Robinson+Cole

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Also admitted in Massachusetts

August 3, 2016

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

Re: **Notice of Exempt Modification – Facility Modification**
232 Shore Road, Old Lyme, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 90-foot level of the existing 110-foot tower at 232 Shore Road in Old Lyme, Connecticut (the "Property"). The tower is owned by Bay Communications II, LLC. Cellco's shared use of this tower was approved by the Council in 2010 (Docket No. 391). Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model SBNHH-1D65B, 700/2100 MHz antennas and three (3) model SBNHH-1D65B, 1900 MHz antennas at the same 90-foot level on the tower. Cellco also intends to replace three (3) remote radio heads ("RRHs"), and install three (3) new RRHs behind its 700 and 1900 MHz antennas. Included in Attachment 1 are specifications for Cellco's replacement antennas and RRHs.

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 Bonnie Reemsnyder, First Selectwoman for the Town of Old Lyme. A copy of this letter is also being sent to ATSSLSS LLC, the owner of the Property and Bay Communications II, LLC, 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 installed at the 90-foot level of the 110-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.

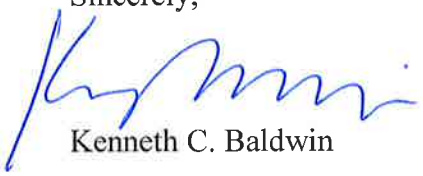
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

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

A copy of the Town Assessor's Parcel Map and property owner information is included in Attachment 4.

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:
Bonnie Reemsnyder, Old Lyme First Selectwoman
ATSSLSS LLC
Bay Communications II, LLC
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

SBNHH-1D65B

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

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

Electrical Specifications

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

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
Gain by Beam Tilt, average, dBi	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

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

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground

Product Specifications

SBNHH-1D65B

Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, frontal	618.0 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Loading, lateral	197.0 N @ 150 km/h 44.3 lbf @ 150 km/h
Wind Loading, rear	728.0 N @ 150 km/h 163.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	180.0 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight, without mounting kit	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

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

Packed Dimensions

Depth	296.0 mm | 11.7 in
Length	2025.0 mm | 79.7 in
Width	390.0 mm | 15.4 in
Shipping Weight	31.0 kg | 68.3 lb

Regulatory Compliance/Certifications

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

Product Specifications

SBNHH-1D65B

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

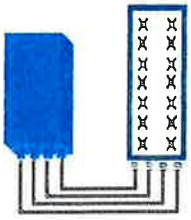
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2X60-1900A-4R FOR BAND 2/25 APPLICATIONS

The Alcatel-Lucent RRH2x60-1900A-4R is a high power, small form factor Remote Radio Head operating in the PCS 1900MHz frequency band for WCDMA and LTE technologies. 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 RRH2x60-1900A-4R 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 RRH2x60-1900A-4R integrates all the latest technologies. This allows operators 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.

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 RRH2x60-1900A-4R 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).

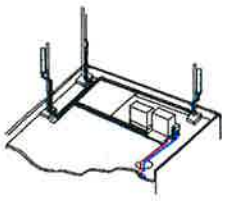
The Alcatel-Lucent RRH2x60-1900A-4R is a very cost-effective solution to deploy LTE MIMO.

EASY INSTALLATION

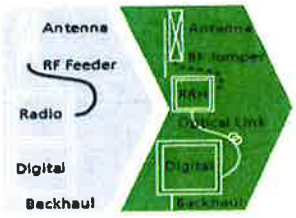
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-1900A-4R installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-1900A-4R is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

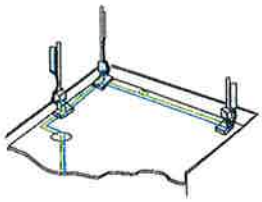
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-190A-4R is compact and weighs about 21 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-1900A-4R integrates two power amplifiers of 60W rating (at each antenna connector)
- RRH2x60-1900A-4R can operate WCDMA only, LTE only or a mix of WCDMA and LTE
- RRH2x60-1900A-4R offers the possibility for WCDMA (non MIMO) to operate the two radio chains independently (2 blocks of 20 MHz anywhere in the band)
- RRH2x60-1900A-4R is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO deployment and/or WCDMA and LTE simultaneous 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 : 500x285x208 mm (30l with solar shield)
- Weight : 21 kg (46 lbs) (with solar shield)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption: 460W typ. @2x60W (100%RF)

RF Characteristics

- Supported spectrum: DL 1930-1990 / UL 1850-1910
- Frequency band: 3GPP band 2/25
- Output power: 2x60W at antenna connectors
- Technology supported: W-CDMA and LTE
- Instantaneous bandwidth: 20 MHz (MIMO) or 2x20 MHz (non MIMO)
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -124.8dBm for WCDMA and -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 15km 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: ETS300-019-1-4 class4.1E
- 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
- Safety : IEC60950-1, EN 60825-1
- Regulatory: CE Mark-European Directive 2002/95/EC (RoHS), 2002/96/EC (WEEE), 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

ATTACHMENT 2

	General	Power	Density					
Site Name: Soundview (old lyme)								
Tower Height: 110Ft.								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*AT&T	2	500	110	1900	0.0332	1.0000	0.33%	
*AT&T	2	500	110	880	0.0332	0.5867	0.57%	
*AT&T	1	500	110	2300	0.0166	1.0000	0.17%	
*AT&T	2	500	110	700	0.0332	0.4667	0.71%	
*AT&T	1	500	110	2300	0.0166	1.0000	0.17%	
*AT&T	2	500	110	1900	0.0332	1.0000	0.33%	
*T-Mobile	2	953	99	1900	0.0793	1.0000	0.79%	
*T-Mobile	4	477	99	2100	0.0793	1.0000	0.79%	
*T-Mobile	1	445	99	700	0.0185	0.4667	0.40%	
Verizon PCS	**1**	**3632**	**90**	**0.1612**	**1970**	**1.0000**	**16.12%**	
Verizon Cellular	**9**	**447**	**90**	**0.1786**	**869**	**0.5793**	**30.83%**	
Verizon AWS	**1**	**4604**	**90**	**0.2044**	**2145**	**1.0000**	**20.44%**	
Verizon 700	**1**	**1782**	**90**	**0.0791**	**746**	**0.4973**	**15.91%**	
								87.55%
* Source: Siting Council								

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

110-ft Existing Sabre Monopole

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Soundview

232 Shore Road
Old Lyme, CT

CENTEK Project No. 16001.15

~~Date: June 23, 2016~~
Rev 1: August 2, 2016

Prepared for:

Verizon Wireless
99 East River Road, 9th Floor
East Hartford, CT 06108

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by Verizon Wireless on the existing monopole (tower) located in Old Lyme, CT.

The host tower is a 110-ft tall, three-section, eighteen sided, tapered monopole, originally designed and manufactured by Sabre Towers & Poles job no; 41153, dated April 28, 2011. The tower geometry, structure member sizes and foundation information were obtained from the aforementioned design documents.

Antenna and appurtenance information were obtained from a previous structural analysis report prepared by Centek job no. 13195.000 dated January 28, 2015, visual verification from grade conducted by Centek personnel on June 23, 2016 and a Verizon RF data sheet.

The tower is made up of three (3) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 22.25-in at the top and 52.4-in at the base.

Verizon proposes the removal of six (6) panel antennas and three (3) remote radio heads and the installation of six (6) panel antennas and six (6) remote radio heads mounted to the existing low profile platform. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- AT&T (Existing/Reserved):
  Antennas: Six (6) CCI OPA-65R-LCUU-H8 panel antennas, nine (9) Ericsson RRUS-11 remote radio units, six (6) Ericsson RRUS-12 remote radio units, three (3) Ericsson RRUS-E2 remote radio units, three (3) Ericsson RRUS-32 remote radio units and six (6) Ericsson A2 units mounted on a Site Pro Monopole Triple T-arm p/n RMV12-496 with a RAD center elevation of 110-ft above the existing tower base plate.
- AT&T (Existing/Reserved):
  Antennas: Four (4) Raycap DC6-48-60-18-8F surge arrestors mounted to one (1) universal ring mount with a RAD center elevation of 108-ft above grade level.
  Coax Cables: Two (2) fiber cable, eight (8) dc control cables and three (3) RET cables running inside of the existing tower.
- T-MOBILE (Existing):
  Antennas: Six (6) Ericsson AIR21 panel antennas, three (3) Andrew LNX-6515DS panel antennas, three (3) TMA's and three (3) Ericsson RRUS-11 remote radio units mounted on a 10-ft T-arm array with a RAD center elevation of 100-ft above the existing tower base plate.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and one (1) 1-1/4" fiber cable running on the inside of the existing tower.

- VERIZON (Existing to Remain):
  Antennas: Six (6) Antel BXA-70063-6CF panel antennas, three (3) Alcatel-Lucent RRH2x60-AWS remote radio heads and two (2) RFS DB-T1-6Z-8AB-0Z main distribution boxes mounted on a low profile platform with a RAD center elevation of 90-ft above the existing tower base plate.
  Coax Cables: Two (2) 1-5/8" ∅ fiber cables running on the inside of the existing tower.
- VERIZON (Existing to Remove):
  Antennas: Six (6) BXA-171063-12CF panel antennas and three (3) Alcatel-Lucent RRH2x40-07-U Remote Radio Heads mounted on a low profile platform with a RAD center elevation of 90-ft above the existing tower base plate.
- **VERIZON (PROPOSED):**
  Antennas: Six (6) Andrew SBNHH-1D65B panel antennas, three (3) Alcatel-Lucent RRH2x60-700 remote radio heads and three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads mounted on a low profile platform with a RAD center elevation of 90-ft above the existing tower base plate.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All existing coax cables to be installed as indicated in this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC[1] and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½" radial ice on the tower structure and its components.

Basic Wind Speed:	New London; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Old Lyme; v = 120 mph (3 second gust) equivalent to v = 100 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	Appendix K wind speed controls.	
Load Cases:	Load Case 1; 100 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 87 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 87 mph wind speed velocity represents 75% of the wind pressure generated by the 100 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

[1] The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **83.4%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (1)	81.00'-109.00'	83.4%	**PASS**

Foundation and Anchors

The existing foundation consists of a 7.0-ft square x 1.0-ft long reinforced concrete pier on a 19.0-ft square x 3.5-ft thick reinforced concrete pad with four (4) 2-1/2" ∅ x 29.5-ft long A722 150 ksi rock anchors. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned Sabre design documents. The base of the tower is connected to the foundation by means of (24) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 3-ft 9-in into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	33 kips
	Compression	23 kips
	Moment	2777 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Pad and Pier w/ Rock Anchors	Uplift	2.0	7.02	**PASS**

Note 1: FS denotes Factor of Safety.

- The flange bolts and plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Flange Bolts	Tension	90.0%	**PASS**
Flange Plate	Bending	34.2%	**PASS**

- The anchor bolts and base plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Axial and Bending	48.8%	**PASS**
Base Plate	Bending	48.6%	**PASS**

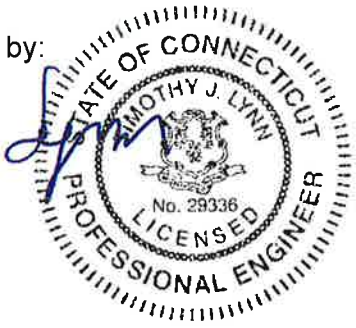
Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by AT&T Mobility. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

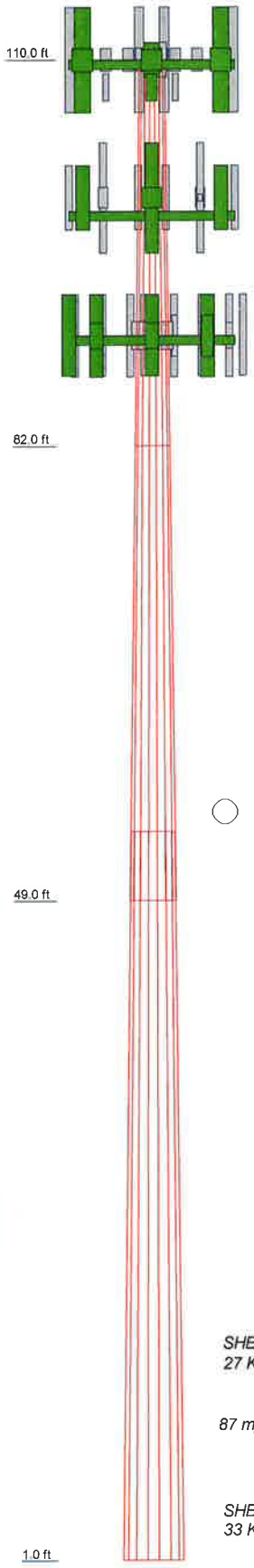
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.



Section	1	2	3
Length (ft)	28.000	33.000	53.000
Number of Sides	18	18	18
Thickness (in)	0.188	0.313	0.375
Socket Length (ft)		5.000	
Top Dia (in)	22.250	30.090	37.517
Bot Dia (in)	30.090	39.580	52.400
Grade	A572-65	A572-65	A572-65
Weight (K)	1.5	3.8	9.6

Total Weight: 14.9 K

AXIAL 30 K
SHEAR 27 K
MOMENT 2312 kip-ft
TORQUE 0 kip-ft
87 mph WIND - 0.500 in ICE

AXIAL 24 K
SHEAR 33 K
MOMENT 2777 kip-ft
TORQUE 0 kip-ft
REACTIONS - 100 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) OPA-65R-LCUU-H8 (ATI - Reserved)	110	LNX-6515DS (T-Mobile - Existing)	100
		LNX-6515DS (T-Mobile - Existing)	100
(2) OPA-65R-LCUU-H8 (ATI - Reserved)	110	KRY 112-144-1 TMA (T-Mobile - Existing)	100
(2) OPA-65R-LCUU-H8 (ATI - Reserved)	110	KRY 112-144-1 TMA (T-Mobile - Existing)	100
(3) RRUS-11 (ATI - Reserved)	110	KRY 112-144-1 TMA (T-Mobile - Existing)	100
(2) RRUS-12 (ATI - Reserved)	110		
RRUS-E2 (ATI - Reserved)	110	RRUS-11 (T-Mobile - Existing)	100
RRUS-32 (ATI - Reserved)	110	RRUS-11 (T-Mobile - Existing)	100
(2) A2 (ATI - Reserved)	110	RRUS-11 (T-Mobile - Existing)	100
(3) RRUS-11 (ATI - Reserved)	110	Valmont T-Arm (3) (T-Mobile - Existing)	99
(2) RRUS-12 (ATI - Reserved)	110	BXA-70063/6CF (Verizon - Existing)	90
RRUS-E2 (ATI - Reserved)	110	SBNHH-1D65B (Verizon - Proposed)	90
RRUS-32 (ATI - Reserved)	110	BXA-70063/6CF (Verizon - Existing)	90
(2) A2 (ATI - Reserved)	110	SBNHH-1D65B (Verizon - Proposed)	90
(3) RRUS-11 (ATI - Reserved)	110	BXA-70063/6CF (Verizon - Existing)	90
(2) RRUS-12 (ATI - Reserved)	110	SBNHH-1D65B (Verizon - Proposed)	90
RRUS-E2 (ATI - Reserved)	110	BXA-70063/6CF (Verizon - Existing)	90
RRUS-32 (ATI - Reserved)	110	SBNHH-1D65B (Verizon - Proposed)	90
(2) A2 (ATI - Reserved)	110	BXA-70063/6CF (Verizon - Existing)	90
Valmont T-Arm (3) (ATI - Reserved)	110	SBNHH-1D65B (Verizon - Proposed)	90
(2) DC6-48-60-18-8F Surge Arrestor (ATI - Reserved)	108	BXA-70063/6CF (Verizon - Existing)	90
		SBNHH-1D65B (Verizon - Proposed)	90
DC6-48-60-18-8F Surge Arrestor (ATI - Reserved)	108	RRH4x30-B13 (Verizon - Proposed)	90
DC6-48-60-18-8F Surge Arrestor (ATI - Reserved)	108	RRH4x30-B13 (Verizon - Proposed)	90
		RRH4x30-B13 (Verizon - Proposed)	90
Valmont Uni-Tri Bracket (ATI - Reserved)	108	RRH2x60-PCS (Verizon - Proposed)	90
		RRH2x60-PCS (Verizon - Proposed)	90
(2) AIR21 B2A/B4P (T-Mobile - Existing)	100	RRH2x60-PCS (Verizon - Existing)	90
		RRH2x60-AWS (Verizon - Existing)	90
(2) AIR21 B2A/B4P (T-Mobile - Existing)	100	RRH2x60-AWS (Verizon - Existing)	90
		RRH2x60-AWS (Verizon - Existing)	90
(2) AIR21 B2A/B4P (T-Mobile - Existing)	100	DB-T1-6Z-8AB-0Z (Verizon - Existing)	90
		DB-T1-6Z-8AB-0Z (Verizon - Existing)	90
LNX-6515DS (T-Mobile - Existing)	100	Valmont 13' Low Profile Platform (Verizon - Existing)	90

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 100 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 87 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 83.4%

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: 16001.15 - Soundview			
Project: 110-ft Sabre Monopole - 232 Shore Rd., Old Lyme,			
Client: AT&T Mobility	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 08/02/16	Scale: NT	
Path:		Dwg No. E	

Tower Input Data

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

Basic wind speed of 100 mph.
Nominal ice thickness of 0.500 in.
Ice density of 56 pcf.
A wind speed of 87 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
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	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	√ Bypass Mast Stability Checks	Consider Feed Line Torque
Always Use Max Kz	Use Azimuth Dish Coefficients	Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	√ Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		

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	110.000-82.000	28.000	0.000	18	22.250	30.090	0.188	0.750	A572-65 (65 ksi)
L2	82.000-49.000	33.000	5.000	18	30.090	39.580	0.313	1.250	A572-65 (65 ksi)
L3	49.000-1.000	53.000		18	37.517	52.400	0.375	1.500	A572-65

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 (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	22.593	13.130	807.439	7.832	11.303	71.436	1615.941	6.566	3.586	19.125
	30.554	17.796	2010.334	10.615	15.286	131.517	4023.313	8.900	4.966	26.484
L2	30.554	29.536	3308.713	10.571	15.286	216.458	6621.780	14.771	4.746	15.187
	40.191	38.948	7587.420	13.940	20.107	377.359	15184.825	19.478	6.416	20.531
L3	39.522	44.208	7705.055	13.185	19.059	404.280	15420.248	22.108	5.943	15.848
	53.208	61.923	21174.439	18.469	26.619	795.457	42376.739	30.967	8.562	22.833

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	Double Angle Stitch Bolt Spacing Redundants in
L1 110.000-82.000				1	1	1			
L2 82.000-49.000				1	1	1			
L3 49.000-1.000				1	1	1			

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
Fiber Trunk (AT&T - Reserved)	C	No	Inside Pole	110.000 - 4.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
DC Trunk (AT&T - Reserved)	C	No	Inside Pole	110.000 - 4.000	8	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
HYBRIFLEX 1-5/8" (Verizon - Existing)	B	No	Inside Pole	90.000 - 4.000	2	No Ice	0.000	0.002
						1/2" Ice	0.000	0.002
1 5/8 (T-Mobile - Existing)	B	No	Inside Pole	99.000 - 4.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
0.3" dia RET (AT&T - Reserved)	C	No	Inside Pole	110.000 - 4.000	3	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
HYBRIFLEX 1-1/4" (T-Mobile - Existing)	B	No	Inside Pole	99.000 - 4.000	1	No Ice	0.000	0.001
						1/2" 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

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	110.000-82.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.265
		C	0.000	0.000	0.000	0.000	0.081
L2	82.000-49.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.580
		C	0.000	0.000	0.000	0.000	0.095
L3	49.000-1.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.791
		C	0.000	0.000	0.000	0.000	0.130

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	110.000-82.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.265
		C		0.000	0.000	0.000	0.000	0.081
L2	82.000-49.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.580
		C		0.000	0.000	0.000	0.000	0.095
L3	49.000-1.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.791
		C		0.000	0.000	0.000	0.000	0.130

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) OPA-65R-LCUU-H8	A	From Face	3.000	0.000	110.000	No Ice	13.295	7.516	0.088
(AT&T - Reserved)			0.000			1/2" Ice	13.994	8.087	0.162
			0.000						
(2) OPA-65R-LCUU-H8	B	From Face	3.000	0.000	110.000	No Ice	13.295	7.516	0.088
(AT&T - Reserved)			0.000			1/2" Ice	13.994	8.087	0.162
			0.000						
(2) OPA-65R-LCUU-H8	C	From Face	3.000	0.000	110.000	No Ice	13.295	7.516	0.088
(AT&T - Reserved)			0.000			1/2" Ice	13.994	8.087	0.162
			0.000						
(3) RRUS-11	A	From Face	0.000	0.000	110.000	No Ice	2.994	1.246	0.050
(AT&T - Reserved)			0.000			1/2" Ice	3.226	1.412	0.070
			0.000						
(2) RRUS-12	A	From Face	0.000	0.000	110.000	No Ice	3.669	1.488	0.058
(AT&T - Reserved)			0.000			1/2" Ice	3.926	1.673	0.081
			0.000						
RRUS-E2	A	From Face	0.000	0.000	110.000	No Ice	3.669	1.488	0.058
(AT&T - Reserved)			0.000			1/2" Ice	3.926	1.673	0.081
			0.000						
RRUS-32	A	From Face	0.000	0.000	110.000	No Ice	3.866	2.762	0.077
(AT&T - Reserved)			0.000			1/2" Ice	4.151	3.021	0.105

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						
(2) A2	A	From Face	0.000	0.000	110.000	No Ice	2.424	0.542	0.022
(AT&T - Reserved)			0.000			1/2" Ice	2.633	0.675	0.035
			0.000						
(3) RRUS-11	B	From Face	0.000	0.000	110.000	No Ice	2.994	1.246	0.050
(AT&T - Reserved)			0.000			1/2" Ice	3.226	1.412	0.070
			0.000						
(2) RRUS-12	B	From Face	0.000	0.000	110.000	No Ice	3.669	1.488	0.058
(AT&T - Reserved)			0.000			1/2" Ice	3.926	1.673	0.081
			0.000						
RRUS-E2	B	From Face	0.000	0.000	110.000	No Ice	3.669	1.488	0.058
(AT&T - Reserved)			0.000			1/2" Ice	3.926	1.673	0.081
			0.000						
RRUS-32	B	From Face	0.000	0.000	110.000	No Ice	3.866	2.762	0.077
(AT&T - Reserved)			0.000			1/2" Ice	4.151	3.021	0.105
			0.000						
(2) A2	B	From Face	0.000	0.000	110.000	No Ice	2.424	0.542	0.022
(AT&T - Reserved)			0.000			1/2" Ice	2.633	0.675	0.035
			0.000						
(3) RRUS-11	C	From Face	0.000	0.000	110.000	No Ice	2.994	1.246	0.050
(AT&T - Reserved)			0.000			1/2" Ice	3.226	1.412	0.070
			0.000						
(2) RRUS-12	C	From Face	0.000	0.000	110.000	No Ice	3.669	1.488	0.058
(AT&T - Reserved)			0.000			1/2" Ice	3.926	1.673	0.081
			0.000						
RRUS-E2	C	From Face	0.000	0.000	110.000	No Ice	3.669	1.488	0.058
(AT&T - Reserved)			0.000			1/2" Ice	3.926	1.673	0.081
			0.000						
RRUS-32	C	From Face	0.000	0.000	110.000	No Ice	3.866	2.762	0.077
(AT&T - Reserved)			0.000			1/2" Ice	4.151	3.021	0.105
			0.000						
(2) A2	C	From Face	0.000	0.000	110.000	No Ice	2.424	0.542	0.022
(AT&T - Reserved)			0.000			1/2" Ice	2.633	0.675	0.035
			0.000						
Valmont T-Arm (3)	C	None		0.000	110.000	No Ice	21.000	21.000	1.008
(AT&T - Reserved)						1/2" Ice	29.000	29.000	1.236
(2) DC6-48-60-18-8F Surge	A	From Face	0.000	0.000	108.000	No Ice	2.228	2.228	0.020
Arrestor			0.000			1/2" Ice	2.447	2.447	0.039
(AT&T - Reserved)			0.000						
DC6-48-60-18-8F Surge	B	From Face	0.000	0.000	108.000	No Ice	2.228	2.228	0.020
Arrestor			0.000			1/2" Ice	2.447	2.447	0.039
(AT&T - Reserved)			0.000						
DC6-48-60-18-8F Surge	C	From Face	0.000	0.000	108.000	No Ice	2.228	2.228	0.020
Arrestor			0.000			1/2" Ice	2.447	2.447	0.039
(AT&T - Reserved)			0.000						
Valmont Uni-Tri Bracket	C	None		0.000	108.000	No Ice	1.750	1.750	0.290
(AT&T - Reserved)						1/2" Ice	1.940	1.940	0.306
(2) AIR21 B2A/B4P	A	From Face	3.000	0.000	100.000	No Ice	6.533	4.356	0.083
(T-Mobile - Existing)			0.000			1/2" Ice	6.978	4.775	0.125
			0.000						
(2) AIR21 B2A/B4P	B	From Face	3.000	0.000	100.000	No Ice	6.533	4.356	0.083
(T-Mobile - Existing)			0.000			1/2" Ice	6.978	4.775	0.125
			0.000						
(2) AIR21 B2A/B4P	C	From Face	3.000	0.000	100.000	No Ice	6.533	4.356	0.083
(T-Mobile - Existing)			0.000			1/2" Ice	6.978	4.775	0.125
			0.000						
LNX-6515DS	A	From Face	3.000	0.000	100.000	No Ice	11.445	7.696	0.055

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
(T-Mobile - Existing)			0.000 0.000			1/2" Ice	12.064	8.289	0.121
LNX-6515DS	B	From Face	3.000	0.000	100.000	No Ice	11.445	7.696	0.055
(T-Mobile - Existing)			0.000 0.000			1/2" Ice	12.064	8.289	0.121
LNX-6515DS	C	From Face	3.000	0.000	100.000	No Ice	11.445	7.696	0.055
(T-Mobile - Existing)			0.000 0.000			1/2" Ice	12.064	8.289	0.121
KRY 112-144-1 TMA	A	From Face	3.000	0.000	100.000	No Ice	0.409	0.166	0.015
(T-Mobile - Existing)			0.000 0.000			1/2" Ice	0.498	0.228	0.018
KRY 112-144-1 TMA	B	From Face	3.000	0.000	100.000	No Ice	0.409	0.166	0.015
(T-Mobile - Existing)			0.000 0.000			1/2" Ice	0.498	0.228	0.018
KRY 112-144-1 TMA	C	From Face	3.000	0.000	100.000	No Ice	0.409	0.166	0.015
(T-Mobile - Existing)			0.000 0.000			1/2" Ice	0.498	0.228	0.018
RRUS-11	A	From Face	3.000	0.000	100.000	No Ice	2.994	1.246	0.050
(T-Mobile - Existing)			0.000 0.000			1/2" Ice	3.226	1.412	0.070
RRUS-11	B	From Face	3.000	0.000	100.000	No Ice	2.994	1.246	0.050
(T-Mobile - Existing)			0.000 0.000			1/2" Ice	3.226	1.412	0.070
RRUS-11	C	From Face	3.000	0.000	100.000	No Ice	2.994	1.246	0.050
(T-Mobile - Existing)			0.000 0.000			1/2" Ice	3.226	1.412	0.070
Valmont T-Arm (3)	C	None		0.000	99.000	No Ice	21.000	21.000	1.008
(T-Mobile - Existing)						1/2" Ice	29.000	29.000	1.236
BXA-70063/6CF	A	From Face	3.000	0.000	90.000	No Ice	7.731	4.158	0.012
(Verizon - Existing)			6.000 0.000			1/2" Ice	8.268	4.595	0.054
SBNHH-1D65B	A	From Face	3.000	0.000	90.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			4.000 0.000			1/2" Ice	8.878	5.795	0.092
BXA-70063/6CF	A	From Face	3.000	0.000	90.000	No Ice	7.731	4.158	0.012
(Verizon - Existing)			0.000 0.000			1/2" Ice	8.268	4.595	0.054
SBNHH-1D65B	A	From Face	3.000	0.000	90.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			-4.000 0.000			1/2" Ice	8.878	5.795	0.092
BXA-70063/6CF	B	From Face	3.000	0.000	90.000	No Ice	7.731	4.158	0.012
(Verizon - Existing)			6.000 0.000			1/2" Ice	8.268	4.595	0.054
SBNHH-1D65B	B	From Face	3.000	0.000	90.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			4.000 0.000			1/2" Ice	8.878	5.795	0.092
BXA-70063/6CF	B	From Face	3.000	0.000	90.000	No Ice	7.731	4.158	0.012
(Verizon - Existing)			0.000 0.000			1/2" Ice	8.268	4.595	0.054
SBNHH-1D65B	B	From Face	3.000	0.000	90.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			-4.000 0.000			1/2" Ice	8.878	5.795	0.092
BXA-70063/6CF	C	From Face	3.000	0.000	90.000	No Ice	7.731	4.158	0.012
(Verizon - Existing)			6.000 0.000			1/2" Ice	8.268	4.595	0.054
SBNHH-1D65B	C	From Face	3.000	0.000	90.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			4.000			1/2" Ice	8.878	5.795	0.092

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert (ft / ft / ft)	Azimuth Adjustment (°)	Placement (ft)		C_AA_A Front (ft^2)	C_AA_A Side (ft^2)	Weight (K)
			0.000						
BXA-70063/6CF	C	From Face	3.000	0.000	90.000	No Ice	7.731	4.158	0.012
(Verizon - Existing)			0.000			1/2" Ice	8.268	4.595	0.054
			0.000						
SBNHH-1D65B	C	From Face	3.000	0.000	90.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			-4.000			1/2" Ice	8.878	5.795	0.092
			0.000						
RRH4x30-B13	A	From Face	3.000	0.000	90.000	No Ice	2.520	1.890	0.058
(Verizon - Proposed)			0.000			1/2" Ice	2.742	2.093	0.078
			0.000						
RRH4x30-B13	B	From Face	3.000	0.000	90.000	No Ice	2.520	1.890	0.058
(Verizon - Proposed)			0.000			1/2" Ice	2.742	2.093	0.078
			0.000						
RRH4x30-B13	C	From Face	3.000	0.000	90.000	No Ice	2.520	1.890	0.058
(Verizon - Proposed)			0.000			1/2" Ice	2.742	2.093	0.078
			0.000						
RRH2x60-PCS	A	From Face	3.000	0.000	90.000	No Ice	2.508	1.547	0.055
(Verizon - Proposed)			4.000			1/2" Ice	2.730	1.738	0.073
			0.000						
RRH2x60-PCS	B	From Face	3.000	0.000	90.000	No Ice	2.508	1.547	0.055
(Verizon - Proposed)			4.000			1/2" Ice	2.730	1.738	0.073
			0.000						
RRH2x60-PCS	C	From Face	3.000	0.000	90.000	No Ice	2.508	1.547	0.055
(Verizon - Existing)			4.000			1/2" Ice	2.730	1.738	0.073
			0.000						
RRH2x60-AWS	A	From Face	3.000	0.000	90.000	No Ice	3.782	2.069	0.055
(Verizon - Existing)			-4.000			1/2" Ice	4.093	2.349	0.078
			0.000						
RRH2x60-AWS	B	From Face	3.000	0.000	90.000	No Ice	3.782	2.069	0.055
(Verizon - Existing)			-4.000			1/2" Ice	4.093	2.349	0.078
			0.000						
RRH2x60-AWS	C	From Face	3.000	0.000	90.000	No Ice	3.782	2.069	0.055
(Verizon - Existing)			-4.000			1/2" Ice	4.093	2.349	0.078
			0.000						
DB-T1-6Z-8AB-0Z	A	From Face	0.000	0.000	90.000	No Ice	5.600	2.333	0.044
(Verizon - Existing)			0.000			1/2" Ice	5.915	2.558	0.080
			0.000						
DB-T1-6Z-8AB-0Z	B	From Face	0.000	0.000	90.000	No Ice	5.600	2.333	0.044
(Verizon - Existing)			0.000			1/2" Ice	5.915	2.558	0.080
			0.000						
Valmont 13' Low Profile Platform	C	None		0.000	90.000	No Ice	15.700	15.700	1.300
(Verizon - Existing)						1/2" Ice	20.100	20.100	1.765

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 110.000-82.000	95.301	1.354	0.035	61.063	A	0.000	61.063	61.063	100.00	0.000	0.000
					B	0.000	61.063		100.00	0.000	0.000
					C	0.000	61.063		100.00	0.000	0.000
L2 82.000-49.000	65.048	1.214	0.031	95.796	A	0.000	95.796	95.796	100.00	0.000	0.000
					B	0.000	95.796		100.00	0.000	0.000
					C	0.000	95.796		100.00	0.000	0.000
L3 49.000-1.000	23.999	1	0.026	182.642	A	0.000	182.642	182.642	100.00	0.000	0.000
					B	0.000	182.642		100.00	0.000	0.000
					C	0.000	182.642		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 110.000-82.000	95.301	1.354	0.026	0.500	63.397	A	0.000	63.397	63.397	100.00	0.000	0.000
						B	0.000	63.397		100.00	0.000	0.000
						C	0.000	63.397		100.00	0.000	0.000
L2 82.000-49.000	65.048	1.214	0.023	0.500	98.546	A	0.000	98.546	98.546	100.00	0.000	0.000
						B	0.000	98.546		100.00	0.000	0.000
						C	0.000	98.546		100.00	0.000	0.000
L3 49.000-1.000	23.999	1	0.019	0.500	186.642	A	0.000	186.642	186.642	100.00	0.000	0.000
						B	0.000	186.642		100.00	0.000	0.000
						C	0.000	186.642		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 110.000-82.000	95.301	1.354	0.009	61.063	A	0.000	61.063	61.063	100.00	0.000	0.000
					B	0.000	61.063		100.00	0.000	0.000
					C	0.000	61.063		100.00	0.000	0.000
L2 82.000-49.000	65.048	1.214	0.008	95.796	A	0.000	95.796	95.796	100.00	0.000	0.000
					B	0.000	95.796		100.00	0.000	0.000
					C	0.000	95.796		100.00	0.000	0.000
L3 49.000-1.000	23.999	1	0.006	182.642	A	0.000	182.642	182.642	100.00	0.000	0.000
					B	0.000	182.642		100.00	0.000	0.000
					C	0.000	182.642		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.345	1.473	A	1	0.65	1	1	1	61.063	2.325	0.083	C
110.000-82.00			B	1	0.65	1	1	1	61.063			
0			C	1	0.65	1	1	1	61.063			
L2	0.675	3.845	A	1	0.65	1	1	1	95.796	3.261	0.099	C
82.000-49.000			B	1	0.65	1	1	1	95.796			
			C	1	0.65	1	1	1	95.796			
L3	0.921	9.570	A	1	0.65	1	1	1	182.642	5.209	0.109	C
49.000-1.000			B	1	0.65	1	1	1	182.642			
			C	1	0.65	1	1	1	182.642			
Sum Weight:	1.942	14.889						OTM	547.898 kip-ft	10.795		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.345	1.473	A	1	0.65	1	1	1	61.063	2.325	0.083	C
110.000-82.00			B	1	0.65	1	1	1	61.063			
0			C	1	0.65	1	1	1	61.063			
L2	0.675	3.845	A	1	0.65	1	1	1	95.796	3.261	0.099	C
82.000-49.000			B	1	0.65	1	1	1	95.796			
			C	1	0.65	1	1	1	95.796			
L3	0.921	9.570	A	1	0.65	1	1	1	182.642	5.209	0.109	C
49.000-1.000			B	1	0.65	1	1	1	182.642			
			C	1	0.65	1	1	1	182.642			
Sum Weight:	1.942	14.889						OTM	547.898 kip-ft	10.795		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.345	1.473	A	1	0.65	1	1	1	61.063	2.325	0.083	C
110.000-82.00			B	1	0.65	1	1	1	61.063			
0			C	1	0.65	1	1	1	61.063			
L2	0.675	3.845	A	1	0.65	1	1	1	95.796	3.261	0.099	C
82.000-49.000			B	1	0.65	1	1	1	95.796			
			C	1	0.65	1	1	1	95.796			
L3	0.921	9.570	A	1	0.65	1	1	1	182.642	5.209	0.109	C
49.000-1.000			B	1	0.65	1	1	1	182.642			
			C	1	0.65	1	1	1	182.642			
Sum Weight:	1.942	14.889						OTM	547.898 kip-ft	10.795		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.345	1.473	A	1	0.65	1	1	1	61.063	2.325	0.083	C
110.000-82.00			B	1	0.65	1	1	1	61.063			
0			C	1	0.65	1	1	1	61.063			
L2	0.675	3.845	A	1	0.65	1	1	1	95.796	3.261	0.099	C
82.000-49.000			B	1	0.65	1	1	1	95.796			
			C	1	0.65	1	1	1	95.796			
L3	0.921	9.570	A	1	0.65	1	1	1	182.642	5.209	0.109	C
49.000-1.000			B	1	0.65	1	1	1	182.642			
			C	1	0.65	1	1	1	182.642			
Sum Weight:	1.942	14.889						OTM	547.898 kip-ft	10.795		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.345	1.934	A	1	0.65	1	1	1	63.397	1.810	0.065	C
110.000-82.00			B	1	0.65	1	1	1	63.397			
0			C	1	0.65	1	1	1	63.397			
L2	0.675	4.565	A	1	0.65	1	1	1	98.546	2.516	0.076	C
82.000-49.000			B	1	0.65	1	1	1	98.546			
			C	1	0.65	1	1	1	98.546			
L3	0.921	10.938	A	1	0.65	1	1	1	186.642	3.992	0.083	C
49.000-1.000			B	1	0.65	1	1	1	186.642			
			C	1	0.65	1	1	1	186.642			
Sum Weight:	1.942	17.437						OTM	423.671 kip-ft	8.319		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.345	1.934	A	1	0.65	1	1	1	63.397	1.810	0.065	C
110.000-82.00			B	1	0.65	1	1	1	63.397			
0			C	1	0.65	1	1	1	63.397			
L2	0.675	4.565	A	1	0.65	1	1	1	98.546	2.516	0.076	C
82.000-49.000			B	1	0.65	1	1	1	98.546			
			C	1	0.65	1	1	1	98.546			
L3	0.921	10.938	A	1	0.65	1	1	1	186.642	3.992	0.083	C
49.000-1.000			B	1	0.65	1	1	1	186.642			
			C	1	0.65	1	1	1	186.642			
Sum Weight:	1.942	17.437						OTM	423.671 kip-ft	8.319		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.345	1.934	A	1	0.65	1	1	1	63.397	1.810	0.065	C
110.000-82.00			B	1	0.65	1	1	1	63.397			
0			C	1	0.65	1	1	1	63.397			
L2	0.675	4.565	A	1	0.65	1	1	1	98.546	2.516	0.076	C
82.000-49.000			B	1	0.65	1	1	1	98.546			
			C	1	0.65	1	1	1	98.546			
L3	0.921	10.938	A	1	0.65	1	1	1	186.642	3.992	0.083	C
49.000-1.000			B	1	0.65	1	1	1	186.642			
			C	1	0.65	1	1	1	186.642			
Sum Weight:	1.942	17.437						OTM	423.671 kip-ft	8.319		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.345	1.934	A	1	0.65	1	1	1	63.397	1.810	0.065	C
110.000-82.00			B	1	0.65	1	1	1	63.397			
0			C	1	0.65	1	1	1	63.397			
L2	0.675	4.565	A	1	0.65	1	1	1	98.546	2.516	0.076	C
82.000-49.000			B	1	0.65	1	1	1	98.546			
			C	1	0.65	1	1	1	98.546			
L3	0.921	10.938	A	1	0.65	1	1	1	186.642	3.992	0.083	C
49.000-1.000			B	1	0.65	1	1	1	186.642			
			C	1	0.65	1	1	1	186.642			
Sum Weight:	1.942	17.437						OTM	423.671 kip-ft	8.319		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.345	1.473	A	1	0.65	1	1	1	61.063	0.581	0.021	C
110.000-82.00			B	1	0.65	1	1	1	61.063			
0			C	1	0.65	1	1	1	61.063			
L2	0.675	3.845	A	1	0.65	1	1	1	95.796	0.815	0.025	C
82.000-49.000			B	1	0.65	1	1	1	95.796			
			C	1	0.65	1	1	1	95.796			
L3	0.921	9.570	A	1	0.65	1	1	1	182.642	1.302	0.027	C
49.000-1.000			B	1	0.65	1	1	1	182.642			
			C	1	0.65	1	1	1	182.642			
Sum Weight:	1.942	14.889						OTM	136.975	2.699		

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
									kip-ft			

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.345	1.473	A	1	0.65	1	1	1	61.063	0.581	0.021	C
110.000-82.00			B	1	0.65	1	1	1	61.063			
0			C	1	0.65	1	1	1	61.063			
L2	0.675	3.845	A	1	0.65	1	1	1	95.796	0.815	0.025	C
82.000-49.000			B	1	0.65	1	1	1	95.796			
			C	1	0.65	1	1	1	95.796			
L3	0.921	9.570	A	1	0.65	1	1	1	182.642	1.302	0.027	C
49.000-1.000			B	1	0.65	1	1	1	182.642			
			C	1	0.65	1	1	1	182.642			
Sum Weight:	1.942	14.889						OTM	136.975 kip-ft	2.699		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.345	1.473	A	1	0.65	1	1	1	61.063	0.581	0.021	C
110.000-82.00			B	1	0.65	1	1	1	61.063			
0			C	1	0.65	1	1	1	61.063			
L2	0.675	3.845	A	1	0.65	1	1	1	95.796	0.815	0.025	C
82.000-49.000			B	1	0.65	1	1	1	95.796			
			C	1	0.65	1	1	1	95.796			
L3	0.921	9.570	A	1	0.65	1	1	1	182.642	1.302	0.027	C
49.000-1.000			B	1	0.65	1	1	1	182.642			
			C	1	0.65	1	1	1	182.642			
Sum Weight:	1.942	14.889						OTM	136.975 kip-ft	2.699		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.345	1.473	A	1	0.65	1	1	1	61.063	0.581	0.021	C
110.000-82.00			B	1	0.65	1	1	1	61.063			
0			C	1	0.65	1	1	1	61.063			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L2	0.675	3.845	A	1	0.65	1	1	1	95.796	0.815	0.025	C
82.000-49.000			B	1	0.65	1	1	1	95.796			
			C	1	0.65	1	1	1	95.796			
L3	0.921	9.570	A	1	0.65	1	1	1	182.642	1.302	0.027	C
49.000-1.000			B	1	0.65	1	1	1	182.642			
			C	1	0.65	1	1	1	182.642			
Sum Weight:	1.942	14.889						OTM	136.975 kip-ft	2.699		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	14.889					
Bracing Weight	0.000					
Total Member Self-Weight	14.889			-0.061	0.016	
Total Weight	24.153			-0.061	0.016	
Wind 0 deg - No Ice		0.000	-32.506	-2720.250	0.016	-0.111
Wind 30 deg - No Ice		16.347	-28.151	-2355.814	-1368.455	-0.207
Wind 45 deg - No Ice		23.118	-22.985	-1923.525	-1935.295	-0.234
Wind 60 deg - No Ice		28.314	-16.253	-1360.155	-2370.246	-0.246
Wind 90 deg - No Ice		32.694	0.000	-0.061	-2736.927	-0.220
Wind 120 deg - No Ice		28.314	16.253	1360.034	-2370.246	-0.135
Wind 135 deg - No Ice		23.118	22.985	1923.404	-1935.295	-0.077
Wind 150 deg - No Ice		16.347	28.151	2355.693	-1368.455	-0.014
Wind 180 deg - No Ice		0.000	32.506	2720.129	0.016	0.111
Wind 210 deg - No Ice		-16.347	28.151	2355.693	1368.488	0.207
Wind 225 deg - No Ice		-23.118	22.985	1923.404	1935.328	0.234
Wind 240 deg - No Ice		-28.314	16.253	1360.034	2370.279	0.246
Wind 270 deg - No Ice		-32.694	0.000	-0.061	2736.960	0.220
Wind 300 deg - No Ice		-28.314	-16.253	-1360.155	2370.279	0.135
Wind 315 deg - No Ice		-23.118	-22.985	-1923.525	1935.328	0.077
Wind 330 deg - No Ice		-16.347	-28.151	-2355.814	1368.488	0.014
Member Ice	2.548					
Total Weight Ice	30.030			-0.112	0.032	
Wind 0 deg - Ice		0.000	-26.597	-2252.933	0.032	-0.092
Wind 30 deg - Ice		13.371	-23.034	-1951.112	-1132.835	-0.170
Wind 45 deg - Ice		18.909	-18.807	-1593.097	-1602.084	-0.193
Wind 60 deg - Ice		23.159	-13.298	-1126.522	-1962.152	-0.203
Wind 90 deg - Ice		26.742	0.000	-0.112	-2265.703	-0.181
Wind 120 deg - Ice		23.159	13.298	1126.299	-1962.152	-0.111
Wind 135 deg - Ice		18.909	18.807	1592.873	-1602.084	-0.063
Wind 150 deg - Ice		13.371	23.034	1950.888	-1132.835	-0.011
Wind 180 deg - Ice		0.000	26.597	2252.709	0.032	0.092
Wind 210 deg - Ice		-13.371	23.034	1950.888	1132.900	0.170
Wind 225 deg - Ice		-18.909	18.807	1592.873	1602.149	0.193
Wind 240 deg - Ice		-23.159	13.298	1126.299	1962.217	0.203
Wind 270 deg - Ice		-26.742	0.000	-0.112	2265.768	0.181
Wind 300 deg - Ice		-23.159	-13.298	-1126.522	1962.217	0.111
Wind 315 deg - Ice		-18.909	-18.807	-1593.097	1602.149	0.063
Wind 330 deg - Ice		-13.371	-23.034	-1951.112	1132.900	0.011
Total Weight	24.153			-0.061	0.016	
Wind 0 deg - Service		0.000	-8.126	-680.108	0.016	-0.028
Wind 30 deg - Service		4.087	-7.038	-588.999	-342.101	-0.052

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 45 deg - Service		5.780	-5.746	-480.927	-483.811	-0.059
Wind 60 deg - Service		7.078	-4.063	-340.084	-592.549	-0.062
Wind 90 deg - Service		8.174	0.000	-0.061	-684.219	-0.055
Wind 120 deg - Service		7.078	4.063	339.963	-592.549	-0.034
Wind 135 deg - Service		5.780	5.746	480.806	-483.811	-0.019
Wind 150 deg - Service		4.087	7.038	588.878	-342.101	-0.003
Wind 180 deg - Service		0.000	8.126	679.987	0.016	0.028
Wind 210 deg - Service		-4.087	7.038	588.878	342.134	0.052
Wind 225 deg - Service		-5.780	5.746	480.806	483.844	0.059
Wind 240 deg - Service		-7.078	4.063	339.963	592.582	0.062
Wind 270 deg - Service		-8.174	0.000	-0.061	684.252	0.055
Wind 300 deg - Service		-7.078	-4.063	-340.084	592.582	0.034
Wind 315 deg - Service		-5.780	-5.746	-480.927	483.844	0.019
Wind 330 deg - Service		-4.087	-7.038	-588.999	342.134	0.003

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 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service

Comb. No.	Description
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	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	110 - 82	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-12.932	0.032	0.112
			Max. Mx	14	-7.674	456.347	0.054
			Max. My	2	-7.694	0.013	454.842
			Max. Vy	14	-24.728	456.347	0.054
			Max. Vx	2	-24.538	0.013	454.842
			Max. Torque	5			0.245
L2	82 - 49	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-17.297	0.032	0.112
			Max. Mx	14	-11.903	1185.712	0.060
			Max. My	2	-11.916	0.016	1178.866
			Max. Vy	14	-27.416	1185.712	0.060
			Max. Vx	2	-27.225	0.016	1178.866
			Max. Torque	5			0.245
L3	49 - 1	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-30.030	0.032	0.112
			Max. Mx	14	-24.126	2776.918	0.062
			Max. My	2	-24.127	0.017	2760.001
			Max. Vy	14	-32.714	2776.918	0.062
			Max. Vx	2	-32.526	0.017	2760.001
			Max. Torque	5			0.244

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	31	30.030	26.742	0.000
	Max. H_x	14	24.153	32.694	0.000
	Max. H_z	2	24.153	0.000	32.506
	Max. M_x	2	2760.001	0.000	32.506
	Max. M_z	6	2776.884	-32.694	0.000
	Max. Torsion	5	0.244	-28.314	16.253
	Min. Vert	1	24.153	0.000	0.000
	Min. H_x	6	24.153	-32.694	0.000
	Min. H_z	10	24.153	0.000	-32.506

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. M_x	10	-2759.877	0.000	-32.506
	Min. M_z	14	-2776.918	32.694	0.000
	Min. Torsion	13	-0.243	28.314	-16.253

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	24.153	0.000	0.000	-0.061	0.016	0.000
Dead+Wind 0 deg - No Ice	24.153	0.000	-32.506	-2760.001	0.017	-0.110
Dead+Wind 30 deg - No Ice	24.153	16.347	-28.151	-2390.234	-1388.444	-0.205
Dead+Wind 45 deg - No Ice	24.153	23.118	-22.985	-1951.624	-1963.558	-0.232
Dead+Wind 60 deg - No Ice	24.153	28.314	-16.253	-1380.022	-2404.856	-0.244
Dead+Wind 90 deg - No Ice	24.153	32.694	0.000	-0.062	-2776.884	-0.218
Dead+Wind 120 deg - No Ice	24.153	28.314	16.253	1379.898	-2404.856	-0.133
Dead+Wind 135 deg - No Ice	24.153	23.118	22.985	1951.501	-1963.558	-0.076
Dead+Wind 150 deg - No Ice	24.153	16.347	28.151	2390.110	-1388.443	-0.013
Dead+Wind 180 deg - No Ice	24.153	0.000	32.506	2759.877	0.017	0.110
Dead+Wind 210 deg - No Ice	24.153	-16.347	28.151	2390.110	1388.477	0.204
Dead+Wind 225 deg - No Ice	24.153	-23.118	22.985	1951.501	1963.591	0.231
Dead+Wind 240 deg - No Ice	24.153	-28.314	16.253	1379.899	2404.889	0.243
Dead+Wind 270 deg - No Ice	24.153	-32.694	0.000	-0.062	2776.918	0.218
Dead+Wind 300 deg - No Ice	24.153	-28.314	-16.253	-1380.022	2404.889	0.134
Dead+Wind 315 deg - No Ice	24.153	-23.118	-22.985	-1951.625	1963.592	0.077
Dead+Wind 330 deg - No Ice	24.153	-16.347	-28.151	-2390.234	1388.477	0.014
Dead+Ice+Temp	30.030	0.000	0.000	-0.112	0.032	0.000
Dead+Wind 0 deg+Ice+Temp	30.030	0.000	-26.597	-2299.073	0.033	-0.090
Dead+Wind 30 deg+Ice+Temp	30.030	13.371	-23.034	-1991.068	-1156.026	-0.168
Dead+Wind 45 deg+Ice+Temp	30.030	18.909	-18.807	-1625.719	-1634.879	-0.191
Dead+Wind 60 deg+Ice+Temp	30.030	23.159	-13.298	-1149.589	-2002.314	-0.200
Dead+Wind 90 deg+Ice+Temp	30.030	26.742	0.000	-0.115	-2312.074	-0.179
Dead+Wind 120 deg+Ice+Temp	30.030	23.159	13.298	1149.358	-2002.313	-0.109
Dead+Wind 135 deg+Ice+Temp	30.030	18.909	18.807	1625.488	-1634.878	-0.062
Dead+Wind 150 deg+Ice+Temp	30.030	13.371	23.034	1990.837	-1156.026	-0.011
Dead+Wind 180 deg+Ice+Temp	30.030	0.000	26.597	2298.842	0.033	0.090
Dead+Wind 210 deg+Ice+Temp	30.030	-13.371	23.034	1990.837	1156.092	0.167
Dead+Wind 225 deg+Ice+Temp	30.030	-18.909	18.807	1625.488	1634.945	0.190
Dead+Wind 240 deg+Ice+Temp	30.030	-23.159	13.298	1149.358	2002.380	0.200
Dead+Wind 270 deg+Ice+Temp	30.030	-26.742	0.000	-0.115	2312.141	0.179
Dead+Wind 300 deg+Ice+Temp	30.030	-23.159	-13.298	-1149.589	2002.381	0.110
Dead+Wind 315 deg+Ice+Temp	30.030	-18.909	-18.807	-1625.719	1634.946	0.063
Dead+Wind 330 deg+Ice+Temp	30.030	-13.371	-23.034	-1991.068	1156.093	0.012
Dead+Wind 0 deg - Service	24.153	0.000	-8.126	-690.579	0.017	-0.028
Dead+Wind 30 deg - Service	24.153	4.087	-7.038	-598.067	-347.366	-0.051
Dead+Wind 45 deg - Service	24.153	5.780	-5.746	-488.331	-491.257	-0.058
Dead+Wind 60 deg - Service	24.153	7.078	-4.063	-345.320	-601.668	-0.061
Dead+Wind 90 deg - Service	24.153	8.174	0.000	-0.062	-694.749	-0.055
Dead+Wind 120 deg - Service	24.153	7.078	4.063	345.196	-601.668	-0.034
Dead+Wind 135 deg - Service	24.153	5.780	5.746	488.206	-491.257	-0.019
Dead+Wind 150 deg - Service	24.153	4.087	7.038	597.942	-347.366	-0.003
Dead+Wind 180 deg - Service	24.153	0.000	8.126	690.454	0.017	0.028
Dead+Wind 210 deg - Service	24.153	-4.087	7.038	597.942	347.400	0.051
Dead+Wind 225 deg - Service	24.153	-5.780	5.746	488.206	491.291	0.058
Dead+Wind 240 deg - Service	24.153	-7.078	4.063	345.196	601.702	0.061
Dead+Wind 270 deg - Service	24.153	-8.174	0.000	-0.062	694.783	0.055
Dead+Wind 300 deg - Service	24.153	-7.078	-4.063	-345.320	601.702	0.034

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 315 deg - Service	24.153	-5.780	-5.746	-488.331	491.291	0.019
Dead+Wind 330 deg - Service	24.153	-4.087	-7.038	-598.067	347.400	0.003

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-24.153	0.000	0.000	24.153	0.000	0.000%
2	0.000	-24.153	-32.506	0.000	24.153	32.506	0.000%
3	16.347	-24.153	-28.151	-16.347	24.153	28.151	0.000%
4	23.118	-24.153	-22.985	-23.118	24.153	22.985	0.000%
5	28.314	-24.153	-16.253	-28.314	24.153	16.253	0.000%
6	32.694	-24.153	0.000	-32.694	24.153	0.000	0.000%
7	28.314	-24.153	16.253	-28.314	24.153	-16.253	0.000%
8	23.118	-24.153	22.985	-23.118	24.153	-22.985	0.000%
9	16.347	-24.153	28.151	-16.347	24.153	-28.151	0.000%
10	0.000	-24.153	32.506	0.000	24.153	-32.506	0.000%
11	-16.347	-24.153	28.151	16.347	24.153	-28.151	0.000%
12	-23.118	-24.153	22.985	23.118	24.153	-22.985	0.000%
13	-28.314	-24.153	16.253	28.314	24.153	-16.253	0.000%
14	-32.694	-24.153	0.000	32.694	24.153	0.000	0.000%
15	-28.314	-24.153	-16.253	28.314	24.153	16.253	0.000%
16	-23.118	-24.153	-22.985	23.118	24.153	22.985	0.000%
17	-16.347	-24.153	-28.151	16.347	24.153	28.151	0.000%
18	0.000	-30.030	0.000	0.000	30.030	0.000	0.000%
19	0.000	-30.030	-26.597	0.000	30.030	26.597	0.000%
20	13.371	-30.030	-23.034	-13.371	30.030	23.034	0.000%
21	18.909	-30.030	-18.807	-18.909	30.030	18.807	0.000%
22	23.159	-30.030	-13.298	-23.159	30.030	13.298	0.000%
23	26.742	-30.030	0.000	-26.742	30.030	0.000	0.000%
24	23.159	-30.030	13.298	-23.159	30.030	-13.298	0.000%
25	18.909	-30.030	18.807	-18.909	30.030	-18.807	0.000%
26	13.371	-30.030	23.034	-13.371	30.030	-23.034	0.000%
27	0.000	-30.030	26.597	0.000	30.030	-26.597	0.000%
28	-13.371	-30.030	23.034	13.371	30.030	-23.034	0.000%
29	-18.909	-30.030	18.807	18.909	30.030	-18.807	0.000%
30	-23.159	-30.030	13.298	23.159	30.030	-13.298	0.000%
31	-26.742	-30.030	0.000	26.742	30.030	0.000	0.000%
32	-23.159	-30.030	-13.298	23.159	30.030	13.298	0.000%
33	-18.909	-30.030	-18.807	18.909	30.030	18.807	0.000%
34	-13.371	-30.030	-23.034	13.371	30.030	23.034	0.000%
35	0.000	-24.153	-8.126	0.000	24.153	8.126	0.000%
36	4.087	-24.153	-7.038	-4.087	24.153	7.038	0.000%
37	5.780	-24.153	-5.746	-5.780	24.153	5.746	0.000%
38	7.078	-24.153	-4.063	-7.078	24.153	4.063	0.000%
39	8.174	-24.153	0.000	-8.174	24.153	0.000	0.000%
40	7.078	-24.153	4.063	-7.078	24.153	-4.063	0.000%
41	5.780	-24.153	5.746	-5.780	24.153	-5.746	0.000%
42	4.087	-24.153	7.038	-4.087	24.153	-7.038	0.000%
43	0.000	-24.153	8.126	0.000	24.153	-8.126	0.000%
44	-4.087	-24.153	7.038	4.087	24.153	-7.038	0.000%
45	-5.780	-24.153	5.746	5.780	24.153	-5.746	0.000%
46	-7.078	-24.153	4.063	7.078	24.153	-4.063	0.000%
47	-8.174	-24.153	0.000	8.174	24.153	0.000	0.000%
48	-7.078	-24.153	-4.063	7.078	24.153	4.063	0.000%
49	-5.780	-24.153	-5.746	5.780	24.153	5.746	0.000%
50	-4.087	-24.153	-7.038	4.087	24.153	7.038	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	0.00002284
3	Yes	5	0.00000001	0.00003629
4	Yes	5	0.00000001	0.00003945
5	Yes	5	0.00000001	0.00003677
6	Yes	4	0.00000001	0.00002999
7	Yes	5	0.00000001	0.00003635
8	Yes	5	0.00000001	0.00003944
9	Yes	5	0.00000001	0.00003652
10	Yes	4	0.00000001	0.00002284
11	Yes	5	0.00000001	0.00003676
12	Yes	5	0.00000001	0.00003944
13	Yes	5	0.00000001	0.00003621
14	Yes	4	0.00000001	0.00002999
15	Yes	5	0.00000001	0.00003664
16	Yes	5	0.00000001	0.00003944
17	Yes	5	0.00000001	0.00003652
18	Yes	4	0.00000001	0.00000001
19	Yes	5	0.00000001	0.00002885
20	Yes	5	0.00000001	0.00009260
21	Yes	5	0.00000001	0.00010420
22	Yes	5	0.00000001	0.00009323
23	Yes	5	0.00000001	0.00002887
24	Yes	5	0.00000001	0.00009262
25	Yes	5	0.00000001	0.00010416
26	Yes	5	0.00000001	0.00009290
27	Yes	5	0.00000001	0.00002885
28	Yes	5	0.00000001	0.00009324
29	Yes	5	0.00000001	0.00010417
30	Yes	5	0.00000001	0.00009244
31	Yes	5	0.00000001	0.00002887
32	Yes	5	0.00000001	0.00009305
33	Yes	5	0.00000001	0.00010420
34	Yes	5	0.00000001	0.00009293
35	Yes	4	0.00000001	0.00001042
36	Yes	4	0.00000001	0.00009273
37	Yes	4	0.00000001	0.00010856
38	Yes	4	0.00000001	0.00009612
39	Yes	4	0.00000001	0.00001081
40	Yes	4	0.00000001	0.00009334
41	Yes	4	0.00000001	0.00010840
42	Yes	4	0.00000001	0.00009411
43	Yes	4	0.00000001	0.00001041
44	Yes	4	0.00000001	0.00009564
45	Yes	4	0.00000001	0.00010847
46	Yes	4	0.00000001	0.00009255
47	Yes	4	0.00000001	0.00001082
48	Yes	4	0.00000001	0.00009524
49	Yes	4	0.00000001	0.00010852
50	Yes	4	0.00000001	0.00009417

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	110 - 82	12.885	47	1.088	0.000
L2	82 - 49	6.989	47	0.849	0.000
L3	54 - 1	2.939	47	0.521	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
110.000	(2) OPA-65R-LCUU-H8	47	12.885	1.088	0.000	23798
108.000	(2) DC6-48-60-18-8F Surge Arrestor	47	12.438	1.072	0.000	23798
100.000	(2) AIR21 B2A/B4P	47	10.664	1.010	0.000	11899
99.000	Valmont T-Arm (3)	47	10.446	1.002	0.000	10817
90.000	BXA-70063/6CF	47	8.545	0.926	0.000	5949

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	110 - 82	51.444	14	4.343	0.002
L2	82 - 49	27.918	14	3.390	0.001
L3	54 - 1	11.741	14	2.083	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
110.000	(2) OPA-65R-LCUU-H8	14	51.444	4.343	0.002	6023
108.000	(2) DC6-48-60-18-8F Surge Arrestor	14	49.659	4.282	0.002	6023
100.000	(2) AIR21 B2A/B4P	14	42.584	4.034	0.002	3010
99.000	Valmont T-Arm (3)	14	41.713	4.002	0.002	2737
90.000	BXA-70063/6CF	14	34.125	3.698	0.001	1504

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	110 - 82 (1)	TP30.09x22.25x0.188	28.000	0.000	0.0	37.947	17.796	-7.674	675.292	0.011
L2	82 - 49 (2)	TP39.58x30.09x0.313	33.000	0.000	0.0	39.000	37.522	-11.903	1463.370	0.008
L3	49 - 1 (3)	TP52.4x37.517x0.375	53.000	0.000	0.0	39.000	61.923	-24.126	2414.990	0.010

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	110 - 82 (1)	TP30.09x22.25x0.188	456.348	41.638	37.947	1.097	0.000	0.000	37.947	0.000
L2	82 - 49 (2)	TP39.58x30.09x0.313	1185.708	40.639	39.000	1.042	0.000	0.000	39.000	0.000
L3	49 - 1 (3)	TP52.4x37.517x0.375	2776.917	41.892	39.000	1.074	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	110 - 82 (1)	TP30.09x22.25x0.188	24.728	1.390	26.000	0.107	0.218	0.010	26.000	0.000
L2	82 - 49 (2)	TP39.58x30.09x0.313	27.416	0.731	26.000	0.056	0.218	0.004	26.000	0.000
L3	49 - 1 (3)	TP52.4x37.517x0.375	32.714	0.528	26.000	0.041	0.218	0.002	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	110 - 82 (1)	0.011	1.097	0.000	0.107	0.000	1.112 ✔	1.333	H1-3+VT ✔
L2	82 - 49 (2)	0.008	1.042	0.000	0.056	0.000	1.051 ✔	1.333	H1-3+VT ✔
L3	49 - 1 (3)	0.010	1.074	0.000	0.041	0.000	1.085 ✔	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	110 - 82	Pole	TP30.09x22.25x0.188	1	-7.674	900.164	83.4	Pass
L2	82 - 49	Pole	TP39.58x30.09x0.313	2	-11.903	1950.672	78.8	Pass
L3	49 - 1	Pole	TP52.4x37.517x0.375	3	-24.126	3219.182	81.4	Pass
							Summary	
						Pole (L1)	83.4	Pass
						RATING =	**83.4**	**Pass**

Program Version 7.0.5.1 - 2/1/2016 File:J:/Jobs/1600100.WI/15_Sound View CT/Structural Analysis Report/Calcs/Rev (1)/ERI Files/110' Monopole_ Old Lyme, CT.eri

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Subject: Flange Bolts and Flangeplate Analysis

Location: 110-ft Sabre Monopole
Old Lyme, CT

Rev. 1: 8/2/16

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 16001.15

Flange Bolt and Flange Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 457·ft·kips	(Input From tnxTower)
Shear Force =	Shear := 24.7·kips	(Input From tnxTower)
Axial Force =	Axial := 13·kips	(Input From tnxTower)

Flange Bolt Data:

Use ASTM A490

Number of Flange Bolts =	N := 12	(User Input)
Diameter of Bolt Circle =	D_{bc} := 33.625·in	(User Input)
Bolt Ultimate Strength =	F_u := 150·ksi	(User Input)
Bolt Yield Strength =	F_y := 130·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Flange Bolts =	D := 1.00·in	(User Input)
Threads per Inch =	n := 8	(User Input)

Flange Plate Data:

Use ASTM A572 Mod 60

Plate Yield Strength =	Fy_{bp} := 60·ksi	(User Input)
Flange Plate Thickness =	t_{bp} := 1.25·in	(User Input)
Flange Plate Diameter =	D_{bp} := 37.875·in	(User Input)
Outer Pole Diameter =	D_{pole} := 30.09·in	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 16.813 \cdot in$

Distance to Bolts = $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N}\right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 8.41 \cdot in$ $d_7 = -8.41 \cdot in$

$d_2 = 14.56 \cdot in$ $d_8 = -14.56 \cdot in$

$d_3 = 16.81 \cdot in$ $d_9 = -16.81 \cdot in$

$d_4 = 14.56 \cdot in$ $d_{10} = -14.56 \cdot in$

$d_5 = 8.41 \cdot in$ $d_{11} = -8.41 \cdot in$

$d_6 = 0.00 \cdot in$ $d_{12} = -0.00 \cdot in$

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 15.045 \cdot in$

Moment Arms of Bolts about Neutral Axis = $MA_i := if\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 0.00 \cdot in$ $MA_7 = 0.00 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 1.77 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 0.00 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 0.00 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 0.00 \cdot in$ $MA_{12} = 0.00 \cdot in$

Effective Width of Flangeplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 18.4 \cdot in$

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i \left(d_i\right)^2 = 1.696 \times 10^3 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 0.785 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 0.606 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 0.878 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.22 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.066 \cdot in^3$

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 53.3 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot \left(0.375 \cdot A_g \cdot F_u\right) = 58.9 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Gross}} = 90 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Gross}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Flange Plate Analysis:

Force from Bolts = $C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$

$C_1 = 28.3 \cdot kips$
$C_2 = 48.2 \cdot kips$
$C_3 = 55.4 \cdot kips$
$C_4 = 48.2 \cdot kips$
$C_5 = 28.3 \cdot kips$
$C_6 = 1.1 \cdot kips$
$C_7 = -26.1 \cdot kips$
$C_8 = -46.0 \cdot kips$
$C_9 = -53.3 \cdot kips$
$C_{10} = -46.0 \cdot kips$
$C_{11} = -26.1 \cdot kips$
$C_{12} = 1.1 \cdot kips$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} t_{bp}^2\right)} = 20.5 \cdot ksi$$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 59.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 34.2 \cdot \%$

Condition3 = $Condition2 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition2 = "Ok"

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Subject:	Anchor Bolt and Baseplate Analysis
Location:	110-ft Sabre Monopole Old Lyme, CT
Rev. 1: 8/2/16	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16001.15

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 2777·ft·kips	(Input From tnxTower)
Shear Force =	Shear := 33·kips	(Input From tnxTower)
Axial Force =	Axial := 24·kips	(Input From tnxTower)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	N := 24	(User Input)
Diameter of Bolt Circle =	D_{bc} := 58.75·in	(User Input)
Bolt "Column" Distance =	l := 3.0·in	(User Input)
Bolt Ultimate Strenght =	F_u := 100·ksi	(User Input)
Bolt Yeild Strenght =	F_y := 75·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Anchor Bolts =	D := 2.25·in	(User Input)
Threads per Inch =	n := 4.5	(User Input)

Base Plate Data:

Use ASTM A572 Mod 50

Plate Yield Strength =	Fy_{bp} := 50·ksi	(User Input)
Base Plate Thickness =	t_{bp} := 2.75·in	(User Input)
Base Plate Diameter =	D_{bp} := 62.75·in	(User Input)
Outer Pole Diameter =	D_{pole} := 52.4·in	(User Input)

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Subject: Anchor Bolt and Baseplate Analysis

Location: 110-ft Sabre Monopole
Old Lyme, CT

Rev. 1: 8/2/16

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 16001.15

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

$d_1 := 29.25in$ (User Input)

$d_2 := 28in$ (User Input)

$d_3 := 25.625in$ (User Input)

$d_4 := 14.375in$ (User Input)

$d_5 := 8.875in$ (User Input)

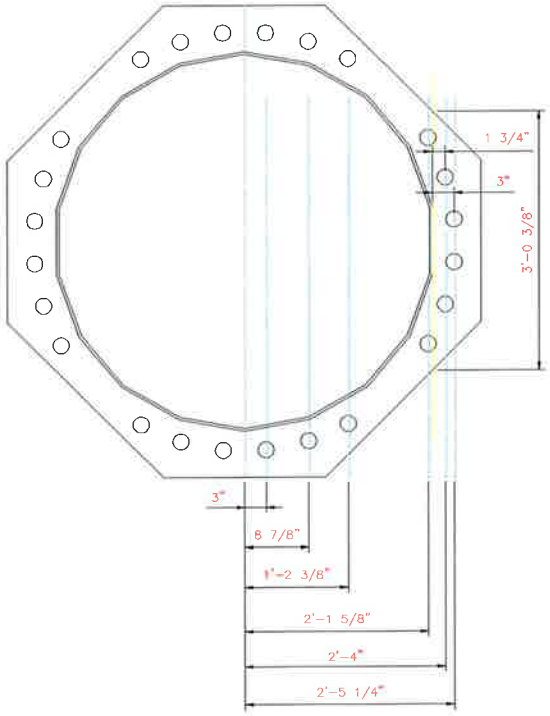
$d_6 := 3in$ (User Input)

Critical Distances For Bending in Plate:

$ma_1 := 3in$ (User Input)

$ma_2 := 1.75in$ (User Input)

Effective Width of Baseplate for Bending = $B_{eff} := 0.8 \cdot 36.375in$ (User Input)



ANCHOR BOLT AND PLATE GEOMETRY

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := \left[(d_1)^2 \cdot 4 + (d_2)^2 \cdot 4 + (d_3)^2 \cdot 4 + (d_4)^2 \cdot 4 + (d_5)^2 \cdot 4 + (d_6)^2 \cdot 4\right] = 10362 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.508 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.826 \cdot in^3$

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_1}{I_p} - \frac{Axial}{N} = 93.1 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot \left(0.33 \cdot A_g \cdot F_u\right) = 174.9 \cdot kips$ (1.333 increase allowed per TIA/EIA)

$T_{ALL.Net} := 1.333 \cdot \left(0.60 \cdot A_n \cdot F_y\right) = 194.812 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 47.8 \cdot \%$ Bolts are "upset bolts". Use net area per AISC

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Net}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Check Anchor Bolt Bending Stress:

Maximum Bending Moment = $M_x := \left(\frac{Shear}{N}\right) \cdot l = 0.344 \cdot ft \cdot kips$

Maximum Bending Stress = $f_{bx} := \frac{M_x}{S_x} = 5 \cdot ksi$

Allowable Bending Stress = $F_{bx} := 1.333 \cdot 0.6 \cdot F_y = 60 \cdot ksi$ (1.333 increase allowed per TIA/EIA)

Check Combined Stress Requirement:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required.

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot in$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot ksi$$

Check Anchor Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{Max} := OM \cdot \frac{d_1}{I_p} + \frac{Axial}{N} = 95.1 \cdot kips$$

Maximum Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = 29.3 \cdot ksi$$

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} = 87.364$$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^2}\right] \cdot F_y}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^3}} & \text{if } \dfrac{K \cdot l}{r} \le C_c \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases} = 45 \cdot ksi$$

Allowable Compressive Stress =

$$F_a := 1.333 \cdot F_a = 60 \cdot ksi$$

(1.333 increase allowed per TIA/EIA)

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}}\right) = 48.8 \cdot \%$$

Condition 2 =

$$Condition2 := if\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \le 1.00, "OK", "Overstressed"\right)$$

Condition2 = "OK"

Base Plate Analysis:

Force from Bolts =

$$C_1 := OM \cdot \frac{d_1}{I_p} + \frac{Axial}{N} = 95.1 \cdot kips$$

$$C_2 := OM \cdot \frac{d_2}{I_p} + \frac{Axial}{N} = 91 \cdot kips$$

Maximum Bending Stress in Plate =

$$f_{bp} := \frac{6 \cdot \left(2 \cdot C_1 \cdot ma_1 + 2 \cdot C_2 \cdot ma_2\right)}{\left(B_{eff} \cdot t_{bp}^{\,2}\right)} = 24.2 \cdot ksi$$

Allowable Bending Stress in Plate =

$$F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 49.9 \cdot ksi$$

Plate Bending Stress % of Capacity =

$$\frac{f_{bp}}{F_{bp}} = 48.6 \cdot \%$$

Condition3 =

$$Condition3 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$$

Condition3 = "Ok"

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Subject: FOUNDATION ANALYSIS

Location: 110-ft Sabre Monopole
Old Lyme, CT

Rev. 1: 8/2/16

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 16001.15

Rock Anchor Design:

Input Data:

Max Pier Reactions:

Moment =	Moment := 2777·ft·kips	*user input*	
Shear =	Shear := 33·kips	*user input*	
Compression =	Axial := 24·kips	*user input*	

Structure:

Footing Width =	$W_{ftg} := 19ft$	*user input*	
Footing Length =	$L_{ftg} := 19ft$	*user input*	
Footing Thickness =	$T_{ftg} := 3.5ft$	*user input*	
Pier Length=	$L_{pier} := 7.0ft$	*user input*	
Pier Depth =	$T_{pier} := 1.0ft$	*user input*	
Pier Projection Above Grade =	$P_p := 1.0 \cdot ft$	*user input*	

Depths:

Depth to Bottom of Footing =	$D_{ftg} := 3.5ft$	*user input*	(from grade line)
Depth to Sound (Competent) Rock Per Geo-tech Report =	$D_{rock} := 3.5ft$	*user input*	(from grade line)
Depth to Suitable Earth =	$D_{earth} := 0ft$	*user input*	(from grade line)
Anchor Depth =	$D_{anchor} := 29.5ft$	*user input*	(from grade line)

Subgrade Properties:

Internal Friction Angle =	$\phi := 45deg$	*user input*
Unit Weight of Earth =	$\gamma_{earth} := 125 \frac{lb}{ft^3}$	*user input*
Unit Weight of Rock =	$\gamma_{rock} := 165 \frac{lb}{ft^3}$	*user input*
Unit Weight of Conc =	$\gamma_{conc} := 150 \frac{lb}{ft^3}$	*user input*
Allowable Bearing =	$q_s := 8000 \cdot psf$	*user input*

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Subject: FOUNDATION ANALYSIS

Location: 110-ft Sabre Monopole
Old Lyme, CT

Rev. 1: 8/2/16

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 16001.15

Rock Anchor Properties:

Number of Anchors (along width) =	$N_{anchor} := 2$	*user input*
Hole Diameter =	$hole_d := 5in$	*user input*
Ultimate Bond Stress Between Rock and Grout =	$\sigma_{bond} := 200 \cdot psi$	*user input*
Allowable Bond Stress Between Rock and Grout =	$\sigma_{allbond} := \sigma_{bond} \cdot 0.5 = 100psi$	*user input*
Grout Allowable Compressive Stress =	$fc_g := 5000 \cdot psi$	*user input*
Anchor Spacing* (along length) =	$S_{anchor} := 14ft$	*user input*
Required Factor of Safety =	$F_S := 2.0$	*user input*
Rock Anchor Ultimate Strength =	$Fu_{anchor} := 150.0ksi$	*user input*
Rock Anchor Yield Strength =	$Fy_{anchor} := 127.7ksi$	*user input*
Rock Anchor Diameter =	$d_{ra} := 2.5in$	*user input*
Rock Anchor Area per Group =	$A_g := 5.19in^2$	*user input*
Rock Anchor Ultimate Tensile Strength =	$P_u := 778kips$	*user input*
Rock Anchor Allowable Tension =	$P_{all} := 0.60 \cdot P_u = 466.8 \cdot kips$	
Rock Anchor Maximum Working Load to Yield =	$T_y := 0.80 \cdot P_u = 622.4 \cdot kips$	
Rock Anchor Shear Capacity =	$Sh := 0.4 \cdot T_y = 248.96 \cdot kips$	
Number of Rock Anchors =	$n_{anchor} := 4$	*user input*

Rock Anchor Tension/Shear Check:

Overturning Moment =	$OM := Moment + Shear \cdot (T_{ftg} + T_{pier}) = 2925.5 \cdot ft \cdot kips$
Weight of Pad =	$W_{pad} := (W_{ftg} \cdot L_{ftg} \cdot T_{ftg}) \cdot \gamma_{conc} = 189.52 \cdot kips$
Weight of Pier =	$W_{pier} := (L_{pier}^2 \cdot T_{pier}) \cdot \gamma_{conc} = 7.4 \cdot kips$
Weight of Soil =	$W_{soil} := \left[\left[(W_{ftg} \cdot L_{ftg}) - L_{pier}^2 \right] \cdot D_{earth} \right] \cdot \gamma_{earth} = 0 \cdot kips$
Total Weight =	$W_{conc} := W_{pad} + W_{pier} = 196.88 \cdot kips$
Total Weight of Foundation =	$W_{tot} := W_{conc} + W_{soil} + Axial = 220.88 \cdot kips$
Resisting Moment =	$M_r := W_{tot} \cdot \left(\frac{W_{ftg}}{2} \right) = 2098.31 \, ft \cdot kips$
Net Moment Required =	$M_{net} := OM - M_r = 827.19 ft \cdot kips$

Check Perpendicular:

Rock Anchor Distance 1 = $d_1 := 7 \cdot ft$ *user input*

Number of Rock Anchors in Group 1 = $n_1 := 4$ *user input*

Polar Moment of Inertia = $I_{p1} := d_1^2 \cdot n_1 = 196 ft^2$

Tension Force per Anchor Perp = $P_{perp} := \frac{d_1}{I_{p1}} \cdot (M_{net}) = 29.5 \cdot kips$

Check @ 45 Degree Angle:

Rock Anchor Distance 2 = $d_2 := 9.9 \cdot ft$ *user input*

Number of Rock Anchors in Group = $n_2 := 2$ *user input*

Polar Moment of Inertia = $I_{p2} := d_2^2 \cdot n_2 = 196.02 ft^2$

Tension Force per Anchor Diag = $P_{diag} := \frac{d_2}{I_{p2}} \cdot (M_{net}) = 41.8 \cdot kips$

Tension Force per Anchor = $P_{anchor} := \begin{cases} P_{perp} & \text{if } P_{perp} \geq P_{diag} \\ P_{diag} & \text{otherwise} \end{cases} = 41.8 \cdot kips$

Anchor Lock off Load = $Lock_{anchor} := 50 \cdot kips$

Provided Safety Factor = $\frac{P_{anchor}}{Lock_{anchor}} = 0.84$

$Rock\_Anchor := if\left(\frac{P_{anchor}}{Lock_{anchor}} \leq 1.0, "OK", "Overstressed"\right)$

Rock_Anchor = "OK"

Rock Anchor Req'd Development Length in Rock:

Minimum Free Stress Length Provided = $F_{stressprov} := 13ft$ *user input*

Rock Anchor/Grout Bond Length = $L_{bprov} := D_{anchor} - F_{stressprov} = 16.5ft$

Rock/Grout Bond Length Required = $L_{breq} := \frac{Lock_{anchor}}{\pi \cdot hole_d \cdot \sigma_{allbond}} = 2.65ft$

$Bond\_Length\_Check := if\left(\frac{L_{breq}}{L_{bprov}} \le 1.00, "OK", "Increase Length"\right)$

$\frac{L_{breq}}{L_{bprov}} = 0.16$

Bond_Length_Check = "OK"

Resistance Calculations:

Intermediate Dimension:

Total Anchor Width = $W := S_{anchor} = 14ft$

Volumes:

Base Area 1 of Resisting Pyramid = $B_1 := W^2 = 196ft^2$

Base Area 2 of Resisting Pyramid = $B_2 := \left[\tan(\phi) \cdot \left[\left(D_{anchor}\right) \cdot 0.55 - \left(T_{ftg} + T_{pier}\right)\right] \cdot 2 + W\right]^2 = 1402.5ft^2$

Base Area 3 of Resisting Pyramid = $B_3 := \left[\tan(\phi) \cdot \left[\left(D_{anchor}\right) \cdot 0.55 - P_p\right] \cdot 2 + W\right]^2 = 1975.8ft^2$

Volume of Rock = $V_{rock} := \frac{\left[\left[\left(D_{anchor}\right) \cdot 0.55 - \left(T_{ftg} + T_{pier}\right)\right] \cdot \left(B_1 + B_2 + \sqrt{B_1 \cdot B_2}\right)\right]}{3} = 8296.6 \cdot ft^3$

Volume of Concrete = $V_{conc} := \left(W_{ftg} \cdot L_{ftg} \cdot T_{ftg}\right) + \left(L_{pier}^2 \cdot T_{pier}\right) = 1312.5 \cdot ft^3$

$V_{top} := \frac{\left[\left(T_{ftg} + T_{pier} - P_p\right) \cdot \left(B_2 + B_3 + \sqrt{B_2 \cdot B_3}\right)\right]}{3} = 5883.5 \cdot ft^3$

Volume of Earth = $V_{earth} := V_{top} - V_{conc} = 4571 \cdot ft^3$

Resisting Forces:

Resisting Rock Force = $W_{rock} := V_{rock} \cdot \gamma_{rock} = 1368.9 \cdot kips$

Resisting Earth Force = $W_{earth} := V_{earth} \cdot \gamma_{earth} = 571.4 \cdot kips$

Resisting Concrete Force = $W_{conc} = 196.9 \cdot kips$

Total Resisting Force = $W_{total} := W_{rock} + W_{earth} + W_{conc} + Axial = 2161.2 \cdot kips$

Foundation Uplift Check:

Check Perpendicular to Foundation =

Uplift Force = $Uplift_{perp} := \frac{OM}{\left(\frac{W_{ftg}}{2}\right)} = 307.9 \cdot kips$

Factor of Safety = $\frac{W_{total}}{Uplift_{perp}} = 7.02$

$Uplift\_Perp\_Check := if\left(\frac{W_{total}}{Uplift_{perp}} \geq 2.0, "OK", "Overstressed"\right)$

Uplift_Perp_Check = "OK"

Check @ 45 Degree Angle to Foundation =

Uplift Force = $Uplift_{Diag} := \frac{OM}{\frac{\left(\sqrt{2} \cdot L_{ftg}\right)}{2}} = 217.8 \cdot kips$

Factor of Safety = $\frac{W_{total}}{Uplift_{Diag}} = 9.93$

$Uplift\_Diag\_Check := if\left(\frac{W_{total}}{Uplift_{Diag}} \geq 2.0, "OK", "Overstressed"\right)$

Uplift_Diag_Check = "OK"

Rock Bearing Capacity Check:

Bearing Force = $MaxBearing := \left[\frac{\left(Axial + W_{conc}\right) + \left(n_{anchor} Lock_{anchor}\right)}{W_{ftg} \cdot L_{ftg}}\right] + \frac{OM}{\left(\frac{W_{ftg}^{3}}{6}\right)}$

$MaxBearing = 3.72 \cdot ksf$

$\frac{MaxBearing}{q_s} = 0.47$

$Rock\_Bearing\_Check := if\left(\frac{MaxBearing}{q_s} \leq 1.00, "OK", "Overstressed"\right)$

Rock_Bearing_Check = "OK"

SITE NAME	SOUNDVIEW CT	ECP & CELL #	2	0578
Change 700,PCS,AWS to RET Change 700 RRH to RRH 2X60 700 Add RRH 2X60 PCS		LATITUDE	41-17-30.25 N	
		LONGITUDE	72-17-13.43 W	
		STRUCTURE TYPE	Monopole	

700 MHz LTE - CURRENT CONFIG	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	LTE-700 BBU+RRH		LTE-700 BBU+RRH		LTE-700 BBU+RRH	
ANTENNA TYPE	BXA-70063-6CF-2-750MHZ		BXA-70063-6CF-2-750MHZ		BXA-70063-6CF-2-750MHZ	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		140		240	
DOWN TILT (MECH/DEG)	2		5		4	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X40-700U	1	ALU RH_2X40-700U	1	ALU RH_2X40-700U
SECTOR DISTRIBUTION BOX - QTY / MODEL						
MAIN DISTRIBUTION BOX - QTY / MODEL	1		DB-T1-6Z-8AB-0Z			

700 MHz LTE - FUTURE CONFIG	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	LTE-700 BBU+RRH		LTE-700 BBU+RRH		LTE-700 BBU+RRH	
ANTENNA TYPE	SBNHH-1D65B_PORT 1 - +45_04DT_0725		SBNHH-1D65B_PORT 1 - +45_07DT_0725		SBNHH-1D65B_PORT 1 - +45_06DT_0725	
QTY OF ANTENNAS PER FACE	0		0		0	
ORIENTATION (DEG)	60		140		240	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U
SECTOR DISTRIBUTION BOX - QTY / MODEL						
MAIN DISTRIBUTION BOX - QTY / MODEL	1		DB-T1-6Z-8AB-0Z			

850 MHz CELLULAR - CURRENT CONFIG	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B	
ANTENNA TYPE	BXA-70063-6CF-2-850MHZ		BXA-70063-6CF-2-850MHZ		BXA-70063-6CF-2-850MHZ	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		140		240	
DOWN TILT (MECH/DEG)	2		5		4	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						

850 MHz CELLULAR - FUTURE CONFIG	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B	
ANTENNA TYPE	BXA-70063-6CF-2-850MHZ		BXA-70063-6CF-2-850MHZ		BXA-70063-6CF-2-850MHZ	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		140		240	
DOWN TILT (MECH/DEG)	2		5		4	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						

1900 MHz PCS - CURRENT CONFIG	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	PCS Mod 4.0B		PCS Mod 4.0B		PCS Mod 4.0B	
ANTENNA TYPE	BXA-171063-12CF-EDIN-2		BXA-171063-12CF-EDIN-2		BXA-171063-12CF-EDIN-2	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		140		240	
DOWN TILT (MECH/DEG)	0		2		0	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEX WITH CELLULAR CABLE	NO		NO		NO	
RRH - QTY / MODEL						
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

1900 MHz PCS - FUTURE CONFIG	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	PCS Mod 4.0B		PCS Mod 4.0B		PCS Mod 4.0B	
ANTENNA TYPE	SBNHH-1D65B_PORT 2 - +45_02DT_1950		SBNHH-1D65B_PORT 2 - +45_04DT_21950		SBNHH-1D65B_PORT 2 - +45_02DT_1950	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		140		240	
DOWN TILT (MECH/DEG)	0		2		0	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEX WITH CELLULAR CABLE	NO		NO		NO	
RRH - QTY / MODEL	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						
2100 MHz AWS LTE - CURRENT CONFIG	**ALPHA**		**BETA**		**GAMMA**	
EQUIPMENT TYPE	LTE-AWS BBU+RRH		LTE-AWS BBU+RRH		LTE-AWS BBU+RRH	
ANTENNA TYPE	BXA-171063-12CF-EDIN-2		BXA-171063-12CF-EDIN-2		BXA-171063-12CF-EDIN-2	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		140		240	
DOWN TILT (MECH/DEG)	0		2		0	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEX WITH LTE CABLE	NO		NO		NO	
RRH - QTY / MODEL	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						
2100 MHz AWS LTE - FUTURE CONFIG	**ALPHA**		**BETA**		**GAMMA**	
EQUIPMENT TYPE	LTE-AWS BBU+RRH		LTE-AWS BBU+RRH		LTE-AWS BBU+RRH	
ANTENNA TYPE	SBNHH-1D65B_PORT 2 - +45_02DT_2130		SBNHH-1D65B_PORT 2 - +45_04DT_2130		SBNHH-1D65B_PORT 2 - +45_02DT_2130	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		140		240	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEX WITH LTE CABLE	NO		NO		NO	
RRH - QTY / MODEL	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

NUMBER OF CABLES NEEDED				FIBER LINES MODEL NUMBER				
TOTAL # FIBER LINES	2	TOTAL # OF MAIN COAX LINES	6	FIBER LINE MODEL #			HB158-1-08U8-S8J18	
TOTAL # FIBER TOP JUMPERS	6	TOTAL # OF TOP JUMPERS	18	FIBER TOP JUMPER MODEL #			HB114-1-08U4-S4J18	
EQUIPMENT CABLE ORDERING		**MAIN CABLE #**	12	+	0	**TOP JUMPER #**	24	+ -6

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular-A Band	**PCS-F/AWS Band**	**700 MHz C-Block**	Cellular (Watts)	20
TX: 869-880/890-891.5 MHz	TX: 1970-1975/2145-2155 MHz	TX: 746-757 MHz	PCS (Watts)	16
RX: 824-835/845-846.5 MHz	RX: 1890-1895/1745-1755 MHz	RX: 776-787 MHz	LTE 700/AWS/PCS (Watts)	60/60/60

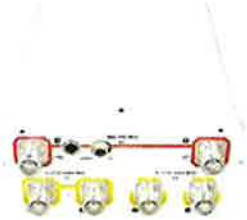
ALPHA				BETA				GAMMA			
Ant.	**Freq.**	**Func.**	**Color Code**	**Ant.**	**Freq.**	**Func.**	**Color Code**	**Ant.**	**Freq.**	**Func.**	**Color Code**
A1-A	800	Tx1/Rx0	RED	A5-A	800	Tx2/Rx0	BLUE	A9-A	800	Tx3/Rx0	GREEN
A1-B	1900	Tx1/Rx0	RED/WHITE	A5-B	1900	Tx2/Rx0	BLUE/ WHITE	A9-B	1900	Tx3/Rx0	GREEN/WHITE
A2	700	Tx1/Rx0	RED/ORANGE	A6	700	Tx2/Rx0	BLUE/ ORANGE	A10	700	Tx3/Rx0	GREEN/ORANGE
A3	700	Tx4/Rx1	RED/RED/ORANGE	A7	700	Tx5/Rx1	BLUE/BLUE/ORANGE	A11	700	Tx6/Rx1	GREEN/GREEN/ORANGE
A4-B	1900	Tx4/Rx1	RED/RED/WHITE	A8-B	1900	Tx5/Rx1	BLUE/BLUE/WHITE	A12-B	1900	Tx6/Rx1	GREEN/GREEN/WHITE
A4-A	800	Tx4/Rx1	RED/RED	A8-A	800	Tx5/Rx1	BLUE/BLUE	A12-A	800	Tx6/Rx1	GREEN/GREEN
F1-A	1700	Tx/Rx	RED/BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN
F1-D	1700	Tx/Rx	RED/RED/BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BROWN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared by: Ray Paradis	Alejandro Restrepo	RLP	9/9/2015

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.



SBNHH-1D65B

Andrew® Tri-band Antenna, 698–896 and 2 x 1710–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.

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

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS, dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2360 MHz | 698 – 896 MHz

Mechanical Specifications

Product Specifications

SBNHH-1D65B

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

Dimensions

Depth	181.0 mm | 7.1 in
Length	1828.0 mm | 72.0 in
Width	301.0 mm | 11.9 in
Net Weight	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

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

Regulatory Compliance/Certifications

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

Included Products

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

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.

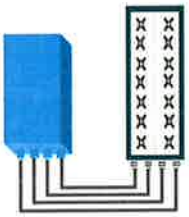
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

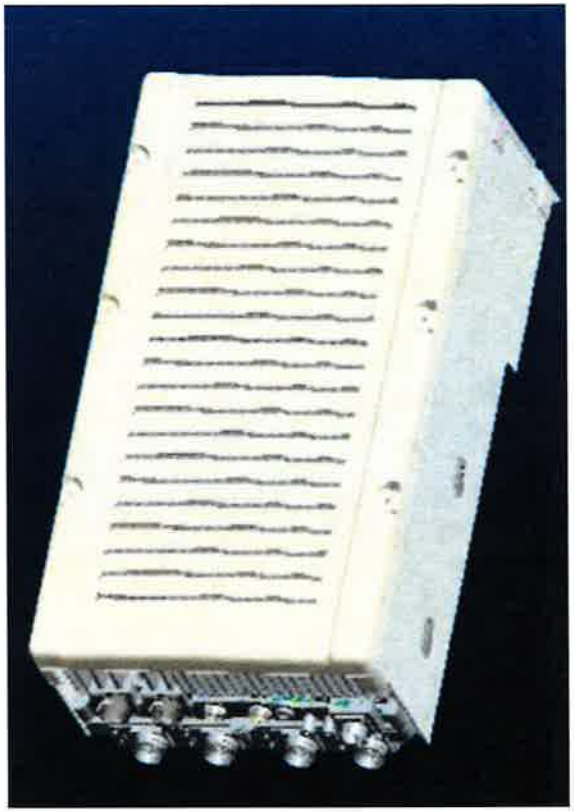
TECHNICAL SPECIFICATIONS

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

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

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



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

Alcatel·Lucent

Product Data Sheet DB-B1 and DB-T1 Series

DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

The RFS Distribution Box design comes with the option for pluggable over voltage protection (OVP) for up to 6 remote radios and the connection for 6 pairs of optical fiber with LC optical fiber cable management. There is a hybrid cable input with a jumper configuration for power and optical fiber to the remote radio heads (RRHs). A custom wall, a 2-inch pole, and an H-Frame mounting bracket are included. Both the compact and standard design are available with lightening protection.

Features/Benefits

- Designed to accommodate varying diameters of HYBRIFLEX™ (combined power and fiber optic) cables – up to 2 inches
- Supports Single- and Multi-Mode Optical fiber
- NEMA 4x rated enclosure – allows **flexibility for indoor or outdoor installation** on a roof or tower top
- Weatherproof enclosure and ports – **improves system reliability**
- Modular design – makes replacement or addition of OVP easy without removal of other components within the box
- Strikesorb OVP technology – protects equipment from damaging surges up to 60 kA on an 8/20 waveform and up to 5 kA on a 10/350 waveform (certain models only)
- Low residual voltage and high impedance – **ideally suited for RRH technology** – won't shut down the RRH the way spark gap technology does (certain models only)

Technical Specifications

Mechanical Specifications

Model Number	DB-B1-6C-8AB-0Z	DB-T1-6Z-8AB-0Z
Enclosure Design	Standard, 6 OVP's	Standard without OVP
Dimensions - H x W x D, mm (in)	610 x 610 x 254 (24 x 24 x 10)	610 x 610 x 254 (24 x 24 x 10)
Weight, kg (lb)	20 (44)	20 (44)
Suppression Connection Method	Compression lug, #2-#14 AWG Copper, #2-#12 Aluminum	
Fiber Connection Method	LC-LC Single- or Multi-mode duplex	
Environmental Rating	NEMA 4x	
Operating Temperature, °C (°F)	-40 to +80 (-40 to +176)	
UV Protection	ISO 4892-2 Method A Xenon-Arc 2160 hrs	

Electrical Specifications

Nominal Operating Voltage	48 VDC	
Nominal Discharge Current (I_n) per UL 1449 3rd Ed	20 kA 8/20 µs	N/A
Maximum Discharge Current (I_{max}) per NEMA LS-1	60 kA 8/20 µs	N/A
Maximum Impulse (Lightning) Current (I_{imp}) per IEC 61643-1	5 kA 10/350 µs	N/A
Maximum Continuous Operating Voltage (U_c)	75 VDC	N/A
Voltage Protection Rating per UL1449 3rd Ed	400 V	N/A
Protection Class as per IEC 61643-1	Class 1	N/A
Strikesorb OVP Compliance	ANSI/UL 1449-3rd Ed	N/A
	IEEE C62.41	N/A
	NEMA LS-1	N/A
	IEC 61643-1	N/A
	IEC 61643-12	N/A
	EN 61643-11	N/A

* This data is provisional and subject to change.

ATTACHMENT 4

Property Information

Property ID	8-36-2
Location	232 SHORE RD
Owner	ATSSLSS LLC

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

Town of Old Lyme, CT makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Parcels updated 2/1/2016
Properties updated Daily

232 SHORE RD

Location	232 SHORE RD	**Assessment**	$1,196,500
Mblu	8/ / 36/2 /	**Appraisal**	$1,709,400
Acct#	00020990	**PID**	100505
Owner	ATSSLSS LLC	**Building Count**	7

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$879,200	$830,200	$1,709,400
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$615,400	$581,100	$1,196,500

Owner of Record

Owner	ATSSLSS LLC	**Sale Price**	$0
Co-Owner		**Certificate**	
Address	POB 833 OLD LYME, CT 06371	**Book & Page**	396/ 757
		Sale Date	12/12/2013

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
ATSSLSS LLC			396/ 757	12/12/2013
SMITH GARY D			181/ 61	

Building Information

Building 1 : Section 1

Year Built:	1986
Living Area:	3800
Replacement Cost:	$122,056
Building Percent Good:	66
Replacement Cost Less Depreciation:	$80,600

Building Attributes	
Field	**Description**
STYLE	Self Storage

MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	1
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	
Roof Structure	Shed
Roof Cover	Metal/Tin
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Coal or Wood
Heating Type	None
AC Type	None
Bldg Use	COM WHS/GAR
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	316I
Heat/AC	NONE
Frame Type	STEEL
Baths/Plumbing	NONE
Ceiling/Wall	NONE
Rooms/Prtns	AVERAGE
Wall Height	8
% Comn Wall	0

Building Photo

(http://images.vgsi.com/photos/OldLymeCTPhotos//\00\00\49/

Building Layout

Building Sub-Areas			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	3800	3800
		3800	3800

Building 2 : Section 1

Year Built: 1986
Living Area: 5000
Replacement Cost: $134,850
Building Percent Good: 66
Replacement Cost Less Depreciation: $89,000

Building Attributes : Bldg 2 of 7	
Field	**Description**
STYLE	Self Storage
MODEL	Ind/Comm
Grade	Average
Stories:	1

Building Photo

Occupancy	1
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	
Roof Structure	Shed
Roof Cover	Metal/Tin
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Coal or Wood
Heating Type	None
AC Type	None
Bldg Use	COM WHS/GAR
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	316I
Heat/AC	NONE
Frame Type	STEEL
Baths/Plumbing	NONE
Ceiling/Wall	NONE
Rooms/Prtns	AVERAGE
Wall Height	0
% Comn Wall	8

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Building Layout

Building Sub-Areas			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	5000	5000
		5000	5000

Building 3 : Section 1

Year Built: 1986
Living Area: 8700
Replacement Cost: $239,857
Building Percent Good: 66
Replacement Cost Less Depreciation: $158,300

Building Attributes : Bldg 3 of 7	
Field	**Description**
STYLE	Self Storage
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	1
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	Vinyl Siding
Roof Structure	Shed

Building Photo

(http://images.vgsi.com/photos/OldLymeCTPhotos//\00\00\49/.

Roof Cover	Metal/Tin
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Electric
Heating Type	Electr Basebrd
AC Type	None
Bldg Use	COM WHS/GAR
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	316I
Heat/AC	NONE
Frame Type	STEEL
Baths/Plumbing	AVERAGE
Ceiling/Wall	NONE
Rooms/Prtns	AVERAGE
Wall Height	0
% Comn Wall	8

Building 4 : Section 1

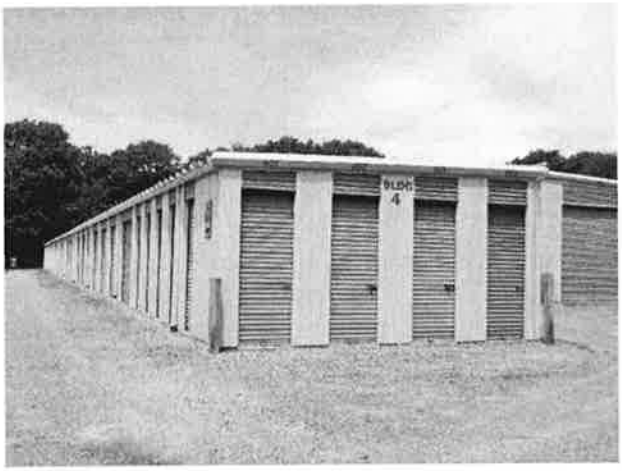
Year Built: 1986
Living Area: 5600
Replacement Cost: $146,888
Building Percent Good:
Replacement Cost Less Depreciation: $96,900

Building Attributes : Bldg 4 of 7	
Field	**Description**
STYLE	Self Storage
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	1
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	
Roof Structure	Shed
Roof Cover	Metal/Tin
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished

Building Layout

Building Sub-Areas			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	8100	8100
AOF	Office, (Average)	600	600
		8700	8700

Building Photo



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Interior Floor 2	
Heating Fuel	Coal or Wood
Heating Type	None
AC Type	None
Bldg Use	COM WHS/GAR
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	316I
Heat/AC	NONE
Frame Type	STEEL
Baths/Plumbing	NONE
Ceiling/Wall	NONE
Rooms/Prtns	AVERAGE
Wall Height	0
% Comn Wall	8

Building Layout

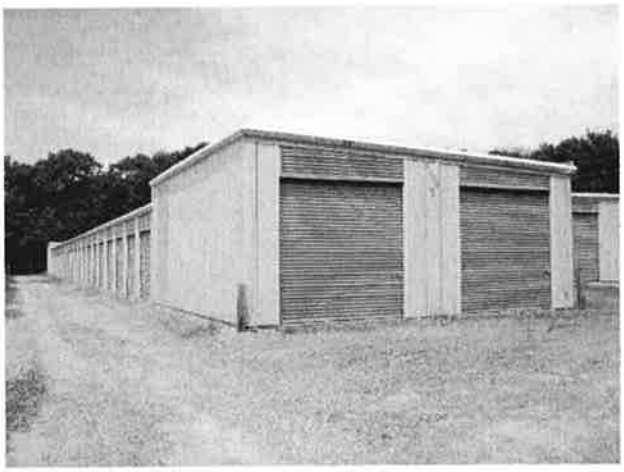
Building Sub-Areas			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	5600	5600
		5600	5600

Building 5 : Section 1

Year Built: 1989
Living Area: 8100
Replacement Cost: $196,587
Building Percent Good: 69
Replacement Cost Less Depreciation: $135,600

Building Attributes : Bldg 5 of 7	
Field	**Description**
STYLE	Self Storage
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	1
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	
Roof Structure	Shed
Roof Cover	Metal/Tin
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Coal or Wood
Heating Type	None

Building Photo



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AC Type	None
Bldg Use	COM WHS/GAR
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	316I
Heat/AC	NONE
Frame Type	STEEL
Baths/Plumbing	NONE
Ceiling/Wall	NONE
Rooms/Prtns	AVERAGE
Wall Height	0
% Comn Wall	8

Building Layout

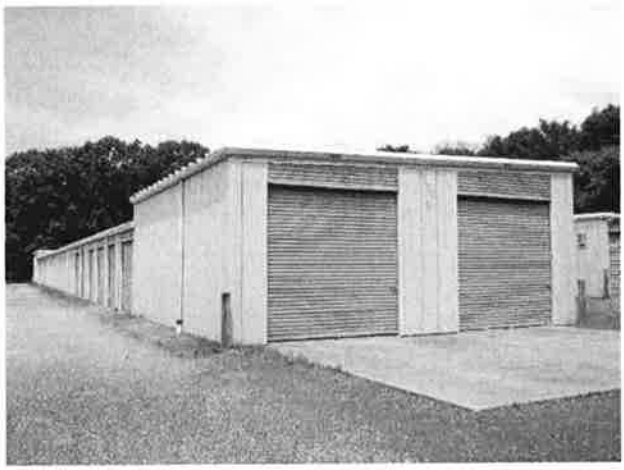
Building Sub-Areas			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	8100	8100
		8100	8100

Building 6 : Section 1

Year Built: 1989
Living Area: 7500
Replacement Cost: $193,725
Building Percent Good: 69
Replacement Cost Less Depreciation: $133,700

Building Attributes : Bldg 6 of 7	
Field	**Description**
STYLE	Self Storage
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	1
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	
Roof Structure	Shed
Roof Cover	Metal/Tin
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Coal or Wood
Heating Type	None

Building Photo



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AC Type	None
Bldg Use	COM WHS/GAR
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	316I
Heat/AC	NONE
Frame Type	STEEL
Baths/Plumbing	LIGHT
Ceiling/Wall	NONE
Rooms/Prtns	AVERAGE
Wall Height	0
% Comn Wall	8

Building Layout

Building Sub-Areas			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	7500	7500
		7500	7500

Building 7 : Section 1

Year Built: 1986
Living Area: 4900
Replacement Cost: $132,790
Building Percent Good: 66
Replacement Cost Less Depreciation: $87,600

Building Attributes : Bldg 7 of 7	
Field	**Description**
STYLE	Self Storage
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	1
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	
Roof Structure	Shed
Roof Cover	Metal/Tin
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Coal or Wood
Heating Type	None

Building Photo

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AC Type	None
Bldg Use	COM WHS/GAR
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	316I
Heat/AC	NONE
Frame Type	STEEL
Baths/Plumbing	NONE
Ceiling/Wall	NONE
Rooms/Prtns	AVERAGE
Wall Height	0
% Comn Wall	8

Building Layout

Building Sub-Areas			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	4900	4900
		4900	4900

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	316I
Description	COM WHS/GAR
Zone	IND
Neighborhood	C2
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	5.01
Frontage	
Depth	
Assessed Value	$581,100
Appraised Value	$830,200

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
SGN2	DOUBLE SIDED			16 S.F.&HGT	$400	1
LT1	LIGHTS-IN W/PL			6 UNITS	$2,100	1
FN7	W/O TOP RL-5'			1100 L.F.	$4,400	1
	TOWER			1	$90,600	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2011	$380,400	$662,900	$1,043,300
2010	$380,400	$662,900	$1,043,300
2009	$380,400	$662,900	$1,043,300

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2011	$266,400	$464,100	$730,500
2010	$266,400	$464,100	$730,500
2009	$266,400	$464,100	$730,500