.09 0.13 0.21
Lightning Rod 5/8x4'	C	From Leg	4.00 0.00 6.00	0.0000	226.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.25 0.66 0.97 1.49 2.68	0.25 0.66 0.97 1.49 2.68	0.03 0.03 0.04 0.06 0.14
**									
LPA-80080/6CF w/ Mount Pipe	A	From Leg	6.00 0.00 2.00	30.0000	226.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.56 5.11 5.61 6.65 8.83	10.73 11.99 12.97 14.98 19.22	0.05 0.11 0.19 0.36 0.86
LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00 0.00	30.0000	226.00	No Ice 1/2"	4.56 5.11	10.73 11.99	0.05 0.11

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
			2.00			Ice	5.61	12.97	0.19
						1" Ice	6.65	14.98	0.36
						2" Ice	8.83	19.22	0.86
						4" Ice			
(2) FD9R6004/2C-3L	A	From Leg	4.00	30.0000	226.00	No Ice	0.37	0.08	0.00
			0.00			1/2"	0.45	0.14	0.01
			2.00			Ice	0.54	0.20	0.01
						1" Ice	0.75	0.34	0.02
						2" Ice	1.28	0.74	0.06
						4" Ice			
RRH2X60-1900	A	From Leg	4.00	30.0000	226.00	No Ice	2.19	1.41	0.04
			0.00			1/2"	2.39	1.59	0.06
			2.00			Ice	2.61	1.78	0.08
						1" Ice	3.07	2.18	0.12
						2" Ice	4.08	3.10	0.26
						4" Ice			
RRH2x60-700	A	From Leg	4.00	30.0000	226.00	No Ice	3.96	1.82	0.06
			0.00			1/2"	4.27	2.08	0.08
			2.00			Ice	4.60	2.36	0.11
						1" Ice	5.27	2.96	0.17
						2" Ice	6.72	4.25	0.35
						4" Ice			
RRH4X45-AWS4 B66	A	From Leg	4.00	30.0000	226.00	No Ice	3.10	1.76	0.06
			0.00			1/2"	3.36	1.98	0.08
			2.00			Ice	3.62	2.21	0.11
						1" Ice	4.17	2.69	0.17
						2" Ice	5.38	3.77	0.33
						4" Ice			
SBNHH-1D65B w/ Mount Pipe	A	From Leg	6.00	30.0000	226.00	No Ice	8.57	7.00	0.07
			0.00			1/2"	9.22	8.19	0.13
			2.00			Ice	9.84	9.08	0.21
						1" Ice	11.10	10.90	0.39
						2" Ice	13.75	14.93	0.90
						4" Ice			
SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00	30.0000	226.00	No Ice	8.57	7.00	0.07
			0.00			1/2"	9.22	8.19	0.13
			2.00			Ice	9.84	9.08	0.21
						1" Ice	11.10	10.90	0.39
						2" Ice	13.75	14.93	0.90
						4" Ice			
LPA-80080/6CF w/ Mount Pipe	B	From Leg	6.00	30.0000	226.00	No Ice	4.56	10.73	0.05
			0.00			1/2"	5.11	11.99	0.11
			2.00			Ice	5.61	12.97	0.19
						1" Ice	6.65	14.98	0.36
						2" Ice	8.83	19.22	0.86
						4" Ice			
LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.00	30.0000	226.00	No Ice	4.56	10.73	0.05
			0.00			1/2"	5.11	11.99	0.11
			2.00			Ice	5.61	12.97	0.19
						1" Ice	6.65	14.98	0.36
						2" Ice	8.83	19.22	0.86
						4" Ice			
(2) FD9R6004/2C-3L	B	From Leg	4.00	30.0000	226.00	No Ice	0.37	0.08	0.00
			0.00			1/2"	0.45	0.14	0.01
			2.00			Ice	0.54	0.20	0.01
						1" Ice	0.75	0.34	0.02
						2" Ice	1.28	0.74	0.06
						4" Ice			
RRH2X60-1900	B	From Leg	4.00	30.0000	226.00	No Ice	2.19	1.41	0.04
			0.00			1/2"	2.39	1.59	0.06
			2.00			Ice	2.61	1.78	0.08
						1" Ice	3.07	2.18	0.12
						2" Ice	4.08	3.10	0.26
						4" Ice			
RRH2x60-700	B	From Leg	4.00	30.0000	226.00	No Ice	3.96	1.82	0.06

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			1/2"	4.27	2.08	0.08
			2.00			Ice	4.60	2.36	0.11
						1" Ice	5.27	2.96	0.17
						2" Ice	6.72	4.25	0.35
						4" Ice			
RRH4X45-AWS4 B66	B	From Leg	4.00	30.0000	226.00	No Ice	3.10	1.76	0.06
			0.00			1/2"	3.36	1.98	0.08
			2.00			Ice	3.62	2.21	0.11
						1" Ice	4.17	2.69	0.17
						2" Ice	5.38	3.77	0.33
						4" Ice			
SBNHH-1D65B w/ Mount Pipe	B	From Leg	6.00	30.0000	226.00	No Ice	8.57	7.00	0.07
			0.00			1/2"	9.22	8.19	0.13
			2.00			Ice	9.84	9.08	0.21
						1" Ice	11.10	10.90	0.39
						2" Ice	13.75	14.93	0.90
						4" Ice			
SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00	30.0000	226.00	No Ice	8.57	7.00	0.07
			0.00			1/2"	9.22	8.19	0.13
			2.00			Ice	9.84	9.08	0.21
						1" Ice	11.10	10.90	0.39
						2" Ice	13.75	14.93	0.90
						4" Ice			
LPA-80080/6CF w/ Mount Pipe	C	From Leg	6.00	30.0000	226.00	No Ice	4.56	10.73	0.05
			0.00			1/2"	5.11	11.99	0.11
			2.00			Ice	5.61	12.97	0.19
						1" Ice	6.65	14.98	0.36
						2" Ice	8.83	19.22	0.86
						4" Ice			
LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00	30.0000	226.00	No Ice	4.56	10.73	0.05
			0.00			1/2"	5.11	11.99	0.11
			2.00			Ice	5.61	12.97	0.19
						1" Ice	6.65	14.98	0.36
						2" Ice	8.83	19.22	0.86
						4" Ice			
(2) FD9R6004/2C-3L	C	From Leg	4.00	30.0000	226.00	No Ice	0.37	0.08	0.00
			0.00			1/2"	0.45	0.14	0.01
			2.00			Ice	0.54	0.20	0.01
						1" Ice	0.75	0.34	0.02
						2" Ice	1.28	0.74	0.06
						4" Ice			
RRH2X60-1900	C	From Leg	4.00	30.0000	226.00	No Ice	2.19	1.41	0.04
			0.00			1/2"	2.39	1.59	0.06
			2.00			Ice	2.61	1.78	0.08
						1" Ice	3.07	2.18	0.12
						2" Ice	4.08	3.10	0.26
						4" Ice			
RRH2x60-700	C	From Leg	4.00	30.0000	226.00	No Ice	3.96	1.82	0.06
			0.00			1/2"	4.27	2.08	0.08
			2.00			Ice	4.60	2.36	0.11
						1" Ice	5.27	2.96	0.17
						2" Ice	6.72	4.25	0.35
						4" Ice			
RRH4X45-AWS4 B66	C	From Leg	4.00	30.0000	226.00	No Ice	3.10	1.76	0.06
			0.00			1/2"	3.36	1.98	0.08
			2.00			Ice	3.62	2.21	0.11
						1" Ice	4.17	2.69	0.17
						2" Ice	5.38	3.77	0.33
						4" Ice			
SBNHH-1D65B w/ Mount Pipe	C	From Leg	6.00	30.0000	226.00	No Ice	8.57	7.00	0.07
			0.00			1/2"	9.22	8.19	0.13
			2.00			Ice	9.84	9.08	0.21
						1" Ice	11.10	10.90	0.39
						2" Ice	13.75	14.93	0.90
						4" Ice			

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
SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	30.0000	226.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.57 9.22 9.84 11.10 13.75	7.00 8.19 9.08 10.90 14.93	0.07 0.13 0.21 0.39 0.90
(2) DB-T1-6Z-8AB-0Z	C	From Leg	4.00 0.00 2.00	30.0000	226.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.60 5.92 6.24 6.91 8.37	2.33 2.56 2.79 3.28 4.37	0.04 0.08 0.12 0.21 0.45
Transition Ladder	C	From Leg	2.00 0.00 -4.00	0.0000	226.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.00 8.00 10.00 14.00 22.00	6.00 8.00 10.00 14.00 22.00	0.16 0.24 0.32 0.48 0.80
Side Arm Mount [SO 202-3]	C	From Leg	4.00 0.00 2.00	0.0000	226.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.18 8.56 10.94 15.70 25.22	6.18 8.56 10.94 15.70 25.22	0.33 0.40 0.47 0.61 0.90
Miscellaneous [NA 507-1]	C	From Leg	0.00 0.00 4.00	0.0000	226.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.80 6.70 8.60 12.40 20.00	4.80 6.70 8.60 12.40 20.00	0.25 0.29 0.34 0.44 0.64
Platform Mount [LP 712-1]	C	None		0.0000	226.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
**									
**									
(2) CS72993.07	A	From Leg	4.00 0.00 2.00	60.0000	205.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.59 1.76 2.13 2.98	0.42 0.54 0.66 0.93 1.59	0.02 0.03 0.04 0.06 0.15
(2) CS72993.07	B	From Leg	4.00 0.00 2.00	60.0000	205.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.59 1.76 2.13 2.98	0.42 0.54 0.66 0.93 1.59	0.02 0.03 0.04 0.06 0.15
(2) CS72993.07	C	From Leg	4.00 0.00 2.00	60.0000	205.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.59 1.76 2.13 2.98	0.42 0.54 0.66 0.93 1.59	0.02 0.03 0.04 0.06 0.15
RR65-18-02DP w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	60.0000	205.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.59 5.09 5.58 6.59 8.73	3.32 4.09 4.78 6.23 9.31	0.03 0.07 0.12 0.22 0.56
RR65-18-02DP w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	60.0000	205.00	No Ice 1/2" Ice	4.59 5.09 5.58	3.32 4.09 4.78	0.03 0.07 0.12

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	6.59	6.23	0.22
						2" Ice	8.73	9.31	0.56
						4" Ice			
RR65-18-02DP w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	60.0000	205.00	No Ice	4.59	3.32	0.03
						1/2" Ice	5.09	4.09	0.07
						1" Ice	5.58	4.78	0.12
						2" Ice	6.59	6.23	0.22
						4" Ice	8.73	9.31	0.56
ATMPP1412D-1CWA	A	From Leg	4.00 0.00 2.00	60.0000	205.00	No Ice	1.17	0.42	0.01
						1/2" Ice	1.32	0.53	0.02
						1" Ice	1.48	0.65	0.03
						2" Ice	1.82	0.92	0.05
						4" Ice	2.61	1.57	0.13
ATMPP1412D-1CWA	B	From Leg	4.00 0.00 2.00	60.0000	205.00	No Ice	1.17	0.42	0.01
						1/2" Ice	1.32	0.53	0.02
						1" Ice	1.48	0.65	0.03
						2" Ice	1.82	0.92	0.05
						4" Ice	2.61	1.57	0.13
ATMPP1412D-1CWA	C	From Leg	4.00 0.00 2.00	60.0000	205.00	No Ice	1.17	0.42	0.01
						1/2" Ice	1.32	0.53	0.02
						1" Ice	1.48	0.65	0.03
						2" Ice	1.82	0.92	0.05
						4" Ice	2.61	1.57	0.13
Transition Ladder	C	From Leg	2.00 0.00 -4.00	0.0000	205.00	No Ice	6.00	6.00	0.16
						1/2" Ice	8.00	8.00	0.24
						1" Ice	10.00	10.00	0.32
						2" Ice	14.00	14.00	0.48
						4" Ice	22.00	22.00	0.80
Platform Mount [LP 712-1]	C	None		0.0000	205.00	No Ice	24.53	24.53	1.34
						1/2" Ice	29.94	29.94	1.65
						1" Ice	35.35	35.35	1.96
						2" Ice	46.17	46.17	2.58
						4" Ice	67.81	67.81	3.82
**									
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice	8.50	6.30	0.07
						1/2" Ice	9.15	7.48	0.14
						1" Ice	9.77	8.37	0.21
						2" Ice	11.03	10.18	0.38
						4" Ice	13.68	14.02	0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice	8.50	6.30	0.07
						1/2" Ice	9.15	7.48	0.14
						1" Ice	9.77	8.37	0.21
						2" Ice	11.03	10.18	0.38
						4" Ice	13.68	14.02	0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice	8.50	6.30	0.07
						1/2" Ice	9.15	7.48	0.14
						1" Ice	9.77	8.37	0.21
						2" Ice	11.03	10.18	0.38
						4" Ice	13.68	14.02	0.87
800 10121 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice	5.69	4.60	0.07
						1/2" Ice	6.18	5.35	0.11
						1" Ice	6.68	6.05	0.17
						2" Ice	7.70	7.53	0.30
						4" Ice	9.86	10.83	0.68
800 10121 w/ Mount Pipe	B	From Leg	4.00	23.0000	193.00	No Ice	5.69	4.60	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 2.00			1/2" Ice 1" Ice 2" Ice 4" Ice	6.18 6.68 7.70 9.86	5.35 6.05 7.53 10.83	0.11 0.17 0.30 0.68
800 10121 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.69 6.18 6.68 7.70 9.86	4.60 5.35 6.05 7.53 10.83	0.07 0.11 0.17 0.30 0.68
DTMABP7819VG12A	A	From Leg	4.00 0.00 0.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.14 1.28 1.44 1.77 2.54	0.39 0.49 0.59 0.83 1.41	0.02 0.03 0.04 0.06 0.14
DTMABP7819VG12A	A	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.14 1.28 1.44 1.77 2.54	0.39 0.49 0.59 0.83 1.41	0.02 0.03 0.04 0.06 0.14
DTMABP7819VG12A	B	From Leg	4.00 0.00 0.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.14 1.28 1.44 1.77 2.54	0.39 0.49 0.59 0.83 1.41	0.02 0.03 0.04 0.06 0.14
DTMABP7819VG12A	B	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.14 1.28 1.44 1.77 2.54	0.39 0.49 0.59 0.83 1.41	0.02 0.03 0.04 0.06 0.14
DTMABP7819VG12A	C	From Leg	4.00 0.00 0.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.14 1.28 1.44 1.77 2.54	0.39 0.49 0.59 0.83 1.41	0.02 0.03 0.04 0.06 0.14
DTMABP7819VG12A	C	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.14 1.28 1.44 1.77 2.54	0.39 0.49 0.59 0.83 1.41	0.02 0.03 0.04 0.06 0.14
(2) 860 10025	A	From Leg	4.00 0.00 0.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.16 0.22 0.29 0.47 0.92	0.13 0.19 0.26 0.43 0.87	0.00 0.00 0.01 0.01 0.05
(2) 860 10025	B	From Leg	4.00 0.00 0.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.16 0.22 0.29 0.47 0.92	0.13 0.19 0.26 0.43 0.87	0.00 0.00 0.01 0.01 0.05
(2) 860 10025	C	From Leg	4.00 0.00 0.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.16 0.22 0.29 0.47 0.92	0.13 0.19 0.26 0.43 0.87	0.00 0.00 0.01 0.01 0.05

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
RRUS 11	A	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.10 0.15 0.31
RRUS 11	B	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.10 0.15 0.31
RRUS 11	C	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.10 0.15 0.31
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.60 11.27 11.91 13.21 15.93	7.18 8.36 9.26 11.09 15.15	0.10 0.18 0.26 0.46 1.00
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.60 11.27 11.91 13.21 15.93	7.18 8.36 9.26 11.09 15.15	0.10 0.18 0.26 0.46 1.00
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.60 11.27 11.91 13.21 15.93	7.18 8.36 9.26 11.09 15.15	0.10 0.18 0.26 0.46 1.00
RRUS A2 MODULE	A	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.87 2.05 2.24 2.66 3.58	0.42 0.53 0.65 0.91 1.54	0.02 0.03 0.04 0.08 0.18
RRUS A2 MODULE	B	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.87 2.05 2.24 2.66 3.58	0.42 0.53 0.65 0.91 1.54	0.02 0.03 0.04 0.08 0.18
RRUS A2 MODULE	C	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.87 2.05 2.24 2.66 3.58	0.42 0.53 0.65 0.91 1.54	0.02 0.03 0.04 0.08 0.18
RRUS 12-B2	A	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.67 3.92 4.19 4.74 5.96	1.48 1.67 1.86 2.27 3.20	0.06 0.08 0.11 0.17 0.34
RRUS 12-B2	B	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.67 3.92 4.19 4.74 5.96	1.48 1.67 1.86 2.27 3.20	0.06 0.08 0.11 0.17 0.34

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
RRUS 12-B2	C	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.67 3.92 4.19 4.74 5.96	1.48 1.67 1.86 2.27 3.20	0.06 0.08 0.11 0.17 0.34
DC6-48-60-18-8F	B	From Leg	4.00 0.00 2.00	23.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.80 3.04 3.54 4.66	2.57 2.80 3.04 3.54 4.66	0.02 0.04 0.07 0.13 0.30
Transition Ladder	C	From Leg	2.00 0.00 -4.00	0.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.00 8.00 10.00 14.00 22.00	6.00 8.00 10.00 14.00 22.00	0.16 0.24 0.32 0.48 0.80
Platform Mount [LP 712-1]	C	None		0.0000	193.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
**									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.40 5.96 6.48 7.55 9.92	4.70 5.86 6.73 8.51 12.28	0.05 0.10 0.15 0.28 0.68
APXV18-206517S-C w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.40 5.96 6.48 7.55 9.92	4.70 5.86 6.73 8.51 12.28	0.05 0.10 0.15 0.28 0.68
APXV18-206517S-C w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.40 5.96 6.48 7.55 9.92	4.70 5.86 6.73 8.51 12.28	0.05 0.10 0.15 0.28 0.68
978QNB120E-M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.79 9.33 9.87 10.97 13.29	5.15 5.92 6.65 8.22 11.58	0.06 0.12 0.19 0.35 0.80
978QNB120E-M w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.79 9.33 9.87 10.97 13.29	5.15 5.92 6.65 8.22 11.58	0.06 0.12 0.19 0.35 0.80
978QNB120E-M w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.79 9.33 9.87 10.97 13.29	5.15 5.92 6.65 8.22 11.58	0.06 0.12 0.19 0.35 0.80
(2) FV90-16-02DP w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice	4.59 5.09 5.58	3.32 4.09 4.78	0.04 0.08 0.12

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	6.59	6.23	0.23
						2" Ice	8.73	9.31	0.56
						4" Ice			
(2) FV90-16-02DP w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.59 5.09 5.58 6.59 8.73	3.32 4.09 4.78 6.23 9.31	0.04 0.08 0.12 0.23 0.56
(2) FV90-16-02DP w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.59 5.09 5.58 6.59 8.73	3.32 4.09 4.78 6.23 9.31	0.04 0.08 0.12 0.23 0.56
CS72993.07	A	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.59 1.76 2.13 2.98	0.42 0.54 0.66 0.93 1.59	0.02 0.03 0.04 0.06 0.15
CS72993.07	B	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.59 1.76 2.13 2.98	0.42 0.54 0.66 0.93 1.59	0.02 0.03 0.04 0.06 0.15
CS72993.07	C	From Leg	4.00 0.00 2.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.59 1.76 2.13 2.98	0.42 0.54 0.66 0.93 1.59	0.02 0.03 0.04 0.06 0.15
Transition Ladder	C	From Leg	2.00 0.00 -4.00	0.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.00 8.00 10.00 14.00 22.00	6.00 8.00 10.00 14.00 22.00	0.16 0.24 0.32 0.48 0.80
Platform Mount [LP 712-1]	C	None		0.0000	185.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
**									
TME-1900MHz RRH (65MHz)	A	From Leg	1.00 0.00 -3.00	20.0000	176.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.70 2.94 3.18 3.70 4.85	2.77 3.01 3.26 3.78 4.93	0.06 0.08 0.11 0.18 0.35
TME-1900MHz RRH (65MHz)	B	From Leg	1.00 0.00 -3.00	10.0000	176.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.70 2.94 3.18 3.70 4.85	2.77 3.01 3.26 3.78 4.93	0.06 0.08 0.11 0.18 0.35
TME-1900MHz RRH (65MHz)	C	From Leg	1.00 0.00 -3.00	20.0000	176.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.70 2.94 3.18 3.70 4.85	2.77 3.01 3.26 3.78 4.93	0.06 0.08 0.11 0.18 0.35
TME-800MHZ RRH	A	From Leg	1.00	20.0000	176.00	No Ice	2.49	2.07	0.05

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			1/2"	2.71	2.27	0.07
			1.00			Ice	2.93	2.48	0.10
						1" Ice	3.41	2.93	0.16
						2" Ice	4.46	3.93	0.32
						4" Ice			
TME-800MHZ RRH	B	From Leg	1.00	10.0000	176.00	No Ice	2.49	2.07	0.05
			0.00			1/2"	2.71	2.27	0.07
			1.00			Ice	2.93	2.48	0.10
						1" Ice	3.41	2.93	0.16
						2" Ice	4.46	3.93	0.32
						4" Ice			
TME-800MHZ RRH	C	From Leg	1.00	20.0000	176.00	No Ice	2.49	2.07	0.05
			0.00			1/2"	2.71	2.27	0.07
			1.00			Ice	2.93	2.48	0.10
						1" Ice	3.41	2.93	0.16
						2" Ice	4.46	3.93	0.32
						4" Ice			
6' x 2" Mount Pipe	A	From Leg	1.00	0.0000	176.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice	4.70	4.70	0.23
						4" Ice			
6' x 2" Mount Pipe	B	From Leg	1.00	0.0000	176.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice	4.70	4.70	0.23
						4" Ice			
6' x 2" Mount Pipe	C	From Leg	1.00	0.0000	176.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice	4.70	4.70	0.23
						4" Ice			
Side Arm Mount [SO 102-3]	C	None		0.0000	176.00	No Ice	3.00	3.00	0.08
						1/2"	3.48	3.48	0.11
						Ice	3.96	3.96	0.14
						1" Ice	4.92	4.92	0.20
						2" Ice	6.84	6.84	0.32
						4" Ice			
**									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00	20.0000	175.00	No Ice	8.50	6.95	0.08
			0.00			1/2"	9.15	8.13	0.15
			0.00			Ice	9.77	9.02	0.23
						1" Ice	11.03	10.84	0.41
						2" Ice	13.68	14.85	0.91
						4" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00	10.0000	175.00	No Ice	8.50	6.95	0.08
			0.00			1/2"	9.15	8.13	0.15
			0.00			Ice	9.77	9.02	0.23
						1" Ice	11.03	10.84	0.41
						2" Ice	13.68	14.85	0.91
						4" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00	20.0000	175.00	No Ice	8.50	6.95	0.08
			0.00			1/2"	9.15	8.13	0.15
			0.00			Ice	9.77	9.02	0.23
						1" Ice	11.03	10.84	0.41
						2" Ice	13.68	14.85	0.91
						4" Ice			
800 EXTERNAL NOTCH FILTER	A	From Leg	4.00	20.0000	175.00	No Ice	0.77	0.37	0.01
			0.00			1/2"	0.89	0.46	0.02
			0.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11

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			
800 EXTERNAL NOTCH FILTER	B	From Leg	4.00 0.00 0.00	10.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
800 EXTERNAL NOTCH FILTER	C	From Leg	4.00 0.00 0.00	20.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
(3) ACU-A20-N	A	From Leg	4.00 0.00 0.00	20.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.08 0.12 0.17 0.30 0.67	0.14 0.19 0.25 0.40 0.80	0.00 0.00 0.00 0.01 0.04
(3) ACU-A20-N	B	From Leg	4.00 0.00 0.00	10.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.08 0.12 0.17 0.30 0.67	0.14 0.19 0.25 0.40 0.80	0.00 0.00 0.00 0.01 0.04
(3) ACU-A20-N	C	From Leg	4.00 0.00 0.00	20.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.08 0.12 0.17 0.30 0.67	0.14 0.19 0.25 0.40 0.80	0.00 0.00 0.00 0.01 0.04
(2) 6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23
(2) 6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23
(2) 6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.02 0.03 0.05 0.09 0.23
Platform Mount [LP 1201-1]	C	None		0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	23.10 26.80 30.50 37.90 52.70	23.10 26.80 30.50 37.90 52.70	2.10 2.50 2.90 3.70 5.30
Honeywill Side-Light	A	From Leg	2.00 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.28 0.36 0.46 0.69 1.27	0.28 0.36 0.46 0.69 1.27	0.00 0.01 0.01 0.03 0.08
Honeywill Side-Light	B	From Leg	2.00 0.00 0.00	0.0000	113.00	No Ice 1/2" Ice	0.28 0.36 0.46	0.28 0.36 0.46	0.00 0.01 0.01

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	0.69	0.69	0.03
						2" Ice	1.27	1.27	0.08
						4" Ice			
**									
GPS_A	A	From Leg	2.00 0.00 1.00	0.0000	72.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.30 0.37 0.46 0.65 1.15	0.30 0.37 0.46 0.65 1.15	0.00 0.00 0.01 0.02 0.08
Side Arm Mount [SO 701-1]	A	From Leg	1.00 0.00 0.00	0.0000	72.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.85 1.14 1.43 2.01 3.17	1.67 2.34 3.01 4.35 7.03	0.07 0.08 0.09 0.12 0.18
**									

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

Comb. No.	Description
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	226 - 197.961	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-11.78	5.45	-3.15
			Max. Mx	11	-5.12	279.52	-1.44
			Max. My	8	-5.19	2.63	-268.91
			Max. Vy	11	-14.34	279.52	-1.44
			Max. Vx	8	13.98	2.63	-268.91
			Max. Torque	13			6.44
L2	197.961 - 162.932	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-33.46	8.22	-5.09
			Max. Mx	11	-17.28	1118.50	-2.21
			Max. My	8	-17.37	3.82	-1094.71
			Max. Vy	11	-33.79	1118.50	-2.21
			Max. Vx	8	33.37	3.82	-1094.71
			Max. Torque	13			8.26
L3	162.932 - 132	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-45.57	10.47	-6.40
			Max. Mx	11	-27.11	2414.80	-2.62
			Max. My	8	-27.17	4.44	-2375.82
			Max. Vy	11	-38.05	2414.80	-2.62
			Max. Vx	8	37.63	4.44	-2375.82
			Max. Torque	13			8.33
L4	132 - 120.305	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-47.69	10.83	-6.61
			Max. Mx	11	-28.90	2618.32	-2.67
			Max. My	8	-28.96	4.53	-2577.10
			Max. Vy	11	-38.73	2618.32	-2.67
			Max. Vx	8	38.31	4.53	-2577.10
			Max. Torque	13			8.33
L5	120.305 - 79.2108	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-65.80	13.74	-8.30
			Max. Mx	11	-44.07	4266.57	-3.08
			Max. My	8	-44.11	5.21	-4208.49
			Max. Vy	11	-43.68	4266.57	-3.08
			Max. Vx	8	43.26	5.21	-4208.49
			Max. Torque	13			8.38
L6	79.2108 - 39.1405	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-87.76	16.77	-9.71
			Max. Mx	11	-62.89	6061.28	-3.26
			Max. My	8	-62.91	5.88	-5985.89
			Max. Vy	11	-48.27	6061.28	-3.26
			Max. Vx	8	47.83	5.88	-5985.89
			Max. Torque	13			8.42
L7	39.1405 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-117.68	19.93	-11.54
			Max. Mx	11	-89.16	8485.81	-3.66
			Max. My	8	-89.16	6.58	-8389.37
			Max. Vy	11	-52.82	8485.81	-3.66
			Max. Vx	8	52.40	6.58	-8389.37
			Max. Torque	13			8.46

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	24	117.68	12.36	-0.00
	Max. H_x	11	89.19	52.78	-0.00
	Max. H_z	2	89.19	0.00	52.35
	Max. M_x	2	8381.98	0.00	52.35
	Max. M_z	5	8472.60	-52.78	-0.00
	Max. Torsion	13	8.46	26.39	45.34
	Min. Vert	1	89.19	0.00	-0.00
	Min. H_x	5	89.19	-52.78	-0.00
	Min. H_z	8	89.19	0.00	-52.35
	Min. M_x	8	-8389.37	0.00	-52.35
	Min. M_z	11	-8485.81	52.78	-0.00
	Min. Torsion	7	-8.42	-26.39	-45.34

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	89.19	-0.00	0.00	3.61	6.46	-0.00
Dead+Wind 0 deg - No Ice	89.19	-0.00	-52.35	-8381.98	6.58	-6.77
Dead+Wind 30 deg - No Ice	89.19	26.39	-45.34	-7258.41	-4233.18	-3.26
Dead+Wind 60 deg - No Ice	89.19	45.71	-26.18	-4188.98	-7336.70	1.11
Dead+Wind 90 deg - No Ice	89.19	52.78	0.00	3.66	-8472.60	5.16
Dead+Wind 120 deg - No Ice	89.19	45.71	26.18	4196.32	-7336.73	7.83
Dead+Wind 150 deg - No Ice	89.19	26.39	45.34	7265.78	-4233.21	8.42
Dead+Wind 180 deg - No Ice	89.19	-0.00	52.35	8389.37	6.58	6.77
Dead+Wind 210 deg - No Ice	89.19	-26.39	45.34	7265.81	4246.38	3.30
Dead+Wind 240 deg - No Ice	89.19	-45.71	26.18	4196.35	7349.92	-1.06
Dead+Wind 270 deg - No Ice	89.19	-52.78	0.00	3.66	8485.81	-5.16
Dead+Wind 300 deg - No Ice	89.19	-45.71	-26.18	-4189.01	7349.89	-7.87
Dead+Wind 330 deg - No Ice	89.19	-26.39	-45.34	-7258.44	4246.35	-8.46
Dead+Ice+Temp	117.68	-0.00	0.00	11.54	19.93	-0.00
Dead+Wind 0 deg+Ice+Temp	117.68	-0.00	-12.27	-2066.18	20.18	-2.22
Dead+Wind 30 deg+Ice+Temp	117.68	6.18	-10.63	-1787.80	-1028.62	-1.15
Dead+Wind 60 deg+Ice+Temp	117.68	10.71	-6.14	-1027.25	-1796.38	0.22
Dead+Wind 90 deg+Ice+Temp	117.68	12.36	0.00	11.67	-2077.41	1.54
Dead+Wind 120 deg+Ice+Temp	117.68	10.71	6.14	1050.60	-1796.39	2.44
Dead+Wind 150 deg+Ice+Temp	117.68	6.18	10.63	1811.15	-1028.62	2.69
Dead+Wind 180 deg+Ice+Temp	117.68	-0.00	12.27	2089.54	20.18	2.22
Dead+Wind 210 deg+Ice+Temp	117.68	-6.18	10.63	1811.16	1068.97	1.16
Dead+Wind 240 deg+Ice+Temp	117.68	-10.71	6.14	1050.60	1836.74	-0.22
Dead+Wind 270 deg+Ice+Temp	117.68	-12.36	0.00	11.67	2117.76	-1.54
Dead+Wind 300 deg+Ice+Temp	117.68	-10.71	-6.14	-1027.25	1836.74	-2.44
Dead+Wind 330 deg+Ice+Temp	117.68	-6.18	-10.63	-1787.80	1068.97	-2.69
Dead+Wind 0 deg - Service	89.19	-0.00	-18.12	-2902.73	6.66	-2.38
Dead+Wind 30 deg - Service	89.19	9.13	-15.69	-2513.35	-1462.87	-1.15
Dead+Wind 60 deg - Service	89.19	15.82	-9.06	-1449.50	-2538.64	0.39
Dead+Wind 90 deg - Service	89.19	18.26	0.00	3.72	-2932.38	1.82
Dead+Wind 120 deg - Service	89.19	15.82	9.06	1456.95	-2538.64	2.76
Dead+Wind 150 deg - Service	89.19	9.13	15.69	2520.80	-1462.88	2.97

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 - Service	89.19	-0.00	18.12	2910.19	6.66	2.38
Dead+Wind 210 deg - Service	89.19	-9.13	15.69	2520.81	1476.20	1.16
Dead+Wind 240 deg - Service	89.19	-15.82	9.06	1456.96	2551.97	-0.38
Dead+Wind 270 deg - Service	89.19	-18.26	0.00	3.72	2945.70	-1.82
Dead+Wind 300 deg - Service	89.19	-15.82	-9.06	-1449.51	2551.96	-2.76
Dead+Wind 330 deg - Service	89.19	-9.13	-15.69	-2513.35	1476.20	-2.97

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	-89.19	0.00	0.00	89.19	-0.00	0.000%
2	0.00	-89.19	-52.35	0.00	89.19	52.35	0.000%
3	26.39	-89.19	-45.34	-26.39	89.19	45.34	0.000%
4	45.71	-89.19	-26.18	-45.71	89.19	26.18	0.000%
5	52.78	-89.19	0.00	-52.78	89.19	-0.00	0.000%
6	45.71	-89.19	26.18	-45.71	89.19	-26.18	0.000%
7	26.39	-89.19	45.34	-26.39	89.19	-45.34	0.000%
8	0.00	-89.19	52.35	0.00	89.19	-52.35	0.000%
9	-26.39	-89.19	45.34	26.39	89.19	-45.34	0.000%
10	-45.71	-89.19	26.18	45.71	89.19	-26.18	0.000%
11	-52.78	-89.19	0.00	52.78	89.19	-0.00	0.000%
12	-45.71	-89.19	-26.18	45.71	89.19	26.18	0.000%
13	-26.39	-89.19	-45.34	26.39	89.19	45.34	0.000%
14	0.00	-117.68	0.00	0.00	117.68	-0.00	0.000%
15	0.00	-117.68	-12.27	0.00	117.68	12.27	0.000%
16	6.18	-117.68	-10.63	-6.18	117.68	10.63	0.000%
17	10.71	-117.68	-6.14	-10.71	117.68	6.14	0.000%
18	12.36	-117.68	0.00	-12.36	117.68	-0.00	0.000%
19	10.71	-117.68	6.14	-10.71	117.68	-6.14	0.000%
20	6.18	-117.68	10.63	-6.18	117.68	-10.63	0.000%
21	0.00	-117.68	12.27	0.00	117.68	-12.27	0.000%
22	-6.18	-117.68	10.63	6.18	117.68	-10.63	0.000%
23	-10.71	-117.68	6.14	10.71	117.68	-6.14	0.000%
24	-12.36	-117.68	0.00	12.36	117.68	-0.00	0.000%
25	-10.71	-117.68	-6.14	10.71	117.68	6.14	0.000%
26	-6.18	-117.68	-10.63	6.18	117.68	10.63	0.000%
27	0.00	-89.19	-18.12	0.00	89.19	18.12	0.000%
28	9.13	-89.19	-15.69	-9.13	89.19	15.69	0.000%
29	15.82	-89.19	-9.06	-15.82	89.19	9.06	0.000%
30	18.26	-89.19	0.00	-18.26	89.19	-0.00	0.000%
31	15.82	-89.19	9.06	-15.82	89.19	-9.06	0.000%
32	9.13	-89.19	15.69	-9.13	89.19	-15.69	0.000%
33	0.00	-89.19	18.12	0.00	89.19	-18.12	0.000%
34	-9.13	-89.19	15.69	9.13	89.19	-15.69	0.000%
35	-15.82	-89.19	9.06	15.82	89.19	-9.06	0.000%
36	-18.26	-89.19	0.00	18.26	89.19	-0.00	0.000%
37	-15.82	-89.19	-9.06	15.82	89.19	9.06	0.000%
38	-9.13	-89.19	-15.69	9.13	89.19	15.69	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	5	0.00000001	0.00025437
3	Yes	6	0.00000001	0.00013107
4	Yes	6	0.00000001	0.00013301
5	Yes	5	0.00000001	0.00020137
6	Yes	6	0.00000001	0.00014331
7	Yes	6	0.00000001	0.00012682
8	Yes	5	0.00000001	0.00025458
9	Yes	6	0.00000001	0.00013801
10	Yes	6	0.00000001	0.00013648
11	Yes	5	0.00000001	0.00020163
12	Yes	6	0.00000001	0.00012737
13	Yes	6	0.00000001	0.00014351
14	Yes	4	0.00000001	0.00013127
15	Yes	5	0.00000001	0.00058556
16	Yes	5	0.00000001	0.00075721
17	Yes	5	0.00000001	0.00076424
18	Yes	5	0.00000001	0.00058464
19	Yes	5	0.00000001	0.00080308
20	Yes	5	0.00000001	0.00076760
21	Yes	5	0.00000001	0.00059607
22	Yes	5	0.00000001	0.00081259
23	Yes	5	0.00000001	0.00080881
24	Yes	5	0.00000001	0.00060203
25	Yes	5	0.00000001	0.00078010
26	Yes	5	0.00000001	0.00081251
27	Yes	4	0.00000001	0.00098064
28	Yes	5	0.00000001	0.00022202
29	Yes	5	0.00000001	0.00022887
30	Yes	4	0.00000001	0.00079820
31	Yes	5	0.00000001	0.00026833
32	Yes	5	0.00000001	0.00021231
33	Yes	4	0.00000001	0.00098604
34	Yes	5	0.00000001	0.00024983
35	Yes	5	0.00000001	0.00024487
36	Yes	4	0.00000001	0.00080549
37	Yes	5	0.00000001	0.00021502
38	Yes	5	0.00000001	0.00026948

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	226 - 197.961	60.037	36	2.6946	0.0290
L2	202.042 - 162.932	47.109	36	2.4026	0.0135
L3	168.07 - 132	31.377	36	1.9665	0.0068
L4	132 - 120.305	18.448	36	1.4187	0.0034
L5	126.698 - 79.2108	16.910	36	1.3527	0.0031
L6	86.7941 - 39.1405	7.616	36	0.8397	0.0015
L7	47.8645 - 0	2.312	36	0.4368	0.0007

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
226.00	Flash Beacon Lighting	36	60.037	2.6946	0.0290	18377
205.00	(2) CS72993.07	36	48.645	2.4382	0.0149	4387
193.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	36	42.584	2.2937	0.0103	3945
185.00	APXV18-206517S-C w/ Mount	36	38.789	2.1953	0.0086	4049

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
	Pipe					
176.00	TME-1900MHz RRH (65MHz)	36	34.746	2.0783	0.0075	4173
175.00	APXVSPP18-C-A20 w/ Mount Pipe	36	34.311	2.0647	0.0074	4188
113.00	Honeywill Side-Light	36	13.275	1.1766	0.0025	4824
72.00	GPS_A	36	5.162	0.6741	0.0011	4898

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	226 - 197.961	172.105	11	7.6908	0.0841
L2	202.042 - 162.932	135.217	11	6.8850	0.0391
L3	168.07 - 132	90.172	11	5.6468	0.0194
L4	132 - 120.305	53.065	11	4.0791	0.0097
L5	126.698 - 79.2108	48.644	11	3.8897	0.0089
L6	86.7941 - 39.1405	21.925	11	2.4165	0.0043
L7	47.8645 - 0	6.659	11	1.2577	0.0019

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
226.00	Flash Beacon Lighting	11	172.105	7.6908	0.0841	6763
205.00	(2) CS72993.07	11	139.603	6.9844	0.0433	1611
193.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	11	122.280	6.5794	0.0296	1436
185.00	APXV18-206517S-C w/ Mount Pipe	11	111.415	6.3003	0.0247	1462
176.00	TME-1900MHz RRH (65MHz)	11	99.830	5.9666	0.0215	1494
175.00	APXVSPP18-C-A20 w/ Mount Pipe	11	98.584	5.9277	0.0212	1498
113.00	Honeywill Side-Light	11	38.196	3.3844	0.0071	1691
72.00	GPS_A	11	14.863	1.9406	0.0032	1707

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	226 - 197.961 (1)	TP28.6437x21.5x0.1875	28.04	0.00	0.0	39.000	16.3163	-5.12	636.33	0.008
L2	197.961 - 162.932 (2)	TP37.108x27.229x0.375	39.11	0.00	0.0	39.000	42.1767	-17.28	1644.89	0.011
L3	162.932 - 132 (3)	TP44.1835x35.0602x0.4375	36.07	0.00	0.0	39.000	60.7467	-27.11	2369.12	0.011
L4	132 - 120.305	TP47.1416x44.1835x0.575	11.70	0.00	0.0	31.461	82.1021	-28.90	2583.04	0.011

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 $\frac{P}{P_a}$
	(4)	5								
L5	120.305 - 79.2108 (5)	TP56.6581x44.6496x0.5	47.49	0.00	0.0	39.000	86.0796	-44.07	3357.10	0.013
L6	79.2108 - 39.1405 (6)	TP65.7875x53.7404x0.5625	47.65	0.00	0.0	39.000	110.9410	-61.35	4326.72	0.014
L7	39.1405 - 0 (7)	TP74.5x62.457x0.5625	47.86	0.00	0.0	39.000	114.4240	-70.21	4462.53	0.016

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	226 - 197.961 (1)	TP28.6437x21.5x0.1875	279.52	30.356	39.000	0.778	0.00	0.000	39.000	0.000
L2	197.961 - 162.932 (2)	TP37.108x27.229x0.375	1118.50	36.493	39.000	0.936	0.00	0.000	39.000	0.000
L3	162.932 - 132 (3)	TP44.1835x35.0602x0.4375	2414.80	44.284	39.000	1.135	0.00	0.000	39.000	0.000
L4	132 - 120.305 (4)	TP47.1416x44.1835x0.5755	2618.32	34.672	31.461	1.102	0.00	0.000	31.461	0.000
L5	120.305 - 79.2108 (5)	TP56.6581x44.6496x0.5	4266.57	44.499	39.000	1.141	0.00	0.000	39.000	0.000
L6	79.2108 - 39.1405 (6)	TP65.7875x53.7404x0.5625	5893.85	41.626	39.000	1.067	0.00	0.000	39.000	0.000
L7	39.1405 - 0 (7)	TP74.5x62.457x0.5625	6487.18	43.058	39.000	1.104	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	226 - 197.961 (1)	TP28.6437x21.5x0.1875	14.34	0.879	26.000	0.068	3.86	0.205	26.000	0.008
L2	197.961 - 162.932 (2)	TP37.108x27.229x0.375	33.79	0.801	26.000	0.062	5.29	0.084	26.000	0.003
L3	162.932 - 132 (3)	TP44.1835x35.0602x0.4375	38.05	0.626	26.000	0.048	5.32	0.047	26.000	0.002
L4	132 - 120.305 (4)	TP47.1416x44.1835x0.5755	38.73	0.472	20.974	0.045	5.31	0.034	20.974	0.002
L5	120.305 - 79.2108 (5)	TP56.6581x44.6496x0.5	43.68	0.507	26.000	0.039	5.32	0.027	26.000	0.001
L6	79.2108 - 39.1405 (6)	TP65.7875x53.7404x0.5625	48.09	0.433	26.000	0.033	5.10	0.018	26.000	0.001
L7	39.1405 - 0 (7)	TP74.5x62.457x0.5625	49.57	0.433	26.000	0.033	5.11	0.017	26.000	0.001

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	226 - 197.961 (1)	0.008	0.778	0.000	0.068	0.008	0.788 ✔	1.333	H1-3+VT ✔

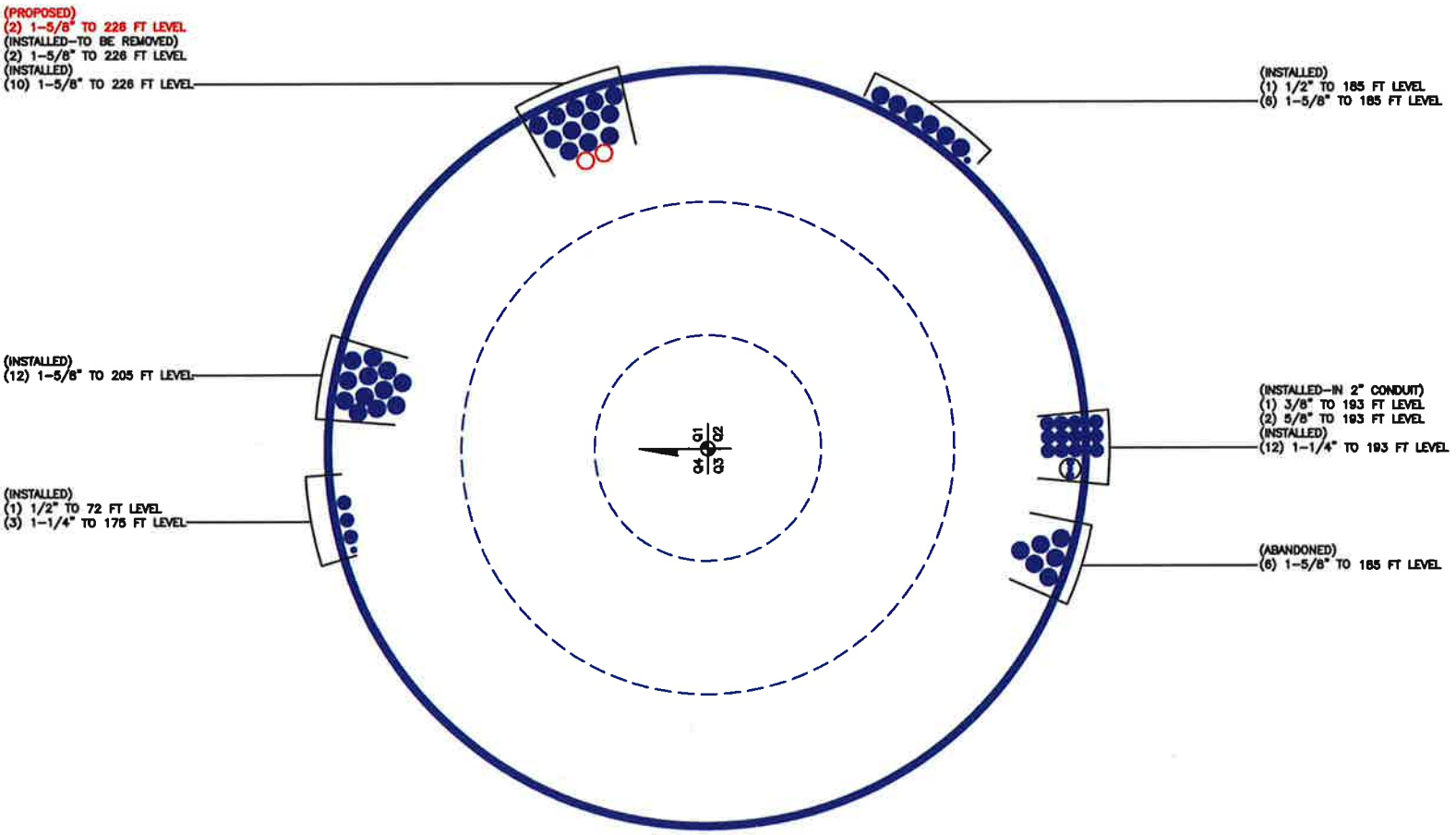
Section No.	Elevation ft	Ratio P / P_a	Ratio f_{bx} / F_{bx}	Ratio f_{by} / F_{by}	Ratio f_v / F_v	Ratio f_{vt} / F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L2	197.961 - 162.932 (2)	0.011	0.936	0.000	0.062	0.003	0.947 ✔	1.333	H1-3+VT ✔
L3	162.932 - 132 (3)	0.011	1.135	0.000	0.048	0.002	1.148 ✔	1.333	H1-3+VT ✔
L4	132 - 120.305 (4)	0.011	1.102	0.000	0.045	0.002	1.114 ✔	1.333	H1-3+VT ✔
L5	120.305 - 79.2108 (5)	0.013	1.141	0.000	0.039	0.001	1.155 ✔	1.333	H1-3+VT ✔
L6	79.2108 - 39.1405 (6)	0.014	1.067	0.000	0.033	0.001	1.082 ✔	1.333	H1-3+VT ✔
L7	39.1405 - 0 (7)	0.016	1.104	0.000	0.033	0.001	1.120 ✔	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	226 - 197.961	Pole	TP28.6437x21.5x0.1875	1	-5.12	848.23	59.1	Pass
L2	197.961 - 162.932	Pole	TP37.108x27.229x0.375	2	-17.28	2192.64	71.1	Pass
L3	162.932 - 132	Pole	TP44.1835x35.0602x0.4375	3	-27.11	3158.04	86.1	Pass
L4	132 - 120.305	Pole	TP47.1416x44.1835x0.5755	4	-28.90	3443.19	83.6	Pass
L5	120.305 - 79.2108	Pole	TP56.6581x44.6496x0.5	5	-44.07	4475.01	86.6	Pass
L6	79.2108 - 39.1405	Pole	TP65.7875x53.7404x0.5625	6	-61.35	5767.52	81.2	Pass
L7	39.1405 - 0	Pole	TP74.5x62.457x0.5625	7	-70.21	5948.55	84.0	Pass
							Summary	
						Pole (L5)	86.6	Pass
						RATING =	**86.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(PROPOSED)
(2) 1-5/8" TO 226 FT LEVEL
(INSTALLED-TO BE REMOVED)
(2) 1-5/8" TO 226 FT LEVEL
(INSTALLED)
(10) 1-5/8" TO 226 FT LEVEL
(INSTALLED)
(1) 1/2" TO 185 FT LEVEL
(6) 1-5/8" TO 185 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 205 FT LEVEL
(INSTALLED-IN 2" CONDUIT)
(1) 3/8" TO 193 FT LEVEL
(2) 5/8" TO 193 FT LEVEL
(INSTALLED)
(12) 1-1/4" TO 193 FT LEVEL
(INSTALLED)
(1) 1/2" TO 72 FT LEVEL
(3) 1-1/4" TO 175 FT LEVEL
(ABANDONED)
(6) 1-5/8" TO 185 FT LEVEL
Q1
Q2
Q4
Q3

APPENDIX C

ADDITIONAL CALCULATIONS

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

Section	Elevation (ft)	Moment (ft-kip)	Compression (kip)	Shear (kip)	Torsion (kip-ft)	Number of Sides	OD (in)	Thickness (in)	Yield Strength (ksi)	Flat Width (in)	Area (in²)	Moment of Inertia (in⁴)	Percent of Composite Moment of Inertia
Section	Elevation	Moment	Compression	Shear	Torsion	PoleSides	PoleOD	PoleT	PoleFy	PoleW	PoleA	PoleI	PolePer
1	126	17.4	3.4	9.2	0.8	18	21.5000	0.1875	65	3.46	12.7	727	100%
2	201.5416	279.5	5.1	14.7	7.9	18	27.6040	0.1875	65	4.54	16.3	1348	100%
3	187.3659	338.9	5.5	14.7	5.9	18	28.4457	0.5625	65	4.06	50.0	4984	100%
4	168.0702	1118.5	17.3	33.8	5.3	18	35.8102	0.3750	65	5.65	42.1	6682	100%
5	162.9322	1293.8	18.2	34.5	5.3	18	37.1080	0.8125	65	5.11	93.4	15541	100%
6	132	2414.8	27.1	38.0	5.2	18	44.1855	0.4375	65	7.02	60.7	14668	100%
7	126.6978	2618.4	28.9	38.7	5.3	18	45.5244	0.4375	65	7.26	62.6	16059	77%
8	126	2645.5	29.2	38.8	5.3	18	45.7011	0.9375	65	6.41	132.9	33644	87%
9	120.3046	2869.0	32.4	39.7	5.3	18	47.1456	0.9375	65	6.66	137.2	37000	100%
10	86.7942	4266.4	44.1	43.7	5.3	18	54.7404	0.5000	65	8.77	86.0	31956	100%
11	79.2108	4601.9	49.1	44.7	5.3	18	56.6581	1.0625	65	8.12	187.2	73060	100%
12	47.8645	6061.1	62.9	48.3	5.1	18	63.5820	0.5625	65	10.22	112.4	56386	100%
13	39.1405	6487.2	70.2	49.1	5.1	18	65.7675	1.1250	65	9.62	230.5	121732	100%
14	0	8485.8	89.2	52.8	5.2	18	74.5000	0.5625	65	12.14	131.9	91073	100%

Section	Angle Offset to Pole Flat	Distance to Extreme Fiber (in)	Section Modulus (in³)	Torsion Constant (in⁴)	Polygonal Compact Criterion	Allowable Bending Stress (ksi)	Allowable Bending Moment Strength (ft-kip)	Allowable Axial Stress (ksi)	Allowable Shear Stress (ksi)
Section	PoleCPoint	PoleC	PoleS	PoleJ	PoleWTT	PoleFb	PoleMall	PoleFa	PoleFv
1	TRUE	10.90	67	1441	149	52.0	388.9	52.0	34.7
2	TRUE	14.00	111	3068	197	52.0	479.0	52.0	34.7
3	TRUE	14.50	344	9895	56	52.0	1489.1	52.0	34.7
4	TRUE	18.15	368	13250	122	52.0	1594.7	52.0	34.7
5	TRUE	18.78	828	30864	51	52.0	3585.6	52.0	34.7
6	TRUE	22.40	655	29066	115	52.0	2837.0	52.0	34.7
7	0	22.75	706	31845	118	52.0	3056.5	52.0	34.7
8	TRUE	23.13	1455	66803	55	52.0	6301.3	52.0	34.7
9	TRUE	23.88	1551	73411	57	52.0	6717.4	52.0	34.7
10	TRUE	27.75	1151	63354	141	52.0	4988.2	52.0	34.7
11	TRUE	28.68	2547	145028	62	52.0	11034.5	52.0	34.7
12	TRUE	32.24	1749	111783	146	52.0	7577.3	52.0	34.7
13	TRUE	33.31	3654	243611	69	52.0	15830.2	52.0	34.7
14	TRUE	37.78	2411	180513	174	52.0	10445.1	52.0	34.7

Section	Unreinforced Pole - Rev. F: Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	Stress Ratio	Reinforced Pole: Moment in Pole when Reinforced	Bending Stress (ksi)	Axial Stress (ksi)	Shear Stress (ksi)	Torsion Shear Stress (ksi)	Rev. F: Reinforced Pole Stress Ratio
Section	PoleFbAct	PoleFaAct	PoleFvAct	PoleFvtAct	PoleSR	PoleMoment	RPoleFbAct	RPoleFaAct	RPoleFvAct	RPoleFvtAct	RPoleSR
1	3.1	0.27	0.00	0.07	0.065	17.4	3.1	0.27	0.00	0.01	0.065
2	30.3	0.31	0.00	0.21	0.590	279.5	30.3	0.31	0.00	0.02	0.590
3	11.8	0.12	0.00	0.07	0.230	338.9	11.8	0.12	0.00	0.01	0.230
4	36.5	0.41	0.00	0.09	0.709	1118.5	36.5	0.41	0.00	0.01	0.709
5	18.8	0.21	0.00	0.04	0.365	1293.8	18.8	0.21	0.00	0.00	0.365
6	44.5	0.45	0.00	0.05	0.860	2414.8	44.5	0.45	0.00	0.00	0.860
7	44.5	0.46	0.00	0.05	0.866	2006.5	34.1	0.46	0.00	0.00	0.665
8	21.8	0.22	0.00	0.02	0.424	2307.2	19.0	0.22	0.00	0.00	0.370
9	22.2	0.24	0.00	0.02	0.432	2869.0	22.2	0.24	0.00	0.00	0.432
10	44.5	0.51	0.00	0.03	0.865	4266.4	44.5	0.51	0.00	0.00	0.865
11	21.7	0.26	0.00	0.01	0.422	4601.9	21.7	0.26	0.00	0.00	0.422
12	41.6	0.36	0.00	0.02	0.811	6061.1	41.6	0.56	0.00	0.00	0.811
13	21.3	0.30	0.00	0.01	0.416	6487.2	21.3	0.30	0.00	0.00	0.416
14	42.2	0.68	0.00	0.01	0.826	8485.8	42.2	0.64	0.00	0.00	0.826
					0.866						0.865

Section	Reinforcement 1: Qty	Model	Position (F-Flat, C-Corner)	Gap Between Pole and Back of Reinf. (in)	Tension only or Tension & Comp.	Total Moment of Inertia (in⁴)	Axial Force (kip)	Stress Ratio
Section	Rein1Qty	Rein1Model	Rein1Pos	Rein1Gap	Rein1TC	Rein1ITotal	Rein1P	Rein1SR
1								
2								
3								
4								
5								
6								
7	3	MS-600	F	0	T&C	4859	209.3	0.836
8	3	MS-600	F	0	T&C	4935	115.3	0.461
9								
10								
11								
12								
13								
14								
								0.836

Section	Composite: Centroid Offset (in)	Area (in²)	Moment of Inertia (in⁴)	Controlling Stress Ratio	Thickness (in)	Weight Multiplier	Derated Yield Stress (ksi)	% Error in Derated Yield Stress
Section	CompYBar	CompA	CompI	CompSR	EPoleT	EPoleWM	EDPoleFy	EDPoleSRCheck
1	0.000	12.7	727	0.065	0.1875	1.00	65.0	26.4%
2	0.000	16.3	1348	0.590	0.1875	1.00	65.0	0.5%
3	0.000	50.0	4984	0.230	0.5625	1.00	65.0	0.5%
4	0.000	42.1	6682	0.709	0.3750	1.20	65.0	0.4%
5	0.000	93.4	15541	0.365	0.8125	1.00	65.0	0.4%
6	0.000	60.7	14668	0.860	0.4375	1.00	65.0	0.2%
7	0.000	80.8	20917	0.836	0.5750	0.98	52.0	2.7%
8	0.000	150.9	38579	0.461	1.0625	0.99	57.7	1.5%
9	0.000	137.2	37000	0.432	0.9375	1.00	65.0	0.2%
10	0.000	86.0	31956	0.865	0.5000	1.00	65.0	0.1%
11	0.000	187.2	73060	0.422	1.0625	1.00	65.0	0.2%
12	0.000	112.4	56386	0.811	0.5625	1.00	65.0	0.1%
13	0.000	230.5	121732	0.416	1.1250	1.00	65.0	0.1%
14	0.000	131.9	91073	0.826	0.5625	1.00	65.0	0.1%
				0.865				

Reinforcement Capacity

AeroSolutions LLC
Optimizing Your Tower Infrastructure
5500 Flatirons Parkway, Suite 100
Boulder, CO 80301
720-304-6882

Dimensions and Properties														Compression				Axial				
																		ASD-9			LRFD	
Model	Weight (lb/ft)	Area (in^2)	Moment of Inertia (in^3)	Moment of Inertia (in^4)	Centroid from Mating Edge (in)	Centroid from Bolt Hole Center (in)	Web Thickness (in)	Width (in)	Flange Width (in)	Flange Thickness (in)	Hole Diameter (in)	Yield Stress (ksi)	Ultimate Stress (ksi)	Slender. Ratio Coefficient	Unbraced Length (in)	Slender. Ratio Coefficient	Unbraced Length (in)	Allowable Axial (kip)	Allowable Axial w/ increase (kip)	Governing Axial	Design Axial Strength (kip)	Governing Axial
MS-600	20.4	6.00	0.50	18.00	0.5	0	1	6	0	0	1.21875	65	80	0.80	16.375	1.00	16.375	187.8	250.4	Compress.	283.1	Rupture

Rein1

Bottom	Top	Qty	Model	Position	T or T&C
126	132	3	MS-600	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Flats (Used for relative orientation only. Actual flat numbers may vary.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1						1						1					

Rein2

Bottom	Top	Qty	Model	Position	T or T&C
0				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Rein3

Bottom	Top	Qty	Model	Position	T or T&C
0				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

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

TIA Rev F

Site Data

BU#: *806358*
Site Name: *NHV 109 943107*
App #: *305854 R3*

Pole Manufacturer:	*Other*

Reactions		
Moment:	8485.8093	ft-kips
Axial:	89.162	kips
Shear:	52.8195	kips

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

Anchor Rod Data		
Qty:	28	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	84	in

Plate Data		
Diam:	90	in
Thick:	2.5	in
Grade:	60	ksi
Single-Rod B-eff:	8.44	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Both	
Groove Depth:	0.5	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.5	in
Width:	6	in
Height:	18	in
Thick:	1	in
Notch:	0.75	in
Grade:	50	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	74.5	in
Thick:	0.5625	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	

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	170.0 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	87.2% Pass	

Base Plate Results

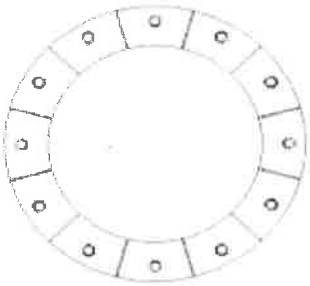
	Flexural Check	Stiffened
Base Plate Stress:	34.8 ksi	Service, ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	57.9% Pass	Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	53.4% Pass
Vertical Weld:	34.5% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	13.2% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	53.8% Pass
Plate Comp. (AISC Bracket):	54.9% Pass

Pole Results

Pole Punching Shear Check:	8.3% Pass



* 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

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Number	806358
Site Name	NHV 109 943107

Caisson Analysis

Pier Properties		
Moment	8486	kip-ft
Shear	53	kip
Pier Diameter	9.0	ft
Height Above Grade	1.00	ft
Depth Below Grade	36.00	ft
Donut Diameter		ft
Donut Depth		ft

Analysis Properties		
TIA Code	F	
Soil Safety Factor	2.00	
Water Table Depth	99.0	ft
Ignored Soil Depth	4.5	ft
Cohesion Based on	PLS Caisson	
Max Soil Capacity	100%	

Soil Properties

Layer	Top of Soil Layer (ft)	Layer Thickness (ft)	Bottom of Soil Layer (ft)	Soil Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Soil.Layer	*Soil.Top*	*Soil.Thick*	*Soil.Bottom*	*Soil.Weight*	*Soil.Cohesion*	*Soil.Phi*
1	0.00	4	4.00	100	0	28
2	4.00	5	9.00	110	0	35
3	9.00	5	14.00	120	0	40
4	14.00	5	19.00	125	0	40
5	19.00	20	39.00	130	0	40
6						
7						
8						
9						
10						

Critical Depths Below Grade		
Rotation Axis	26.55	ft
Zero Shear	9.03	ft

Results		
Soil Capacity	33.1%	OK
Max Pier Moment	8910	kip-ft

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

V1.0

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

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

Site Data

BU#: *806358*
Site Name: *NHV 109 943107*
App #: *305854 R3*

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

Pier Properties

Concrete:

Pier Diameter =	9.0	ft
Concrete Area =	9160.9	in^2

Reinforcement:

Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	8.11	ft
Vert. Cage Diameter =	97.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	40	
As Total=	62.4	in^2
A s/ Aconc, Rho:	0.0068	0.68%

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

(3)*(Sqrt(f'c)/Fy:	0.0032
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.68%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	18033.00	kips
at Mu=(ϕ=0.65)Mn=	14169.12	ft-kips
Max Tu, (φ=0.9) Tn =	3369.6	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	8910.44	ft-kips **(* Note)**
Max. Service Shaft P:	89.162	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	Shaft Factored Loads		
1.30	Mu:	11583.57	ft-kips
1.30	Pu:	115.9106	kips

Material Properties

Concrete Comp. strength, f'c =	4000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2005

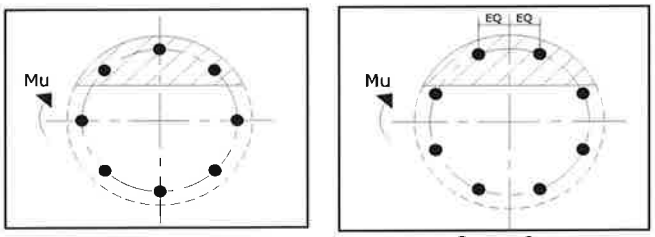
Seismic Properties

Seismic Design Category =	C
Seismic Risk =	**Moderate**

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

Results:

Governing Orientation Case: **1**



Case 1 Case 2

Dist. From Edge to Neutral Axis:	**16.42**	in
Extreme Steel Strain, εt:	**0.0158**	
	εt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	115.91	kips
Drilled Shaft Moment Capacity, φMn:	**13074.37**	ft-kips
Drilled Shaft Superimposed Mu:	**11583.57**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**88.6%**