Robinson+Cole

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Also admitted in Massachusetts

January 8, 2016

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 (Storrs), Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 109-foot level of the existing 120-foot tower at 497 Middle Turnpike in Mansfield, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of the tower in 2007. Cellco now intends to modify its facility by replacing three (3) of its existing antennas with two (2) model LNX-6514DS, 700 MHz antennas and one (1) model LNX-4514DS, 700 MHz antenna, at the same 109-foot level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") and one (1) HYBRIFLEX™ fiber optic antenna cable. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to 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 and Crown, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be located at the 109-foot level on the 120-foot tower.

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

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

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

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Matthew W. Hart, Mansfield Town Manger
Ann Brodin, Trustee
Crown
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6514DS-VTM

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

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	15.8	15.9
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Vertical, degrees	12.4	11.2
Beam Tilt, degrees	0–10	0–10
USLS (First Lobe), dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	23	23
CPR at Sector, dB	12	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**
Gain by all Beam Tilts, average, dBi	15.6	15.7
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.5
Gain by Beam Tilt, average, dBi	0 ° | 15.7 5 ° | 15.7 10 ° | 15.3	0 ° | 15.9 5 ° | 15.8 10 ° | 15.3
Beamwidth, Horizontal Tolerance, degrees	±0.9	±1.4
Beamwidth, Vertical Tolerance, degrees	±0.8	±0.6
USLS, beampeak to 20° above beampeak, dB	18	20
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	25	24
CPR at Sector, dB	15	12

* 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®
Band	Single band
Brand	DualPol® | Teletilt®

Product Specifications

LNX-6514DS-VTM

Operating Frequency Band	698 – 896 MHz
Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	180.5 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight	14.2 kg | 31.3 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	LNX-6514DS-A1M
RET System	Teletilt®

Packed Dimensions

Depth	284.0 mm | 11.2 in
Length	2163.0 mm | 85.2 in
Width	411.0 mm | 16.2 in
Shipping Weight	32.3 kg | 71.2 lb

Regulatory Compliance/Certifications

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

Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

Product Specifications

LNX-6514DS-VTM

DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

Product Specifications

COMMSCOPE®

LNX-4514DS-VTM

Andrew® Antenna, 698–896 MHz, 45° horizontal beamwidth, RET compatible

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.5	16.4
Beamwidth, Horizontal, degrees	47	45
Beamwidth, Vertical, degrees	17.3	15.8
Beam Tilt, degrees	2–18	2–18
USLS, typical, dB	16	15
Front-to-Back Ratio at 180°, dB	32	28
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	500	500
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	586.4 N @ 150 km/h 131.8 lbf @ 150 km/h
Wind Speed, maximum	241.4 km/h | 150.0 mph
Antenna Dimensions, L x W x D	1308.0 mm x 389.0 mm x 163.0 mm | 51.5 in x 15.3 in x 6.4 in
Net Weight	13.3 kg | 29.3 lb
Model with factory installed AISG 2.0 RET	LNX-4514DS-A1M

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.

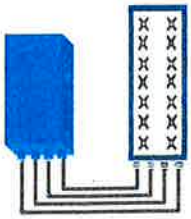
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

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)

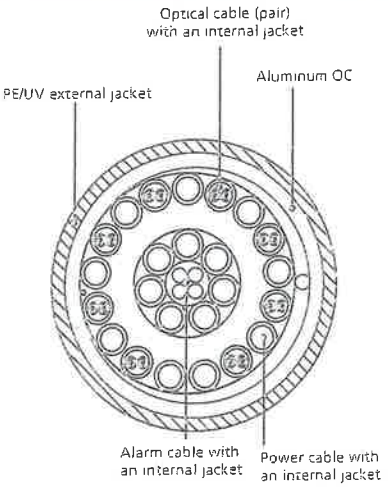


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Mansfield								
Tower Height: 120'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T	2	565	123	0.0297	880	0.5867	0.51%	
*AT&T	2	875	123	0.0460	1900	1.0000	0.46%	
*AT&T	1	283	123	0.0074	880	0.5867	0.13%	
*AT&T	4	525	123	0.0552	1900	1.0000	0.55%	
*AT&T	1	1375	123	0.0361	734	0.4893	0.74%	
Verizon	**11**	**476**	**109**	**0.1585**	**1970**	**1.0000**	**15.85%**	
Verizon	**9**	**303**	**109**	**0.0825**	**869**	**0.5793**	**14.25%**	
Verizon	**1**	**2806**	**109**	**0.0849**	**2145**	**1.0000**	**8.49%**	
Verizon	**1**	**1098**	**109**	**0.0332**	**746**	**0.4973**	**6.68%**	
								47.6%
* Source: Siting Council								

ATTACHMENT 3

Date: **November 20, 2015**

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

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**
Crown Castle Designation:	**Crown Castle BU Number:** 842867
	Crown Castle Site Name: MANSFIELD FOUR CORNERS
	Crown Castle JDE Job Number: 356355
	Crown Castle Work Order Number: 1154585
	Crown Castle Application Number: 321526 Rev. 0
Engineering Firm Designation:	**Aero Solutions, LLC. Project Number:** [redacted]
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 Holly Haas,

Aero Solutions, LLC. is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 846920, in accordance with application 321526, revision 0.

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

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

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 85 mph fastest mile.

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

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

Structural analysis prepared by: Sina Erturk

Respectfully submitted by:

Ryan C Spalding

STATE OF CONNECTICUT
RYAN C SPALDING
0030849
LICENSED PROFESSIONAL ENGINEER

Ryan Spalding, P.E.
Structural Engineer
CT PE#: 30849
Expires: 01/31/2016

11.20.2015

TABLE OF CONTENTS

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	RRH2x60-700	1	1-5/8"	
		1	commscope	LNX-4514DS-A1M w/ Mount Pipe			
		2	commscope	LNX-6514DS-A1M w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing 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	tower mounts	Platform Mount [LP 303-1]			
109.0	109.0	3	alcatel lucent	RRH2X60-1900	18	1-5/8"	1
		3	alcatel lucent	RRH2X60-AWS			
		2	antel	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	1	1-5/8"	2
		6	commscope	HBXX-6517DS-A2M w/ Mount Pipe			1
		3	commscope	LNX-8513DS-VTM w/ Mount Pipe			
		1	rfs celwave	APX75-866514-CT0 w/			2

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
				Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			1
		1	tower mounts	Platform Mount [LP 303-1]			

Notes:
1) Existing Equipment
2) 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)
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. 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	120 - 70.75	Pole	TP32.28x18x0.1875	1	-7.61	916.08	86.7	Pass
L2	70.75 - 34.75	Pole	TP42.35x30.7452x0.3125	2	-13.24	2089.10	59.6	Pass
L3	34.75 - 0	Pole	TP51.8x40.2019x0.375	3	-22.35	3149.24	52.5	Pass
							Summary	
						Pole (L1)	86.7	Pass
						Rating =	86.7	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	44.8	Pass
1	Base Plate	0	42.2	Pass
1	Base Foundation	0	48.7	Pass
1	Base Foundation Soil Interaction	0	70.3	Pass

Structure Rating (max from all components) =	86.7%

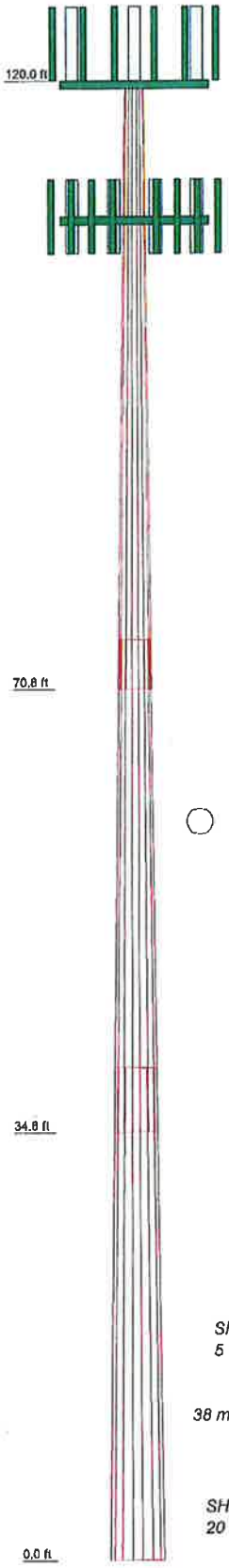
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT



Section	1	2	3
Length (ft)	49.25	40.00	40.00
Number of Sides	18	18	18
Thickness (in)	0.1875	0.3125	0.3750
Socket Length (ft)	4.00	5.25	
Top Dia (in)	18.0000	30.7452	40.2019
Bot Dia (in)	32.2600	42.3500	51.8000
Grade	A607-65		
Weight (K)	2.5	4.9	7.4

14.8

AXIAL
38 K

SHEAR
5 K

MOMENT
447 kip-ft

TORQUE 0 kip-ft
38 mph WIND - 1.0000 In ICE

AXIAL
23 K

SHEAR
20 K

MOMENT
1744 kip-ft

TORQUE 1 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 7770.00 w/ Mount Pipe	120	LNX-6513DS-VTM w/ Mount Pipe	109
AM-X-CD-16-65-00T-RET w/ Mount Pipe	120	(2) HBXX-6517DS-A2M w/ Mount Pipe	109
(2) LGP21401	120	RRH2X60-AWS	109
(2) LGP21903	120	RRH2X60-1900	109
(2) RRUS 11	120	LNX-6514DS-A1M w/ Mount Pipe	109
(2) 7770.00 w/ Mount Pipe	120	RRH2x60-700	109
AM-X-CD-16-65-00T-RET w/ Mount Pipe	120	LNX-6513DS-VTM w/ Mount Pipe	109
(2) LGP21401	120	(2) HBXX-6517DS-A2M w/ Mount Pipe	109
(2) LGP21903	120	DB-T1-6Z-8AB-0Z	109
(2) RRUS 11	120	RRH2X60-AWS	109
(2) 7770.00 w/ Mount Pipe	120	RRH2X60-1900	109
SBNH-1D6565C w/ Mount Pipe	120	LNX-6514DS-A1M w/ Mount Pipe	109
(2) LGP21401	120	RRH2x60-700	109
(2) LGP21903	120	LNX-6513DS-VTM w/ Mount Pipe	109
(2) RRUS 11	120	(2) HBXX-6517DS-A2M w/ Mount Pipe	109
DC6-48-60-18-8F	120	RRH2X60-AWS	109
Platform Mount [LP 303-1]	120	RRH2X60-1900	109
6' x 2" Mount Pipe	120	LNX-6514DS-A1M w/ Mount Pipe	109
6' x 2" Mount Pipe	120	RRH2x60-700	109
6' x 2" Mount Pipe	120	DB-T1-6Z-8AB-0Z	109
		Platform Mount [LP 303-1]	109

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: 86.7%

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

Job: BU#842867 MANSFIELD FOUR CORNERS			
Project: Existing 120 ft. Monopole			
Client: Crown Castle	Drawn by: roplatka	App'd:	
Code: TIA/EIA-222-F	Date: 11/20/15	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 Poles
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	√ Include Shear-Torsion Interaction
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	Always Use Sub-Critical Flow
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Use Top Mounted Sockets
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	
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	120.00-70.75	49.25	4.00	18	18.0000	32.2800	0.1875	0.7500	A607-65 (65 ksi)
L2	70.75-34.75	40.00	5.25	18	30.7452	42.3500	0.3125	1.2500	A607-65 (65 ksi)
L3	34.75-0.00	40.00		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

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L2	32.3979	30.1854	3531.9616	10.8036	15.6186	226.1387	7068.5707	15.0956	4.8612	15.556
	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 120.00-70.75				1	1	1		
L2 70.75-34.75				1	1	1		
L3 34.75-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
***								
LDF4-50A(1/2")	C	No	Inside Pole	120.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
LDF5-50A(7/8)	C	No	Inside Pole	120.00 - 0.00	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)	C	No	Inside Pole	120.00 - 0.00	12	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
						2" Ice	0.00	0.60
						4" Ice	0.00	0.60
***								
HJ7-50A(1-5/8)	A	No	Inside Pole	109.00 - 0.00	11	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
						2" Ice	0.00	1.04
						4" Ice	0.00	1.04
HB158-1-08U8-S8J18(1-5/8)	A	No	CaAa (Out Of Face)	109.00 - 0.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	2.81
						1" Ice	0.00	4.94
						2" Ice	0.00	11.03
						4" Ice	0.00	30.52
HJ7-50A(1-5/8)	A	No	CaAa (Out Of Face)	109.00 - 0.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55
						1" Ice	0.00	4.68
						2" Ice	0.00	10.76

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						4" Ice	0.00	30.26
HJ7-50A(1-5/8)	A	No	CaAa (Out Of Face)	109.00 - 0.00	1	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
						1" Ice	0.40	4.68
						2" Ice	0.60	10.76
						4" Ice	1.00	30.26
***								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	120.00-70.75	A	0.000	0.000	0.000	7.574	0.77
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.39
L2	70.75-34.75	A	0.000	0.000	0.000	7.128	0.72
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.29
L3	34.75-0.00	A	0.000	0.000	0.000	6.880	0.70
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.28

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	120.00-70.75	A	1.133	0.000	0.000	0.000	16.242	2.13
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.39
L2	70.75-34.75	A	1.057	0.000	0.000	0.000	15.286	2.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.29
L3	34.75-0.00	A	1.000	0.000	0.000	0.000	14.226	1.80
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.28

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	120.00-70.75	0.0000	-0.2285	0.0000	-0.4217
L2	70.75-34.75	0.0000	-0.2791	0.0000	-0.5315
L3	34.75-0.00	0.0000	-0.2826	0.0000	-0.5339

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
***									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	-30.0000	120.00	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
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	-30.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.30 7.48 8.37 10.18 14.02	0.07 0.14 0.21 0.38 0.87
(2) LGP21401	A	From Leg	4.00 0.00 3.00	-30.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.36 0.48 0.60 0.87 1.52	0.01 0.02 0.03 0.05 0.14
(2) LGP21903	A	From Leg	4.00 0.00 3.00	-30.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.02 0.03 0.07
(2) RRUS 11	A	From Leg	4.00 0.00 3.00	-30.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.10 0.15 0.31
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	-30.0000	120.00	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
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.30 7.48 8.37 10.18 14.02	0.07 0.14 0.21 0.38 0.87
(2) LGP21401	B	From Leg	4.00 0.00 3.00	-30.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.36 0.48 0.60 0.87 1.52	0.01 0.02 0.03 0.05 0.14
(2) LGP21903	B	From Leg	4.00 0.00 3.00	-30.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.02 0.03 0.07
(2) RRUS 11	B	From Leg	4.00 0.00 3.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.10 0.15 0.31
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	-30.0000	120.00	No Ice 1/2" Ice 1" Ice	6.12 6.63 7.13 8.16	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29

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	10.36	10.41	0.66
						4" Ice			
SBNH-1D6565C w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.0000	120.00	No Ice	11.68	9.84	0.10
						1/2" Ice	12.40	11.37	0.19
						1" Ice	13.14	12.91	0.29
						2" Ice	14.60	15.27	0.52
						4" Ice	17.87	20.14	1.17
(2) LGP21401	C	From Leg	4.00 0.00 3.00	-30.0000	120.00	No Ice	1.29	0.36	0.01
						1/2" Ice	1.45	0.48	0.02
						1" Ice	1.61	0.60	0.03
						2" Ice	1.97	0.87	0.05
						4" Ice	2.79	1.52	0.14
(2) LGP21903	C	From Leg	4.00 0.00 3.00	-30.0000	120.00	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) RRUS 11	C	From Leg	4.00 0.00 3.00	0.0000	120.00	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
DC6-48-60-18-8F	C	From Leg	4.00 0.00 3.00	-30.0000	120.00	No Ice	2.57	2.57	0.02
						1/2" Ice	2.80	2.80	0.04
						1" Ice	3.04	3.04	0.07
						2" Ice	3.54	3.54	0.13
						4" Ice	4.66	4.66	0.30
Platform Mount [LP 303-1]	C	None		0.0000	120.00	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
6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
						4" Ice	4.70	4.70	0.23
6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
						4" Ice	4.70	4.70	0.23
6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	120.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
						4" Ice	4.70	4.70	0.23
***									
LNX-8513DS-VTM w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	109.00	No Ice	8.65	7.08	0.06
						1/2" Ice	9.31	8.27	0.13
						1" Ice	9.93	9.18	0.21
						2" Ice	11.20	11.02	0.39
						4" Ice	13.87	15.06	0.90
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	4.00 0.00	0.0000	109.00	No Ice	8.98	6.96	0.07
						1/2"	9.65	8.18	0.14

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	10.29	9.14	0.21
						1" Ice	11.59	11.02	0.40
						2" Ice	14.32	15.03	0.91
						4" Ice			
RRH2X60-AWS	A	From Leg	4.00	0.0000	109.00	No Ice	2.19	1.43	0.04
			0.00			1/2"	2.40	1.61	0.06
			0.00			Ice	2.61	1.80	0.08
						1" Ice	3.07	2.21	0.13
						2" Ice	4.09	3.13	0.26
						4" Ice			
RRH2X60-1900	A	From Leg	4.00	0.0000	109.00	No Ice	2.19	1.41	0.04
			0.00			1/2"	2.39	1.59	0.06
			0.00			Ice	2.61	1.78	0.08
						1" Ice	3.07	2.18	0.12
						2" Ice	4.08	3.10	0.26
						4" Ice			
LNX-6514DS-A1M w/ Mount Pipe	A	From Leg	4.00	0.0000	109.00	No Ice	8.65	7.08	0.06
			0.00			1/2"	9.31	8.27	0.13
			0.00			Ice	9.93	9.18	0.21
						1" Ice	11.20	11.02	0.39
						2" Ice	13.87	15.06	0.90
						4" Ice			
RRH2x60-700	A	From Leg	4.00	0.0000	109.00	No Ice	3.96	1.82	0.06
			0.00			1/2"	4.27	2.08	0.08
			0.00			Ice	4.60	2.36	0.11
						1" Ice	5.27	2.96	0.17
						2" Ice	6.72	4.25	0.35
						4" Ice			
LNX-8513DS-VTM w/ Mount Pipe	B	From Leg	4.00	0.0000	109.00	No Ice	8.65	7.08	0.06
			0.00			1/2"	9.31	8.27	0.13
			0.00			Ice	9.93	9.18	0.21
						1" Ice	11.20	11.02	0.39
						2" Ice	13.87	15.06	0.90
						4" Ice			
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	4.00	0.0000	109.00	No Ice	8.98	6.96	0.07
			0.00			1/2"	9.65	8.18	0.14
			0.00			Ice	10.29	9.14	0.21
						1" Ice	11.59	11.02	0.40
						2" Ice	14.32	15.03	0.91
						4" Ice			
DB-T1-6Z-8AB-0Z	B	From Leg	4.00	0.0000	109.00	No Ice	5.60	2.33	0.04
			0.00			1/2"	5.92	2.56	0.08
			0.00			Ice	6.24	2.79	0.12
						1" Ice	6.91	3.28	0.21
						2" Ice	8.37	4.37	0.45
						4" Ice			
RRH2X60-AWS	B	From Leg	4.00	0.0000	109.00	No Ice	2.19	1.43	0.04
			0.00			1/2"	2.40	1.61	0.06
			0.00			Ice	2.61	1.80	0.08
						1" Ice	3.07	2.21	0.13
						2" Ice	4.09	3.13	0.26
						4" Ice			
RRH2X60-1900	B	From Leg	4.00	0.0000	109.00	No Ice	2.19	1.41	0.04
			0.00			1/2"	2.39	1.59	0.06
			0.00			Ice	2.61	1.78	0.08
						1" Ice	3.07	2.18	0.12
						2" Ice	4.08	3.10	0.26
						4" Ice			
LNX-4514DS-A1M w/ Mount Pipe	B	From Leg	4.00	0.0000	109.00	No Ice	7.90	4.54	0.05
			0.00			1/2"	8.40	5.23	0.10
			0.00			Ice	8.91	5.92	0.17
						1" Ice	9.96	7.40	0.31
						2" Ice	12.18	10.60	0.73
						4" Ice			
RRH2x60-700	B	From Leg	4.00	0.0000	109.00	No Ice	3.96	1.82	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	4.27	2.08	0.08
			0.00			1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
LNX-8513DS-VTM w/ Mount Pipe	C	From Leg	4.00	0.0000	109.00	No Ice	8.65	7.08	0.06
			0.00			1/2" Ice	9.31	8.27	0.13
			0.00			1" Ice	9.93	9.18	0.21
						2" Ice	11.20	11.02	0.39
						4" Ice	13.87	15.06	0.90
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	4.00	0.0000	109.00	No Ice	8.98	6.96	0.07
			0.00			1/2" Ice	9.65	8.18	0.14
			0.00			1" Ice	10.29	9.14	0.21
						2" Ice	11.59	11.02	0.40
						4" Ice	14.32	15.03	0.91
RRH2X60-AWS	C	From Leg	4.00	0.0000	109.00	No Ice	2.19	1.43	0.04
			0.00			1/2" Ice	2.40	1.61	0.06
			0.00			1" Ice	2.61	1.80	0.08
						2" Ice	3.07	2.21	0.13
						4" Ice	4.09	3.13	0.26
RRH2X60-1900	C	From Leg	4.00	0.0000	109.00	No Ice	2.19	1.41	0.04
			0.00			1/2" Ice	2.39	1.59	0.06
			0.00			1" Ice	2.61	1.78	0.08
						2" Ice	3.07	2.18	0.12
						4" Ice	4.08	3.10	0.26
LNX-6514DS-A1M w/ Mount Pipe	C	From Leg	4.00	0.0000	109.00	No Ice	8.65	7.08	0.06
			0.00			1/2" Ice	9.31	8.27	0.13
			0.00			1" Ice	9.93	9.18	0.21
						2" Ice	11.20	11.02	0.39
						4" Ice	13.87	15.06	0.90
RRH2x60-700	C	From Leg	4.00	0.0000	109.00	No Ice	3.96	1.82	0.06
			0.00			1/2" Ice	4.27	2.08	0.08
			0.00			1" Ice	4.60	2.36	0.11
						2" Ice	5.27	2.96	0.17
						4" Ice	6.72	4.25	0.35
DB-T1-6Z-8AB-0Z	C	From Leg	4.00	0.0000	109.00	No Ice	5.60	2.33	0.04
			0.00			1/2" Ice	5.92	2.56	0.08
			0.00			1" Ice	6.24	2.79	0.12
						2" Ice	6.91	3.28	0.21
						4" Ice	8.37	4.37	0.45
Platform Mount [LP 303-1]	C	None		0.0000	109.00	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

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	-16.84	0.94	0.88
			Max. Mx	11	-7.61	497.45	7.42
			Max. My	2	-7.64	7.60	484.52
			Max. Vy	11	-13.73	497.45	7.42
			Max. Vx	2	-13.41	7.60	484.52
			Max. Torque	13			1.22
L2	70.75 - 34.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-25.29	0.95	3.16
			Max. Mx	11	-13.25	1019.71	13.48
			Max. My	2	-13.26	13.24	996.22
			Max. Vy	11	-16.34	1019.71	13.48
			Max. Vx	2	-16.03	13.24	996.22
			Max. Torque	13			1.19
L3	34.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-38.45	0.95	6.26
			Max. Mx	11	-22.78	1735.73	20.54
			Max. My	2	-22.78	19.64	1700.34
			Max. Vy	11	-19.51	1735.73	20.54
			Max. Vx	2	-19.20	19.64	1700.34
			Max. Torque	13			1.15

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	25	38.45	4.12	2.37
	Max. H_x	11	22.79	19.50	0.16
	Max. H_z	2	22.79	0.16	19.19
	Max. M_x	2	1700.34	0.16	19.19
	Max. M_z	5	1735.21	-19.50	-0.16
	Max. Torsion	13	1.12	9.89	16.70
	Min. Vert	1	22.79	0.00	0.00
	Min. H_x	5	22.79	-19.50	-0.16
	Min. H_z	8	22.79	-0.16	-19.19
	Min. M_x	8	-1698.05	-0.16	-19.19
	Min. M_z	11	-1735.73	19.50	0.16
	Min. Torsion	7	-1.10	-9.89	-16.70

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	22.79	0.00	0.00	-1.13	0.25	0.00
Dead+Wind 0 deg - No Ice	22.79	-0.16	-19.19	-1700.34	19.64	-1.08
Dead+Wind 30 deg - No Ice	22.79	9.61	-16.54	-1463.01	-850.72	-0.74
Dead+Wind 60 deg - No Ice	22.79	16.81	-9.46	-833.95	-1493.05	-0.20
Dead+Wind 90 deg - No Ice	22.79	19.50	0.16	18.24	-1735.21	0.39
Dead+Wind 120 deg - No Ice	22.79	16.97	9.73	865.20	-1512.39	0.86
Dead+Wind 150 deg - No Ice	22.79	9.89	16.70	1480.06	-884.28	1.10
Dead+Wind 180 deg - No Ice	22.79	0.16	19.19	1698.05	-19.13	1.05
Dead+Wind 210 deg - No Ice	22.79	-9.61	16.54	1460.72	851.24	0.73
Dead+Wind 240 deg - No Ice	22.79	-16.81	9.46	831.65	1493.56	0.22
Dead+Wind 270 deg - No Ice	22.79	-19.50	-0.16	-20.54	1735.73	-0.36
Dead+Wind 300 deg - No Ice	22.79	-16.97	-9.73	-867.50	1512.90	-0.85
Dead+Wind 330 deg - No Ice	22.79	-9.89	-16.70	-1482.35	884.79	-1.12
Dead+Ice+Temp	38.45	-0.00	-0.00	-6.26	0.95	-0.00
Dead+Wind 0 deg+Ice+Temp	38.45	-0.03	-4.68	-440.24	5.20	-0.32
Dead+Wind 30 deg+Ice+Temp	38.45	2.34	-4.03	-379.99	-215.75	-0.24
Dead+Wind 60 deg+Ice+Temp	38.45	4.08	-2.31	-219.62	-378.63	-0.09
Dead+Wind 90 deg+Ice+Temp	38.45	4.73	0.03	-2.11	-439.80	0.08
Dead+Wind 120 deg+Ice+Temp	38.45	4.12	2.37	214.28	-382.87	0.23
Dead+Wind 150 deg+Ice+Temp	38.45	2.40	4.07	371.55	-223.08	0.31
Dead+Wind 180 deg+Ice+Temp	38.45	0.03	4.68	427.57	-3.27	0.32
Dead+Wind 210 deg+Ice+Temp	38.45	-2.34	4.03	367.32	217.69	0.24
Dead+Wind 240 deg+Ice+Temp	38.45	-4.08	2.31	206.95	380.57	0.09
Dead+Wind 270 deg+Ice+Temp	38.45	-4.73	-0.03	-10.57	441.73	-0.08
Dead+Wind 300 deg+Ice+Temp	38.45	-4.12	-2.37	-226.96	384.80	-0.23
Dead+Wind 330 deg+Ice+Temp	38.45	-2.40	-4.07	-384.23	225.01	-0.32
Dead+Wind 0 deg - Service	22.79	-0.05	-6.64	-589.43	6.97	-0.37
Dead+Wind 30 deg - Service	22.79	3.33	-5.72	-507.26	-294.36	-0.26
Dead+Wind 60 deg - Service	22.79	5.82	-3.27	-289.47	-516.74	-0.07
Dead+Wind 90 deg - Service	22.79	6.75	0.05	5.57	-600.60	0.13

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 120 deg - Service	22.79	5.87	3.37	298.81	-523.46	0.30
Dead+Wind 150 deg - Service	22.79	3.42	5.78	511.67	-305.98	0.38
Dead+Wind 180 deg - Service	22.79	0.05	6.64	587.13	-6.45	0.37
Dead+Wind 210 deg - Service	22.79	-3.33	5.72	504.96	294.88	0.26
Dead+Wind 240 deg - Service	22.79	-5.82	3.27	287.18	517.26	0.07
Dead+Wind 270 deg - Service	22.79	-6.75	-0.05	-7.86	601.12	-0.13
Dead+Wind 300 deg - Service	22.79	-5.87	-3.37	-301.10	523.97	-0.30
Dead+Wind 330 deg - Service	22.79	-3.42	-5.78	-513.97	306.50	-0.39

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-22.79	0.00	0.00	22.79	0.00	0.000%
2	-0.16	-22.79	-19.19	0.16	22.79	19.19	0.000%
3	9.61	-22.79	-16.54	-9.61	22.79	16.54	0.000%
4	16.81	-22.79	-9.46	-16.81	22.79	9.46	0.000%
5	19.50	-22.79	0.16	-19.50	22.79	-0.16	0.000%
6	16.97	-22.79	9.73	-16.97	22.79	-9.73	0.000%
7	9.89	-22.79	16.70	-9.89	22.79	-16.70	0.000%
8	0.16	-22.79	19.19	-0.16	22.79	-19.19	0.000%
9	-9.61	-22.79	16.54	9.61	22.79	-16.54	0.000%
10	-16.81	-22.79	9.46	16.81	22.79	-9.46	0.000%
11	-19.50	-22.79	-0.16	19.50	22.79	0.16	0.000%
12	-16.97	-22.79	-9.73	16.97	22.79	9.73	0.000%
13	-9.89	-22.79	-16.70	9.89	22.79	16.70	0.000%
14	0.00	-38.45	0.00	0.00	38.45	0.00	0.000%
15	-0.03	-38.45	-4.68	0.03	38.45	4.68	0.000%
16	2.34	-38.45	-4.03	-2.34	38.45	4.03	0.000%
17	4.08	-38.45	-2.31	-4.08	38.45	2.31	0.000%
18	4.73	-38.45	0.03	-4.73	38.45	-0.03	0.000%
19	4.12	-38.45	2.37	-4.12	38.45	-2.37	0.000%
20	2.40	-38.45	4.07	-2.40	38.45	-4.07	0.000%
21	0.03	-38.45	4.68	-0.03	38.45	-4.68	0.000%
22	-2.34	-38.45	4.03	2.34	38.45	-4.03	0.000%
23	-4.08	-38.45	2.31	4.08	38.45	-2.31	0.000%
24	-4.73	-38.45	-0.03	4.73	38.45	0.03	0.000%
25	-4.12	-38.45	-2.37	4.12	38.45	2.37	0.000%
26	-2.40	-38.45	-4.07	2.40	38.45	4.07	0.000%
27	-0.05	-22.79	-6.64	0.05	22.79	6.64	0.000%
28	3.33	-22.79	-5.72	-3.33	22.79	5.72	0.000%
29	5.82	-22.79	-3.27	-5.82	22.79	3.27	0.000%
30	6.75	-22.79	0.05	-6.75	22.79	-0.05	0.000%
31	5.87	-22.79	3.37	-5.87	22.79	-3.37	0.000%
32	3.42	-22.79	5.78	-3.42	22.79	-5.78	0.000%
33	0.05	-22.79	6.64	-0.05	22.79	-6.64	0.000%
34	-3.33	-22.79	5.72	3.33	22.79	-5.72	0.000%
35	-5.82	-22.79	3.27	5.82	22.79	-3.27	0.000%
36	-6.75	-22.79	-0.05	6.75	22.79	0.05	0.000%
37	-5.87	-22.79	-3.37	5.87	22.79	3.37	0.000%
38	-3.42	-22.79	-5.78	3.42	22.79	5.78	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	0.00014320
3	Yes	4	0.00000001	0.00096112
4	Yes	5	0.00000001	0.00002344
5	Yes	4	0.00000001	0.00008460
6	Yes	5	0.00000001	0.00002599
7	Yes	5	0.00000001	0.00002318
8	Yes	4	0.00000001	0.00007944
9	Yes	5	0.00000001	0.00002414
10	Yes	4	0.00000001	0.00099324
11	Yes	4	0.00000001	0.00002567
12	Yes	5	0.00000001	0.00002346
13	Yes	5	0.00000001	0.00002619
14	Yes	4	0.00000001	0.00000888
15	Yes	4	0.00000001	0.00071245
16	Yes	4	0.00000001	0.00074526
17	Yes	4	0.00000001	0.00074903
18	Yes	4	0.00000001	0.00071254
19	Yes	4	0.00000001	0.00075787
20	Yes	4	0.00000001	0.00074941
21	Yes	4	0.00000001	0.00069840
22	Yes	4	0.00000001	0.00073943
23	Yes	4	0.00000001	0.00074679
24	Yes	4	0.00000001	0.00072130
25	Yes	4	0.00000001	0.00077380
26	Yes	4	0.00000001	0.00077147
27	Yes	4	0.00000001	0.00002430
28	Yes	4	0.00000001	0.00006534
29	Yes	4	0.00000001	0.00007197
30	Yes	4	0.00000001	0.00001519
31	Yes	4	0.00000001	0.00008645
32	Yes	4	0.00000001	0.00006903
33	Yes	4	0.00000001	0.00002059
34	Yes	4	0.00000001	0.00007685
35	Yes	4	0.00000001	0.00006983
36	Yes	4	0.00000001	0.00001240
37	Yes	4	0.00000001	0.00007042
38	Yes	4	0.00000001	0.00008822

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 70.75	17.372	37	1.5184	0.0073
L2	74.75 - 34.75	5.702	37	0.7902	0.0013
L3	40 - 0	1.512	37	0.3533	0.0004

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	(2) 7770.00 w/ Mount Pipe	37	17.372	1.5184	0.0073	23312
109.00	LNX-8513DS-VTM w/ Mount Pipe	37	14.171	1.3332	0.0055	10596

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 70.75	50.058	12	4.3758	0.0212
L2	74.75 - 34.75	16.447	12	2.2793	0.0037
L3	40 - 0	4.361	12	1.0194	0.0011

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	(2) 7770.00 w/ Mount Pipe	12	50.058	4.3758	0.0212	8159
109.00	LNX-8513DS-VTM w/ Mount Pipe	12	40.841	3.8429	0.0161	3708

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	49.25	0.00	0.0	37.332	18.4088	-7.61	687.23	0.011
L2	70.75 - 34.75 (2)	TP42.35x30.7452x0.3125	40.00	0.00	0.0	39.000	40.1852	-13.24	1567.22	0.008
L3	34.75 - 0 (3)	TP51.8x40.2019x0.375	40.00	0.00	0.0	39.000	60.5774	-22.35	2362.52	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	500.61	42.677	37.332	1.143	0.00	0.000	37.332	0.000
L2	70.75 - 34.75 (2)	TP42.35x30.7452x0.3125	1025.22	30.619	39.000	0.785	0.00	0.000	39.000	0.000
L3	34.75 - 0 (3)	TP51.8x40.2019x0.375	1708.32	26.933	39.000	0.691	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	13.79	0.749	26.000	0.058	0.98	0.041	26.000	0.002
L2	70.75 - 34.75 (2)	TP42.35x30.7452x0.3125	16.41	0.408	26.000	0.031	0.92	0.013	26.000	0.001
L3	34.75 - 0 (3)	TP51.8x40.2019x0.375	19.57	0.323	26.000	0.025	0.85	0.007	26.000	0.000

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 $\frac{f_{vt}}{F_{vt}}$

Pole Interaction Design Data

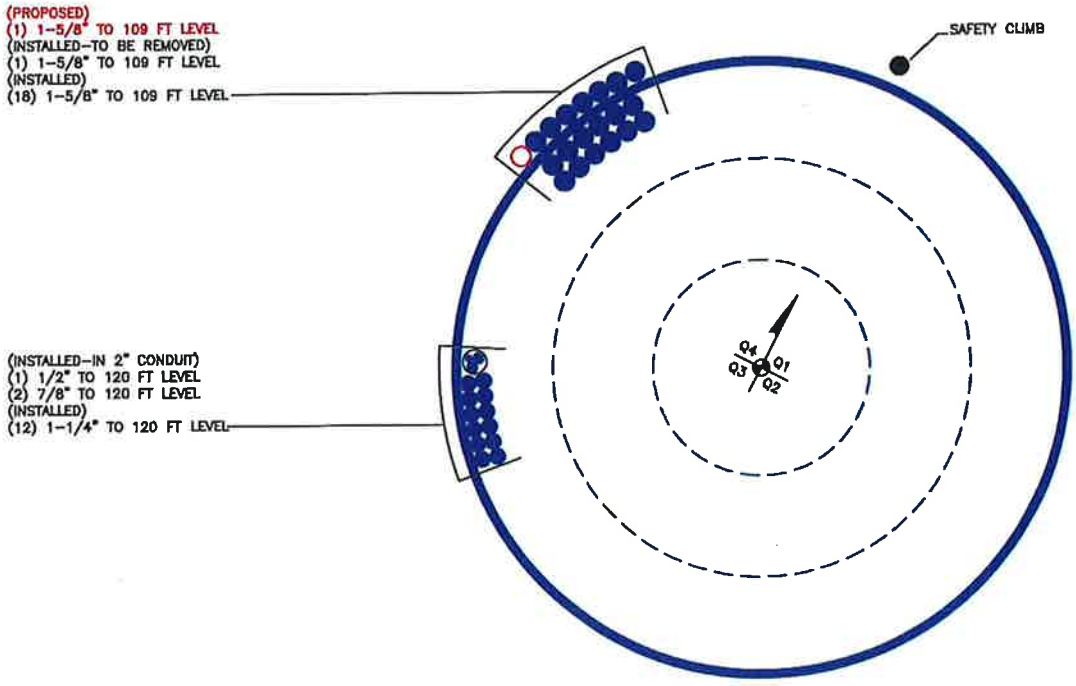
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 70.75 (1)	0.011	1.143	0.000	0.058	0.002	1.155 ✔	1.333	H1-3+VT ✔
L2	70.75 - 34.75 (2)	0.008	0.785	0.000	0.031	0.001	0.794 ✔	1.333	H1-3+VT ✔
L3	34.75 - 0 (3)	0.009	0.691	0.000	0.025	0.000	0.700 ✔	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	-7.61	916.08	86.7	Pass
L2	70.75 - 34.75	Pole	TP42.35x30.7452x0.3125	2	-13.24	2089.10	59.6	Pass
L3	34.75 - 0	Pole	TP51.8x40.2019x0.375	3	-22.35	3149.24	52.5	Pass
							Summary	
							Pole (L1) 86.7	Pass
							RATING = **86.7**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(PROPOSED)
(1) 1-5/8" TO 109 FT LEVEL
(INSTALLED-TO BE REMOVED)
(1) 1-5/8" TO 109 FT LEVEL
(INSTALLED)
(18) 1-5/8" TO 109 FT LEVEL
SAFETY CLIMB
(INSTALLED-IN 2" CONDUIT)
(1) 1/2" TO 120 FT LEVEL
(2) 7/8" TO 120 FT LEVEL
(INSTALLED)
(12) 1-1/4" TO 120 FT LEVEL
Q4
Q1
Q3
Q2

APPENDIX C

ADDITIONAL CALCULATIONS

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

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 CORN*
App #: *321526 R0*

Anchor Rod Data		
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:		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:	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:	1743.96803	ft-kips
Unfactored Axial, P:	22.7781	kips
Unfactored Shear, V:	19.570239	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	87.3 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	44.8% **Pass**

Base Plate Results Flexural Check

Base Plate Stress:	23.2 ksi
Allowable PL Bending Stress:	55.0 ksi
Base Plate Stress Ratio:	42.2% **Pass**

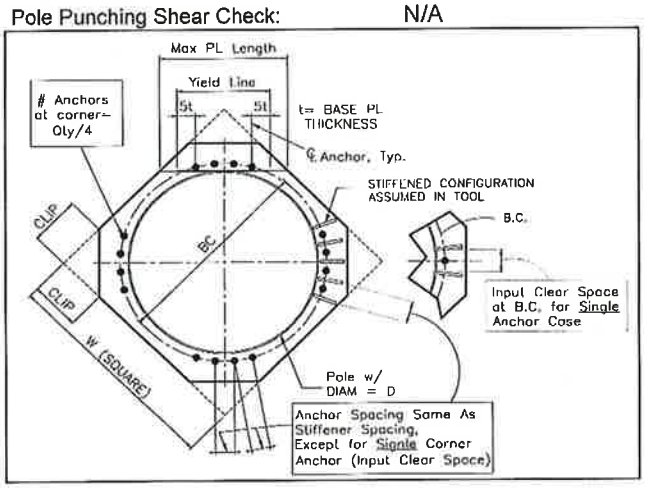
N/A - Unstiffened

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

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Number	842867
Site Name	MANSFIELD FOUR CORNERS

Caisson Analysis

Pier Properties		
Moment	1744	kip-ft
Shear	20	kip
Pier Diameter	7.0	ft
Height Above Grade	0.50	ft
Depth Below Grade	19.00	ft
Donut Diameter		ft
Donut Depth		ft

Analysis Properties		
TIA Code	F	
Soil Safety Factor	2.00	
Water Table Depth	13.0	ft
Ignored Soil Depth	3.5	ft
Cohesion Based on	PLS Caisson	
Max Soil Capacity	110%	

Soil Properties

Layer	Top of Soil Layer (ft)	Layer Thickness (ft)	Bottom of Soil Layer (ft)	Soil Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Soil.Layer	*Soil.Top*	*Soil.Thick*	*Soil.Bottom*	*Soil.Weight*	*Soil.Cohesion*	*Soil.Phi*
1	0.00	19	19.00	135	0	34
2						
3						
4						
5						
6						
7						
8						
9						
10						

Critical Depths Below Grade		
Rotation Axis	13.56	ft
Zero Shear	4.83	ft

Results		
Soil Capacity	70.3%	OK
Max Pier Moment	1836	kip-ft

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

V1.0

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

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

Site Data

BU#: *842867*
Site Name: *MANSFIELD FOUR CORNERS*
App #: *321526 R0*

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

Pier Properties		
Concrete:		
Pier Diameter =	7.0	ft
Concrete Area =	5541.8	in^2
Reinforcement:		
Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	6.11	ft
Vert. Cage Diameter =	73.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	20	
As Total=	31.2	in^2
A s/ Aconc, Rho:	0.0056	0.56%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:
(3)*(Sqrt(f'c)/Fy: 0.0027
200 / Fy: 0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.56%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	8280.46	kips
at Mu=(ϕ=0.65)Mn=	5016.69	ft-kips
Max Tu, (φ=0.9) Tn =	1684.8	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces		
TIA Revision:	F	
Max. Service Shaft M:	1835.976	ft-kips (* Note)
Max. Service Shaft P:	22.7781	kips
Max Axial Force Type:	Comp.	

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

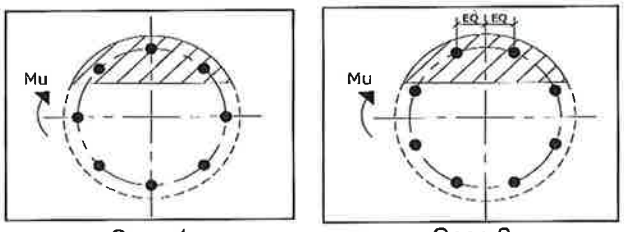
Load Factor	Shaft Factored Loads		
1.30	Mu:	2386.769	ft-kips
1.30	Pu:	29.61153	kips

Material Properties		
Concrete Comp. strength, f'c =	3000	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: **1**



Case 1 Case 2

Dist. From Edge to Neutral Axis: **13.54** in
Extreme Steel Strain, εt: **0.0144**
εt > 0.0050, Tension Controlled
Reduction Factor,φ: **0.900**

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	29.61	kips
Drilled Shaft Moment Capacity, φMn:	**4898.86**	ft-kips
Drilled Shaft Superimposed Mu:	**2386.77**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**48.7%**