Robinson+Cole

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

April 5, 2016

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

Re: **Notice of Exempt Modification – Facility Modification**
1218 Cromwell Avenue, Rocky Hill, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 150-foot level of the existing 173-foot tower at 1218 Cromwell Avenue in Rocky Hill, Connecticut (the Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of this tower in 2000. 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) HBXX-6517DS-VTM, 2100 MHz antennas, all at the same 150-foot level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.[1]

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 Guy Scaife, Town Manager for the Town of Rocky Hill. A copy of this letter is also being sent to Tabshey Development LLC, the owner of the Property and Crown, the tower owner.

[1] On October 20, 2014, the Council acknowledged Cellco's notice of intent to modify the existing wireless facility at 1218 Cromwell Avenue in Rocky Hill, Connecticut (EM-VER-119-141001). None of the facility modifications described in that filing were completed within one year of the approval and the approval has expired. This letter seeks Council acknowledgement for these same facility modifications.

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 platform at the 150-foot level on the existing 173-foot tower.

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

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

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table 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:
Guy Scaife, Rocky Hill Town Manager
Tabshey Development, LLC
Crown Castle
Tim Parks

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°

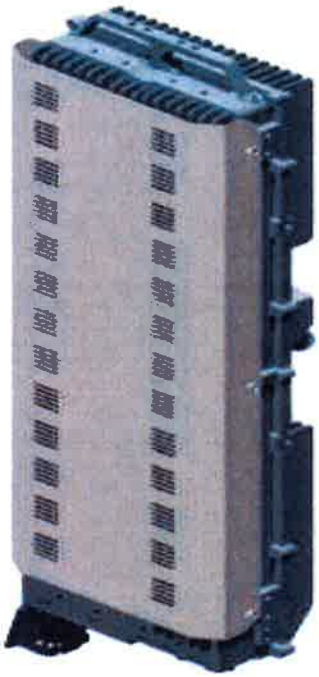
**Values calculated using NGMN Alliance N-P-BASTA v9.6*

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

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.

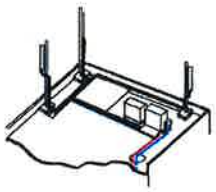
EASY INSTALLATION

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.

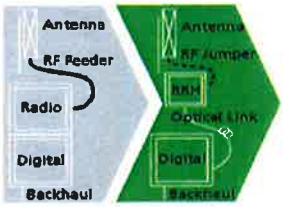
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

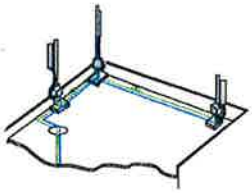
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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.

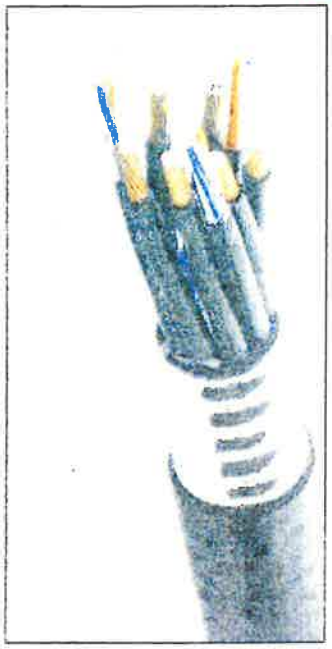


Figure 1: HYBRIFLEX Series

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-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)

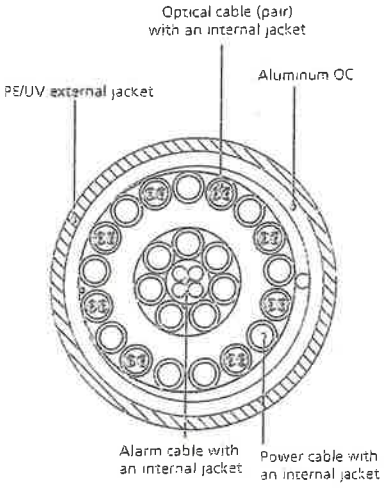


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Montville 2								
Tower Height: 173 ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
Metricom			156	0.0144		1.0000	0.14%	
Verizon	**11**	**412**	**150**	**0.0724**	**1970**	**1.0000**	**7.24%**	
Verizon	**9**	**388**	**150**	**0.0558**	**869**	**0.5793**	**9.63%**	
Verizon	**1**	**1750**	**150**	**0.0280**	**2145**	**1.0000**	**2.80%**	
Verizon	**1**	**1050**	**150**	**0.0168**	**698**	**0.4973**	**3.37%**	
								23.19%
* Source: Siting Council								

ATTACHMENT 3

Date: **August 28, 2014**

Charles McGuirt
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	119642
	Carrier Site Name:	Rocky Hill 2 CT
Crown Castle Designation:	**Crown Castle BU Number:**	801366
	Crown Castle Site Name:	ROCKY HILL 2
	Crown Castle JDE Job Number:	303666
	Crown Castle Work Order Number:	918271
	Crown Castle Application Number:	261418 Rev. 4
Engineering Firm Designation:	**Aero Solutions LLC Project Number:**	003-14-0889R1
Site Data:	**1218 Cromwell Ave, Rocky Hill, Hartford County, CT**	
	Latitude *41° 38' 13.3"*, Longitude *-72° 40' 24"*	
	173 Foot - Monopole Tower	

Dear Charles McGuirt,

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 685831, in accordance with application 261418, revision 4.

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

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

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 81 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: Shawn D. Cook, P.E.

Respectfully submitted by:

Shraddha Dharia, P.E.
Structural Engineer
CT PE#: PEN0028187
Expires: 1/31/2015

8.28.2014

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 173 ft Monopole tower designed by Summit in June of 2000. The tower was originally designed for a wind speed of 80 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 81 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
150.0	150.0	3	alcatel lucent	RRH2X60-AWS	1	1-5/8"	
		6	andrew	HBXX-6517DS-A2M w/ Mount Pipe			
		3	andrew	LNX-8513DS-A1M w/ Mount Pipe			
		1	rfs celwave	DB-B1-6C-12AB-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
174.0	174.0	1	tower mounts	Platform Mount [LP 1201-1]			1
150.0	150.0	3	andrew	LNX-6514DS-T4M w/ Mount Pipe	12	1-5/8"	1
		6	antel	LPA-80080/4CF w/ Mount Pipe			2
		6	rfs celwave	FD9R6004/2C-3L			1
		3	rymsa wireless	MG D5-800Tx w/ Mount Pipe			2
		1	tower mounts	Platform Mount [LP 601-1]			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)
174	174	12	SWEDCOM	ALP-9212-N		
166	166	12	SWEDCOM	ALP-9212-N		
156	156	12	SWEDCOM	ALP-9212-N		
146	146	12	SWEDCOM	ALP-9212-N		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
136	136	12	SWEDCOM	ALP-9212-N		
126	126	12	SWEDCOM	ALP-9212-N		
101	101	2		GPS ANTENNA		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Rizzo Associates, Inc.	639257	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit Manufacturing, LLC	679665	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit Manufacturing, LLC	639263	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	173 - 127	Pole	TP35.568x26x0.25	1	-7.617	1309.214	29.0	Pass
L2	127 - 86.5	Pole	TP43.493x34.132x0.313	2	-13.557	2167.591	42.0	Pass
L3	86.5 - 42.5	Pole	TP52.02x41.724x0.375	3	-22.970	3112.008	46.9	Pass
L4	42.5 - 0	Pole	TP60.11x49.918x0.438	4	-37.688	4307.789	47.8	Pass
							Summary	
						Pole (L4)	47.8	Pass
						Rating =	47.8	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	44.6	Pass
1	Base Plate	0	38.5	Pass
1	Base Foundation	0	49.3	Pass
1	Base Foundation Soil Interaction	0	50.1	Pass

Structure Rating (max from all components) =	50.1%

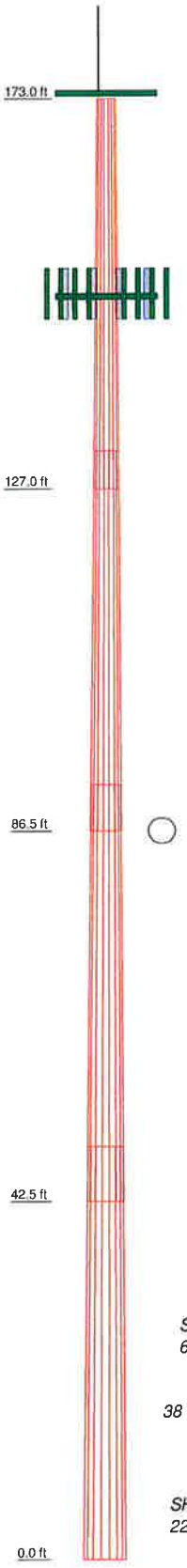
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

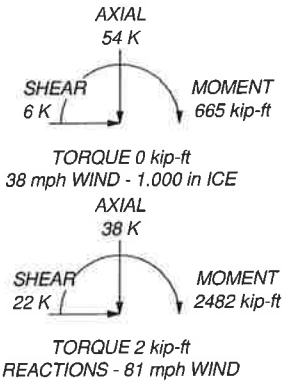
The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

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	46.000	18	0.250	4.500	26.000	35.568	A607-60	3.8
2	45.000	18	0.313	5.500	34.132	43.493	A607-60	5.8
3	49.500	18	0.375	6.500	41.724	52.020	A607-65	9.3
4	49.000	18	0.438		49.918	60.110		12.6
								31.6



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 1"x10'	174	LNX-6514DS-T4M w/ Mount Pipe	150
(4) 6' x 2" Mount Pipe	174	(2) FD9R6004/2C-3L	150
(4) 6' x 2" Mount Pipe	174	RRH2X60-AWS	150
(4) 6' x 2" Mount Pipe	174	(2) HBXX-6517DS-A2M w/ Mount Pipe	150
Platform Mount [LP 1201-1]	174	LNX-8513DS-A1M w/ Mount Pipe	150
LNX-6514DS-T4M w/ Mount Pipe	150	LNX-6514DS-T4M w/ Mount Pipe	150
(2) FD9R6004/2C-3L	150	(2) FD9R6004/2C-3L	150
(2) RRH2X60-AWS	150	HBXX-6517DS-A2M w/ Mount Pipe	150
(3) HBXX-6517DS-A2M w/ Mount Pipe	150	(2) LNX-8513DS-A1M w/ Mount Pipe	150
DB-B1-6C-12AB-0Z	150	Platform Mount [LP 601-1]	150

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	A607-65	65 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 81 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: 47.8%

Aero Solutions LLC
5500 Flatiron Parkway, Suite 100
Boulder, CO 80301
Phone: (720) 304-6882
FAX: (720) 304-6883

Job:	***BU#801366 ROCKY HILL 2***		
Project:	***Existing 173 Ft. Monopole***		
Client: Crown Castle	Drawn by: Shawn D. Cook, P.E.	App'd:	
Code: TIA/EIA-222-F	Date: 08/28/14	Scale: NTS	
Path: C:\CC\003-14-0869 JTE\Engineering\Aero Calculations\Working BSA\801366 ROCKY HILL 2.eri		Dwg No. E-1	

Tower Input Data

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

3) Tower is located in Hartford County, Connecticut.
4) Basic wind speed of 81 mph.
5) Nominal ice thickness of 1.000 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	173.000-127.000	46.000	4.500	18	26.000	35.568	0.250	1.000	A607-60 (60 ksi)
L2	127.000-86.500	45.000	5.500	18	34.132	43.493	0.313	1.250	A607-65 (65 ksi)
L3	86.500-42.500	49.500	6.500	18	41.724	52.020	0.375	1.500	A607-65 (65 ksi)
L4	42.500-0.000	49.000		18	49.918	60.110	0.438	1.750	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

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	26.401	20.433	1711.654	9.141	13.208	129.592	3425.561	10.218	4.136	16.544
	36.117	28.025	4416.444	12.538	18.069	244.427	8838.698	14.015	5.820	23.28
L2	35.609	33.545	4847.256	12.006	17.339	279.557	9700.890	16.776	5.457	17.463
	44.164	42.830	10089.215	15.329	22.094	456.640	20191.706	21.419	7.105	22.735
L3	43.529	49.216	10630.821	14.679	21.196	501.555	21275.631	24.612	6.683	17.822
	52.822	61.470	20713.834	18.334	26.426	783.838	41454.923	30.741	8.496	22.655
L4	52.061	68.710	21253.196	17.566	25.358	838.115	42534.357	34.361	8.016	18.321
	61.037	82.863	37277.358	21.184	30.536	1220.772	74603.767	41.439	9.809	22.421

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 173.000-127.000				1	1	1		
L2 127.000-86.500				1	1	1		
L3 86.500-42.500				1	1	1		
L4 42.500-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

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

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
LDF7-50A(1-5/8")	C	No	Inside Pole	150.000 - 8.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	150.000 - 8.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
***								

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	173.000-127.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.256
L2	127.000-86.500	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.451
L3	86.500-42.500	A	0.000	0.000	0.000	0.000	0.000

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
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.490
L4	42.500-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.384

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	173.000-127.000	A	1.198	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.256
L2	127.000-86.500	A	1.151	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.451
L3	86.500-42.500	A	1.083	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.490
L4	42.500-0.000	A	1.000	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.384

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	173.000-127.000	0.000	0.000	0.000	0.000
L2	127.000-86.500	0.000	0.000	0.000	0.000
L3	86.500-42.500	0.000	0.000	0.000	0.000
L4	42.500-0.000	0.000	0.000	0.000	0.000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / °	Azimuth Adjustment	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lightning Rod 1"x10'	C	From Leg	0.000 0.000 5.000	0.000	174.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.000 2.017 3.050 5.148 7.684	1.000 2.017 3.050 5.148 7.684	0.040 0.049 0.065 0.116 0.301
***									
(4) 6' x 2" Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	174.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.925 2.294 3.060 4.702	1.425 1.925 2.294 3.060 4.702	0.022 0.033 0.048 0.090 0.231
(4) 6' x 2" Mount Pipe	B	From Leg	4.000 0.000	0.000	174.000	No Ice 1/2"	1.425 1.925	1.425 1.925	0.022 0.033

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			Ice	2.294	2.294	0.048
						1" Ice	3.060	3.060	0.090
						2" Ice	4.702	4.702	0.231
						4" Ice			
(4) 6' x 2" Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	174.000	No Ice	1.425	1.425	0.022
						1/2" Ice	1.925	1.925	0.033
						1" Ice	2.294	2.294	0.048
						2" Ice	3.060	3.060	0.090
						4" Ice	4.702	4.702	0.231
Platform Mount [LP 1201-1]	C	None		0.000	174.000	No Ice	23.100	23.100	2.100
						1/2" Ice	26.800	26.800	2.500
						1" Ice	30.500	30.500	2.900
						2" Ice	37.900	37.900	3.700
						4" Ice	52.700	52.700	5.300
***									
LNX-6514DS-T4M w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice	8.568	7.004	0.058
						1/2" Ice	9.220	8.185	0.127
						1" Ice	9.838	9.081	0.203
						2" Ice	11.104	10.904	0.384
						4" Ice	13.754	14.926	0.889
(2) FD9R6004/2C-3L	A	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice	0.367	0.085	0.003
						1/2" Ice	0.451	0.136	0.005
						1" Ice	0.543	0.196	0.009
						2" Ice	0.755	0.343	0.020
						4" Ice	1.281	0.740	0.063
(2) RRH2X60-AWS	A	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice	3.957	1.816	0.060
						1/2" Ice	4.272	2.075	0.083
						1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
(3) HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice	8.976	6.963	0.067
						1/2" Ice	9.647	8.182	0.137
						1" Ice	10.291	9.144	0.215
						2" Ice	11.595	11.022	0.398
						4" Ice	14.321	15.027	0.914
DB-B1-6C-12AB-0Z	A	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice	3.924	2.557	0.021
						1/2" Ice	4.197	2.794	0.050
						1" Ice	4.478	3.040	0.082
						2" Ice	5.066	3.557	0.158
						4" Ice	6.347	4.696	0.360
LNX-6514DS-T4M w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice	8.568	7.004	0.058
						1/2" Ice	9.220	8.185	0.127
						1" Ice	9.838	9.081	0.203
						2" Ice	11.104	10.904	0.384
						4" Ice	13.754	14.926	0.889
(2) FD9R6004/2C-3L	B	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice	0.367	0.085	0.003
						1/2" Ice	0.451	0.136	0.005
						1" Ice	0.543	0.196	0.009
						2" Ice	0.755	0.343	0.020
						4" Ice	1.281	0.740	0.063
RRH2X60-AWS	B	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice	3.957	1.816	0.060
						1/2" Ice	4.272	2.075	0.083
						1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354

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) HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.976 9.647 10.291 11.595 14.321	6.963 8.182 9.144 11.022 15.027	0.067 0.137 0.215 0.398 0.914
LNX-8513DS-A1M w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.648 9.305 9.930 11.204 13.872	7.082 8.273 9.185 11.023 15.063	0.065 0.134 0.211 0.393 0.903
LNX-6514DS-T4M w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.568 9.220 9.838 11.104 13.754	7.004 8.185 9.081 10.904 14.926	0.058 0.127 0.203 0.384 0.889
(2) FD9R6004/2C-3L	C	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.976 9.647 10.291 11.595 14.321	6.963 8.182 9.144 11.022 15.027	0.067 0.137 0.215 0.398 0.914
(2) LNX-8513DS-A1M w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	30.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.648 9.305 9.930 11.204 13.872	7.082 8.273 9.185 11.023 15.063	0.065 0.134 0.211 0.393 0.903
Platform Mount [LP 601-1]	C	None		0.000	150.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	28.470 33.590 38.710 48.950 69.430	28.470 33.590 38.710 48.950 69.430	1.122 1.514 1.905 2.689 4.255
***									

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

Comb. No.	Description
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	173 - 127	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-14.959	-0.511	1.491
			Max. Mx	5	-7.635	-258.246	1.979
			Max. My	2	-7.618	-1.690	262.409
			Max. Vy	5	11.083	-258.246	1.979
			Max. Vx	2	-11.287	-1.690	262.409
			Max. Torque	11			-1.665
L2	127 - 86.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-23.335	-0.511	1.491
			Max. Mx	5	-13.571	-762.024	5.063
			Max. My	2	-13.558	-4.738	774.301
			Max. Vy	5	14.446	-762.024	5.063
			Max. Vx	2	-14.652	-4.738	774.301
			Max. Torque	11			-1.665
L3	86.5 - 42.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-35.692	-0.511	1.491
			Max. Mx	5	-22.977	-1464.043	8.399
			Max. My	2	-22.970	-8.056	1485.157
			Max. Vy	5	18.156	-1464.043	8.399
			Max. Vx	2	-18.361	-8.056	1485.157
			Max. Torque	11			-1.663
L4	42.5 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-53.977	-0.511	1.491
			Max. Mx	5	-37.688	-2449.017	12.128
			Max. My	2	-37.688	-11.783	2480.065
			Max. Vy	5	22.026	-2449.017	12.128
			Max. Vx	2	-22.226	-11.783	2480.065
			Max. Torque	11			-1.662

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	53.977	0.000	0.000
	Max. H_x	11	37.696	22.012	-0.075
	Max. H_z	2	37.696	-0.075	22.212
	Max. M_x	2	2480.065	-0.075	22.212
	Max. M_z	5	2449.017	-22.012	0.075
	Max. Torsion	5	1.661	-22.012	0.075
	Min. Vert	1	37.696	0.000	0.000
	Min. H_x	5	37.696	-22.012	0.075
	Min. H_z	8	37.696	0.075	-22.212
	Min. M_x	8	-2478.853	0.075	-22.212
	Min. M_z	11	-2448.503	22.012	-0.075
	Min. Torsion	11	-1.662	22.012	-0.075

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	37.696	0.000	0.000	-0.581	-0.246	0.000
Dead+Wind 0 deg - No Ice	37.696	0.075	-22.212	-2480.065	-11.783	-0.108
Dead+Wind 30 deg - No Ice	37.696	11.071	-19.273	-2153.642	-1234.608	-0.923
Dead+Wind 60 deg - No Ice	37.696	19.100	-11.171	-1250.320	-2126.698	-1.492
Dead+Wind 90 deg - No Ice	37.696	22.012	-0.075	-12.128	-2449.017	-1.661
Dead+Wind 120 deg - No Ice	37.696	19.025	11.041	1229.159	-2115.184	-1.385
Dead+Wind 150 deg - No Ice	37.696	10.941	19.198	2140.921	-1214.649	-0.738
Dead+Wind 180 deg - No Ice	37.696	-0.075	22.212	2478.853	11.268	0.107
Dead+Wind 210 deg - No Ice	37.696	-11.071	19.273	2152.433	1234.090	0.924
Dead+Wind 240 deg - No Ice	37.696	-19.100	11.171	1249.115	2126.181	1.493
Dead+Wind 270 deg - No Ice	37.696	-22.012	0.075	10.924	2448.503	1.662
Dead+Wind 300 deg - No Ice	37.696	-19.025	-11.041	-1230.366	2114.673	1.385
Dead+Wind 330 deg - No Ice	37.696	-10.941	-19.198	-2142.131	1214.138	0.737
Dead+Ice+Temp	53.977	0.000	0.000	-1.491	-0.511	-0.000
Dead+Wind 0 deg+Ice+Temp	53.977	0.017	-5.577	-664.497	-3.167	-0.021
Dead+Wind 30 deg+Ice+Temp	53.977	2.781	-4.838	-576.998	-330.801	-0.231
Dead+Wind 60 deg+Ice+Temp	53.977	4.799	-2.803	-335.315	-569.943	-0.380
Dead+Wind 90 deg+Ice+Temp	53.977	5.532	-0.017	-4.209	-656.511	-0.427
Dead+Wind 120 deg+Ice+Temp	53.977	4.783	2.774	327.600	-567.319	-0.359
Dead+Wind 150 deg+Ice+Temp	53.977	2.752	4.821	571.203	-326.257	-0.196
Dead+Wind 180 deg+Ice+Temp	53.977	-0.017	5.577	661.325	2.080	0.021
Dead+Wind 210 deg+Ice+Temp	53.977	-2.781	4.838	573.827	329.713	0.231
Dead+Wind 240 deg+Ice+Temp	53.977	-4.799	2.803	332.144	568.855	0.380
Dead+Wind 270 deg+Ice+Temp	53.977	-5.532	0.017	1.038	655.423	0.427
Dead+Wind 300 deg+Ice+Temp	53.977	-4.783	-2.774	-330.771	566.232	0.359
Dead+Wind 330 deg+Ice+Temp	53.977	-2.752	-4.821	-574.375	325.169	0.195
Dead+Wind 0 deg - Service	37.696	0.029	-8.464	-945.682	-4.651	-0.041
Dead+Wind 30 deg - Service	37.696	4.218	-7.344	-821.262	-470.744	-0.353
Dead+Wind 60 deg - Service	37.696	7.278	-4.256	-476.949	-810.771	-0.570
Dead+Wind 90 deg - Service	37.696	8.387	-0.029	-5.001	-933.621	-0.635
Dead+Wind 120 deg - Service	37.696	7.249	4.207	468.126	-806.378	-0.529
Dead+Wind 150 deg - Service	37.696	4.169	7.315	815.655	-463.134	-0.282
Dead+Wind 180 deg -	37.696	-0.029	8.464	944.466	4.136	0.041

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Service						
Dead+Wind 210 deg - Service	37.696	-4.218	7.344	820.047	470.228	0.353
Dead+Wind 240 deg - Service	37.696	-7.278	4.256	475.735	810.255	0.570
Dead+Wind 270 deg - Service	37.696	-8.387	0.029	3.786	933.106	0.635
Dead+Wind 300 deg - Service	37.696	-7.249	-4.207	-469.340	805.863	0.529
Dead+Wind 330 deg - Service	37.696	-4.169	-7.315	-816.870	462.619	0.282

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	0.000	-37.696	0.000	0.000	37.696	0.000	0.000%
2	0.075	-37.696	-22.212	-0.075	37.696	22.212	0.000%
3	11.071	-37.696	-19.273	-11.071	37.696	19.273	0.000%
4	19.100	-37.696	-11.171	-19.100	37.696	11.171	0.000%
5	22.012	-37.696	-0.075	-22.012	37.696	0.075	0.000%
6	19.025	-37.696	11.041	-19.025	37.696	-11.041	0.000%
7	10.941	-37.696	19.198	-10.941	37.696	-19.198	0.000%
8	-0.075	-37.696	22.212	0.075	37.696	-22.212	0.000%
9	-11.071	-37.696	19.273	11.071	37.696	-19.273	0.000%
10	-19.100	-37.696	11.171	19.100	37.696	-11.171	0.000%
11	-22.012	-37.696	0.075	22.012	37.696	-0.075	0.000%
12	-19.025	-37.696	-11.041	19.025	37.696	11.041	0.000%
13	-10.941	-37.696	-19.198	10.941	37.696	19.198	0.000%
14	0.000	-53.977	0.000	0.000	53.977	0.000	0.000%
15	0.017	-53.977	-5.577	-0.017	53.977	5.577	0.000%
16	2.781	-53.977	-4.838	-2.781	53.977	4.838	0.000%
17	4.799	-53.977	-2.803	-4.799	53.977	2.803	0.000%
18	5.532	-53.977	-0.017	-5.532	53.977	0.017	0.000%
19	4.783	-53.977	2.774	-4.783	53.977	-2.774	0.000%
20	2.752	-53.977	4.821	-2.752	53.977	-4.821	0.000%
21	-0.017	-53.977	5.577	0.017	53.977	-5.577	0.000%
22	-2.781	-53.977	4.838	2.781	53.977	-4.838	0.000%
23	-4.799	-53.977	2.803	4.799	53.977	-2.803	0.000%
24	-5.532	-53.977	0.017	5.532	53.977	-0.017	0.000%
25	-4.783	-53.977	-2.774	4.783	53.977	2.774	0.000%
26	-2.752	-53.977	-4.821	2.752	53.977	4.821	0.000%
27	0.029	-37.696	-8.464	-0.029	37.696	8.464	0.000%
28	4.218	-37.696	-7.344	-4.218	37.696	7.344	0.000%
29	7.278	-37.696	-4.256	-7.278	37.696	4.256	0.000%
30	8.387	-37.696	-0.029	-8.387	37.696	0.029	0.000%
31	7.249	-37.696	4.207	-7.249	37.696	-4.207	0.000%
32	4.169	-37.696	7.315	-4.169	37.696	-7.315	0.000%
33	-0.029	-37.696	8.464	0.029	37.696	-8.464	0.000%
34	-4.218	-37.696	7.344	4.218	37.696	-7.344	0.000%
35	-7.278	-37.696	4.256	7.278	37.696	-4.256	0.000%
36	-8.387	-37.696	0.029	8.387	37.696	-0.029	0.000%
37	-7.249	-37.696	-4.207	7.249	37.696	4.207	0.000%
38	-4.169	-37.696	-7.315	4.169	37.696	7.315	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	0.00004109

3	Yes	5	0.00000001	0.00006227
4	Yes	5	0.00000001	0.00006838
5	Yes	4	0.00000001	0.00031559
6	Yes	5	0.00000001	0.00005920
7	Yes	5	0.00000001	0.00006472
8	Yes	4	0.00000001	0.00006000
9	Yes	5	0.00000001	0.00006694
10	Yes	5	0.00000001	0.00006072
11	Yes	4	0.00000001	0.00026392
12	Yes	5	0.00000001	0.00006630
13	Yes	5	0.00000001	0.00006088
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00097209
16	Yes	5	0.00000001	0.00005478
17	Yes	5	0.00000001	0.00005470
18	Yes	4	0.00000001	0.00095911
19	Yes	5	0.00000001	0.00005354
20	Yes	5	0.00000001	0.00005386
21	Yes	4	0.00000001	0.00096170
22	Yes	5	0.00000001	0.00005424
23	Yes	5	0.00000001	0.00005386
24	Yes	4	0.00000001	0.00095538
25	Yes	5	0.00000001	0.00005399
26	Yes	5	0.00000001	0.00005413
27	Yes	4	0.00000001	0.00001884
28	Yes	4	0.00000001	0.00015820
29	Yes	4	0.00000001	0.00019430
30	Yes	4	0.00000001	0.00005703
31	Yes	4	0.00000001	0.00014780
32	Yes	4	0.00000001	0.00017555
33	Yes	4	0.00000001	0.00001941
34	Yes	4	0.00000001	0.00018370
35	Yes	4	0.00000001	0.00015209
36	Yes	4	0.00000001	0.00005357
37	Yes	4	0.00000001	0.00018660
38	Yes	4	0.00000001	0.00015436

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	173 - 127	22.698	28	1.099	0.004
L2	131.5 - 86.5	13.482	28	0.973	0.002
L3	92 - 42.5	6.524	28	0.677	0.001
L4	49 - 0	1.841	28	0.341	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
174.000	Lightning Rod 1"x10'	28	22.698	1.099	0.004	76373
150.000	LNX-6514DS-T4M w/ Mount Pipe	28	17.447	1.048	0.003	16602

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	173 - 127	59.449	3	2.878	0.009
L2	131.5 - 86.5	35.328	3	2.550	0.006
L3	92 - 42.5	17.103	3	1.775	0.003
L4	49 - 0	4.826	3	0.895	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
174.000	Lightning Rod 1"x10'	3	59.449	2.878	0.009	29394
150.000	LNX-6514DS-T4M w/ Mount Pipe	3	45.706	2.746	0.008	6388

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	173 - 127 (1)	TP35.568x26x0.25	46.000	0.000	0.0	36.000	27.282	-7.617	982.156	0.008
L2	127 - 86.5 (2)	TP43.493x34.132x0.313	45.000	0.000	0.0	39.000	41.695	-13.557	1626.100	0.008
L3	86.5 - 42.5 (3)	TP52.02x41.724x0.375	49.500	0.000	0.0	39.000	59.861	-22.970	2334.590	0.010
L4	42.5 - 0 (4)	TP60.11x49.918x0.438	49.000	0.000	0.0	39.000	82.863	-37.688	3231.650	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	173 - 127 (1)	TP35.568x26x0.25	262.743	13.614	36.000	0.378	0.000	0.000	36.000	0.000
L2	127 - 86.5 (2)	TP43.493x34.132x0.313	775.247	21.501	39.000	0.551	0.000	0.000	39.000	0.000
L3	86.5 - 42.5 (3)	TP52.02x41.724x0.375	1486.767	24.006	39.000	0.616	0.000	0.000	39.000	0.000
L4	42.5 - 0 (4)	TP60.11x49.918x0.438	2482.425	24.402	39.000	0.626	0.000	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	173 - 127 (1)	TP35.568x26x0.25	11.303	0.414	24.000	0.035	0.925	0.023	24.000	0.001
L2	127 - 86.5 (2)	TP43.493x34.132x0.313	14.667	0.352	26.000	0.027	0.924	0.013	26.000	0.000
L3	86.5 - 42.5 (3)	TP52.02x41.724x0.375	18.376	0.307	26.000	0.024	0.924	0.007	26.000	0.000
L4	42.5 - 0 (4)	TP60.11x49.918x0.438	22.241	0.268	26.000	0.021	0.923	0.004	26.000	0.000

Pole Interaction Design Data

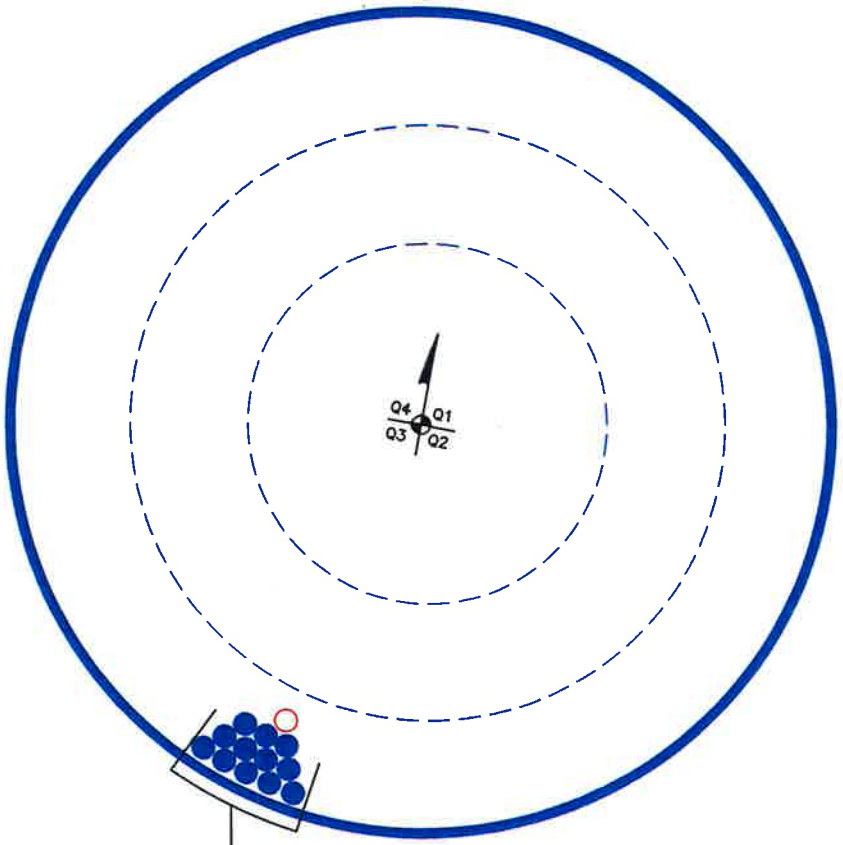
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	173 - 127 (1)	0.008	0.378	0.000	0.035	0.001	0.386 ✔	1.333	H1-3+VT ✔
L2	127 - 86.5 (2)	0.008	0.551	0.000	0.027	0.000	0.560 ✔	1.333	H1-3+VT ✔
L3	86.5 - 42.5 (3)	0.010	0.616	0.000	0.024	0.000	0.626 ✔	1.333	H1-3+VT ✔
L4	42.5 - 0 (4)	0.012	0.626	0.000	0.021	0.000	0.637 ✔	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	173 - 127	Pole	TP35.568x26x0.25	1	-7.617	1309.214	29.0	Pass
L2	127 - 86.5	Pole	TP43.493x34.132x0.313	2	-13.557	2167.591	42.0	Pass
L3	86.5 - 42.5	Pole	TP52.02x41.724x0.375	3	-22.970	3112.008	46.9	Pass
L4	42.5 - 0	Pole	TP60.11x49.918x0.438	4	-37.688	4307.789	47.8	Pass
							Summary	
							Pole (L4) 47.8	Pass
							RATING = 47.8	**Pass**

APPENDIX B

BASE LEVEL DRAWING



(PROPOSED)
(1) 1-5/8" TO 150 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 150 FT LEVEL

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#: *801366*
Site Name: *ROCKY HILL 2*
App #: *261418 R1*

Anchor Rod Data		
Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	67	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	66	in
Thick:	3	in
Grade:	55	ksi
Clip Distance:	14	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:	60.11	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

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

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	2482.42387	ft-kips
Unfactored Axial, P:	37.6878	kips
Unfactored Shear, V:	22.240687	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	87.0 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	44.6% **Pass**

Base Plate Results Flexural Check

Base Plate Stress:	21.2 ksi
Allowable PL Bending Stress:	55.0 ksi
Base Plate Stress Ratio:	38.5% **Pass**

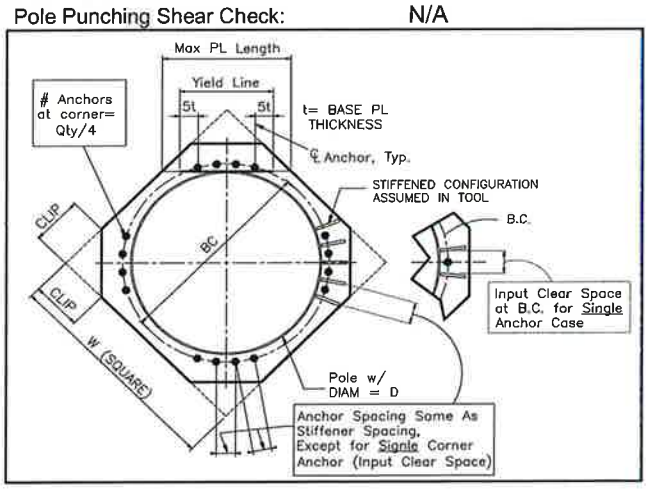
N/A - Unstiffened

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



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

Site Data

BU#: *801366*
Site Name: *ROCKY HILL 2*
App #: *????*

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

Pad & Pier Data		
Base PL Dist. Above Pier:	0	in
Pier Dist. Above Grade:	6	in
Pad Bearing Depth, D:	8	ft
Pad Thickness, T:	3.5	ft
Pad Width=Length, L:	26	ft
Pier Cross Section Shape:	Round	<--Pull Down
Enter Pier Diameter:	8	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	50.27	ft^2
Pier Height:	5.00	ft
Soil (above pad) Height:	4.50	ft

Soil Parameters		
Unit Weight, γ:	120.0	pcf
Ultimate Bearing Capacity, qn:	6.00	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	33.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	4.50	ksf
Passive Pres. Coeff., Kp	3.39	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	30.0	kips
Pad Force Location Above D:	1.59	ft
ϕ(Passive Pressure Moment):	47.64	ft-kips
Factored O.T. M(WL), "1.6W":	3606.5	ft-kips
Factored OT (MW-Msoil), M1	3558.84	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	2.92	ft
Sum of Soil Wedges Wt:	37.32	kips
Soil Wedges ecc, K1:	12.02	ft
Ftg+Soil above Pad wt:	730.5	kips
Unfactored (Total ftg-soil Wt):	767.82	kips
1.2D. **No Soil Wedges.**	921.82	kips
0.9D. **With Soil Wedges**	724.96	kips

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

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	37.6878	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	22.24069	kips
Unfactored WL Moment, M:	2482.424	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	45.22536	kips
0.90	0.9D+1.6W, Pu:	33.91902	kips
1.35	Vu:	30.02493	kips
	Mu:	3351.272	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	921.82	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	3558.84	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	3.86	ft
Orthogonal qu=	2.17	ksf
qu/ϕ*qn Ratio=	**48.30%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	2.73	ft
Diagonal qu=	2.18	ksf
qu/ϕ*qn Ratio=	**48.55%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	724.96	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	3154.93	ft-kips

Orthogonal ecc3 = M2/P2 =	4.35	ft
Ortho Non Bearing Length,NBL=	8.70	ft
Orthogonal qu=	1.79	ksf
Diagonal qu=	1.84	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	2482.42		
M Orthogonal:	5526.84	**44.92%**	**Pass**
M Diagonal:	5242.28	**47.35%**	**Pass**

AeroSolutions LLC
Optimizing Your Tower Infrastructure

Site Number	801366
Site Name	ROCKY HILL 2

Caisson Analysis

Pier Properties		
Moment	2482	kip-ft
Shear	22	kip
Pier Diameter	8.0	ft
Height Above Grade	0.50	ft
Depth Below Grade	27.00	ft
Donut Diameter		ft
Donut Depth		ft

Analysis Properties		
TIA Code	F	
Soil Safety Factor	2.00	
Water Table Depth	10.0	ft
Ignored Soil Depth	4.0	ft
Cohesion Based on	PLS Caisson	
Max Soil Capacity	100%	

Soil Properties

Layer	Top of Soil Layer (ft)	Layer Thickness (ft)	Bottom of Soil Layer (ft)	Soil Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Soil.Layer	*Soil.Top*	*Soil.Thick*	*Soil.Bottom*	*Soil.Weight*	*Soil.Cohesion*	*Soil.Phi*
1	0.00	13.5	13.50	120	0	33
2	13.50	10	23.50	120	0	32
3	23.50	13.5	37.00	115	1000	
4						
5						
6						
7						
8						
9						
10						

Critical Depths Below Grade		
Rotation Axis	17.12	ft
Zero Shear	5.85	ft

Results		
Soil Capacity	50.1%	OK
Max Pier Moment	2604	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#: *801366*
Site Name: *ROCKY HILL 2*
App #: *261418 R1*

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

Pier Properties		
Concrete:		
Pier Diameter =	8.0	ft
Concrete Area =	7238.2	in^2
Reinforcement:		
Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	7.11	ft
Vert. Cage Diameter =	85.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	24	
As Total=	37.44	in^2
A s/ Aconc, Rho:	0.0052	0.52%

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:	0.52%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	10716.37	kips
at Mu=(ϕ=0.65)Mn=	7467.49	ft-kips
Max Tu, (φ=0.9) Tn =	2021.76	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces		
TIA Revision:	F	
Max. Service Shaft M:	2604.316	ft-kips **(* Note)**
Max. Service Shaft P:	37.6878	kips
Max Axial Force Type:	Comp.	

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

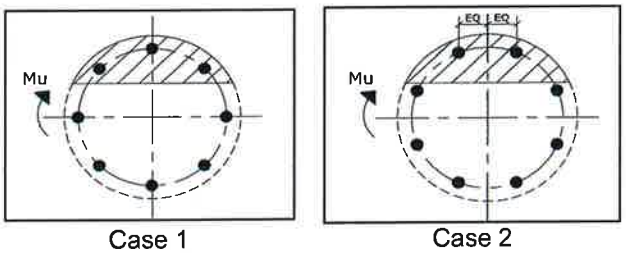
Load Factor	Shaft Factored Loads		
1.30	Mu:	3385.611	ft-kips
1.30	Pu:	48.99414	kips

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: **2**



Case 1 Case 2

Dist. From Edge to Neutral Axis: **14.71** in
Extreme Steel Strain, εt: **0.0154**
εt > 0.0050, Tension Controlled
Reduction Factor,φ: **0.900**

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	48.99	kips
Drilled Shaft Moment Capacity, φMn:	**6863.11**	ft-kips
Drilled Shaft Superimposed Mu:	**3385.61**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**49.3%**