Robinson+Cole

KENNETH C. BALDWIN

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Also admitted in Massachusetts

January 26, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
497 Middle Turnpike, Mansfield, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 109-foot level on the existing 120-foot tower at 497 Middle Turnpike in Mansfield (the "Property"). The tower is owned by Crown Castle. Cellco's shared use of this tower was approved by the Council in 2007. Cellco now intends to modify its facility by replacing nine (9) of its existing antennas with three (3) model LNX-8513DS-VTM, 850 MHz antennas; three (3) model HBXX-6517DS-VTM, 1900 MHz antennas; and three (3) model HBXX-6517DS-VTM, 2100 MHz antennas, all at the same level on the tower. Cellco also intends to install six (6) remote radio heads ("RRHs") behind its 1900 MHz and 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable, attached to the outside of the monopole tower. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent Matthew W. Hart, Town Manager of the Town of Mansfield. A copy of this letter is also being sent to Ann Brodin, Trustee, 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. Cellco's replacement antennas and RRHs will be installed on its existing antenna platform at the 109-foot level.

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 for Cellco's modified facility is included in Attachment 2.

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Matthew W. Hart, Mansfield Town Manger
Ann Brodin, Trustee
Sandy M. Carter

ATTACHMENT 1

Product Specifications

COMMSCOPE®

LNX-8513DS-VTM

Andrew® Teletilt® Antenna, 698–896 MHz, 85° horizontal beamwidth, RET compatible

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	14.6	15.3
Beamwidth, Horizontal, degrees	85	85
Beamwidth, Vertical, degrees	12.2	11.0
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	17
Front-to-Back Ratio at 180°, dB	25	26
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°

Mechanical Specifications

Color | Radome Material	Light gray | Fiberglass, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1847.0 mm x 301.0 mm x 181.0 mm | 72.7 in x 11.9 in x 7.1 in
Net Weight	17.8 kg | 39.2 lb
Model with factory installed AISG 2.0 RET	LNX-8513DS-A1M

Product Specifications

COMMSCOPE®

HBXX-6517DS-VTM

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

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	**1710–1880**	**1850–1990**	**1920–2180**
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4 3 ° | 18.7 6 ° | 18.4	0 ° | 18.4 3 ° | 18.7 6 ° | 18.5	0 ° | 18.7 3 ° | 18.9 6 ° | 18.6
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°

**Values calculated using NGMN Alliance N-P-BASTA v9.6*

Mechanical Specifications

Color | Radome Material	Light gray | PVC, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1903.0 mm x 305.0 mm x 166.0 mm | 74.9 in x 12.0 in x 6.5 in
Net Weight	19.5 kg | 43.0 lb
Model with factory installed AISG 2.0 RET	HBXX-6517DS-A2M

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

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

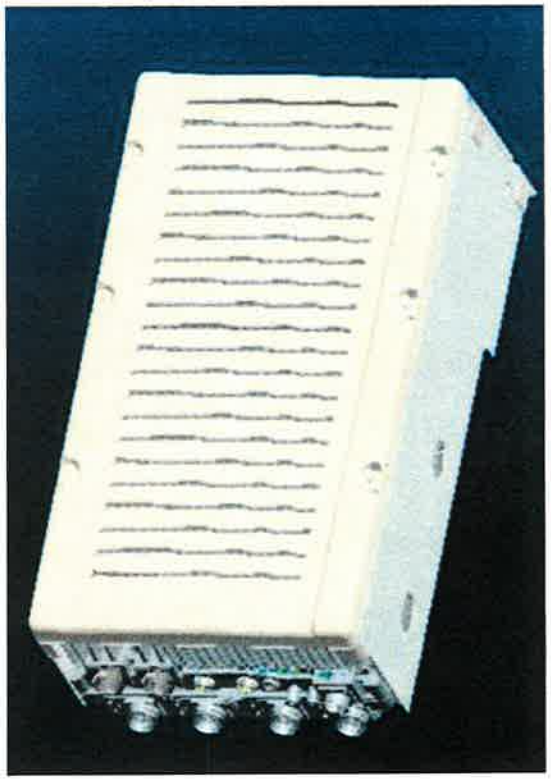
** Not a Verizon Wireless deployed product

Alcatel·Lucent

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

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



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

Alcatel·Lucent

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

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

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

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

SUPERIOR RF PERFORMANCE

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

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

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

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

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

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

OPTIMIZED TCO

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

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

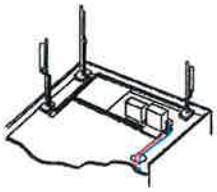
EASY INSTALLATION

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

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

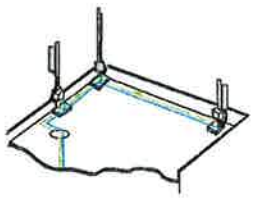
The Alcatel-Lucent RRH2x60-AWS is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

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



Macro

RRH for space-constrained cell sites



Distributed

FEATURES

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

BENEFITS

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

TECHNICAL SPECIFICATIONS

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

Dimensions and weights

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

Electrical Data

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

RF Characteristics

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

Connectivity

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

Environmental specifications

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

Safety and Regulatory Data

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

Alcatel·Lucent

AT THE SPEED OF IDEAS™

Product Data Sheet **HB158-1-08U8-S8J18**

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

Product Description

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

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

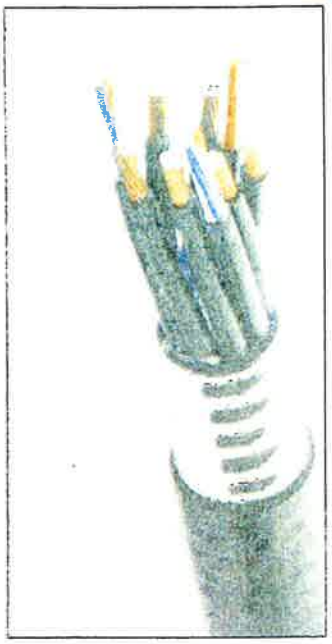


Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-93-653 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)

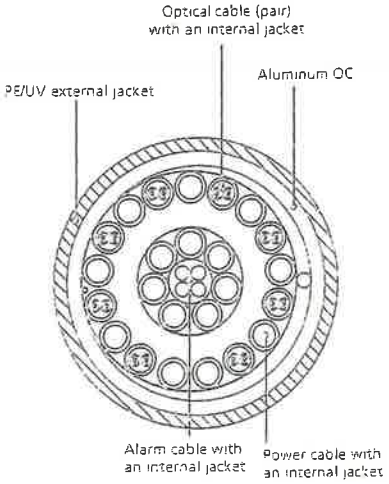


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Mansfield								
Tower Height: 120ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	2	565	123	0.0269	880	0.5867	4.58%	
*AT&T UMTS	2	875	123	0.0416	1900	1.0000	4.16%	
*AT&T GSM	1	283	123	0.0067	880	0.5867	1.15%	
*AT&T GSM	4	525	123	0.0499	1900	1.0000	4.99%	
*AT&T LTE	1	1375	123	0.0327	734	0.4893	6.68%	
Verizon PCS	**11**	**450**	**109**	**0.1498**	**1970**	**1.0000**	**14.98%**	
Verizon Cellular	**9**	**410**	**109**	**0.1117**	**869**	**0.5793**	**19.28%**	
Verizon AWS	**1**	**1750**	**109**	**0.0530**	**2145**	**1.0000**	**5.30%**	
Verizon 700	**1**	**1050**	**109**	**0.0318**	**746**	**0.4973**	**6.39%**	
								67.50%
* Source: Siting Council								

ATTACHMENT 3

Date: **January 12, 2015**

TECTONIC
Practical Solutions, Exceptional Service

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

TECTONIC
1279 Route 300
Newburgh, NY 12550
(845) 567-6656

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	169108
	Carrier Site Name:	Mansfield
Crown Castle Designation:	**Crown Castle BU Number:**	842867
	Crown Castle Site Name:	MANSFIELD FOUR CORNERS
	Crown Castle JDE Job Number:	312488
	Crown Castle Work Order Number:	987074
	Crown Castle Application Number:	244214 Rev. 10
Engineering Firm Designation:	**TECTONIC Project Number:**	6500.842867, Phase 2 Rev.1
Site Data:	**497 MIDDLE TURNPIKE, STORRS MANSFIELD, Tolland County, CT** **Latitude *41° 49' 32.81"*, Longitude *-72° 16' 54.46"*** **120 Foot - Monopole Tower**	

Dear Rebecca Klein,

TECTONIC 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 743097, in accordance with application 244214, revision 10.

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

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

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code 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 *TECTONIC* 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: Diana Galofaro / IM

Respectfully submitted by:

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 25406
LICENSED PROFESSIONAL ENGINEER
1/12/15

Antonio A. Gualtieri, P.E.
Sr. Vice President

tnxTower Report - version 6.1.4.1

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1) INTRODUCTION

This tower is a 120 ft Monopole tower designed by PENNSUMMIT TUBULAR, LLC in November of 2003. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 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
109.0	109.0	3	alcatel lucent	RRH2X60-AWS	1	1-5/8	-
		3	alcatel lucent	RRH2X60-PCS			
		6	commscope	HBXX-6517DS-A2M w/ Mount Pipe			
		3	commscope	LNX-8513DS-VTM 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
120.0	123.0	1	andrew	SBNH-1D6565C w/ Mount Pipe	1 2 12	1/2 7/8 1-1/4	1
		6	ericsson	RRUS 11			
		2	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21903			
		1	raycap	DC6-48-60-18-8F			
	120.0	1	crown mounts	LP 303-1			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
109.0	109.0	6	andrew	ONEBASE TWIN DUAL DUPLEX TMA	-	-	2
		6	Antel	LPA-80080/6CF w/ Mount Pipe			
		2	antel	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	18	1-5/8	1
		1	rfs celwave	APX75-866514-CT0 w/ Mount Pipe			
		1	crown mounts	LP 303-1			

Notes:
1) Existing Equipment
2) Equipment To Be Removed; Not Considered In This Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
119.5	119.5	6	powerwave technologies	7920	-	-
110.0	110.0	6	generic	1X4 Panel		
100.0	100.0	6	generic	1X4 Panel		
90.0	90.0	6	generic	1X4 Panel		
80.0	80.0	3	generic	1X4 Panel		
70.0	70.0	3	generic	1X4 Panel		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	VN Engineers, Inc.	4713232	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PennSummit Tubular, LLC	4858941	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PennSummit Tubular, LLC	5214860	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. TECTONIC 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	120 - 70.75	Pole	TP32.28x18x0.1875	1	-7.51	916.08	82.8	Pass
L2	70.75 - 34.75	Pole	TP42.35x30.7452x0.3125	2	-13.01	2089.10	57.1	Pass
L3	34.75 - 0	Pole	TP51.8x40.2019x0.375	3	-22.39	3182.06	50.6	Pass
							Summary	
						Pole (L1)	82.8	Pass
						Rating =	82.8	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	43.1	Pass
1	Base Plate	0	40.6	Pass
1	Base Foundation Soil Interaction	0	76.5	Pass

Structure Rating (max from all components) =	82.8%

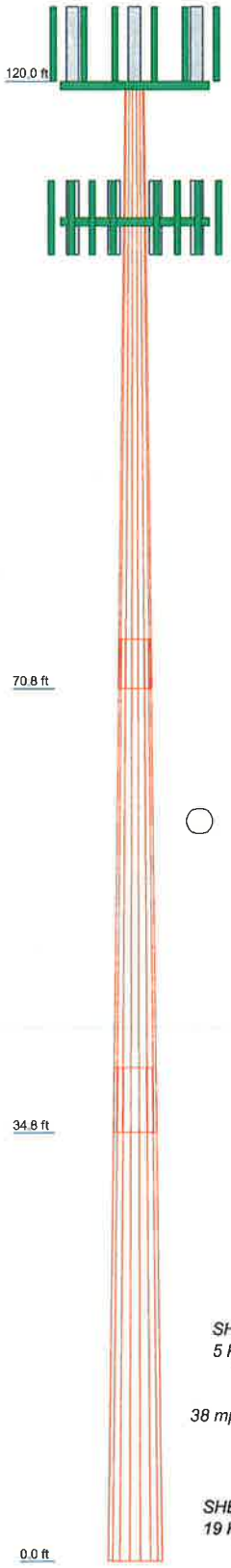
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

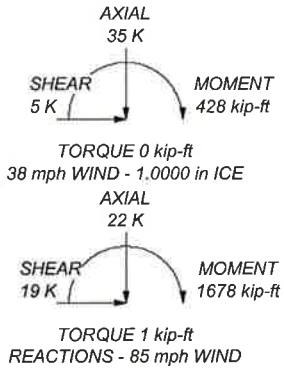
The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT



Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	49'3"	18	0.1875	4'	18.0000	32.2800		2.5
2	40'	18	0.3125	5'3"	30.7452	42.3500	A607-65	4.9
3	40'	18	0.3750		40.2019	51.8000		7.4
								14.8



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 7770.00 w/ Mount Pipe	120	LP 303-1	120
(2) 7770.00 w/ Mount Pipe	120	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	109
(2) 7770.00 w/ Mount Pipe	120		
AM-X-CD-16-65-00T-RET w/ Mount Pipe	120	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	109
AM-X-CD-16-65-00T-RET w/ Mount Pipe	120	LNX-8513DS-VTM w/ Mount Pipe	109
		LNX-8513DS-VTM w/ Mount Pipe	109
SBNH-1D6565C w/ Mount Pipe	120	LNX-8513DS-VTM w/ Mount Pipe	109
(2) LGP21401	120	APX75-866514-CT0 w/ Mount Pipe	109
(2) LGP21401	120	(2) HBXX-6517DS-A2M w/ Mount Pipe	109
(2) LGP21401	120	(2) HBXX-6517DS-A2M w/ Mount Pipe	109
(2) RRUS 11	120	(2) HBXX-6517DS-A2M w/ Mount Pipe	109
(2) RRUS 11	120	RRH2X60-PCS	109
(2) RRUS 11	120	RRH2X60-PCS	109
(2) LGP21903	120	RRH2X60-PCS	109
(2) LGP21903	120	DB-T1-6Z-8AB-0Z	109
(2) LGP21903	120	RRH2X60-AWS	109
DC6-48-60-18-8F	120	RRH2X60-AWS	109
2.375"x6' Pipe Mount	120	RRH2X60-AWS	109
2.375"x6' Pipe Mount	120	LP 303-1	109
2.375"x6' Pipe Mount	120		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Tolland 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 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: 82.8%

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Job: 6500.842867, Phase 2			
Project: BU 842867 - MANSFIELD FOUR CORNERS			
Client: Crown Castle	Drawn by: Diana Galofaro	App'd:	
Code: TIA/EIA-222-F	Date: 12/31/14	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

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

3) Tower is located in Tolland County, Connecticut.
4) Basic wind speed of 85 mph.
5) Nominal ice thickness of 1.0000 in.
6) Ice thickness is considered to increase with height.
7) Ice density of 56 pcf.
8) A wind speed of 38 mph is used in combination with ice.
9) Temperature drop of 50 °F.
10) Deflections calculated using a wind speed of 50 mph.
11) A non-linear (P-delta) analysis was used.
12) Pressures are calculated at each section.
13) Stress ratio used in pole design is 1.333.
14) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	120'-70'9"	49'3"	4'	18	18.0000	32.2800	0.1875	0.7500	A607-65 (65 ksi)
L2	70'9"-34'9"	40'	5'3"	18	30.7452	42.3500	0.3125	1.2500	A607-65 (65 ksi)
L3	34'9"-0'	40'		18	40.2019	51.8000	0.3750	1.5000	A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	18.2777	10.6007	424.9328	6.3234	9.1440	46.4712	850.4248	5.3013	2.8380	15.136
	32.7780	19.0990	2485.1711	11.3928	16.3982	151.5511	4973.6122	9.5513	5.3513	28.54
L2	32.3979	30.1854	3531.9616	10.8036	15.6186	226.1387	7068.5707	15.0956	4.8612	15.556

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
	43.0033	41.6959	9309.0430	14.9233	21.5138	432.7010	18630.3350	20.8519	6.9036	22.092
L3	42.3678	47.4039	9499.5749	14.1385	20.4225	465.1513	19011.6495	23.7065	6.4155	17.108
	52.5991	61.2086	20450.2462	18.2559	26.3144	777.1504	40927.4014	30.6101	8.4568	22.551

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 120'-70'9"				1	1	1		
L2 70'9"-34'9"				1	1	1		
L3 34'9"-0'				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
**								
LDF4-50A(1/2")	A	No	Inside Pole	120' - 0'	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
LDF5-50A(7/8")	A	No	Inside Pole	120' - 0'	2	No Ice	0.00	0.33
						1/2" Ice	0.00	0.33
						1" Ice	0.00	0.33
						2" Ice	0.00	0.33
						4" Ice	0.00	0.33
LDF6-50A(1-1/4")	A	No	Inside Pole	120' - 0'	12	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
**								
LDF7-50A(1-5/8")	B	No	Inside Pole	109' - 0'	18	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
HB158-1-08U8-S8J18(1-5/8)	B	No	CaAa (Out Of Face)	109' - 0'	1	No Ice	0.20	1.30
						1/2" Ice	0.30	2.81
						1" Ice	0.40	4.94
						2" Ice	0.60	11.03
						4" Ice	1.00	30.52
**								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	120'-70'9"	A	0.000	0.000	0.000	0.000	0.43
		B	0.000	0.000	0.000	7.574	0.61
		C	0.000	0.000	0.000	0.000	0.00
L2	70'9"-34'9"	A	0.000	0.000	0.000	0.000	0.31
		B	0.000	0.000	0.000	7.128	0.58
		C	0.000	0.000	0.000	0.000	0.00
L3	34'9"-0'	A	0.000	0.000	0.000	0.000	0.30
		B	0.000	0.000	0.000	6.880	0.56
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	120'-70'9"	A	1.133	0.000	0.000	0.000	0.000	0.43
		B		0.000	0.000	0.000	16.242	0.78
		C		0.000	0.000	0.000	0.000	0.00
L2	70'9"-34'9"	A	1.057	0.000	0.000	0.000	0.000	0.31
		B		0.000	0.000	0.000	15.286	0.74
		C		0.000	0.000	0.000	0.000	0.00
L3	34'9"-0'	A	1.000	0.000	0.000	0.000	0.000	0.30
		B		0.000	0.000	0.000	14.226	0.70
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	120'-70'9"	0.1979	0.1143	0.3652	0.2108
L2	70'9"-34'9"	0.2417	0.1396	0.4603	0.2658
L3	34'9"-0'	0.2448	0.1413	0.4623	0.2669

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00 0' 3'	0.0000	120'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00 0' 3'	0.0000	120'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00 0' 3'	0.0000	120'	No Ice 1/2" Ice	6.12 6.63 7.13	4.25 5.01 5.71	0.06 0.10 0.16

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	8.16	7.16	0.29
						2" Ice	10.36	10.41	0.66
						4" Ice			
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00 0' 3'	0.0000	120'	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' 3'	0.0000	120'	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
SBNH-1D6565C w/ Mount Pipe	C	From Leg	4.00 0' 3'	0.0000	120'	No Ice	11.68	9.84	0.09
						1/2" Ice	12.40	11.37	0.18
						1" Ice	13.14	12.91	0.28
						2" Ice	14.60	15.27	0.52
						4" Ice	17.87	20.14	1.16
(2) LGP21401	A	From Leg	4.00 0' 3'	0.0000	120'	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02
						1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) LGP21401	B	From Leg	4.00 0' 3'	0.0000	120'	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02
						1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) LGP21401	C	From Leg	4.00 0' 3'	0.0000	120'	No Ice	1.29	0.23	0.01
						1/2" Ice	1.45	0.31	0.02
						1" Ice	1.61	0.40	0.03
						2" Ice	1.97	0.61	0.05
						4" Ice	2.79	1.12	0.14
(2) RRUS 11	A	From Leg	4.00 0' 3'	0.0000	120'	No Ice	3.25	1.37	0.05
						1/2" Ice	3.49	1.55	0.07
						1" Ice	3.74	1.74	0.10
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
(2) RRUS 11	B	From Leg	4.00 0' 3'	0.0000	120'	No Ice	3.25	1.37	0.05
						1/2" Ice	3.49	1.55	0.07
						1" Ice	3.74	1.74	0.10
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
(2) RRUS 11	C	From Leg	4.00 0' 3'	0.0000	120'	No Ice	3.25	1.37	0.05
						1/2" Ice	3.49	1.55	0.07
						1" Ice	3.74	1.74	0.10
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
(2) LGP21903	A	From Leg	4.00 0' 3'	0.0000	120'	No Ice	0.27	0.18	0.01
						1/2" Ice	0.34	0.25	0.01
						1" Ice	0.43	0.32	0.02
						2" Ice	0.62	0.49	0.03
						4" Ice	1.10	0.94	0.07
(2) LGP21903	B	From Leg	4.00 0'	0.0000	120'	No Ice	0.27	0.18	0.01
							0.34	0.25	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
			3'			1/2" Ice	0.43	0.32	0.02
						1" Ice	0.62	0.49	0.03
						2" Ice	1.10	0.94	0.07
						4" Ice			
(2) LGP21903	C	From Leg	4.00	0.0000	120'	No Ice	0.27	0.18	0.01
			0'			1/2" Ice	0.34	0.25	0.01
			3'			1" Ice	0.43	0.32	0.02
						2" Ice	0.62	0.49	0.03
						4" Ice	1.10	0.94	0.07
DC6-48-60-18-8F	C	From Leg	4.00	0.0000	120'	No Ice	1.47	1.47	0.02
			0'			1/2" Ice	1.67	1.67	0.04
			3'			1" Ice	1.88	1.88	0.06
						2" Ice	2.33	2.33	0.11
						4" Ice	3.38	3.38	0.24
2.375"x6' Pipe Mount	A	From Leg	4.00	0.0000	120'	No Ice	1.43	1.43	0.02
			0'			1/2" Ice	1.92	1.92	0.03
			3'			1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
						4" Ice	4.70	4.70	0.23
2.375"x6' Pipe Mount	B	From Leg	4.00	0.0000	120'	No Ice	1.43	1.43	0.02
			0'			1/2" Ice	1.92	1.92	0.03
			3'			1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
						4" Ice	4.70	4.70	0.23
2.375"x6' Pipe Mount	C	From Leg	4.00	0.0000	120'	No Ice	1.43	1.43	0.02
			0'			1/2" Ice	1.92	1.92	0.03
			3'			1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
						4" Ice	4.70	4.70	0.23
LP 303-1	C	None		0.0000	120'	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
						2" Ice	31.50	31.50	2.18
						4" Ice	48.34	48.34	3.10
**									
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	B	From Leg	4.00	0.0000	109'	No Ice	7.97	5.80	0.06
			0'			1/2" Ice	8.61	6.95	0.12
			0'			1" Ice	9.22	7.82	0.19
						2" Ice	10.46	9.60	0.35
						4" Ice	13.07	13.37	0.82
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	C	From Leg	4.00	0.0000	109'	No Ice	7.97	5.80	0.06
			0'			1/2" Ice	8.61	6.95	0.12
			0'			1" Ice	9.22	7.82	0.19
						2" Ice	10.46	9.60	0.35
						4" Ice	13.07	13.37	0.82
LNX-8513DS-VTM w/ Mount Pipe	A	From Leg	4.00	0.0000	109'	No Ice	8.65	7.08	0.06
			0'			1/2" Ice	9.31	8.27	0.13
			0'			1" Ice	9.93	9.18	0.21
						2" Ice	11.20	11.02	0.39
						4" Ice	13.87	15.06	0.90
LNX-8513DS-VTM w/ Mount Pipe	B	From Leg	4.00	0.0000	109'	No Ice	8.65	7.08	0.06
			0'			1/2" Ice	9.31	8.27	0.13
			0'			1" Ice	9.93	9.18	0.21
						2" Ice	11.20	11.02	0.39
							13.87	15.06	0.90

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
LNX-8513DS-VTM w/ Mount Pipe	C	From Leg	4.00 0' 0'	0.0000	109'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.65 9.31 9.93 11.20 13.87	7.08 8.27 9.18 11.02 15.06	0.06 0.13 0.21 0.39 0.90
APX75-866514-CT0 w/ Mount Pipe	A	From Leg	4.00 0' 0'	0.0000	109'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.00 10.72 11.43 12.82 15.74	6.57 7.88 9.02 11.02 15.24	0.06 0.13 0.21 0.40 0.93
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	4.00 0' 0'	0.0000	109'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.92 9.56 10.19 11.46 14.13	6.91 8.10 9.01 10.86 14.81	0.08 0.15 0.22 0.41 0.92
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	4.00 0' 0'	0.0000	109'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.92 9.56 10.19 11.46 14.13	6.91 8.10 9.01 10.86 14.81	0.08 0.15 0.22 0.41 0.92
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	4.00 0' 0'	0.0000	109'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.92 9.56 10.19 11.46 14.13	6.91 8.10 9.01 10.86 14.81	0.08 0.15 0.22 0.41 0.92
RRH2X60-PCS	A	From Leg	4.00 0' 0'	0.0000	109'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.79 3.02 3.52 4.61	2.01 2.22 2.43 2.89 3.92	0.06 0.08 0.10 0.16 0.31
RRH2X60-PCS	B	From Leg	4.00 0' 0'	0.0000	109'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.79 3.02 3.52 4.61	2.01 2.22 2.43 2.89 3.92	0.06 0.08 0.10 0.16 0.31
RRH2X60-PCS	C	From Leg	4.00 0' 0'	0.0000	109'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.79 3.02 3.52 4.61	2.01 2.22 2.43 2.89 3.92	0.06 0.08 0.10 0.16 0.31
DB-T1-6Z-8AB-0Z	B	From Leg	4.00 0' 0'	0.0000	109'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.60 5.92 6.24 6.91 8.37	2.33 2.56 2.79 3.28 4.37	0.04 0.08 0.12 0.21 0.45
RRH2X60-AWS	A	From Leg	4.00 0' 0'	0.0000	109'	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.96 4.27 4.60 5.27 6.72	2.05 2.33 2.62 3.23 4.54	0.06 0.08 0.11 0.18 0.36
RRH2X60-AWS	B	From Leg	4.00 0' 0'	0.0000	109'	No Ice 1/2" Ice 1" Ice	3.96 4.27 4.60 5.27	2.05 2.33 2.62 3.23	0.06 0.08 0.11 0.18

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	6.72	4.54	0.36
						4" Ice			
RRH2X60-AWS	C	From Leg	4.00 0' 0'	0.0000	109'	No Ice	3.96	2.05	0.06
						1/2" Ice	4.27	2.33	0.08
						1" Ice	4.60	2.62	0.11
						2" Ice	5.27	3.23	0.18
						4" Ice	6.72	4.54	0.36
LP 303-1	C	None		0.0000	109'	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
						2" Ice	31.50	31.50	2.18
						4" Ice	48.34	48.34	3.10
***									

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 70.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.35	-0.16	-0.67
			Max. Mx	5	-7.51	-476.00	-2.75
			Max. My	8	-7.51	-2.59	-476.00
			Max. Vy	5	13.15	-476.00	-2.75
			Max. Vx	8	13.14	-2.59	-476.00
			Max. Torque	7			-1.09
L2	70.75 - 34.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-22.64	-0.42	-0.82
			Max. Mx	5	-13.01	-978.26	-5.24
			Max. My	8	-13.01	-5.10	-977.94
			Max. Vy	5	15.77	-978.26	-5.24
			Max. Vx	8	15.76	-5.10	-977.94
			Max. Torque	12			0.80
L3	34.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-34.54	-0.77	-1.02
			Max. Mx	5	-22.39	-1671.59	-8.09
			Max. My	8	-22.39	-7.98	-1670.90
			Max. Vy	5	18.95	-1671.59	-8.09
			Max. Vx	8	18.94	-7.98	-1670.90
			Max. Torque	12			0.80

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	34.54	0.00	0.00
	Max. H_x	11	22.40	18.94	0.07
	Max. H_z	2	22.40	0.07	18.93
	Max. M_x	2	1670.29	0.07	18.93
	Max. M_z	5	1671.59	-18.94	-0.07
	Max. Torsion	12	0.80	16.44	9.53
	Min. Vert	1	22.40	0.00	0.00
	Min. H_x	5	22.40	-18.94	-0.07
	Min. H_z	8	22.40	-0.07	-18.93
	Min. M_x	8	-1670.90	-0.07	-18.93
	Min. M_z	11	-1671.20	18.94	0.07
	Min. Torsion	6	-0.80	-16.44	-9.53

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	22.40	0.00	0.00	0.30	-0.19	0.00
Dead+Wind 0 deg - No Ice	22.40	-0.07	-18.93	-1670.29	7.58	-0.35
Dead+Wind 30 deg - No Ice	22.40	9.41	-16.36	-1442.59	-829.16	0.06
Dead+Wind 60 deg - No Ice	22.40	16.37	-9.41	-828.25	-1443.78	0.45
Dead+Wind 90 deg - No Ice	22.40	18.94	0.07	8.09	-1671.59	0.72
Dead+Wind 120 deg - No Ice	22.40	16.44	9.53	842.34	-1451.55	0.80
Dead+Wind 150 deg - No Ice	22.40	9.53	16.43	1450.97	-842.63	0.66
Dead+Wind 180 deg - No Ice	22.40	0.07	18.93	1670.90	-7.98	0.35
Dead+Wind 210 deg - No Ice	22.40	-9.41	16.36	1443.20	828.77	-0.06
Dead+Wind 240 deg - No Ice	22.40	-16.37	9.41	828.87	1443.39	-0.45
Dead+Wind 270 deg - No Ice	22.40	-18.94	-0.07	-7.47	1671.20	-0.72

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 300 deg - No Ice	22.40	-16.44	-9.53	-841.72	1451.16	-0.80
Dead+Wind 330 deg - No Ice	22.40	-9.53	-16.43	-1450.35	842.24	-0.66
Dead+Ice+Temp	34.54	0.00	0.00	1.02	-0.77	0.00
Dead+Wind 0 deg+Ice+Temp	34.54	-0.02	-4.61	-423.99	1.29	-0.08
Dead+Wind 30 deg+Ice+Temp	34.54	2.29	-3.98	-366.00	-211.52	0.03
Dead+Wind 60 deg+Ice+Temp	34.54	3.98	-2.29	-209.66	-367.87	0.13
Dead+Wind 90 deg+Ice+Temp	34.54	4.61	0.02	3.14	-425.85	0.19
Dead+Wind 120 deg+Ice+Temp	34.54	4.00	2.32	215.39	-369.94	0.21
Dead+Wind 150 deg+Ice+Temp	34.54	2.32	4.00	370.21	-215.12	0.17
Dead+Wind 180 deg+Ice+Temp	34.54	0.02	4.61	426.12	-2.87	0.08
Dead+Wind 210 deg+Ice+Temp	34.54	-2.29	3.98	368.14	209.95	-0.03
Dead+Wind 240 deg+Ice+Temp	34.54	-3.98	2.29	211.80	366.29	-0.13
Dead+Wind 270 deg+Ice+Temp	34.54	-4.61	-0.02	-1.01	424.28	-0.19
Dead+Wind 300 deg+Ice+Temp	34.54	-4.00	-2.32	-213.26	368.36	-0.21
Dead+Wind 330 deg+Ice+Temp	34.54	-2.32	-4.00	-368.08	213.54	-0.17
Dead+Wind 0 deg - Service	22.40	-0.02	-6.55	-578.06	2.50	-0.12
Dead+Wind 30 deg - Service	22.40	3.26	-5.66	-499.22	-287.18	0.02
Dead+Wind 60 deg - Service	22.40	5.66	-3.25	-286.54	-499.97	0.16
Dead+Wind 90 deg - Service	22.40	6.55	0.02	3.00	-578.84	0.25
Dead+Wind 120 deg - Service	22.40	5.69	3.30	291.83	-502.66	0.28
Dead+Wind 150 deg - Service	22.40	3.30	5.69	502.54	-291.85	0.23
Dead+Wind 180 deg - Service	22.40	0.02	6.55	578.68	-2.89	0.12
Dead+Wind 210 deg - Service	22.40	-3.26	5.66	499.85	286.80	-0.02
Dead+Wind 240 deg - Service	22.40	-5.66	3.25	287.16	499.58	-0.16
Dead+Wind 270 deg - Service	22.40	-6.55	-0.02	-2.38	578.45	-0.25
Dead+Wind 300 deg - Service	22.40	-5.69	-3.30	-291.21	502.27	-0.28
Dead+Wind 330 deg - Service	22.40	-3.30	-5.69	-501.92	291.46	-0.23

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	-22.40	0.00	0.00	22.40	0.00	0.000%
2	-0.07	-22.40	-18.93	0.07	22.40	18.93	0.000%
3	9.41	-22.40	-16.36	-9.41	22.40	16.36	0.000%
4	16.37	-22.40	-9.41	-16.37	22.40	9.41	0.000%
5	18.94	-22.40	0.07	-18.94	22.40	-0.07	0.000%
6	16.44	-22.40	9.53	-16.44	22.40	-9.53	0.000%
7	9.53	-22.40	16.43	-9.53	22.40	-16.43	0.000%
8	0.07	-22.40	18.93	-0.07	22.40	-18.93	0.000%
9	-9.41	-22.40	16.36	9.41	22.40	-16.36	0.000%
10	-16.37	-22.40	9.41	16.37	22.40	-9.41	0.000%
11	-18.94	-22.40	-0.07	18.94	22.40	0.07	0.000%
12	-16.44	-22.40	-9.53	16.44	22.40	9.53	0.000%
13	-9.53	-22.40	-16.43	9.53	22.40	16.43	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
14	0.00	-34.54	0.00	0.00	34.54	0.00	0.000%
15	-0.02	-34.54	-4.61	0.02	34.54	4.61	0.000%
16	2.29	-34.54	-3.98	-2.29	34.54	3.98	0.000%
17	3.98	-34.54	-2.29	-3.98	34.54	2.29	0.000%
18	4.61	-34.54	0.02	-4.61	34.54	-0.02	0.000%
19	4.00	-34.54	2.32	-4.00	34.54	-2.32	0.000%
20	2.32	-34.54	4.00	-2.32	34.54	-4.00	0.000%
21	0.02	-34.54	4.61	-0.02	34.54	-4.61	0.000%
22	-2.29	-34.54	3.98	2.29	34.54	-3.98	0.000%
23	-3.98	-34.54	2.29	3.98	34.54	-2.29	0.000%
24	-4.61	-34.54	-0.02	4.61	34.54	0.02	0.000%
25	-4.00	-34.54	-2.32	4.00	34.54	2.32	0.000%
26	-2.32	-34.54	-4.00	2.32	34.54	4.00	0.000%
27	-0.02	-22.40	-6.55	0.02	22.40	6.55	0.000%
28	3.26	-22.40	-5.66	-3.26	22.40	5.66	0.000%
29	5.66	-22.40	-3.25	-5.66	22.40	3.25	0.000%
30	6.55	-22.40	0.02	-6.55	22.40	-0.02	0.000%
31	5.69	-22.40	3.30	-5.69	22.40	-3.30	0.000%
32	3.30	-22.40	5.69	-3.30	22.40	-5.69	0.000%
33	0.02	-22.40	6.55	-0.02	22.40	-6.55	0.000%
34	-3.26	-22.40	5.66	3.26	22.40	-5.66	0.000%
35	-5.66	-22.40	3.25	5.66	22.40	-3.25	0.000%
36	-6.55	-22.40	-0.02	6.55	22.40	0.02	0.000%
37	-5.69	-22.40	-3.30	5.69	22.40	3.30	0.000%
38	-3.30	-22.40	-5.69	3.30	22.40	5.69	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	4	0.00000001	0.00006071
3	Yes	4	0.00000001	0.00092975
4	Yes	4	0.00000001	0.00091537
5	Yes	4	0.00000001	0.00008078
6	Yes	5	0.00000001	0.00002309
7	Yes	4	0.00000001	0.00092212
8	Yes	4	0.00000001	0.00004089
9	Yes	4	0.00000001	0.00093749
10	Yes	4	0.00000001	0.00095294
11	Yes	4	0.00000001	0.00005962
12	Yes	4	0.00000001	0.00091714
13	Yes	4	0.00000001	0.00099553
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00065423
16	Yes	4	0.00000001	0.00068891
17	Yes	4	0.00000001	0.00068970
18	Yes	4	0.00000001	0.00065827
19	Yes	4	0.00000001	0.00070285
20	Yes	4	0.00000001	0.00070196
21	Yes	4	0.00000001	0.00066063
22	Yes	4	0.00000001	0.00069383
23	Yes	4	0.00000001	0.00069290
24	Yes	4	0.00000001	0.00065638
25	Yes	4	0.00000001	0.00069513
26	Yes	4	0.00000001	0.00069611
27	Yes	4	0.00000001	0.00001332
28	Yes	4	0.00000001	0.00006518
29	Yes	4	0.00000001	0.00006299
30	Yes	4	0.00000001	0.00001620
31	Yes	4	0.00000001	0.00007595
32	Yes	4	0.00000001	0.00006297
33	Yes	4	0.00000001	0.00001244
34	Yes	4	0.00000001	0.00006649
35	Yes	4	0.00000001	0.00006912
36	Yes	4	0.00000001	0.00001509
37	Yes	4	0.00000001	0.00006220
38	Yes	4	0.00000001	0.00007471

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 70.75	16.638	32	1.4536	0.0062
L2	74.75 - 34.75	5.469	31	0.7569	0.0009
L3	40 - 0	1.452	31	0.3391	0.0003

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120'	(2) 7770.00 w/ Mount Pipe	32	16.638	1.4536	0.0063	24395
109'	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	32	13.575	1.2764	0.0046	11088

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 70.75	47.966	6	4.1911	0.0180
L2	74.75 - 34.75	15.784	6	2.1846	0.0026
L3	40 - 0	4.191	6	0.9790	0.0008

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120'	(2) 7770.00 w/ Mount Pipe	6	47.966	4.1911	0.0180	8532
109'	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	6	39.143	3.6808	0.0133	3877

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	120 - 70.75 (1)	TP32.28x18x0.1875	49'3"	0'	0.0	37.332	18.4088	-7.51	687.23	0.011
L2	70.75 - 34.75 (2)	TP42.35x30.7452x0.3125	40'	0'	0.0	39.000	40.1852	-13.01	1567.22	0.008
L3	34.75 - 0 (3)	TP51.8x40.2019x0.375	40'	0'	0.0	39.000	61.2086	-22.39	2387.14	0.009

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	120 - 70.75 (1)	TP32.28x18x0.1875	478.25	40.770	37.332	1.092	0.00	0.000	37.332	0.000
L2	70.75 - 34.75 (2)	TP42.35x30.7452x0.3125	982.57	29.345	39.000	0.752	0.00	0.000	39.000	0.000
L3	34.75 - 0 (3)	TP51.8x40.2019x0.375	1678.25	25.914	39.000	0.664	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	120 - 70.75 (1)	TP32.28x18x0.1875	13.21	0.718	26.000	0.055	0.80	0.033	26.000	0.001
L2	70.75 - 34.75 (2)	TP42.35x30.7452x0.3125	15.83	0.394	26.000	0.030	0.80	0.012	26.000	0.000
L3	34.75 - 0 (3)	TP51.8x40.2019x0.375	19.01	0.311	26.000	0.024	0.80	0.006	26.000	0.000

Pole Interaction Design Data

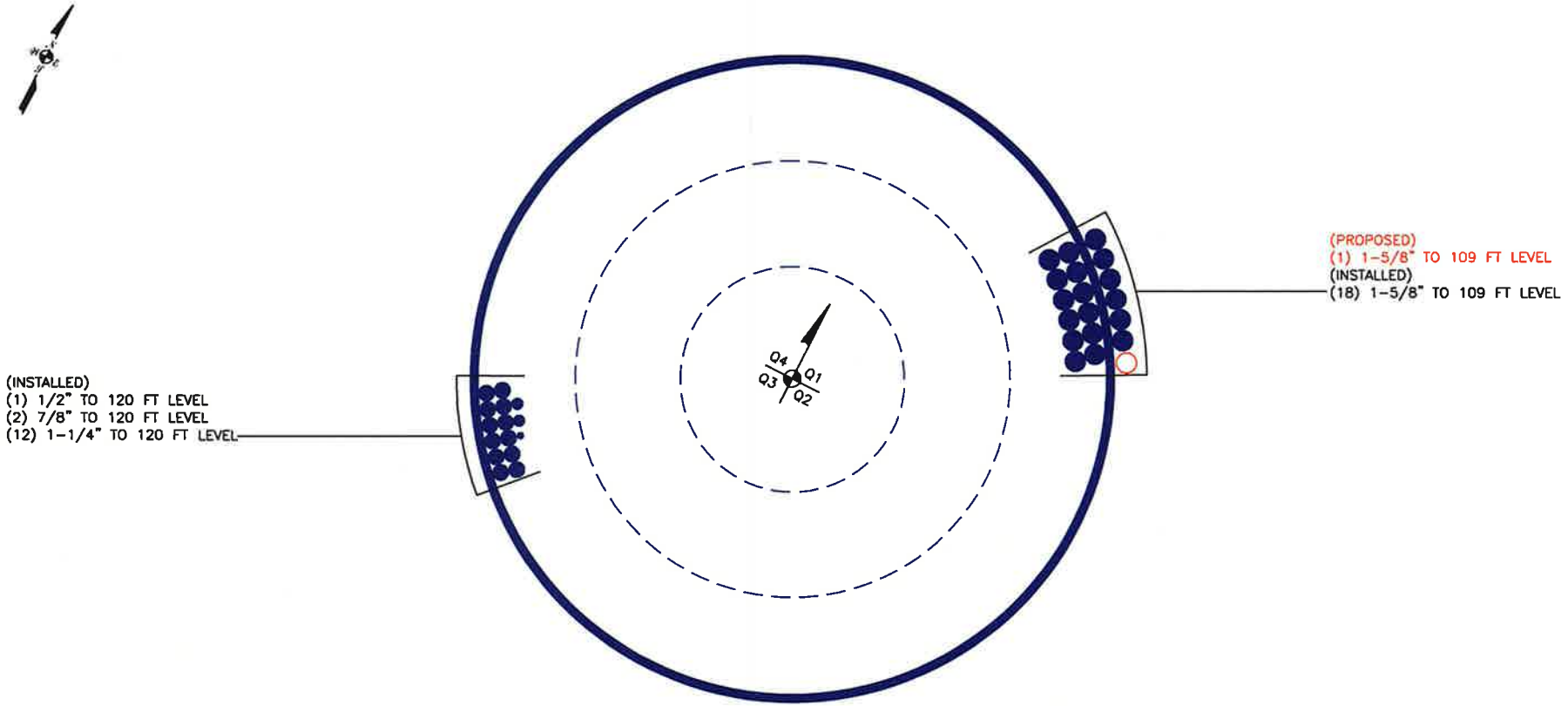
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 70.75 (1)	0.011	1.092	0.000	0.055	0.001	1.104 ✔	1.333	H1-3+VT ✔
L2	70.75 - 34.75 (2)	0.008	0.752	0.000	0.030	0.000	0.761 ✔	1.333	H1-3+VT ✔
L3	34.75 - 0 (3)	0.009	0.664	0.000	0.024	0.000	0.674 ✔	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	120 - 70.75	Pole	TP32.28x18x0.1875	1	-7.51	916.08	82.8	Pass
L2	70.75 - 34.75	Pole	TP42.35x30.7452x0.3125	2	-13.01	2089.10	57.1	Pass
L3	34.75 - 0	Pole	TP51.8x40.2019x0.375	3	-22.39	3182.06	50.6	Pass
							Summary	
						Pole (L1)	82.8	Pass
						RATING =	**82.8**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 842867 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

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

Site Data

BU#: *842867*
Site Name: *MANSFIELD FOUR CORNER*
App #: *244214 Rev 10*

Anchor Rod Data		
Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	59	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	57	in
Thick:	3	in
Grade:	55	ksi
Clip Distance:	7	in

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

Pole Data		
Diam:	51.8	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	1678	ft-kips
Unfactored Axial, P:	22	kips
Unfactored Shear, V:	19	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	83.9 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	43.1% **Pass**

Base Plate Results	Flexural Check
Base Plate Stress:	22.3 ksi
Allowable PL Bending Stress:	55.0 ksi
Base Plate Stress Ratio:	40.6% **Pass**

PL Ref. Data
Yield Line (in): 28.81
Max PL Length: 28.81

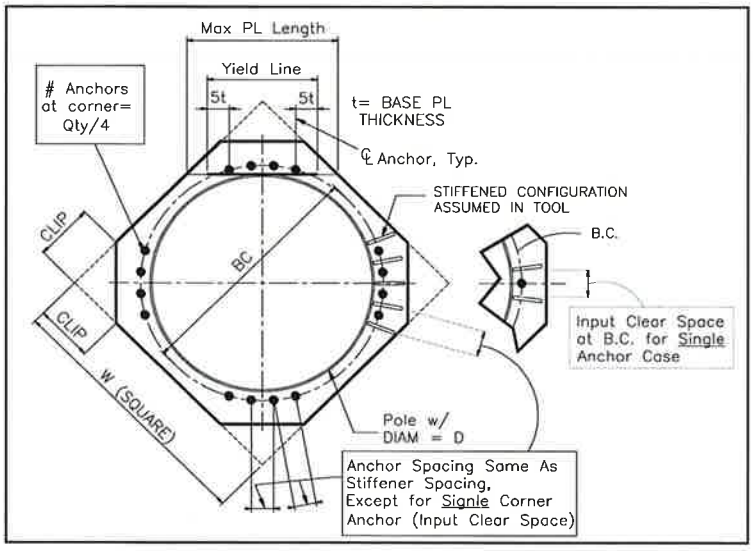
N/A - Unstiffened

Stiffener Results

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

Pole Results

Pole Punching Shear Check:	N/A



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

CCI Foundation Tool Suite - Monopole Pier

CCIFTS 1.2.108.14286 - Phase 1-2 Date: 12/31/2014

BU:	842867
Site Name:	MANSFIELD FOUR CORNERS
App Number:	244214 Rev 10
Work Order:	978074

CROWN CASTLE

Monopole Drilled Pier

Input

Criteria

TIA Revision:	F
ACI 318 Revision:	2002
Seismic Category:	B

Forces

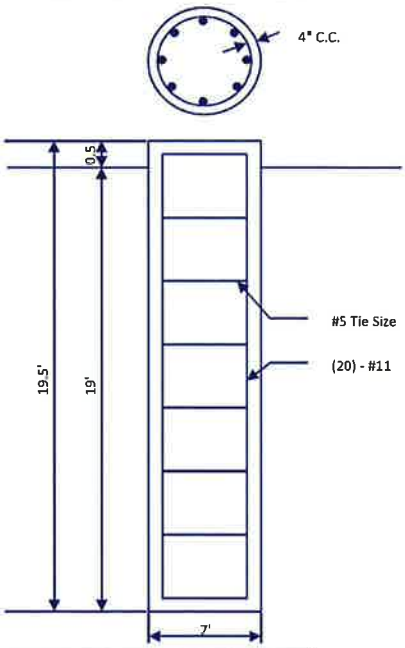
Compression	22 kips
Shear	19 kips
Moment	1678 k-ft
Swelling Force	0 kips

Foundation Dimensions

Pier Diameter:	7 ft
Ext. above grade:	0.5 ft
Depth below grade:	19 ft

Material Properties

Number of Rebar:	20
Rebar Size:	11
Tie Size	5
Rebar tensile strength:	60 ksi
Concrete Strength:	3000 psi
Ultimate Concrete Strain	0.003 in/in
Clear Cover to Ties:	4 in



Soil Profile: 842867

Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3.5	0	3.5	130					0	
2	9.5	3.5	13	130		32			0	
3	6	13	19	67.6		32			8	

Analysis Results

Soil Lateral Capacity

Depth to Zero Shear:	4.84 ft
Max Moment, Mu:	1764.32 k-ft
Soil Safety Factor:	2.61
Safety Factor Req'd:	2
RATING:	76.5%

Soil Axial Capacity

Skin Friction (k):	103.62 kips
End Bearing (k):	153.94 kips
Comp. Capacity (k), ϕCn:	257.56 kips
Comp. (k), Cu:	28.60 kips
RATING:	11.1%

Concrete/Steel Check

Mu (from soil analysis)	2293.61 k-ft
ϕMn	4895.56 k-ft
RATING:	46.9%

rho provided	0.56
rho required	0.33 OK
Rebar Spacing	10.11
Spacing required	22.56 OK
Dev. Length required	13.83
Dev. Length provided	61.78 OK

Overall Foundation Rating: 76.5%