Robinson+Cole

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

July 8, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
171 Town Hill Road, Plymouth, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 144-foot level on the existing 169-foot tower at 171 Town Hill Road in Plymouth, Connecticut (the "Property"). The tower is owned by Crown Castle. The Council approved Cellco's shared use of this tower in 2003. 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 144-foot level on the tower. Cellco also intends to install nine (9) remote radio heads ("RRHs") and two (2) HYBRIFLEX™ 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 David V. Merchant, Mayor of the Town of Plymouth and Terryville Country Fair, Inc., the owner of the Property.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. The replacement antennas and RRHs will be located at the 144-foot level on the 169-foot tower.

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

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

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table is included in Attachment 2.

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

6. The tower and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis Report included in Attachment 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
David V. Merchant, Plymouth Mayor
Terryville Country Fair, Inc.
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

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

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

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS, dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
Gain by Beam Tilt, average, dBi	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

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

Product Specifications

SBNHH-1D65B

Mechanical Specifications

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

Dimensions

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

Remote Electrical Tilt (RET) Information

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

Regulatory Compliance/Certifications

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

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

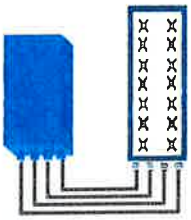
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

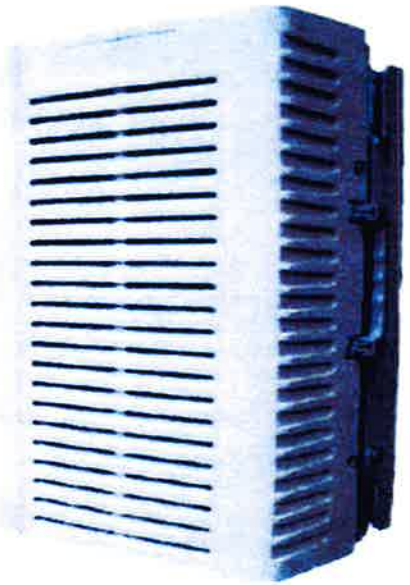
Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W 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 1900A HW version	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3
Features	AISG 2.0 for RET/TMA
	Internal Smart Bias-T
Power	-48VDC
CPRI Ports	2 CPRI Rate 3 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (top mounted)

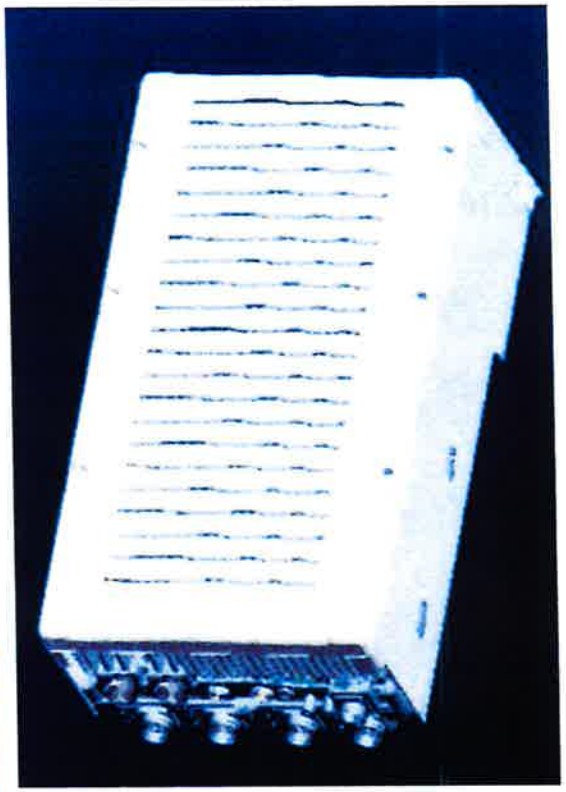


** Not a Verizon Wireless deployed product

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

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

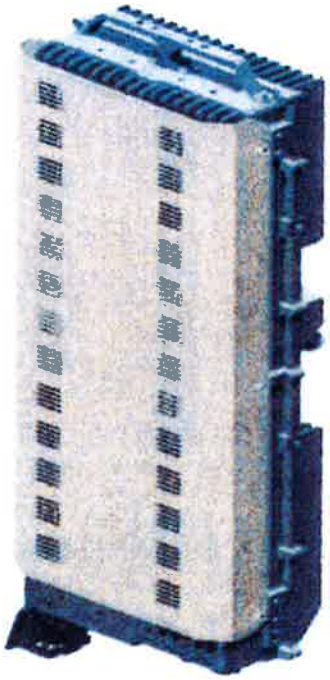


**- Includes solar shield but not mounting brackets (8 lbs.)

Alcatel·Lucent

ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2x60-AWS FOR BAND 4 APPLICATIONS

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



A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent RRH2x60-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

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

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

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

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

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

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

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

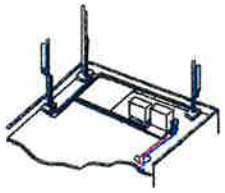
The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

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

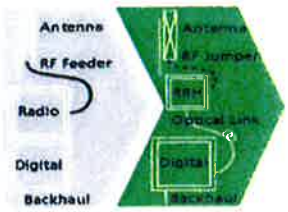
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

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

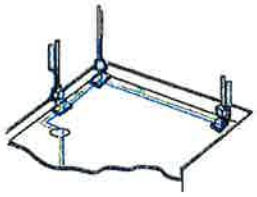
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control
- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

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

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

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

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

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

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

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

Alcatel·Lucent

AT THE SPEED OF IDEAS™

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

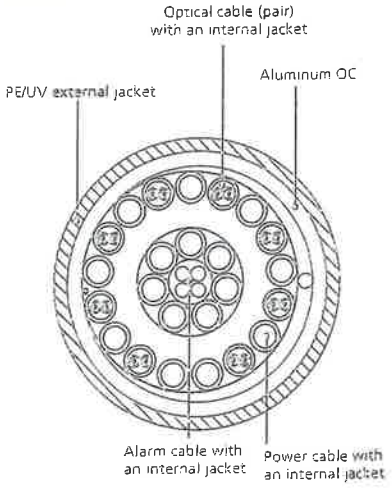


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Plymouth								
Tower Height: 169Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Sprint CDMA/LTE	4	693	155	0.0415	1900	1.0000	4.15%	
*Sprint CDMA/LTE	1	390	155	0.0058	850	0.5667	1.03%	
*Sprint CDMA/LTE	2	693	155	0.0207	2500	1.0000	2.07%	
*T-Mobile PCS	6	584	164	0.0131	1900	1.0000	1.31%	
*T-Mobile LTE	1	445	164	0.0131	700	0.4667	2.82%	
*Town	1	500	178	0.0057	147.32	0.2000	2.84%	
*Town	1	500	178	0.0057	224.78	0.2000	2.84%	
*Town	1	500	178	0.0057	50.39	0.2000	2.84%	
*Town	1	500	80	0.0281	425	0.2833	9.91%	
*Town	1	500	178	0.0057	442.3	0.2949	1.92%	
*Nextel	12	100	125	0.0276	851	0.5673	4.87%	
*AT&T UMTS	2	565	115	0.0307	880	0.5867	5.24%	
*AT&T UMTS	2	875	115	0.0476	1900	1.0000	4.76%	
*AT&T GSM	1	283	115	0.0077	880	0.5867	1.31%	
*AT&T GSM	4	525	115	0.0571	1900	1.0000	5.71%	
*AT&T LTE	1	1313	115	0.0357	734	0.4893	7.30%	
Verizon PCS	**11**	**414**	**144**	**0.0790**	**1970**	**1.0000**	**7.90%**	
Verizon Cellular	**9**	**389**	**144**	**0.0607**	**869**	**0.5793**	**10.48%**	
Verizon AWS	**1**	**3500**	**144**	**0.0607**	**2145**	**1.0000**	**6.07%**	
Verizon 700	**1**	**2100**	**144**	**0.0364**	**746**	**0.4973**	**7.32%**	
								92.68%
* Source: Siting Council								

ATTACHMENT 3

Date: **June 22, 2015**

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

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate** **Carrier Site Name:**	 Plymouth/RT 6
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:**	826768 PLYMOUTH/RT 6 338055 1078638 300807 Rev. 0
Engineering Firm Designation:	**Aero Solutions, LLC Project Number:**	003-15-0486
Site Data:	**171 Town Hill Road, Plymouth, Litchfield County, CT** **Latitude *41° 40' 6.197"*, Longitude *-73° 1' 11.842"*** **169 Foot - Monopole Tower**	

Dear Darcy Tarr,

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 798954, in accordance with application 300807, revision 0.

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

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

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

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

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

Structural analysis prepared by: Marcus Benson, E.I.

Respectfully submitted by:

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

6.23.2015

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 169 ft Monopole tower designed by PIROD MANUFACTURES INC. in September of 2000. The tower was originally designed for a wind speed of 80 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 28.1 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
144.0	144.0	3	alcatel lucent	RRH2X60-AWS	2	1-5/8"	
		3	alcatel lucent	RRH2X60-PCS			
		3	alcatel lucent	RRH2x60-700			
		6	commscope	SBNHH-1D65B w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
164.0	169.0	1	decibel	ASP-952	4 6	7/8" 1-5/8"	1
		1	rfs celwave	PD220			
		1	rfs celwave	PD455-6			
		1	sinclair	SRL-229			
	165.0	3	rfs celwave	ATMAA1412D-1A20			
	164.0	3	commscope	ATBT-BOTTOM-24V	6	1-5/8"	2
		3	commscope	LNX-6515DS-VTM w/ Mount Pipe			
		3	ems wireless	RR90-17-02DP w/ Mount Pipe			1
		1	tower mounts	Platform Mount [LP 403-1]			
155.0	155.0	3	alcatel lucent	1900MHz RRH	3	1-1/4"	1
		3	alcatel lucent	800MHZ RRH			
		3	alcatel lucent	TD-RRH8x20-25	1	1-1/4"	2
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			1
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			2
		1	tower mounts	Platform Mount [LP 303-1]			1
148.0	150.0	1	miscl	6' Generic Dipole Antena			1
	148.0	1	tower mounts	Side Arm Mount [SO 311-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
144.0	144.0	3	antel	BXA-171085-8BF-EDIN-0 w/ Mount Pipe			3
		3	antel	BXA-70063/6CF w/ Mount Pipe			
		6	antel	LPA-80080/6CF w/ Mount Pipe	12	1-5/8"	1
		6	rfs celwave	FD9R6004/2C-3L			3
		1	tower mounts	Platform Mount [LP 403-1]			1
121.0	125.0	1	rfs celwave	201-4	2	1/2"	1
	121.0	1	tower mounts	Side Arm Mount [SO 701-1]			
115.0	117.0	6	ericsson	RRUS 11	12 2 1	1-5/8" 3/4" 3/8"	1
		6	kathrein	AP14/17-880/1940/088D/ADT/XXP w/ Mount Pipe			
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		12	powerwave technologies	LGP2140X			
		1	raycap	DC6-48-60-18-8F			
	115.0	1	tower mounts	Platform Mount [LP 304-1]			
80.0	91.0	1	rfs celwave	PD455-6	1	7/8"	1
	80.0	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)
170	170	12	ems wireless	RR65-16-00XP		
160	160	12	ems wireless	RR-65-16-00XP		
150	150	12	ems wireless	RR-65-16-00XP		
140	140	12	ems wireless	RR-65-16-00XP		
130	130	12	ems wireless	RR-65-16-00XP		
120	120	12	ems wireless	RR-65-16-00XP		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, P.E., P.C.	3491991	CCISITES

Document	Remarks	Reference	Source
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PiRod, Inc.	3678682	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PiRod, Inc.	3491992	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	169 - 164.25	Pole	TP26x18x0.25	1	-0.200	1062.230	0.1	Pass
L2	164.25 - 129.125	Pole	TP34.063x21.5x0.313	2	-10.037	1663.291	31.0	Pass
L3	129.125 - 96.083	Pole	TP41.75x31.944x0.375	3	-18.908	2484.672	50.7	Pass
L4	96.083 - 63.25	Pole	TP49.063x39.78x0.375	4	-26.944	2928.414	66.8	Pass
L5	63.25 - 31.25	Pole	TP56.125x46.951x0.375	5	-36.054	3355.068	76.1	Pass
L6	31.25 - 0	Pole	TP62.938x53.846x0.375	6	-48.359	3684.958	86.3	Pass
							Summary	
						Pole (L6)	86.3	Pass
						Rating =	86.3	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	76.9	Pass
1	Base Plate	0	86.3	Pass
1	Base Foundation	0	80.6	Pass
1	Base Foundation Soil Interaction	0	50.1	Pass

Structure Rating (max from all components) =	86.3%

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

4.1) Recommendations

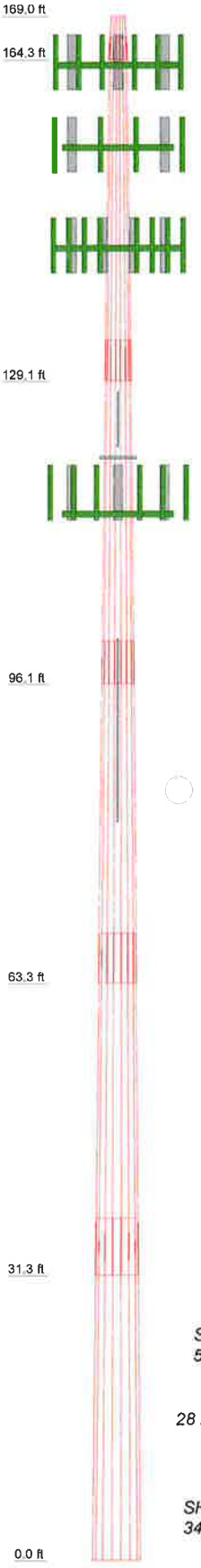
The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5	6
Length (ft)	4.750	37.500	37.500	37.500	37.500	37.500
Number of Sides	18	18	18	18	18	18
Thickness (in)	0.250	0.313	0.375	0.375	0.375	0.375
Socket Length (ft)	2.375	4.458	4.667	5.500	6.250	
Top Dia (in)	18.000	21.500	31.944	39.780	46.951	53.846
Bot Dia (in)	26.000	34.063	41.750	49.063	56.125	62.938
Grade	A572-65					
Weight (K)	0.3	3.5	5.5	6.7	7.8	8.8

32.6



AXIAL
80 K

SHEAR
5 K

MOMENT
697 kip-ft

TORQUE 1 kip-ft
28 mph WIND - 1.000 in ICE

AXIAL
48 K

SHEAR
34 K

MOMENT
4037 kip-ft

TORQUE 4 kip-ft
REACTIONS - 80 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
RR90-17-02DP w/ Mount Pipe	164	RRH2X60-AWS	144
ATMAA1412D-1A20	164	RRH2X60-PCS	144
PD455-6	164	(2) SBNHH-1D65B w/ Mount Pipe	144
SRL-229	164	(2) LPA-80080/6CF w/ Mount Pipe	144
ATBT-BOTTOM-24V	164	RRH2x60-700	144
LNX-6515DS-VTM w/ Mount Pipe	164	RRH2X60-AWS	144
RR90-17-02DP w/ Mount Pipe	164	RRH2X60-PCS	144
ATMAA1412D-1A20	164	(2) SBNHH-1D65B w/ Mount Pipe	144
PD220	164	(2) LPA-80080/6CF w/ Mount Pipe	144
ATBT-BOTTOM-24V	164	RRH2x60-700	144
LNX-6515DS-VTM w/ Mount Pipe	164	RRH2X60-AWS	144
RR90-17-02DP w/ Mount Pipe	164	RRH2X60-PCS	144
ATMAA1412D-1A20	164	(2) SBNHH-1D65B w/ Mount Pipe	144
ASP-952	164	DB-T1-6Z-8AB-0Z	144
ATBT-BOTTOM-24V	164	Platform Mount [LP 403-1]	144
LNX-6515DS-VTM w/ Mount Pipe	164	201-4	121
(2) 6' x 2" Mount Pipe	164	Side Arm Mount [SO 701-1]	121
(2) 6' x 2" Mount Pipe	164	(2) RRUS 11	115
(2) 6' x 2" Mount Pipe	164	(2) AP14/17-880/1940/088D/ADT/XXP w/ Mount Pipe	115
Platform Mount [LP 403-1]	164		
Lightning Rod 1/2"x4' on 15' Pole	162	AM-X-CD-16-65-00T-RET w/ Mount Pipe	115
1900MHz RRH	155	(2) LGP2140X	115
800MHZ RRH	155	(2) RRUS 11	115
APXVSPP18-C-A20 w/ Mount Pipe	155	(2) AP14/17-880/1940/088D/ADT/XXP w/ Mount Pipe	115
TD-RRH8x20-25	155		
APXVTM14-C-120 w/ Mount Pipe	155	AM-X-CD-16-65-00T-RET w/ Mount Pipe	115
1900MHz RRH	155		
800MHZ RRH	155	(4) LGP2140X	115
APXVSPP18-C-A20 w/ Mount Pipe	155	(2) RRUS 11	115
TD-RRH8x20-25	155	(2) AP14/17-880/1940/088D/ADT/XXP w/ Mount Pipe	115
APXVTM14-C-120 w/ Mount Pipe	155		
1900MHz RRH	155	AM-X-CD-16-65-00T-RET w/ Mount Pipe	115
800MHZ RRH	155		
APXVSPP18-C-A20 w/ Mount Pipe	155	(6) LGP2140X	115
TD-RRH8x20-25	155	DC6-48-60-18-8F	115
APXVTM14-C-120 w/ Mount Pipe	155	6' x 2" Mount Pipe	115
6' x 2" Mount Pipe	155	6' x 2" Mount Pipe	115
6' x 2" Mount Pipe	155	6' x 2" Mount Pipe	115
6' x 2" Mount Pipe	155	Platform Mount [LP 304-1]	115
Platform Mount [LP 303-1]	155	PD455-6	80
6' Generic Dipole Antena	148	6' x 2" Mount Pipe	80
Side Arm Mount [SO 311-1]	148	Side Arm Mount [SO 701-1]	80
(2) LPA-80080/6CF w/ Mount Pipe	144		
RRH2x60-700	144		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Litchfield County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 28 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 86.3%

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

Job:	***BU# 826768 PLYMOUTH-RT 6***		
Project:	***Existing 169 Ft. Monopole***		
Client: Crown Castle	Drawn by: MBenson		App'd:
Code: TIA/EIA-222-F	Date: 06/22/15		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 Litchfield County, Connecticut.
5) Basic wind speed of 80 mph.
6) Nominal ice thickness of 1.000 in.
7) Ice thickness is considered to increase with height.
8) Ice density of 56.000 pcf.
9) A wind speed of 28 mph is used in combination with ice.
10) Temperature drop of 50.000 °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	169.000-164.250	4.750	2.375	18	18.000	26.000	0.250	1.000	A572-65 (65 ksi)
L2	164.250-129.125	37.500	4.458	18	21.500	34.063	0.313	1.250	A572-65 (65 ksi)
L3	129.125-96.083	37.500	4.667	18	31.944	41.750	0.375	1.500	A572-65 (65 ksi)
L4	96.083-63.250	37.500	5.500	18	39.780	49.063	0.375	1.500	A572-65 (65 ksi)
L5	63.250-31.250	37.500	6.250	18	46.951	56.125	0.375	1.500	A572-65 (65 ksi)
L6	31.250-0.000	37.500		18	53.846	62.938	0.375	1.500	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	18.278	14.085	560.634	6.301	9.144	61.312	1122.006	7.044	2.728	10.912
	26.401	20.433	1711.654	9.141	13.208	129.592	3425.561	10.218	4.136	16.544
L2	22.640	21.015	1191.883	7.522	10.922	109.127	2385.334	10.510	3.234	10.349
	34.588	33.476	4817.433	11.981	17.304	278.404	9641.206	16.741	5.445	17.424
L3	33.621	37.575	4731.088	11.207	16.228	291.546	9468.401	18.791	4.962	13.232
	42.394	49.247	10650.982	14.688	21.209	502.192	21315.979	24.628	6.688	17.835
L4	41.566	46.901	9200.619	13.989	20.208	455.295	18413.344	23.455	6.341	16.91
	49.819	57.950	17355.138	17.284	24.924	696.329	34733.112	28.981	7.975	21.267
L5	49.042	55.437	15193.664	16.534	23.851	637.021	30407.320	27.724	7.603	20.276
	56.991	66.356	26056.151	19.791	28.511	913.882	52146.587	33.185	9.218	24.581
L6	56.215	63.644	22989.557	18.982	27.354	840.453	46009.365	31.828	8.817	23.512
	63.908	74.465	36822.895	22.210	31.972	1151.714	73694.242	37.240	10.417	27.779

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_r	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 169.000-164.250				1	1	1		
L2 164.250-129.125				1	1	1		
L3 129.125-96.083				1	1	1		
L4 96.083-63.250				1	1	1		
L5 63.250-31.250				1	1	1		
L6 31.250-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
LDF5-50A(7/8")	A	No	Inside Pole	164.000 - 0.000	4	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
LDF7-50A(1-5/8")	C	No	Inside Pole	164.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
AVA7-50(1-5/8)	C	No	Inside Pole	164.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
***								
HB114-1-08U4-M6F(1 1/4")	B	No	Inside Pole	155.000 - 0.000	3	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
HB114-21U3M12-XXXF(1-1/4")	B	No	Inside Pole	155.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
***								
LDF7-50A(1-5/8")	C	No	Inside Pole	144.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	144.000 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
***								
***								
LDF4-50A(1/2")	A	No	CaAa (Out Of Face)	121.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.002
						2" Ice	0.000	0.007
						4" Ice	0.000	0.023
***								
LDF7-50A(1-5/8")	A	No	CaAa (Out Of Face)	115.000 - 0.000	2	No Ice	0.198	0.001
						1/2" Ice	0.298	0.002
						1" Ice	0.398	0.004
						2" Ice	0.598	0.011
						4" Ice	0.998	0.030
LDF7-50A(1-5/8")	A	No	CaAa (Out Of Face)	115.000 - 0.000	10	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.011
						4" Ice	0.000	0.030
FB-L98-002-XXX(3/8)	A	No	CaAa (Out Of Face)	115.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.002
						2" Ice	0.000	0.006
						4" Ice	0.000	0.022
WR-VG86T(3/4)	A	No	CaAa (Out Of Face)	115.000 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.003
						2" Ice	0.000	0.007
						4" Ice	0.000	0.024
2" Flex Conduit	A	No	CaAa (Out Of Face)	115.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.010
						4" Ice	0.000	0.030
***								
***								
LDF5-50A(7/8")	A	No	CaAa (Out Of Face)	80.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.003
						2" Ice	0.000	0.008
						4" Ice	0.000	0.025
***								

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

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	169.000-164.250	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.000
L2	164.250-129.125	A	0.000	0.000	0.000	0.000	0.046
		B	0.000	0.000	0.000	0.000	0.132
		C	0.000	0.000	0.000	0.000	0.503
L3	129.125-96.083	A	0.000	0.000	0.000	7.491	0.265
		B	0.000	0.000	0.000	0.000	0.169
		C	0.000	0.000	0.000	0.000	0.712
L4	96.083-63.250	A	0.000	0.000	0.000	13.002	0.429
		B	0.000	0.000	0.000	0.000	0.168
		C	0.000	0.000	0.000	0.000	0.708
L5	63.250-31.250	A	0.000	0.000	0.000	12.672	0.423
		B	0.000	0.000	0.000	0.000	0.164
		C	0.000	0.000	0.000	0.000	0.690
L6	31.250-0.000	A	0.000	0.000	0.000	12.375	0.413
		B	0.000	0.000	0.000	0.000	0.160
		C	0.000	0.000	0.000	0.000	0.674

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	169.000-164.250	A	1.214	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.000
L2	164.250-129.125	A	1.195	0.000	0.000	0.000	0.000	0.046
		B		0.000	0.000	0.000	0.000	0.132
		C		0.000	0.000	0.000	0.000	0.503
L3	129.125-96.083	A	1.158	0.000	0.000	0.000	16.533	1.757
		B		0.000	0.000	0.000	0.000	0.169
		C		0.000	0.000	0.000	0.000	0.712
L4	96.083-63.250	A	1.111	0.000	0.000	0.000	28.212	2.893
		B		0.000	0.000	0.000	0.000	0.168
		C		0.000	0.000	0.000	0.000	0.708
L5	63.250-31.250	A	1.044	0.000	0.000	0.000	26.895	2.718
		B		0.000	0.000	0.000	0.000	0.164
		C		0.000	0.000	0.000	0.000	0.690
L6	31.250-0.000	A	1.000	0.000	0.000	0.000	25.425	2.431
		B		0.000	0.000	0.000	0.000	0.160
		C		0.000	0.000	0.000	0.000	0.674

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	169.000-164.250	0.000	0.000	0.000	0.000
L2	164.250-129.125	0.000	0.000	0.000	0.000
L3	129.125-96.083	0.000	-0.333	0.000	-0.643
L4	96.083-63.250	0.000	-0.537	0.000	-1.006
L5	63.250-31.250	0.000	-0.544	0.000	-1.020
L6	31.250-0.000	0.000	-0.550	0.000	-1.017

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lightning Rod 1/2"x4' on 15' Pole	A	From Leg	0.500 0.000 8.000	0.000	162.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.450 7.400 9.287 12.865 17.774	5.450 7.400 9.287 12.865 17.774	0.129 0.187 0.256 0.406 0.851
***									
RR90-17-02DP w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	60.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.593 5.088 5.578 6.588 8.731	3.319 4.089 4.784 6.225 9.308	0.034 0.072 0.115 0.224 0.557
ATMAA1412D-1A20	A	From Leg	4.000 0.000 1.000	60.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.167 1.314 1.469 1.806 2.584	0.467 0.575 0.691 0.951 1.573	0.013 0.021 0.030 0.056 0.137
PD455-6	A	From Leg	4.000 0.000 5.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.050 8.281 10.529 15.075 24.367	6.050 8.281 10.529 15.075 24.367	0.023 0.067 0.125 0.283 0.772
SRL-229	A	From Leg	4.000 0.000 5.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.450 8.633 10.833 15.283 24.014	6.450 8.633 10.833 15.283 24.014	0.025 0.071 0.131 0.293 0.785
ATBT-BOTTOM-24V	A	From Leg	4.000 0.000 0.000	60.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.121 0.172 0.232 0.377 0.771	0.075 0.119 0.172 0.303 0.668	0.003 0.004 0.006 0.013 0.045
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	60.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.683 12.404 13.135 14.601 17.875	9.842 11.366 12.914 15.267 20.139	0.083 0.173 0.273 0.506 1.151
RR90-17-02DP w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	60.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.593 5.088 5.578 6.588 8.731	3.319 4.089 4.784 6.225 9.308	0.034 0.072 0.115 0.224 0.557
ATMAA1412D-1A20	B	From Leg	4.000 0.000 1.000	60.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.167 1.314 1.469 1.806 2.584	0.467 0.575 0.691 0.951 1.573	0.013 0.021 0.030 0.056 0.137
PD220	B	From Leg	4.000 0.000 5.000	0.000	164.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.080 5.300 7.537 12.060 21.307	3.080 5.300 7.537 12.060 21.307	0.023 0.049 0.088 0.209 0.622
ATBT-BOTTOM-24V	B	From Leg	4.000 0.000 0.000	60.000	164.000	No Ice 1/2" Ice 1" Ice	0.121 0.172 0.232 0.377	0.075 0.119 0.172 0.303	0.003 0.004 0.006 0.013

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
							2" Ice	0.771	0.668	0.045
							4" Ice			
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.000	0.000	60.000	164.000	No Ice	11.683	9.842	0.083
			0.000				1/2" Ice	12.404	11.366	0.173
			0.000				1" Ice	13.135	12.914	0.273
							2" Ice	14.601	15.267	0.506
							4" Ice	17.875	20.139	1.151
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.000	0.000	60.000	164.000	No Ice	4.593	3.319	0.034
			0.000				1/2" Ice	5.088	4.089	0.072
			0.000				1" Ice	5.578	4.784	0.115
							2" Ice	6.588	6.225	0.224
							4" Ice	8.731	9.308	0.557
ATMAA1412D-1A20	C	From Leg	4.000	0.000	60.000	164.000	No Ice	1.167	0.467	0.013
			0.000				1/2" Ice	1.314	0.575	0.021
			1.000				1" Ice	1.469	0.691	0.030
							2" Ice	1.806	0.951	0.056
							4" Ice	2.584	1.573	0.137
ASP-952	C	From Leg	4.000	0.000	0.000	164.000	No Ice	3.025	3.025	0.017
			0.000				1/2" Ice	4.156	4.156	0.039
			5.000				1" Ice	5.304	5.304	0.069
							2" Ice	6.963	6.963	0.149
							4" Ice	9.760	9.760	0.403
ATBT-BOTTOM-24V	C	From Leg	4.000	0.000	60.000	164.000	No Ice	0.121	0.075	0.003
			0.000				1/2" Ice	0.172	0.119	0.004
			0.000				1" Ice	0.232	0.172	0.006
							2" Ice	0.377	0.303	0.013
							4" Ice	0.771	0.668	0.045
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.000	0.000	60.000	164.000	No Ice	11.683	9.842	0.083
			0.000				1/2" Ice	12.404	11.366	0.173
			0.000				1" Ice	13.135	12.914	0.273
							2" Ice	14.601	15.267	0.506
							4" Ice	17.875	20.139	1.151
(2) 6' x 2" Mount Pipe	A	From Leg	4.000	0.000	0.000	164.000	No Ice	1.425	1.425	0.022
			0.000				1/2" Ice	1.925	1.925	0.033
			1.000				1" Ice	2.294	2.294	0.048
							2" Ice	3.060	3.060	0.090
							4" Ice	4.702	4.702	0.231
(2) 6' x 2" Mount Pipe	B	From Leg	4.000	0.000	0.000	164.000	No Ice	1.425	1.425	0.022
			0.000				1/2" Ice	1.925	1.925	0.033
			1.000				1" Ice	2.294	2.294	0.048
							2" Ice	3.060	3.060	0.090
							4" Ice	4.702	4.702	0.231
(2) 6' x 2" Mount Pipe	C	From Leg	4.000	0.000	0.000	164.000	No Ice	1.425	1.425	0.022
			0.000				1/2" Ice	1.925	1.925	0.033
			1.000				1" Ice	2.294	2.294	0.048
							2" Ice	3.060	3.060	0.090
							4" Ice	4.702	4.702	0.231
Platform Mount [LP 403-1]	C	None			0.000	164.000	No Ice	18.850	18.850	1.500
							1/2" Ice	24.300	24.300	1.797
							1" Ice	29.750	29.750	2.093
							2" Ice	40.650	40.650	2.686
							4" Ice	62.450	62.450	3.872
***										
1900MHz RRH	A	From Leg	4.000	0.000	0.000	155.000	No Ice	2.907	3.801	0.044
			0.000				1/2"	3.145	4.065	0.075

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000				Ice	3.391	4.337	0.110
							1" Ice	3.909	4.908	0.192
							2" Ice	5.050	6.152	0.407
							4" Ice			
800MHZ RRH	A	From Leg	4.000	0.000	155.000	No Ice		2.490	2.068	0.053
			0.000				1/2"	2.706	2.271	0.074
			0.000				Ice	2.931	2.481	0.098
							1" Ice	3.407	2.928	0.157
							2" Ice	4.462	3.927	0.318
							4" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.000	0.000	155.000	No Ice		8.498	6.946	0.083
			0.000				1/2"	9.149	8.127	0.151
			0.000				Ice	9.767	9.021	0.227
							1" Ice	11.031	10.844	0.406
							2" Ice	13.679	14.851	0.909
							4" Ice			
TD-RRH8x20-25	A	From Leg	4.000	0.000	155.000	No Ice		4.720	1.703	0.070
			0.000				1/2"	5.014	1.920	0.097
			0.000				Ice	5.316	2.145	0.128
							1" Ice	5.948	2.622	0.201
							2" Ice	7.314	3.680	0.397
							4" Ice			
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.000	0.000	155.000	No Ice		7.134	4.959	0.077
			0.000				1/2"	7.662	5.754	0.132
			0.000				Ice	8.183	6.472	0.193
							1" Ice	9.256	8.010	0.339
							2" Ice	11.526	11.412	0.753
							4" Ice			
1900MHz RRH	B	From Leg	4.000	-30.000	155.000	No Ice		2.907	3.801	0.044
			0.000				1/2"	3.145	4.065	0.075
			0.000				Ice	3.391	4.337	0.110
							1" Ice	3.909	4.908	0.192
							2" Ice	5.050	6.152	0.407
							4" Ice			
800MHZ RRH	B	From Leg	4.000	-30.000	155.000	No Ice		2.490	2.068	0.053
			0.000				1/2"	2.706	2.271	0.074
			0.000				Ice	2.931	2.481	0.098
							1" Ice	3.407	2.928	0.157
							2" Ice	4.462	3.927	0.318
							4" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.000	-30.000	155.000	No Ice		8.498	6.946	0.083
			0.000				1/2"	9.149	8.127	0.151
			0.000				Ice	9.767	9.021	0.227
							1" Ice	11.031	10.844	0.406
							2" Ice	13.679	14.851	0.909
							4" Ice			
TD-RRH8x20-25	B	From Leg	4.000	-30.000	155.000	No Ice		4.720	1.703	0.070
			0.000				1/2"	5.014	1.920	0.097
			0.000				Ice	5.316	2.145	0.128
							1" Ice	5.948	2.622	0.201
							2" Ice	7.314	3.680	0.397
							4" Ice			
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.000	-30.000	155.000	No Ice		7.134	4.959	0.077
			0.000				1/2"	7.662	5.754	0.132
			0.000				Ice	8.183	6.472	0.193
							1" Ice	9.256	8.010	0.339
							2" Ice	11.526	11.412	0.753
							4" Ice			
1900MHz RRH	C	From Leg	4.000	-15.000	155.000	No Ice		2.907	3.801	0.044
			0.000				1/2"	3.145	4.065	0.075
			0.000				Ice	3.391	4.337	0.110
							1" Ice	3.909	4.908	0.192
							2" Ice	5.050	6.152	0.407
							4" Ice			
800MHZ RRH	C	From Leg	4.000	-15.000	155.000	No Ice		2.490	2.068	0.053

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
			0.000 0.000			1/2" Ice	2.706 2.931	2.271 2.481	0.074 0.098
						1" Ice	3.407	2.928	0.157
						2" Ice	4.462	3.927	0.318
						4" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	-15.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.946 8.127 9.021 10.844 14.851	0.083 0.151 0.227 0.406 0.909
TD-RRH8x20-25	C	From Leg	4.000 0.000 0.000	-15.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.720 5.014 5.316 5.948 7.314	1.703 1.920 2.145 2.622 3.680	0.070 0.097 0.128 0.201 0.397
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	-15.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.134 7.662 8.183 9.256 11.526	4.959 5.754 6.472 8.010 11.412	0.077 0.132 0.193 0.339 0.753
6' x 2" Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
6' x 2" Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
6' x 2" Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
Platform Mount [LP 303-1]	C	None		0.000	155.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.660 18.870 23.080 31.500 48.340	14.660 18.870 23.080 31.500 48.340	1.250 1.481 1.713 2.175 3.101
***									
6' Generic Dipole Antena	A	From Leg	3.000 0.000 2.000	0.000	148.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.950 3.381 3.819 4.719 6.606	2.000 2.691 3.225 4.114 5.979	0.025 0.039 0.059 0.114 0.296
Side Arm Mount [SO 311-1]	A	None		0.000	148.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.970 4.390 5.810 8.650 14.330	3.510 5.330 7.150 10.790 18.070	0.062 0.094 0.127 0.191 0.321
***									
(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	20.000	144.000	No Ice 1/2" Ice 1" Ice	4.564 5.105 5.612 6.651	10.728 11.990 12.968 14.980	0.046 0.113 0.187 0.363

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	8.834	19.217	0.857
						4" Ice			
RRH2x60-700	A	From Leg	4.000	20.000	144.000	No Ice	3.957	1.816	0.060
			0.000			1/2" Ice	4.272	2.075	0.083
			0.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2X60-AWS	A	From Leg	4.000	20.000	144.000	No Ice	2.190	1.429	0.044
			0.000			1/2" Ice	2.398	1.611	0.060
			0.000			1" Ice	2.613	1.801	0.079
						2" Ice	3.071	2.209	0.125
						4" Ice	4.090	3.126	0.259
RRH2X60-PCS	A	From Leg	4.000	20.000	144.000	No Ice	2.567	2.011	0.055
			0.000			1/2" Ice	2.791	2.218	0.075
			0.000			1" Ice	3.025	2.435	0.099
						2" Ice	3.517	2.894	0.155
						4" Ice	4.606	3.915	0.313
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.000	20.000	144.000	No Ice	8.568	7.004	0.066
			0.000			1/2" Ice	9.220	8.185	0.135
			0.000			1" Ice	9.838	9.081	0.211
						2" Ice	11.104	10.904	0.392
						4" Ice	13.754	14.926	0.897
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.000	40.000	144.000	No Ice	4.564	10.728	0.046
			0.000			1/2" Ice	5.105	11.990	0.113
			0.000			1" Ice	5.612	12.968	0.187
						2" Ice	6.651	14.980	0.363
						4" Ice	8.834	19.217	0.857
RRH2x60-700	B	From Leg	4.000	40.000	144.000	No Ice	3.957	1.816	0.060
			0.000			1/2" Ice	4.272	2.075	0.083
			0.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2X60-AWS	B	From Leg	4.000	40.000	144.000	No Ice	2.190	1.429	0.044
			0.000			1/2" Ice	2.398	1.611	0.060
			0.000			1" Ice	2.613	1.801	0.079
						2" Ice	3.071	2.209	0.125
						4" Ice	4.090	3.126	0.259
RRH2X60-PCS	B	From Leg	4.000	40.000	144.000	No Ice	2.567	2.011	0.055
			0.000			1/2" Ice	2.791	2.218	0.075
			0.000			1" Ice	3.025	2.435	0.099
						2" Ice	3.517	2.894	0.155
						4" Ice	4.606	3.915	0.313
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.000	40.000	144.000	No Ice	8.568	7.004	0.066
			0.000			1/2" Ice	9.220	8.185	0.135
			0.000			1" Ice	9.838	9.081	0.211
						2" Ice	11.104	10.904	0.392
						4" Ice	13.754	14.926	0.897
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.000	20.000	144.000	No Ice	4.564	10.728	0.046
			0.000			1/2" Ice	5.105	11.990	0.113
			0.000			1" Ice	5.612	12.968	0.187
						2" Ice	6.651	14.980	0.363
						4" Ice	8.834	19.217	0.857
RRH2x60-700	C	From Leg	4.000	20.000	144.000	No Ice	3.957	1.816	0.060
			0.000			1/2" Ice	4.272	2.075	0.083
			0.000			1" Ice	4.596	2.360	0.109

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
							1" Ice	5.271	2.957	0.173
							2" Ice	6.722	4.253	0.354
							4" Ice			
RRH2X60-AWS	C	From Leg	4.000	0.000	20.000	144.000	No Ice	2.190	1.429	0.044
			0.000				1/2" Ice	2.398	1.611	0.060
			0.000				1" Ice	2.613	1.801	0.079
							2" Ice	3.071	2.209	0.125
							4" Ice	4.090	3.126	0.259
RRH2X60-PCS	C	From Leg	4.000	0.000	20.000	144.000	No Ice	2.567	2.011	0.055
			0.000				1/2" Ice	2.791	2.218	0.075
			0.000				1" Ice	3.025	2.435	0.099
							2" Ice	3.517	2.894	0.155
							4" Ice	4.606	3.915	0.313
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.000	0.000	20.000	144.000	No Ice	8.568	7.004	0.066
			0.000				1/2" Ice	9.220	8.185	0.135
			0.000				1" Ice	9.838	9.081	0.211
							2" Ice	11.104	10.904	0.392
							4" Ice	13.754	14.926	0.897
DB-T1-6Z-8AB-0Z	C	From Leg	4.000	0.000	20.000	144.000	No Ice	5.600	2.333	0.044
			0.000				1/2" Ice	5.915	2.558	0.080
			0.000				1" Ice	6.240	2.791	0.120
							2" Ice	6.914	3.284	0.213
							4" Ice	8.365	4.373	0.455
Platform Mount [LP 403-1]	C	None			0.000	144.000	No Ice	18.850	18.850	1.500
							1/2" Ice	24.300	24.300	1.797
							1" Ice	29.750	29.750	2.093
							2" Ice	40.650	40.650	2.686
							4" Ice	62.450	62.450	3.872
***										
***										
201-4	A	From Leg	3.000	0.000	0.000	121.000	No Ice	1.125	1.125	0.004
			0.000				1/2" Ice	2.004	2.004	0.014
			4.000				1" Ice	2.898	2.898	0.029
							2" Ice	4.314	4.314	0.076
							4" Ice	6.532	6.532	0.245
Side Arm Mount [SO 701-1]	A	From Leg	1.500	0.000	0.000	121.000	No Ice	0.850	1.670	0.065
			0.000				1/2" Ice	1.140	2.340	0.079
			0.000				1" Ice	1.430	3.010	0.093
							2" Ice	2.010	4.350	0.121
							4" Ice	3.170	7.030	0.177
***										
(2) RRUS 11	A	From Leg	4.000	0.000	23.000	115.000	No Ice	3.249	1.373	0.051
			0.000				1/2" Ice	3.491	1.551	0.071
			2.000				1" Ice	3.741	1.738	0.095
							2" Ice	4.268	2.138	0.153
							4" Ice	5.426	3.042	0.313
(2) AP14/17-880/1940/088D/ADT/XXP w/ Mount Pipe	A	From Leg	4.000	0.000	23.000	115.000	No Ice	7.846	6.650	0.086
			0.000				1/2" Ice	8.452	7.873	0.150
			2.000				1" Ice	9.088	8.844	0.222
							2" Ice	10.376	10.726	0.393
							4" Ice	13.072	14.690	0.883
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.000	0.000	23.000	115.000	No Ice	8.498	6.304	0.074
			0.000				1/2" Ice	9.149	7.479	0.139
			2.000				1" Ice	9.767	8.368	0.212
							2" Ice	11.031	10.179	0.385
								13.679	14.024	0.874

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
							4" Ice			
(2) LGP2140X	A	From Leg	4.000	23.000		115.000	No Ice	1.260	0.378	0.014
			0.000				1/2" Ice	1.416	0.493	0.021
			2.000				1" Ice	1.581	0.617	0.030
							2" Ice	1.936	0.890	0.055
							4" Ice	2.750	1.541	0.135
(2) RRUS 11	B	From Leg	4.000	23.000		115.000	No Ice	3.249	1.373	0.051
			0.000				1/2" Ice	3.491	1.551	0.071
			2.000				1" Ice	3.741	1.738	0.095
							2" Ice	4.268	2.138	0.153
							4" Ice	5.426	3.042	0.313
(2) AP14/17-880/1940/088D/ADT/XXP w/ Mount Pipe	B	From Leg	4.000	23.000		115.000	No Ice	7.846	6.650	0.086
			0.000				1/2" Ice	8.452	7.873	0.150
			2.000				1" Ice	9.088	8.844	0.222
							2" Ice	10.376	10.726	0.393
							4" Ice	13.072	14.690	0.883
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.000	23.000		115.000	No Ice	8.498	6.304	0.074
			0.000				1/2" Ice	9.149	7.479	0.139
			2.000				1" Ice	9.767	8.368	0.212
							2" Ice	11.031	10.179	0.385
							4" Ice	13.679	14.024	0.874
(4) LGP2140X	B	From Leg	4.000	23.000		115.000	No Ice	1.260	0.378	0.014
			0.000				1/2" Ice	1.416	0.493	0.021
			2.000				1" Ice	1.581	0.617	0.030
							2" Ice	1.936	0.890	0.055
							4" Ice	2.750	1.541	0.135
(2) RRUS 11	C	From Leg	4.000	23.000		115.000	No Ice	3.249	1.373	0.051
			0.000				1/2" Ice	3.491	1.551	0.071
			2.000				1" Ice	3.741	1.738	0.095
							2" Ice	4.268	2.138	0.153
							4" Ice	5.426	3.042	0.313
(2) AP14/17-880/1940/088D/ADT/XXP w/ Mount Pipe	C	From Leg	4.000	23.000		115.000	No Ice	7.846	6.650	0.086
			0.000				1/2" Ice	8.452	7.873	0.150
			2.000				1" Ice	9.088	8.844	0.222
							2" Ice	10.376	10.726	0.393
							4" Ice	13.072	14.690	0.883
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.000	23.000		115.000	No Ice	8.498	6.304	0.074
			0.000				1/2" Ice	9.149	7.479	0.139
			2.000				1" Ice	9.767	8.368	0.212
							2" Ice	11.031	10.179	0.385
							4" Ice	13.679	14.024	0.874
(6) LGP2140X	C	From Leg	4.000	23.000		115.000	No Ice	1.260	0.378	0.014
			0.000				1/2" Ice	1.416	0.493	0.021
			2.000				1" Ice	1.581	0.617	0.030
							2" Ice	1.936	0.890	0.055
							4" Ice	2.750	1.541	0.135
DC6-48-60-18-8F	C	From Leg	4.000	23.000		115.000	No Ice	2.567	2.567	0.019
			0.000				1/2" Ice	2.798	2.798	0.041
			2.000				1" Ice	3.038	3.038	0.067
							2" Ice	3.543	3.543	0.129
							4" Ice	4.658	4.658	0.299
6' x 2" Mount Pipe	A	From Leg	4.000	0.000		115.000	No Ice	1.425	1.425	0.022
			0.000				1/2" Ice	1.925	1.925	0.033
			2.000				1" Ice	2.294	2.294	0.048
								3.060	3.060	0.090

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
						2" Ice	4.702	4.702	0.231
						4" Ice			
6' x 2" Mount Pipe	B	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice	1.425	1.425	0.022
						1/2" Ice	1.925	1.925	0.033
						1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
6' x 2" Mount Pipe	C	From Leg	4.000 0.000 2.000	0.000	115.000	No Ice	1.425	1.425	0.022
						1/2" Ice	1.925	1.925	0.033
						1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
Platform Mount [LP 304-1]	C	None		0.000	115.000	No Ice	17.460	17.460	1.349
						1/2" Ice	22.440	22.440	1.625
						1" Ice	27.420	27.420	1.900
						2" Ice	37.380	37.380	2.451
						4" Ice	57.300	57.300	3.554
***									
***									
PD455-6	A	From Leg	3.000 0.000 11.000	0.000	80.000	No Ice	6.050	6.050	0.023
						1/2" Ice	8.281	8.281	0.067
						1" Ice	10.529	10.529	0.125
						2" Ice	15.075	15.075	0.283
						4" Ice	24.367	24.367	0.772
6' x 2" Mount Pipe	A	From Leg	3.000 0.000 2.000	0.000	80.000	No Ice	1.425	1.425	0.022
						1/2" Ice	1.925	1.925	0.033
						1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
Side Arm Mount [SO 701-1]	A	From Leg	1.500 0.000 0.000	0.000	80.000	No Ice	0.850	1.670	0.065
						1/2" Ice	1.140	2.340	0.079
						1" Ice	1.430	3.010	0.093
						2" Ice	2.010	4.350	0.121
						4" Ice	3.170	7.030	0.177
***									

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

Comb. No.	Description
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	169 - 164.25	Pole	Max Tension	2	0.000	-0.000	-0.000
			Max. Compression	14	-0.336	0.000	0.000
			Max. Mx	11	-0.200	0.333	-0.000
			Max. My	2	-0.201	0.000	0.333
			Max. Vy	11	-0.180	0.333	-0.000
			Max. Vx	2	-0.179	0.000	0.333
			Max. Torque	6			-0.000
L2	164.25 - 129.125	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-21.219	0.526	1.612
			Max. Mx	11	-10.041	332.828	-2.538
			Max. My	2	-10.071	-2.653	330.636
			Max. Vy	11	-17.082	332.828	-2.538
			Max. Vx	2	-16.841	-2.653	330.636
			Max. Torque	5			2.401
L3	129.125 - 96.083	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-36.460	1.263	3.992
			Max. Mx	11	-18.908	1020.070	-5.930
			Max. My	2	-18.946	-6.145	1007.339
			Max. Vy	11	-24.920	1020.070	-5.930
			Max. Vx	2	-24.526	-6.145	1007.339
			Max. Torque	10			-2.489
L4	96.083 - 63.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-48.934	1.296	10.468
			Max. Mx	11	-26.944	1874.340	-8.212
			Max. My	2	-26.973	-9.499	1849.715
			Max. Vy	11	-28.386	1874.340	-8.212
			Max. Vx	2	-27.962	-9.499	1849.715
			Max. Torque	10			-3.553
L5	63.25 - 31.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-62.380	1.318	16.338
			Max. Mx	11	-36.055	2807.161	-10.652
			Max. My	2	-36.071	-12.757	2770.103

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	11	-31.204	2807.161	-10.652
			Max. Vx	2	-30.784	-12.757	2770.103
			Max. Torque	10			-3.671
L6	31.25 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-79.759	1.321	23.420
			Max. Mx	11	-48.359	4034.750	-13.402
			Max. My	2	-48.359	-16.594	3983.139
			Max. Vy	11	-34.226	4034.750	-13.402
			Max. Vx	2	-33.814	-16.594	3983.139
			Max. Torque	10			-3.817

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	79.759	0.000	0.000
	Max. H_x	11	48.374	34.204	-0.100
	Max. H_z	2	48.374	-0.100	33.792
	Max. M_x	2	3983.139	-0.100	33.792
	Max. M_z	5	4033.912	-34.204	0.100
	Max. Torsion	4	3.803	-29.672	16.983
	Min. Vert	1	48.374	0.000	0.000
	Min. H_x	5	48.374	-34.204	0.100
	Min. H_z	8	48.374	0.100	-33.792
	Min. M_x	8	-3975.913	0.100	-33.792
	Min. M_z	11	-4034.750	34.204	-0.100
	Min. Torsion	10	-3.817	29.672	-16.983

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	48.374	0.000	0.000	-3.512	0.398	0.000
Dead+Wind 0 deg - No Ice	48.374	0.100	-33.792	-3983.139	-16.595	-1.557
Dead+Wind 30 deg - No Ice	48.374	17.189	-29.315	-3458.440	-2031.503	-3.094
Dead+Wind 60 deg - No Ice	48.374	29.672	-16.983	-2008.047	-3501.916	-3.803
Dead+Wind 90 deg - No Ice	48.374	34.204	-0.100	-20.610	-4033.912	-3.499
Dead+Wind 120 deg - No Ice	48.374	29.571	16.809	1971.409	-3484.957	-2.260
Dead+Wind 150 deg - No Ice	48.374	17.015	29.215	3434.266	-2002.070	-0.413
Dead+Wind 180 deg - No Ice	48.374	-0.100	33.792	3975.913	17.419	1.550
Dead+Wind 210 deg - No Ice	48.374	-17.189	29.315	3451.224	2032.324	3.100
Dead+Wind 240 deg - No Ice	48.374	-29.672	16.983	2000.840	3502.743	3.817
Dead+Wind 270 deg - No Ice	48.374	-34.204	0.100	13.403	4034.750	3.507
Dead+Wind 300 deg - No Ice	48.374	-29.571	-16.809	-1978.627	3485.799	2.254
Dead+Wind 330 deg - No Ice	48.374	-17.015	-29.215	-3441.493	2002.906	0.399
Dead+Ice+Temp	79.759	-0.000	-0.000	-23.420	1.321	-0.000
Dead+Wind 0 deg+Ice+Temp	79.759	0.005	-5.411	-696.693	0.338	-0.206
Dead+Wind 30 deg+Ice+Temp	79.759	2.748	-4.688	-607.000	-341.388	-0.649
Dead+Wind 60 deg+Ice+Temp	79.759	4.755	-2.710	-360.964	-591.283	-0.918
Dead+Wind 90 deg+Ice+Temp	79.759	5.488	-0.005	-24.512	-682.389	-0.942
Dead+Wind 120 deg+Ice+Temp	79.759	4.750	2.701	312.206	-590.293	-0.713
Dead+Wind 150 deg+Ice+Temp	79.759	2.740	4.683	558.966	-339.674	-0.293
Dead+Wind 180	79.759	-0.005	5.411	649.649	2.317	0.205

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
deg+Ice+Temp						
Dead+Wind 210 deg+Ice+Temp	79.759	-2.748	4.688	559.956	344.043	0.648
Dead+Wind 240 deg+Ice+Temp	79.759	-4.755	2.710	313.920	593.938	0.918
Dead+Wind 270 deg+Ice+Temp	79.759	-5.488	0.005	-22.532	685.044	0.941
Dead+Wind 300 deg+Ice+Temp	79.759	-4.750	-2.701	-359.250	592.949	0.712
Dead+Wind 330 deg+Ice+Temp	79.759	-2.740	-4.683	-606.011	342.329	0.293
Dead+Wind 0 deg - Service	48.374	0.039	-13.200	-1559.258	-6.230	-0.611
Dead+Wind 30 deg - Service	48.374	6.714	-11.451	-1354.166	-793.887	-1.215
Dead+Wind 60 deg - Service	48.374	11.590	-6.634	-787.195	-1368.707	-1.494
Dead+Wind 90 deg - Service	48.374	13.361	-0.039	-10.270	-1576.669	-1.374
Dead+Wind 120 deg - Service	48.374	11.551	6.566	768.439	-1362.059	-0.886
Dead+Wind 150 deg - Service	48.374	6.646	11.412	1340.278	-782.370	-0.160
Dead+Wind 180 deg - Service	48.374	-0.039	13.200	1552.016	7.069	0.609
Dead+Wind 210 deg - Service	48.374	-6.714	11.451	1346.925	794.725	1.216
Dead+Wind 240 deg - Service	48.374	-11.590	6.634	779.956	1369.546	1.496
Dead+Wind 270 deg - Service	48.374	-13.361	0.039	3.030	1577.510	1.375
Dead+Wind 300 deg - Service	48.374	-11.551	-6.566	-775.681	1362.900	0.885
Dead+Wind 330 deg - Service	48.374	-6.646	-11.412	-1347.520	783.210	0.158

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-48.374	0.000	0.000	48.374	0.000	0.000%
2	0.100	-48.374	-33.792	-0.100	48.374	33.792	0.000%
3	17.189	-48.374	-29.315	-17.189	48.374	29.315	0.000%
4	29.672	-48.374	-16.983	-29.672	48.374	16.983	0.000%
5	34.204	-48.374	-0.100	-34.204	48.374	0.100	0.000%
6	29.571	-48.374	16.809	-29.571	48.374	-16.809	0.000%
7	17.015	-48.374	29.215	-17.015	48.374	-29.215	0.000%
8	-0.100	-48.374	33.792	0.100	48.374	-33.792	0.000%
9	-17.189	-48.374	29.315	17.189	48.374	-29.315	0.000%
10	-29.672	-48.374	16.983	29.672	48.374	-16.983	0.000%
11	-34.204	-48.374	0.100	34.204	48.374	-0.100	0.000%
12	-29.571	-48.374	-16.809	29.571	48.374	16.809	0.000%
13	-17.015	-48.374	-29.215	17.015	48.374	29.215	0.000%
14	0.000	-79.759	0.000	0.000	79.759	0.000	0.000%
15	0.005	-79.759	-5.411	-0.005	79.759	5.411	0.000%
16	2.748	-79.759	-4.688	-2.748	79.759	4.688	0.000%
17	4.755	-79.759	-2.710	-4.755	79.759	2.710	0.000%
18	5.488	-79.759	-0.005	-5.488	79.759	0.005	0.000%
19	4.750	-79.759	2.701	-4.750	79.759	-2.701	0.000%
20	2.740	-79.759	4.683	-2.740	79.759	-4.683	0.000%
21	-0.005	-79.759	5.411	0.005	79.759	-5.411	0.000%
22	-2.748	-79.759	4.688	2.748	79.759	-4.688	0.000%
23	-4.755	-79.759	2.710	4.755	79.759	-2.710	0.000%
24	-5.488	-79.759	0.005	5.488	79.759	-0.005	0.000%
25	-4.750	-79.759	-2.701	4.750	79.759	2.701	0.000%
26	-2.740	-79.759	-4.683	2.740	79.759	4.683	0.000%
27	0.039	-48.374	-13.200	-0.039	48.374	13.200	0.000%
28	6.714	-48.374	-11.451	-6.714	48.374	11.451	0.000%
29	11.590	-48.374	-6.634	-11.590	48.374	6.634	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
30	13.361	-48.374	-0.039	-13.361	48.374	0.039	0.000%
31	11.551	-48.374	6.566	-11.551	48.374	-6.566	0.000%
32	6.646	-48.374	11.412	-6.646	48.374	-11.412	0.000%
33	-0.039	-48.374	13.200	0.039	48.374	-13.200	0.000%
34	-6.714	-48.374	11.451	6.714	48.374	-11.451	0.000%
35	-11.590	-48.374	6.634	11.590	48.374	-6.634	0.000%
36	-13.361	-48.374	0.039	13.361	48.374	-0.039	0.000%
37	-11.551	-48.374	-6.566	11.551	48.374	6.566	0.000%
38	-6.646	-48.374	-11.412	6.646	48.374	11.412	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00054605
3	Yes	5	0.00000001	0.00051196
4	Yes	5	0.00000001	0.00056245
5	Yes	5	0.00000001	0.00005200
6	Yes	5	0.00000001	0.00050594
7	Yes	5	0.00000001	0.00051884
8	Yes	4	0.00000001	0.00084732
9	Yes	5	0.00000001	0.00055481
10	Yes	5	0.00000001	0.00050764
11	Yes	5	0.00000001	0.00004021
12	Yes	5	0.00000001	0.00053610
13	Yes	5	0.00000001	0.00051991
14	Yes	4	0.00000001	0.00007767
15	Yes	5	0.00000001	0.00017310
16	Yes	5	0.00000001	0.00018366
17	Yes	5	0.00000001	0.00018430
18	Yes	5	0.00000001	0.00017018
19	Yes	5	0.00000001	0.00017515
20	Yes	5	0.00000001	0.00017294
21	Yes	5	0.00000001	0.00016234
22	Yes	5	0.00000001	0.00017479
23	Yes	5	0.00000001	0.00017701
24	Yes	5	0.00000001	0.00017136
25	Yes	5	0.00000001	0.00018454
26	Yes	5	0.00000001	0.00018390
27	Yes	4	0.00000001	0.00017154
28	Yes	5	0.00000001	0.00004733
29	Yes	5	0.00000001	0.00005728
30	Yes	4	0.00000001	0.00029154
31	Yes	5	0.00000001	0.00004673
32	Yes	5	0.00000001	0.00004908
33	Yes	4	0.00000001	0.00018993
34	Yes	5	0.00000001	0.00005551
35	Yes	5	0.00000001	0.00004655
36	Yes	4	0.00000001	0.00026833
37	Yes	5	0.00000001	0.00005277
38	Yes	5	0.00000001	0.00004944

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	169 - 164.25	34.498	29	1.668	0.007
L2	166.625 -	33.669	29	1.668	0.007

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
	129.125				
L3	133.583 - 96.083	22.465	29	1.520	0.004
L4	100.75 - 63.25	12.969	29	1.207	0.002
L5	68.75 - 31.25	6.069	29	0.823	0.001
L6	37.5 - 0	1.840	29	0.441	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.000	RR90-17-02DP w/ Mount Pipe	29	32.753	1.666	0.007	54906
162.000	Lightning Rod 1/2"x4' on 15' Pole	29	32.055	1.663	0.007	38551
155.000	1900MHz RRH	29	29.628	1.645	0.007	18745
148.000	6' Generic Dipole Antena	29	27.232	1.614	0.006	12371
144.000	(2) LPA-80080/6CF w/ Mount Pipe	29	25.883	1.592	0.005	10358
121.000	201-4	29	18.572	1.414	0.003	6203
115.000	(2) RRUS 11	29	16.820	1.357	0.003	5798
80.000	PD455-6	29	8.215	0.962	0.002	4998

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	169 - 164.25	88.095	4	4.262	0.019
L2	166.625 - 129.125	85.979	4	4.262	0.019
L3	133.583 - 96.083	57.384	4	3.885	0.010
L4	100.75 - 63.25	33.138	4	3.084	0.006
L5	68.75 - 31.25	15.512	4	2.104	0.004
L6	37.5 - 0	4.702	4	1.128	0.002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.000	RR90-17-02DP w/ Mount Pipe	4	83.641	4.257	0.019	22184
162.000	Lightning Rod 1/2"x4' on 15' Pole	4	81.862	4.250	0.019	15473
155.000	1900MHz RRH	4	75.668	4.203	0.017	7462
148.000	6' Generic Dipole Antena	4	69.553	4.124	0.015	4907
144.000	(2) LPA-80080/6CF w/ Mount Pipe	4	66.110	4.067	0.013	4102
121.000	201-4	4	47.445	3.613	0.007	2448
115.000	(2) RRUS 11	4	42.974	3.467	0.007	2286
80.000	PD455-6	4	20.994	2.459	0.004	1963

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	169 - 164.25 (1)	TP26x18x0.25	4.750	0.000	0.0	39.000	20.433	-0.200	796.872	0.000
L2	164.25 - 129.125 (2)	TP34.063x21.5x0.313	37.500	0.000	0.0	39.000	31.994	-10.037	1247.780	0.008
L3	129.125 - 96.083 (3)	TP41.75x31.944x0.375	37.500	0.000	0.0	39.000	47.794	-18.908	1863.970	0.010
L4	96.083 - 63.25 (4)	TP49.063x39.78x0.375	37.500	0.000	0.0	39.000	56.330	-26.944	2196.860	0.012
L5	63.25 - 31.25 (5)	TP56.125x46.951x0.375	37.500	0.000	0.0	39.000	64.536	-36.054	2516.930	0.014
L6	31.25 - 0 (6)	TP62.938x53.846x0.375	37.500	0.000	0.0	37.124	74.465	-48.359	2764.410	0.017

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	169 - 164.25 (1)	TP26x18x0.25	0.334	0.031	39.000	0.001	0.000	0.000	39.000	0.000
L2	164.25 - 129.125 (2)	TP34.063x21.5x0.313	334.481	15.790	39.000	0.405	0.000	0.000	39.000	0.000
L3	129.125 - 96.083 (3)	TP41.75x31.944x0.375	1022.125	25.938	39.000	0.665	0.000	0.000	39.000	0.000
L4	96.083 - 63.25 (4)	TP49.063x39.78x0.375	1876.492	34.233	39.000	0.878	0.000	0.000	39.000	0.000
L5	63.25 - 31.25 (5)	TP56.125x46.951x0.375	2809.242	39.005	39.000	1.000	0.000	0.000	39.000	0.000
L6	31.25 - 0 (6)	TP62.938x53.846x0.375	4036.792	42.060	37.124	1.133	0.000	0.000	37.124	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	169 - 164.25 (1)	TP26x18x0.25	0.180	0.009	26.000	0.001	0.000	0.000	26.000	0.000
L2	164.25 - 129.125 (2)	TP34.063x21.5x0.313	17.127	0.535	26.000	0.041	2.110	0.049	26.000	0.002
L3	129.125 - 96.083 (3)	TP41.75x31.944x0.375	24.913	0.521	26.000	0.040	2.116	0.026	26.000	0.001
L4	96.083 - 63.25 (4)	TP49.063x39.78x0.375	28.372	0.504	26.000	0.039	3.539	0.032	26.000	0.001
L5	63.25 - 31.25 (5)	TP56.125x46.951x0.375	31.189	0.483	26.000	0.037	3.657	0.025	26.000	0.001
L6	31.25 - 0 (6)	TP62.938x53.846x0.375	34.210	0.459	26.000	0.035	3.803	0.019	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

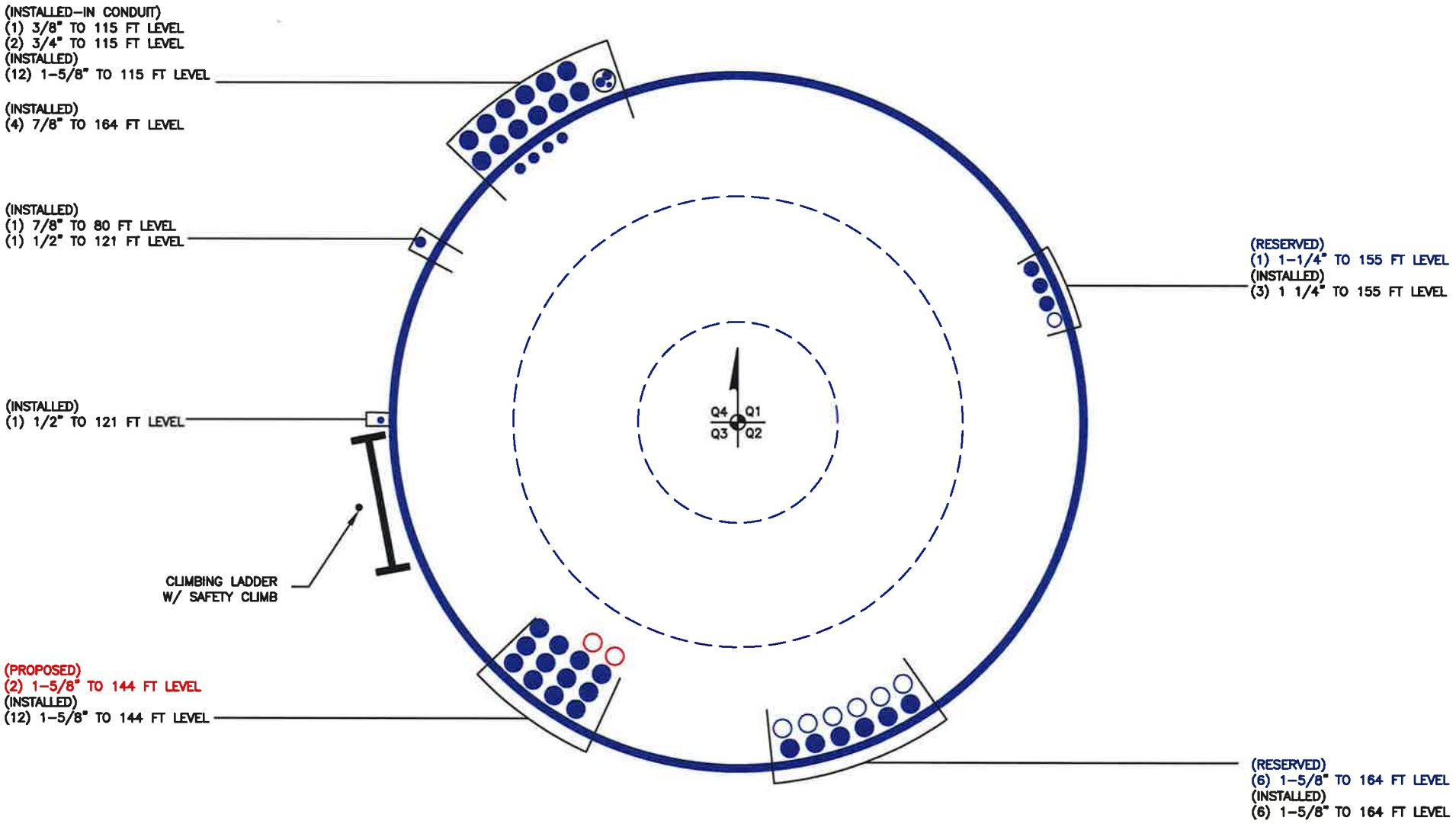
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	169 - 164.25 (1)	0.000	0.001	0.000	0.001	0.000	0.001 ✔	1.333	H1-3+VT ✔
L2	164.25 - 129.125 (2)	0.008	0.405	0.000	0.041	0.002	0.413 ✔	1.333	H1-3+VT ✔
L3	129.125 - 96.083 (3)	0.010	0.665	0.000	0.040	0.001	0.676 ✔	1.333	H1-3+VT ✔
L4	96.083 - 63.25 (4)	0.012	0.878	0.000	0.039	0.001	0.890 ✔	1.333	H1-3+VT ✔
L5	63.25 - 31.25 (5)	0.014	1.000	0.000	0.037	0.001	1.015 ✔	1.333	H1-3+VT ✔
L6	31.25 - 0 (6)	0.017	1.133	0.000	0.035	0.001	1.151 ✔	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	169 - 164.25	Pole	TP26x18x0.25	1	-0.200	1062.230	0.1	Pass
L2	164.25 - 129.125	Pole	TP34.063x21.5x0.313	2	-10.037	1663.291	31.0	Pass
L3	129.125 - 96.083	Pole	TP41.75x31.944x0.375	3	-18.908	2484.672	50.7	Pass
L4	96.083 - 63.25	Pole	TP49.063x39.78x0.375	4	-26.944	2928.414	66.8	Pass
L5	63.25 - 31.25	Pole	TP56.125x46.951x0.375	5	-36.054	3355.068	76.1	Pass
L6	31.25 - 0	Pole	TP62.938x53.846x0.375	6	-48.359	3684.958	86.3	Pass
							Summary	
						Pole (L6)	86.3	Pass
						RATING =	**86.3**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(INSTALLED–IN CONDUIT)
(1) 3/8" TO 115 FT LEVEL
(2) 3/4" TO 115 FT LEVEL
(INSTALLED)
(12) 1–5/8" TO 115 FT LEVEL
(INSTALLED)
(4) 7/8" TO 164 FT LEVEL
(INSTALLED)
(1) 7/8" TO 80 FT LEVEL
(1) 1/2" TO 121 FT LEVEL
(INSTALLED)
(1) 1/2" TO 121 FT LEVEL
CLIMBING LADDER
W/ SAFETY CLIMB
(PROPOSED)
(2) 1–5/8" TO 144 FT LEVEL
(INSTALLED)
(12) 1–5/8" TO 144 FT LEVEL
(RESERVED)
(1) 1–1/4" TO 155 FT LEVEL
(INSTALLED)
(3) 1 1/4" TO 155 FT LEVEL
(RESERVED)
(6) 1–5/8" TO 164 FT LEVEL
(INSTALLED)
(6) 1–5/8" TO 164 FT LEVEL
Q4
Q1
Q3
Q2

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

BU#: *826768*
Site Name: *PLYMOUTH-RT 6*
App #: *300807 R0*

Pole Manufacturer:	*Pirod*

Anchor Rod Data		
Qty:	45	
Diam:	1.25	in
Rod Material:	Other	
Strength (Fu):	150	ksi
Yield (Fy):	105	ksi
Bolt Circle:	68	in

Plate Data		
Diam:	73	in
Thick:	1.5	in
Grade:	50	ksi
Single-Rod B-eff:	4.44	in

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

Pole Data		
Diam:	62.9375	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	4036.7891	ft-kips
Axial:	48.3591	kips
Shear:	34.20993	kips

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

Anchor Rod Results

Maximum Rod Tension:	62.2 Kips	Rigid
Allowable Tension:	81.0 Kips	Service, ASD
Anchor Rod Stress Ratio:	76.9% Pass	Fty*ASIF

Base Plate Results

Base Plate Stress:	Flexural Check Rohn/Pirod, OK	Rigid
Allowable Plate Stress:	50.0 ksi	Service ASD
Base Plate Stress Ratio:	Rohn/Pirod, OK	0.75*Fy*ASIF
		Y.L. Length: 25.75

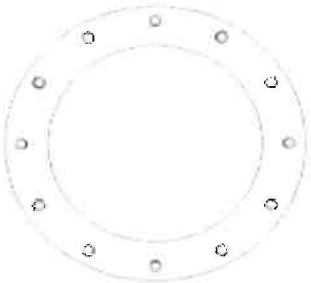
n/a

Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A



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

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

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

Site Data

BU#: *826768*
Site Name: *PLYMOUTH-RT 6*
App #: *300807 R0*

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

Pad & Pier Data		
Base PL Dist. Above Pier:	0	in
Pier Dist. Above Grade:	6	in
Pad Bearing Depth, D:	8.5	ft
Pad Thickness, T:	2.5	ft
Pad Width=Length, L:	27	ft
Pier Cross Section Shape:	Round	<--Pull Down
Enter Pier Diameter:	7.5	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	44.18	ft^2
Pier Height:	6.50	ft
Soil (above pad) Height:	6.00	ft

Soil Parameters		
Unit Weight, γ:	125.0	pcf
Ultimate Bearing Capacity, qn:	12.00	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	34.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	9.00	ksf
Passive Pres. Coeff., Kp	3.54	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	46.2	kips
Pad Force Location Above D:	1.18	ft
ϕ(Passive Pressure Moment):	54.41	ft-kips
Factored O.T. M(WL), "1.6W":	5865.3	ft-kips
Factored OT (MW-Msoil), M1	5810.90	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	4.05	ft
Sum of Soil Wedges Wt:	83.59	kips
Soil Wedges ecc, K1:	11.97	ft
Ftg+Soil above Pad wt:	830.1	kips
Unfactored (Total ftg-soil Wt):	913.66	kips
1.2D. **No Soil Wedges**.	1054.11	kips
0.9D. **With Soil Wedges**	865.81	kips

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

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	48.3591	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	34.20993	kips
Unfactored WL Moment, M:	4036.789	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	58.03092	kips
0.90	0.9D+1.6W, Pu:	43.52319	kips
1.35	Vu:	46.18341	kips
	Mu:	5449.665	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	1054.11	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	5810.90	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	5.51	ft
Orthogonal qu=	2.63	ksf
qu/ϕ*qn Ratio=	**29.19%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	3.90	ft
Diagonal qu=	2.86	ksf
qu/ϕ*qn Ratio=	**31.75%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	865.81	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	4910.03	ft-kips

Orthogonal ecc3 = M2/P2 =	5.67	ft
Ortho Non Bearing Length,NBL=	11.34	ft
Orthogonal qu=	2.19	ksf
Diagonal qu=	2.40	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	4036.79		
M Orthogonal:	8061.67	**50.07%**	**Pass**
M Diagonal:	8061.67	**50.07%**	**Pass**

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

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

Site Data

BU#: *826768*
Site Name: *PLYMOUTH-RT 6*
App #: *300807 R0*

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

Pier Properties		
Concrete:		
Pier Diameter =	7.5	ft
Concrete Area =	6361.7	in^2
Reinforcement:		
Clear Cover to **Tie**=	3.00	in
Horiz. **Tie** Bar Size=	4	
Vert. Cage Diameter =	6.82	ft
Vert. Cage Diameter =	81.87	in
Vertical Bar Size =	9	
Bar Diameter =	1.13	in
Bar Area =	1	in^2
Number of Bars =	39	
As Total=	39	in^2
A s/ Aconc, Rho:	0.0061	0.61%

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:	0.61%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	12395.38	kips
at Mu=(ϕ=0.65)Mn=	8136.61	ft-kips
Max Tu, (φ=0.9) Tn =	2106	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces		
TIA Revision:	F	
Max. Service Shaft M:	4259.154	ft-kips **(* Note)**
Max. Service Shaft P:	48.3591	kips
Max Axial Force Type:	Comp.	

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

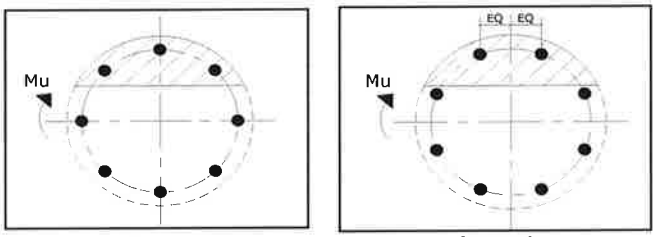
Load Factor	Shaft Factored Loads		
1.30	Mu:	5536.9	ft-kips
1.30	Pu:	62.86683	kips

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=	2002	
Seismic Properties		
Seismic Design Category =	D	
Seismic Risk =	**High**	

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

Results:

Governing Orientation Case: **2**



Case 1 Case 2

Dist. From Edge to Neutral Axis: **12.85** in
Extreme Steel Strain, ϵt: **0.0171**
ϵt > 0.0050, Tension Controlled
Reduction Factor,φ: **0.900**

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	62.87	kips
Drilled Shaft Moment Capacity, φMn:	**6871.34**	ft-kips
Drilled Shaft Superimposed Mu:	**5536.90**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**80.6%**