Robinson+Cole

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Also admitted in Massachusetts

January 5, 2016

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

Re: **Notice of Exempt Modification – Facility Modification**
1825 South Main Street (a/k/a 1279 Long Hill Road), Middletown, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the top of the existing 158-foot tower at 1825 South Main Street (a/k/a 1279 Long Hill Road) in Middletown, Connecticut (the "Property"). The tower and underlying property are owned by SBA Communications Corporation ("SBA"). The Council approved Cellco's use of the tower in 2000. Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model SBNHH-1D65B, 1900 MHz antennas and three (3) model SBNHH-1D65B, 700/2100 MHz antennas, all at the same level on the tower. Cellco also intends to install nine (9) remote radio heads ("RRHs") behind its antennas and two (2) HYBRIFLEX™ fiber optic antenna cables. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cables.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Daniel Drew, Mayor for the City of Middletown. A copy of this letter is also being sent to SBA, the tower and Property 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. The replacement antennas and RRHs will be located on Cellco's existing platform at the 158-foot level on the 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 modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Attachment 2.

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Daniel Drew, Middletown Mayor
SBA
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

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

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

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	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
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	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
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, 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 Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol® | Teletilt®
Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Performance Note	Outdoor usage

Product Specifications

SBNHH-1D65B

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241 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	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®

Packed Dimensions

Depth	299.0 mm | 11.8 in
Length	1970.0 mm | 77.6 in
Width	409.0 mm | 16.1 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

Included Products

Product Specifications

SBNHH-1D65B

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

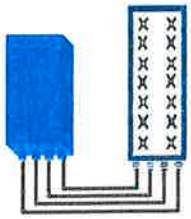
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

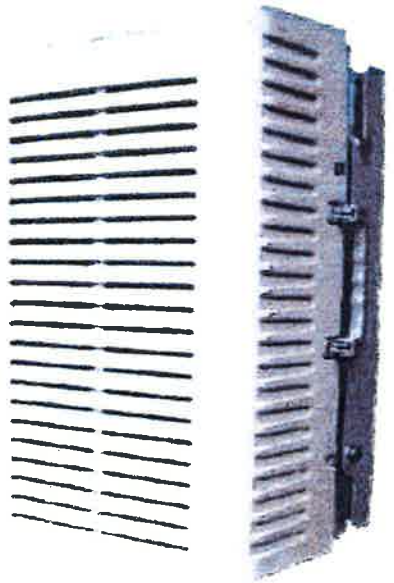
Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W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

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

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



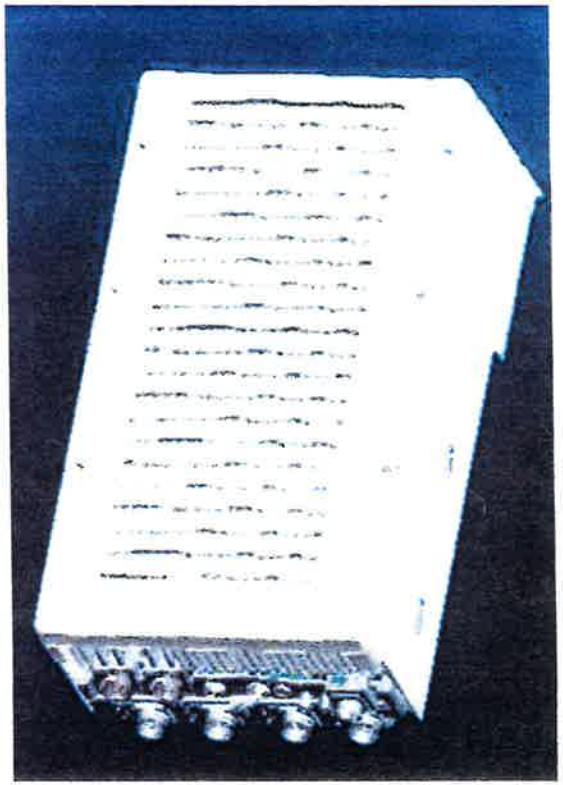
** Not a Verizon Wireless deployed product

NEW PCS RF MODULES FOR VZW

RRH2X60 - HW CHARACTERISTICS

LR14.3

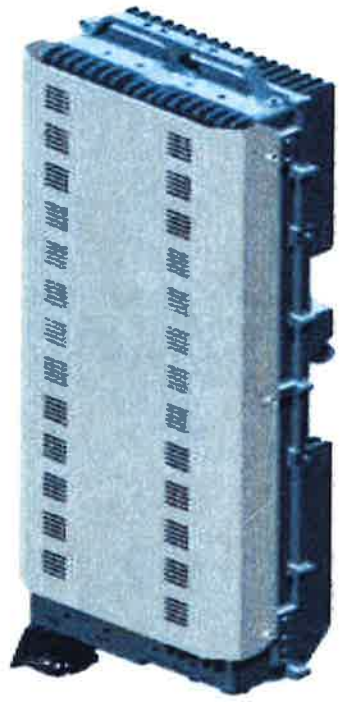
	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	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
WIRELESS PRODUCT DATASHEET
RRH2X60-AWS FOR BAND 4 APPLICATIONS

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



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

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

SUPERIOR RF PERFORMANCE

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

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

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

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

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

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

OPTIMIZED TCO

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

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

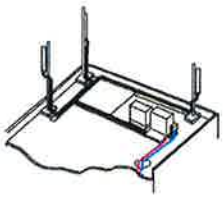
EASY INSTALLATION

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

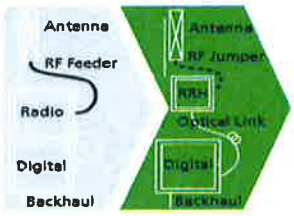
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

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

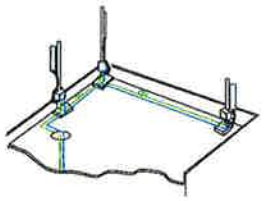
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

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

BENEFITS

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

TECHNICAL SPECIFICATIONS

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

Dimensions and weights

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

Electrical Data

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

RF Characteristics

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

Connectivity

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

Environmental specifications

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

Safety and Regulatory Data

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

Alcatel·Lucent

AT THE SPEED OF IDEAS™

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket:	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-99-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

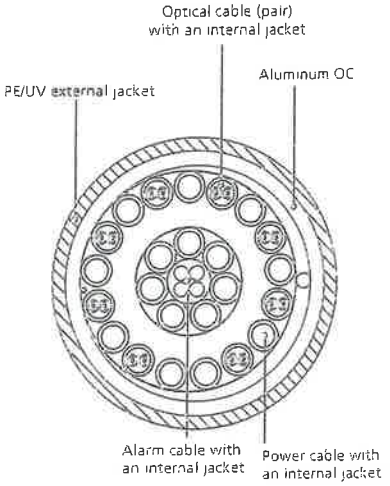


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Middletown 2								
Tower Height: 158'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*T-Mobile	1	865	137	0.0181	700	0.4667	0.39%	
*T-Mobile	6	1102	137	0.1386	1900	1.0000	1.39%	
*Nextel	9	100	125	0.0229	851	0.5673	0.40%	
*Sprint CDMA/LTE	2	347	146	0.0127	1900	1.0000	0.13%	
*Sprint CDMA/LTE	1	195	146	0.0036	850	0.5667	0.06%	
*Sprint CDMA/LTE	2	347	146	0.0127	2500	1.0000	0.13%	
*Clearwire	2	153	147	0.0055	2496	1.0000	0.06%	
*Clearwire	1	211	147	0.0038	18 GHz	1.0000	0.04%	
*Pocket (now MetroPCS)	3	631	116	0.0563	2130	1.0000	0.56%	
*AT&T UMTS	2	565	107	0.0398	880	0.5867	0.68%	
*AT&T UMTS	2	875	107	0.0617	1900	1.0000	0.62%	
*AT&T GSM	1	491	107	0.0173	880	0.5867	0.30%	
*AT&T GSM	4	813	107	0.1146	1900	1.0000	1.15%	
*AT&T LTE	1	1313	107	0.0463	734	0.4893	0.95%	
Verizon	**11**	**376**	**158**	**0.0596**	**1970**	**1.0000**	**5.96%**	
Verizon	**9**	**381**	**158**	**0.0494**	**869**	**0.5793**	**8.53%**	
Verizon	**1**	**2349**	**158**	**0.0338**	**2145**	**1.0000**	**3.38%**	
Verizon	**1**	**1048**	**158**	**0.0151**	**746**	**0.4973**	**3.04%**	
								27.7%
* Source: Siting Council								

ATTACHMENT 3

Tower Engineering Solutions
Phone (972) 483-0607, Fax (972) 975-9615
8445 Freeport Parkway, Suite 375, Irving, Texas 75063

Structural Analysis Report

Existing 158 ft. SUMMIT Monopole

Customer Name: SBA Communications Corp

Customer Site Number: CT01080-S

Customer Site Name: Long Hill #1

Carrier Name: Verizon

Carrier Site Number: N/A

Carrier Site Name: Middletown 2

Site Location: 1279 Long Hill Road

Middletown, Connecticut

Middlesex County

Latitude: 41.511231

Longitude: -72.670744

Analysis Result:

Max Structural Usage: 97.3% [Pass]

Max Foundation Usage: 75% [Pass]

Report Prepared By : Stacey Hesselbein

Introduction

The purpose of this report is to summarize the analysis results on the 158 ft. SUMMIT Monopole to support the proposed antennas and transmission lines in addition to those currently installed. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

Sources of Information

Tower Drawings	Tower drawings prepared by Summit Manufacturing, Inc., Job No. 5173 Dated 11/08/1999
Foundation Drawing	Foundation drawings prepared by Paul J. Ford & Company, Job No. 29299-641 Dated 10/22/1999
Geotechnical Report	Geotechnical report prepared by Jawarski Geotech, Inc., Project No. C98590G Dated 02/04/1999
Modification Drawings	N/A

Analysis Criteria

The rigorous analysis was performed in accordance with the requirements and stipulations of the ANSI/TIA/EIA 222-F. In accordance with this standard, the structure was analyzed using **TESPoles,** a proprietary analysis software. The program considers the structure as an elastic 3-D model with second-order effects and temperature effects incorporated in the analysis. The analysis was performed using multiple wind directions.

Basic Wind Speed Used in the Analysis:	85.0 mph (fastest mile)
Basic Wind Speed with Ice:	74 mph (fastest mile) with 1/2" radial ice concurrent
Operational Wind Speed:	50 mph + 0" Radial ice
Standard/Codes:	ANSI/TIA/EIA 222-F / 2005 Connecticut State Building Code
Exposure Category:	C
Crest Height:	0 ft.

Existing Antennas, Mounts and Transmission Lines

The table below summarizes the antennas, mounts and transmission lines that were considered in the analysis as existing on the tower.

Items	Elevation (ft.)	Qty.	Antenna Descriptions	Mount Type & Qty.	Transmission Lines	Owner
1	158.0	3	Antel - BXA-70063-6CF-EDIN-5 - Panel	(1)Low Profile Platform	(12) 1 5/8" (1) 1/2"	Verizon
3		2	Antel - BXA-171063-8BF - Panel			
4		1	Antel - BXA-171063-12BF-EDIN-X - Panel			
5		2	Amphenol - LPA-80063-6CF-EDIN-5 - Panel			
6		4	RFS - APL866513-42T0 - Panel w/ Mount Pipe			
10		6	RFS - FD9R6004/2CL-3CL - Diplexer			
12		1	GPS			
13	151.0	1	Andrew - VHLP2.5 - Dish	(1) Pipe Mount	(1) 1/2"	Clearwire
14		1	ODU			
15	146.0	3	RFS - APXVSPP18-C-A20 -Panel w/ Mount Pipe	(1) Low Profile Platform	(3) 1 1/4" (1) 1-1/4" Power/Fiber	Sprint
16		3	RFS - APXVTM14-C-120 - Panel w/ Mount Pipe			
17		3	Alcatel - TD-RRH8x20-25 - RRH			
18		3	Alcatel - 1900MHz - RRH			
19		3	Alcatel - 800 MHz - RRH			
20		3	Alcatel - 800MHz Filters			
21		4	RFS - ACU-A20-N - RET			
22		1	GPS			
23		3	Kathrein Scala - 840 10054 - Panel		(2) 1/2" (6) 5/16"	Clearwire
24		3	RRUs			
25	137.0	3	RFS - APXV18-209014-02 - Panel	(1) Low Profile Platform w/ Support Kit	(12) 1 5/8"	T-Mobile
26		3	Commscope - LNX-6515DS - Panel			
27		12	Allen Telecom - FE15S01P77/75 - TMA			
28		3	Kathrein - 782 11056 - Diplexer			
29	107.0	6	KMW - AM-X-CD-16-65-00T- Panel	(1)Low Profile Platform	(12) 1 5/8" (1) Rosenberger FB-L98-002-050 (3) WR-VG122ST-BRDA/12 Gage	AT&T
30		3	Powerwave - 7770.00 - Panel			
31		3	Powerwave - LGP21401 - TMA			
32		3	CCI - DTMABP7819VG12A - TMA			
33	103.0	6	Ericsson - RRU-11 - RRU	(1) Collar Mount		
34		1	Raycap - DC6-48-60-18-8F - SP			

Proposed Carrier's Final Configuration of Antennas, Mounts and Transmission Lines

Information pertaining to the proposed carrier's final configuration of antennas and transmission lines was provided by SBA Communications Corp. The proposed antennas and lines are listed below.

Items	Elevation (ft.)	Qty.	Antenna Descriptions	Mount Type & Qty.	Transmission Lines	Owner
2	158.0	6	Commscope - SBNHH-1D65B - Panel	(1)Low Profile Platform	(10) 1 5/8" *(2) 1 5/8" Hybrid	Verizon
5		2	Amphenol - LPA-80063-6CF-EDIN-5 - Panel			
6		4	RFS - APL866513-42T0 - Panel w/ Mount Pipe			
7		3	Alcatel - RRH2X60-AWS - RRU			
8		3	Alcatel - RRH2X60-700 - RRU			
9		3	Alcatel - RRH2X60-PCS - RRU			
10		6	RFS - FD9R6004/2CL-3CL - Diplexer			
11		2	RFS - DB-T1-6C-8AB-0Z - Distribution Box			

*Lines assumed outside of the pole shaft

The proposed transmission lines can be installed inside or outside of the pole shafts. If installed outside, the lines shall be strapped tightly to the face of the pole shafts.

Analysis Results

The results of the structural analysis, performed for the wind and ice loading and antenna equipment as defined above, are summarized as the following:

	Pole shafts	Anchor Bolts	Base Plate
Max. Usage:	**95.1%**	**64.0%**	**97.3%**
Pass/Fail	**Pass**	**Pass**	**Pass**

Foundations

	Moment (Kip-Ft)	Shear (Kips)	Axial (Kips)
Original Design Reactions	4350.0	37.5	51.0
Analysis Reactions	4047.4	34.6	49.7
% of Design Reactions	93.0%	92.4%	97.5%

The foundation has been investigated using the supplied documents and soils report and was found adequate. Therefore, no modification to the foundation will be required.

Operational Condition (Rigidity):

Maximum twist and sway of the microwave dishes under the operational wind speed as specified in the Analysis Criteria are listed in the table below:

Elevation (ft.)	Dish	Carrier	Twist (deg)	Sway (deg)
151.0	Andrew - VHLP2.5 - Dish	Clearwire	0.002	2.061

It is recommended that the carriers review the twist and sway values of the microwave dishes.

Conclusions

Based on the analysis results, the existing structure and its foundation were found to be adequate to safely support the existing and proposed equipment and meet the minimum requirements per the ANSI/TIA/EIA 222-F Standard under the design basic wind speed as specified in the Analysis Criteria.

Standard Conditions

1. This analysis was performed based on the information supplied to **(TES) Tower Engineering Solutions, LLC.** Verification of the information provided was not included in the Scope of Work for **TES**. The accuracy of the analysis is dependent on the accuracy of the information provided.

2. The analysis is based on the presumption that the tower members and components along with any existing reinforcement items have been correctly and properly designed, manufactured, installed and maintained.

3. All the existing structural members were assumed to be in good condition with no physical damage or deterioration associated with corrosion.

4. An initial tension of 10% of the break strength on all the existing guy wires was assumed in all the structural analyses of guyed towers unless different values were provided by the client. **TES** cannot take responsibility for the deviations in the analysis results because of differences in the initial tension forces of the existing guy wires.

5. Secondary component or connection secondary components, welds and bolts are assumed to be able to carry their intended original design loads. **TES** cannot take responsibility for verification of the adequacy on the connections, bolts and welds present in the structure.

6. The analyses will be performed based on the codes as specified by the client or based on the best knowledge of the engineering staff of **TES**. In the absence of information to the contrary, all work will be performed in accordance with the latest relevant revision of ANSI/TIA-222. If wind speed or/and ice loads are different from the minimum values recommended by the EIA/TIA-222 standard or other codes, **TES** should be notified in writing and the applicable minimum values provided by the client.

7. The configuration of the existing mounts, antennas, coax and other appurtenances were supplied by the customer for the current structural analysis. **TES** has not visited the tower site to verify the adequacy of the information provided. If there is any discrepancy found in the report regarding the existing conditions, **TES** should be notified immediately to evaluate the effect of the discrepancy on the analysis results.

8. The client will assume responsibility for rework associated with the differences in initially provided information, including tower and foundation information, existing and/or proposed equipment and transmission lines.

9. If a feasibility analysis was performed, final acceptance of changed conditions shall be based upon a rigorous structural analysis.

Usage Diagram - Max Stress 95.1% at 96.5ft

Structure:	CT01080-S-SBA	**Code:**	EIA/TIA-222-F	8/27/2015	
Site Name:	Long Hill #1	**Exposure:**	C		
Height:	158.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)			Page: 1	

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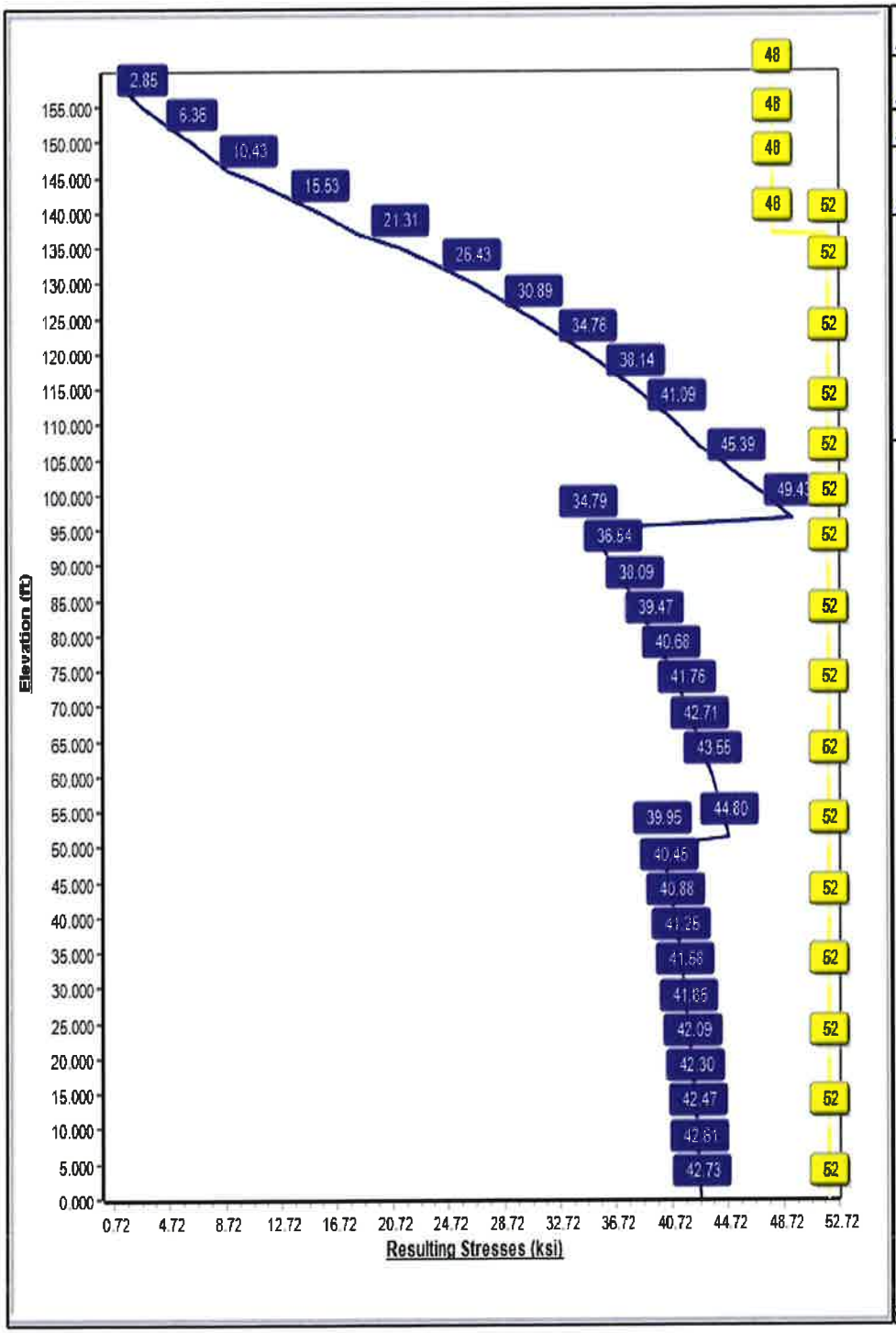
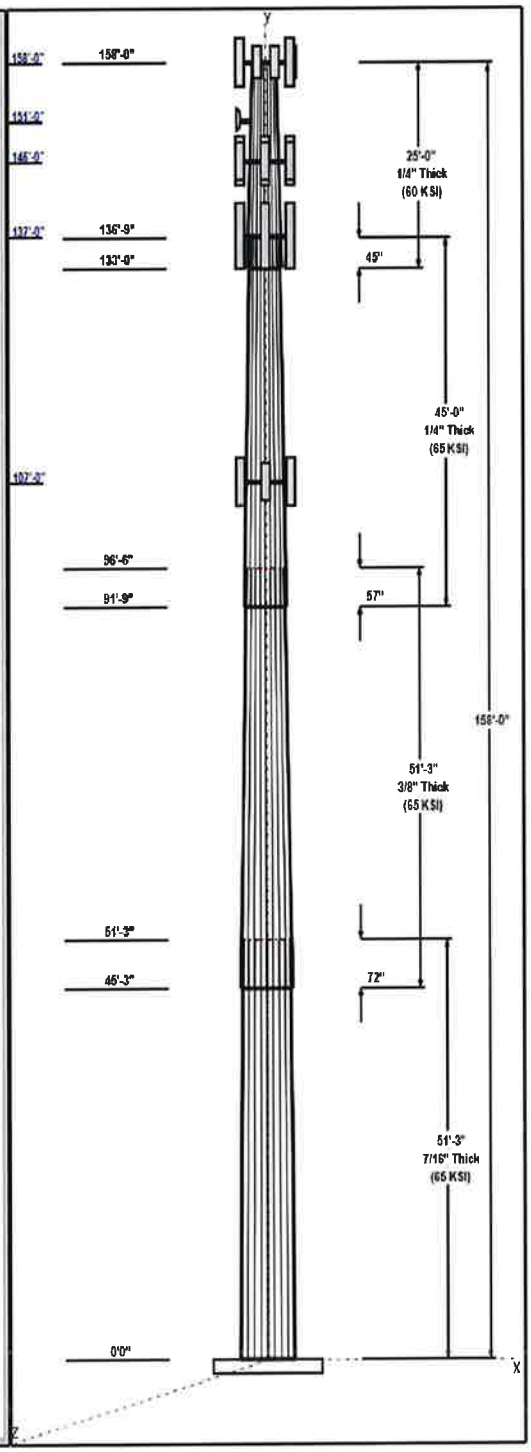
Dead Load Factor:	1.00		
Wind Load Factor:	1.00	**Load Case : 85 mph Wind with 0 in Ice**	**Iterations:** 25
52 Alllowable Stress			
49 Resulting Stress			





Structure: CT01080-S-SBA

Type: Tapered
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.00 (ft)

Base Shape: 18 Sided
Taper: 0.23500

8/27/2015

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Shaft Properties

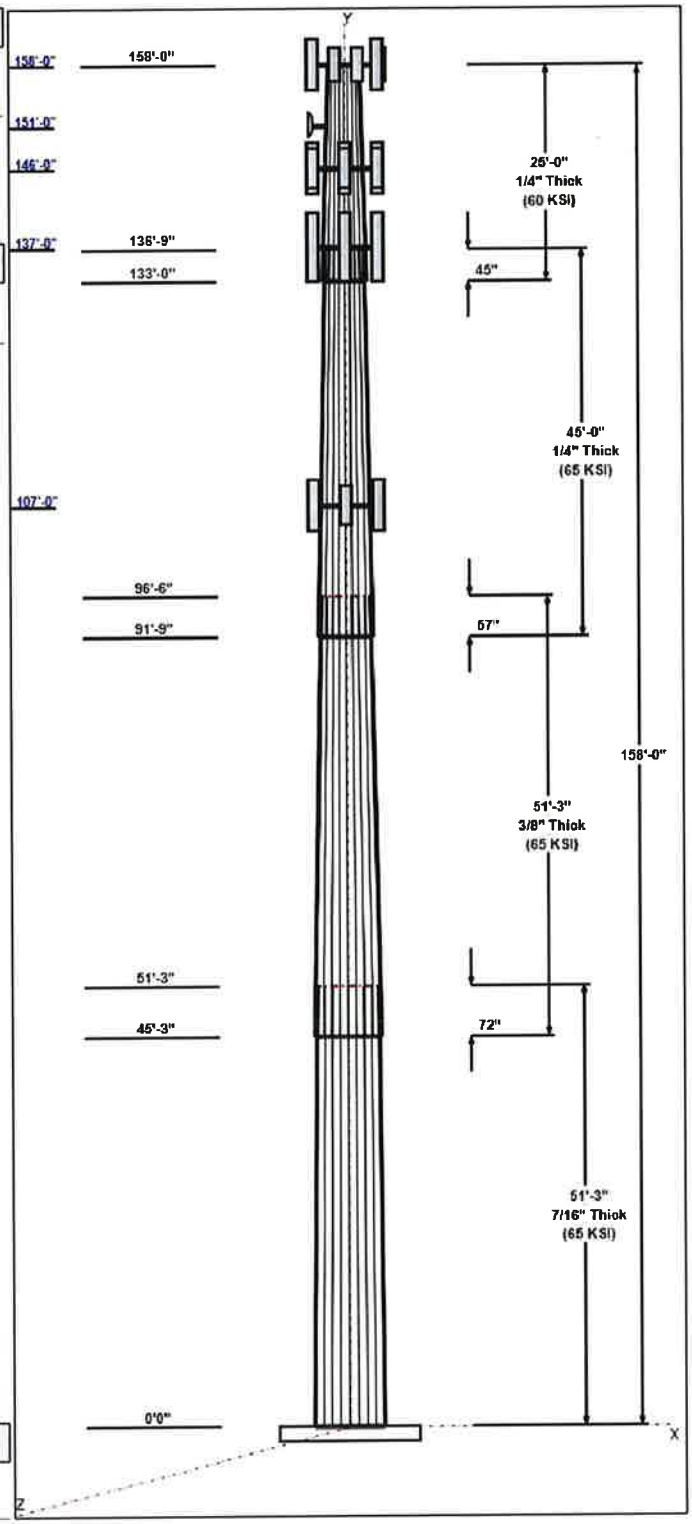
Seq	Length (ft)	Top (in)	Bottom (in)	Thick (in)	Joint Type	Taper	Grade (ksi)
1	51.25	46.34	58.38	0.438		0.23500	65
2	51.25	36.45	48.50	0.375	Slip	0.23500	65
3	45.00	27.49	38.07	0.250	Slip	0.23500	65
4	25.00	23.00	28.88	0.250	Slip	0.23500	60

Discrete Appurtenances

Attach Elev (ft)	Force Elev (ft)	Qty	Description	Carrier
158.00	158.00	1	6' Lightning rod	Verizon
158.00	158.00	4	APL866513-42T0	Verizon
158.00	158.00	2	DB-T1-6C-8AB-0Z	Verizon
158.00	158.00	6	FD9R6004/2C-3L	Verizon
158.00	158.00	1	Low Profile Platform-flat	Verizon
158.00	158.00	2	LPA-80063-6CF-EDIN-5	Verizon
158.00	158.00	3	RRH2X60-700	Verizon
158.00	158.00	3	RRH2X60-AWS	Verizon
158.00	158.00	3	RRH2X60-PCS	Verizon
158.00	158.00	6	SBNHH-1D65B	Verizon
151.00	151.00	1	ODU	Clearwire
151.00	151.00	1	Pipe	Clearwire
151.00	151.00	1	VHLP2.5	Clearwire
146.00	146.00	3	1900MHz RRH	Sprint
146.00	146.00	3	800 MHz RRH	Sprint
146.00	146.00	3	800MHz External Notch	Sprint
146.00	146.00	3	840 10054	Clearwire
146.00	146.00	4	ACU-A20-N	Sprint
146.00	146.00	3	APXVSPP18-C-A20	Sprint
146.00	146.00	3	APXVTM14-C-120	Sprint
146.00	146.00	1	GPS	Sprint
146.00	146.00	1	Low Profile Platform-flat	Sprint
146.00	146.00	3	RRH	Clearwire
146.00	146.00	3	TD-RRH8x20-25	Sprint
137.00	137.00	3	782 11056	T-Mobile
137.00	137.00	3	APXV18-209014-C	T-Mobile
137.00	137.00	12	FE15S01P77/75	T-Mobile
137.00	137.00	3	LNX-6515DS-A1M	T-Mobile
137.00	137.00	1	Low Profile Platform-flat	T-Mobile
107.00	107.00	3	7770.00	AT&T
107.00	107.00	6	AM-X-CD-16-65-00T-RET	AT&T
107.00	107.00	3	DTMABP7819VG12A	AT&T
107.00	107.00	3	LGP21401	AT&T
107.00	107.00	1	Low Profile Platform-flat	AT&T
103.00	103.00	1	Collar Mount	AT&T
103.00	103.00	1	DC6-48-60-18-8F	AT&T
103.00	103.00	6	RRU-11	AT&T

Linear Appurtenances

Elev From (ft)	Elev To (ft)	Placement	Description	Carrier
0.00	158.00	Inside	1 5/8" Coax	Verizon
0.00	158.00	Outside	1 5/8" Hybrid	Verizon
0.00	151.00	Inside	1/2" Coax	Clearwire
0.00	146.00	Inside	1 1/4" Coax	Sprint
0.00	146.00	Inside	1-1/4" Hybrid	Sprint



0.00	146.00	Inside	1/2" Coax	Clearwire
0.00	146.00	Inside	5/16" Coax	Clearwire
0.00	137.00	Inside	1 5/8" Coax	T-Mobile
0.00	107.00	Inside	1 5/8" Coax	AT&T
0.00	107.00	Inside	FB-L98-002	AT&T
0.00	107.00	Inside	VG122ST	AT&T

Anchor Bolts

Qty	Specifications	Grade (ksi)	Arrangement
24	2.25" 18J	75.0	Cluster

Base Plate

Thickness (in)	Specifications (in)	Grade (ksi)	Geometry
2.7500	67.0	50.0	Square

Reactions

Load Case	Moment	Shear	Axial
85 mph Wind with 0" Ice	4047.5	34.6	42.2
73.61 mph Wind with 0.5" Ice	3385.1	28.5	49.7
50 mph Wind with 0" Ice	1402.2	12.0	42.2

Structure: CT01080-S-SBA - Coax Line Placement

Type: Monopole
Site Name: Long Hill #1
Height: 158.00 (ft)

8/27/2015

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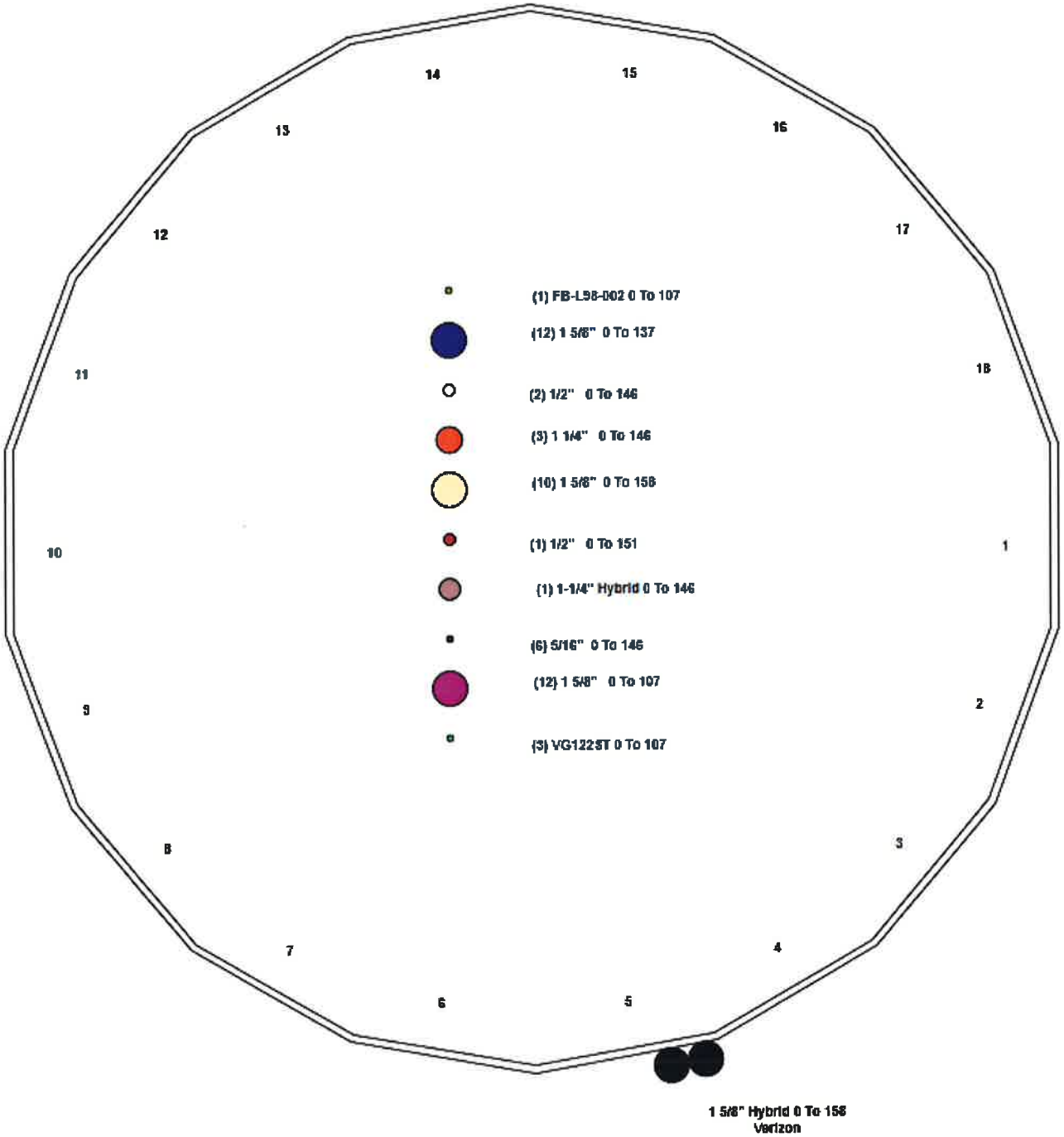

Shaft Properties

Structure:	CT01080-S-SBA	**Code:**	EIA/TIA-222-F	8/27/2015	
Site Name:	Long Hill #1	**Exposure:**	C		
Height:	158.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 5	

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Sec. No.	Shape	Length (ft)	Thick (in)	Fy (ksi)	Joint Type	Overlap (in)	Weight (lb)
1	18	51.250	0.4375	65		0.00	12,573
2	18	51.250	0.3750	65	Slip	72.00	8,738
3	18	45.000	0.2500	65	Slip	57.00	3,953
4	18	25.000	0.2500	60	Slip	45.00	1,734
					Total Shaft Weight:		**26,998**

	Bottom						Top						
Sec. No.	Dia (in)	Elev (ft)	Area (sqin)	Ix (in^4)	W/t Ratio	D/t Ratio	Dia (in)	Elev (ft)	Area (sqin)	Ix (in^4)	W/t Ratio	D/t Ratio	Taper
1	58.38	0.00	80.46	34128.26	22.11	133.4	46.34	51.25	63.73	16963.8	17.26	105.9	0.235000
2	48.50	45.25	57.27	16756.62	21.39	129.3	36.45	96.50	42.94	7061.30	15.72	97.20	0.235000
3	38.07	91.75	30.01	5422.58	25.43	152.2	27.49	136.7	21.62	2027.15	17.98	109.9	0.235000
4	28.88	133.0	22.71	2351.37	18.95	115.5	23.00	158.0	18.05	1180.40	14.81	92	0.235000

Loading Summary

Structure: CT01080-S-SBA
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

Tower Engineering Solutions

Discrete Appurtenances

No.	Elev (ft)	Description	Qty	No Ice Weight (lb)	No Ice CaAa (sf)	No Ice CaAa Factor	Ice Weight (lb)	Ice CaAa (sf)	Ice CaAa Factor	Hor. Ecc. (ft)	Vert Ecc (ft)
1	158.0	6' Lightning rod	1	6.50	0.38	1.00	11.80	0.980	1.00	0.00	0.00
2	158.0	APL866513-42T0	4	15.70	4.29	0.94	47.00	4.620	0.94	0.00	0.00
3	158.0	DB-T1-6C-8AB-0Z	2	21.40	4.78	1.00	51.10	5.040	1.00	0.00	0.00
4	158.0	FD9R6004/2C-3L	6	3.10	0.36	0.62	5.40	0.440	0.65	0.00	0.00
5	158.0	Low Profile Platform-flat	1	1200.00	25.00	1.00	1500.00	31.00	1.00	0.00	0.00
6	158.0	LPA-80063-6CF-EDIN-5	2	27.00	10.50	1.00	101.90	11.35	1.00	0.00	0.00
7	158.0	RRH2X60-700	3	60.00	3.96	0.73	80.10	4.230	0.74	0.00	0.00
8	158.0	RRH2X60-AWS	3	60.00	3.96	0.73	80.10	4.230	0.74	0.00	0.00
9	158.0	RRH2X60-PCS	3	55.00	2.57	0.89	80.10	2.760	0.90	0.00	0.00
10	158.0	SBNHH-1D65B	6	50.71	8.33	0.82	87.00	8.800	0.82	0.00	0.00
11	151.0	ODU	1	13.20	1.24	1.00	21.70	1.470	1.00	0.00	0.00
12	151.0	Pipe	1	40.00	2.63	0.75	63.00	4.340	0.75	0.00	0.00
13	151.0	VHLP2.5	1	47.60	8.43	1.00	97.00	8.920	1.00	1.00	0.00
14	146.0	1900MHz RRH	3	44.00	2.91	1.00	75.20	3.110	1.00	0.00	0.00
15	146.0	800 MHz RRH	3	53.00	2.49	0.92	74.10	2.680	0.92	0.00	0.00
16	146.0	800MHz External Notch Filt	3	8.80	0.78	0.69	13.80	0.880	0.71	0.00	0.00
17	146.0	840 10054	3	35.00	5.18	0.63	59.10	5.500	0.64	0.00	0.00
18	146.0	ACU-A20-N	4	1.00	0.08	1.00	2.30	0.120	1.00	0.00	0.00
19	146.0	APXVSPP18-C-A20	3	57.00	8.26	0.82	106.50	8.730	0.82	0.00	0.00
20	146.0	APXVTM14-C-120	3	56.00	6.90	0.76	91.90	7.290	0.77	0.00	0.00
21	146.0	GPS	1	10.00	1.05	1.00	18.00	1.170	1.00	0.00	0.00
22	146.0	Low Profile Platform-flat	1	1200.00	25.00	1.00	1500.00	31.00	1.00	0.00	0.00
23	146.0	RRH	3	3.13	2.92	0.88	65.00	2.920	0.88	0.00	0.00
24	146.0	TD-RRH8x20-25	3	70.00	4.72	0.68	92.00	4.970	0.69	0.00	0.00
25	137.0	782 11056	3	11.00	0.55	0.99	16.00	0.640	0.99	0.00	0.00
26	137.0	APXV18-209014-C	3	18.70	3.57	0.78	0.00	3.840	0.79	0.00	0.00
27	137.0	FE15S01P77/75	12	8.20	0.54	0.68	12.10	0.630	0.70	0.00	0.00
28	137.0	LNX-6515DS-A1M	3	49.80	11.41	0.84	115.60	11.92	0.84	0.00	0.00
29	137.0	Low Profile Platform-flat	1	1200.00	25.00	1.00	1500.00	31.00	1.00	0.00	0.00
30	107.0	7770.00	3	35.00	5.88	0.75	0.00	6.250	0.75	0.00	0.00
31	107.0	AM-X-CD-16-65-00T-RET	6	48.50	8.26	0.78	95.00	8.730	0.78	0.00	0.00
32	107.0	DTMABP7819VG12A	3	19.20	1.14	0.67	26.50	1.260	0.69	0.00	0.00
33	107.0	LGP21401	3	14.10	1.29	0.64	21.20	1.420	0.66	0.00	0.00
34	107.0	Low Profile Platform-flat	1	1200.00	25.00	1.00	1500.00	31.00	1.00	0.00	0.00
35	103.0	Collar Mount	1	250.00	5.00	1.00	425.00	7.500	1.00	0.00	0.00
36	103.0	DC6-48-60-18-8F	1	31.80	1.47	1.00	49.50	1.670	1.00	0.00	0.00
37	103.0	RRU-11	6	55.00	2.94	0.71	0.00	3.140	0.72	0.00	0.00
		Totals:	**110**	**8,354.15**			**11,450.40**				

Linear Appurtenances

Bottom Elev. (ft)	Top Elev. (ft)	Description	No Ice Weight (lb/ft)	No Ice CaAa (sf/ft)	Ice Weight (lb/ft)	Ice CaAa (sf/ft)	Exposed
0.00	158.0	(10) 1 5/8" Coax	10.40	0.00	10.40	0.00	Inside
0.00	158.0	(2) 1 5/8" Hybrid	2.20	0.20	5.00	0.30	Outside

Discrete Appurtenances

No.	Elev (ft)	Description	Qty	No Ice Weight (lb)	No Ice CaAa (sf)	No Ice CaAa Factor	Ice Weight (lb)	Ice CaAa (sf)	Ice CaAa Factor	Hor. Ecc. (ft)	Vert Ecc (ft)
0.00	151.0	(1) 1/2" Coax		0.16	0.00		0.16	0.00	Inside		
0.00	146.0	(3) 1 1/4" Coax		6.00	0.00		6.00	0.00	Inside		
0.00	146.0	(1) 1-1/4" Hybrid		2.86	0.00		2.86	0.00	Inside		
0.00	146.0	(2) 1/2" Coax		0.32	0.00		0.32	0.00	Inside		
0.00	146.0	(6) 5/16" Coax		2.88	0.00		2.88	0.00	Inside		
0.00	137.0	(12) 1 5/8" Coax		12.48	0.00		12.48	0.00	Inside		
0.00	107.0	(12) 1 5/8" Coax		12.48	0.00		12.48	0.00	Inside		
0.00	107.0	(1) FB-L98-002		0.07	0.00		0.07	0.00	Inside		
0.00	107.0	(3) VG122ST		0.60	0.00		0.60	0.00	Inside		
			Totals:	**6,892.61**			**7,334.93**				

Shaft Section Properties

Structure: CT01080-S-SBA
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

TES Tower Engineering Solutions

Increment Length: 5 (ft)

Elev (ft)	Description	Thick (in)	Dia (in)	Area (in^2)	Ix (in^4)	W/t Ratio	D/t Ratio	Fy (ksi)	Fb (ksi)	Weight (lb)
0.00		0.4375	58.380	80.458	34128.3	22.12	133.44	65	52	0.0
5.00		0.4375	57.205	78.826	32093.8	21.64	130.75	65	52	1355.0
10.00		0.4375	56.030	77.194	30141.9	21.17	128.07	65	52	1327.3
15.00		0.4375	54.855	75.563	28270.8	20.70	125.38	65	52	1299.5
20.00		0.4375	53.680	73.931	26478.8	20.22	122.70	65	52	1271.7
25.00		0.4375	52.505	72.300	24764.1	19.75	120.01	65	52	1244.0
30.00		0.4375	51.330	70.668	23125.1	19.28	117.33	65	52	1216.2
35.00		0.4375	50.155	69.036	21560.1	18.80	114.64	65	52	1188.5
40.00		0.4375	48.980	67.405	20067.3	18.33	111.95	65	52	1160.7
45.00		0.4375	47.805	65.773	18645.1	17.86	109.27	65	52	1132.9
45.25	Bot - Section 2	0.4375	47.746	65.692	18575.8	17.83	109.13	65	52	55.9
50.00		0.4375	46.630	64.142	17291.7	17.38	106.58	65	52	1964.3
51.25	Top - Section 1	0.3750	47.086	55.596	15326.4	20.73	125.56	65	52	509.2
55.00		0.3750	46.205	54.547	14475.2	20.32	123.21	65	52	702.7
60.00		0.3750	45.030	53.149	13390.2	19.76	120.08	65	52	916.2
65.00		0.3750	43.855	51.750	12360.7	19.21	116.95	65	52	892.4
70.00		0.3750	42.680	50.352	11385.5	18.66	113.81	65	52	868.6
75.00		0.3750	41.505	48.953	10462.9	18.11	110.68	65	52	844.8
80.00		0.3750	40.330	47.555	9591.6	17.55	107.55	65	52	821.0
85.00		0.3750	39.155	46.156	8770.0	17.00	104.41	65	52	797.2
90.00		0.3750	37.980	44.758	7996.7	16.45	101.28	65	52	773.4
91.75	Bot - Section 3	0.3750	37.569	44.268	7737.2	16.25	100.18	65	52	265.1
95.00		0.3750	36.805	43.359	7270.3	15.90	98.15	65	52	813.0
96.50	Top - Section 2	0.2500	36.953	29.122	4956.5	24.65	147.81	65	52	369.6
100.00		0.2500	36.130	28.470	4630.6	24.07	144.52	65	52	343.0
103.00		0.2500	35.425	27.910	4363.0	23.57	141.70	65	52	287.8
105.00		0.2500	34.955	27.537	4190.4	23.24	139.82	65	52	188.7
107.00		0.2500	34.485	27.164	4022.5	22.91	137.94	65	52	186.1
110.00		0.2500	33.780	26.605	3779.1	22.41	135.12	65	52	274.4
115.00		0.2500	32.605	25.673	3395.5	21.59	130.42	65	52	444.7
120.00		0.2500	31.430	24.740	3038.9	20.76	125.72	65	52	428.9
125.00		0.2500	30.255	23.808	2708.1	19.93	121.02	65	52	413.0
130.00		0.2500	29.080	22.876	2402.3	19.10	116.32	65	52	397.1
133.00	Bot - Section 4	0.2500	28.375	22.316	2230.3	18.60	113.50	65	52	230.7
135.00		0.2500	27.905	21.943	2120.3	18.27	111.62	65	52	303.9
136.75	Top - Section 3	0.2500	27.994	22.014	2140.8	18.33	111.97	60	52	261.8
137.00		0.2500	27.935	21.967	2127.2	18.29	111.74	60	48	18.7
140.00		0.2500	27.230	21.408	1968.8	17.79	108.92	60	48	221.4
145.00		0.2500	26.055	20.476	1722.6	16.97	104.22	60	48	356.3
146.00		0.2500	25.820	20.289	1676.0	16.80	103.28	60	48	69.4
150.00		0.2500	24.880	19.543	1497.9	16.14	99.52	60	48	271.1
151.00		0.2500	24.645	19.357	1455.4	15.97	98.58	60	48	66.2
155.00		0.2500	23.705	18.611	1293.6	15.31	94.82	60	48	258.4
158.00		0.2500	23.000	18.051	1180.4	14.81	92.00	60	48	187.1
										26997.7

Wind Loading - Shaft

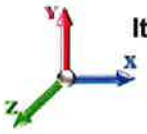
Structure: CT01080-S-SBA
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

TES Tower Engineering Solutions

Load Case: 85 mph Wind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 25

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		0.00	1.00	18.496	31.26	413.53	0.650	0.000	0.00	0.000	0.00	0.0	0.0	0.0
5.00		0.00	1.00	18.496	31.26	405.20	0.650	0.000	5.00	24.080	15.65	489.3	0.0	1355.0
10.00		0.00	1.00	18.496	31.26	396.88	0.650	0.000	5.00	23.591	15.33	479.3	0.0	1327.3
15.00		0.00	1.00	18.496	31.26	388.56	0.650	0.000	5.00	23.101	15.02	469.4	0.0	1299.5
20.00		0.00	1.00	18.496	31.26	380.23	0.650	0.000	5.00	22.611	14.70	459.4	0.0	1271.7
25.00		0.00	1.00	18.496	31.26	371.91	0.650	0.000	5.00	22.122	14.38	449.5	0.0	1244.0
30.00		0.00	1.00	18.496	31.26	363.59	0.650	0.000	5.00	21.632	14.06	439.5	0.0	1216.2
35.00		0.00	1.02	18.810	31.79	358.26	0.650	0.000	5.00	21.143	13.74	436.9	0.0	1188.5
40.00		0.00	1.06	19.541	33.02	356.61	0.650	0.000	5.00	20.653	13.42	443.3	0.0	1160.7
45.00		0.00	1.09	20.210	34.15	353.96	0.650	0.000	5.00	20.164	13.11	447.6	0.0	1132.9
45.25	Bot - Section 2	0.00	1.09	20.242	34.21	353.80	0.650	0.000	0.25	0.995	0.65	22.1	0.0	55.9
50.00		0.00	1.13	20.827	35.20	350.50	0.650	0.000	4.75	18.976	12.33	434.1	0.0	1964.3
51.25	Top - Section 1	0.00	1.13	20.975	35.45	349.52	0.650	0.000	1.25	4.920	3.20	113.4	0.0	509.2
55.00		0.00	1.16	21.402	36.17	352.06	0.650	0.000	3.75	14.577	9.47	342.7	0.0	702.7
60.00		0.00	1.19	21.941	37.08	347.40	0.650	0.000	5.00	19.007	12.35	458.1	0.0	916.2
65.00		0.00	1.21	22.449	37.94	342.23	0.650	0.000	5.00	18.518	12.04	456.6	0.0	892.4
70.00		0.00	1.24	22.929	38.75	336.60	0.650	0.000	5.00	18.028	11.72	454.1	0.0	868.6
75.00		0.00	1.26	23.386	39.52	330.58	0.650	0.000	5.00	17.539	11.40	450.5	0.0	844.8
80.00		0.00	1.29	23.821	40.26	324.19	0.650	0.000	5.00	17.049	11.08	446.1	0.0	821.0
85.00		0.00	1.31	24.237	40.96	317.49	0.650	0.000	5.00	16.559	10.76	440.9	0.0	797.2
90.00		0.00	1.33	24.636	41.63	310.48	0.650	0.000	5.00	16.070	10.45	434.9	0.0	773.4
91.75	Bot - Section 3	0.00	1.34	24.772	41.86	307.97	0.650	0.000	1.75	5.509	3.58	149.9	0.0	265.1
95.00		0.00	1.35	25.020	42.28	303.21	0.650	0.000	3.25	10.207	6.63	280.5	0.0	813.0
96.50	Top - Section 2	0.00	1.36	25.132	42.47	300.98	0.650	0.000	1.50	4.641	3.02	128.1	0.0	369.6
100.00		0.00	1.37	25.389	42.91	299.84	0.650	0.000	3.50	10.658	6.93	297.2	0.0	343.0
103.00	Appurtenance(s)	0.00	1.38	25.604	43.27	295.23	0.650	0.000	3.00	8.944	5.81	251.6	0.0	287.8
105.00		0.00	1.39	25.745	43.51	292.12	0.650	0.000	2.00	5.865	3.81	165.9	0.0	188.7
107.00	Appurtenance(s)	0.00	1.40	25.885	43.74	288.97	0.650	0.000	2.00	5.787	3.76	164.5	0.0	186.1
110.00		0.00	1.41	26.090	44.09	284.18	0.650	0.000	3.00	8.533	5.55	244.6	0.0	274.4
115.00		0.00	1.43	26.423	44.66	276.04	0.650	0.000	5.00	13.830	8.99	401.4	0.0	444.7
120.00		0.00	1.45	26.747	45.20	267.72	0.650	0.000	5.00	13.341	8.67	392.0	0.0	428.9
125.00		0.00	1.46	27.060	45.73	259.22	0.650	0.000	5.00	12.851	8.35	382.0	0.0	413.0
130.00		0.00	1.48	27.365	46.25	250.55	0.650	0.000	5.00	12.361	8.03	371.6	0.0	397.1
133.00	Bot - Section 4	0.00	1.49	27.544	46.55	245.27	0.650	0.000	3.00	7.182	4.67	217.3	0.0	230.7
135.00		0.00	1.50	27.662	46.75	241.73	0.650	0.000	2.00	4.773	3.10	145.0	0.0	303.9
136.75	Top - Section 3	0.00	1.50	27.764	46.92	238.60	0.650	0.000	1.75	4.112	2.67	125.4	0.0	261.8
137.00	Appurtenance(s)	0.00	1.50	27.778	46.95	242.49	0.650	0.000	0.25	0.583	0.38	17.8	0.0	18.7
140.00		0.00	1.51	27.951	47.24	237.11	0.650	0.000	3.00	6.896	4.48	211.7	0.0	221.4
145.00		0.00	1.53	28.233	47.71	228.02	0.650	0.000	5.00	11.101	7.22	344.3	0.0	356.3
146.00	Appurtenance(s)	0.00	1.53	28.288	47.81	226.18	0.650	0.000	1.00	2.161	1.40	67.2	0.0	69.4
150.00		0.00	1.54	28.507	48.18	218.79	0.650	0.000	4.00	8.450	5.49	264.6	0.0	271.1
151.00	Appurtenance(s)	0.00	1.54	28.562	48.27	216.93	0.650	0.000	1.00	2.064	1.34	64.7	0.0	66.2
155.00		0.00	1.56	28.776	48.63	209.44	0.650	0.000	4.00	8.058	5.24	254.7	0.0	258.4
158.00	Appurtenance(s)	0.00	1.56	28.934	48.90	203.76	0.650	0.000	3.00	5.838	3.79	185.6	0.0	187.1
								Totals:	**158.00**			**13,295.5**		**26,997.7**

Discrete Appurtenance Forces

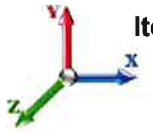
Structure: CT01080-S-SB
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

TES Tower Engineering Solutions

Load Case: 85 mph Wind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 25

No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa Factor	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	158.00	Low Profile Platform-flat	1	28.934	48.898	1.00	25.00	1200.00	0.000	0.000	1222.45	0.00	0.00
2	158.00	6' Lightning rod	1	28.934	48.898	1.00	0.38	6.50	0.000	0.000	18.58	0.00	0.00
3	158.00	APL866513-42T0	4	28.934	48.898	0.94	16.13	62.80	0.000	0.000	788.74	0.00	0.00
4	158.00	DB-T1-6C-8AB-0Z	2	28.934	48.898	1.00	9.56	42.80	0.000	0.000	467.46	0.00	0.00
5	158.00	FD9R6004/2C-3L	6	28.934	48.898	0.62	1.34	18.60	0.000	0.000	65.48	0.00	0.00
6	158.00	SBNHH-1D65B	6	28.934	48.898	0.82	40.98	304.26	0.000	0.000	2004.02	0.00	0.00
7	158.00	LPA-80063-6CF-EDIN-5	2	28.934	48.898	1.00	21.00	54.00	0.000	0.000	1026.86	0.00	0.00
8	158.00	RRH2X60-700	3	28.934	48.898	0.73	8.67	180.00	0.000	0.000	424.06	0.00	0.00
9	158.00	RRH2X60-AWS	3	28.934	48.898	0.73	8.67	180.00	0.000	0.000	424.06	0.00	0.00
10	158.00	RRH2X60-PCS	3	28.934	48.898	0.89	6.86	165.00	0.000	0.000	335.53	0.00	0.00
11	151.00	ODU	1	28.562	48.269	1.00	1.24	13.20	0.000	0.000	59.85	0.00	0.00
12	151.00	Pipe	1	28.562	48.269	0.75	1.97	40.00	0.000	0.000	95.21	0.00	0.00
13	151.00	VHLP2.5	1	28.562	48.269	1.00	8.43	47.60	2.043	0.000	406.91	831.20	0.00
14	146.00	TD-RRH8x20-25	3	28.288	47.807	0.68	9.63	210.00	0.000	0.000	460.32	0.00	0.00
15	146.00	RRH	3	28.288	47.807	0.88	7.71	9.39	0.000	0.000	368.53	0.00	0.00
16	146.00	Low Profile Platform-flat	1	28.288	47.807	1.00	25.00	1200.00	0.000	0.000	1195.17	0.00	0.00
17	146.00	GPS	1	28.288	47.807	1.00	1.05	10.00	0.000	0.000	50.20	0.00	0.00
18	146.00	APXVTM14-C-120	3	28.288	47.807	0.76	15.73	168.00	0.000	0.000	752.10	0.00	0.00
19	146.00	APXVSPP18-C-A20	3	28.288	47.807	0.82	20.32	171.00	0.000	0.000	971.42	0.00	0.00
20	146.00	840 10054	3	28.288	47.807	0.63	9.79	105.00	0.000	0.000	468.04	0.00	0.00
21	146.00	800MHz External Notch Filt	3	28.288	47.807	0.69	1.61	26.40	0.000	0.000	77.19	0.00	0.00
22	146.00	800 MHz RRH	3	28.288	47.807	0.92	6.87	159.00	0.000	0.000	328.55	0.00	0.00
23	146.00	1900MHz RRH	3	28.288	47.807	1.00	8.73	132.00	0.000	0.000	417.35	0.00	0.00
24	146.00	ACU-A20-N	4	28.288	47.807	1.00	0.32	4.00	0.000	0.000	15.30	0.00	0.00
25	137.00	FE15S01P77/75	12	27.778	46.946	0.68	4.41	98.40	0.000	0.000	206.86	0.00	0.00
26	137.00	782 11056	3	27.778	46.946	0.99	1.63	33.00	0.000	0.000	76.69	0.00	0.00
27	137.00	APXV18-209014-C	3	27.778	46.946	0.78	8.35	56.10	0.000	0.000	392.17	0.00	0.00
28	137.00	LNX-6515DS-A1M	3	27.778	46.946	0.84	28.75	149.40	0.000	0.000	1349.84	0.00	0.00
29	137.00	Low Profile Platform-flat	1	27.778	46.946	1.00	25.00	1200.00	0.000	0.000	1173.64	0.00	0.00
30	107.00	Low Profile Platform-flat	1	25.885	43.745	1.00	25.00	1200.00	0.000	0.000	1093.62	0.00	0.00
31	107.00	LGP21401	3	25.885	43.745	0.64	2.48	42.30	0.000	0.000	108.35	0.00	0.00
32	107.00	DTMABP7819VG12A	3	25.885	43.745	0.67	2.29	57.60	0.000	0.000	100.24	0.00	0.00
33	107.00	AM-X-CD-16-65-00T-RET	6	25.885	43.745	0.78	38.66	291.00	0.000	0.000	1691.04	0.00	0.00
34	107.00	7770.00	3	25.885	43.745	0.75	13.23	105.00	0.000	0.000	578.74	0.00	0.00
35	103.00	RRU-11	6	25.604	43.271	0.71	12.52	330.00	0.000	0.000	541.95	0.00	0.00
36	103.00	DC6-48-60-18-8F	1	25.604	43.271	1.00	1.47	31.80	0.000	0.000	63.61	0.00	0.00
37	103.00	Collar Mount	1	25.604	43.271	1.00	5.00	250.00	0.000	0.000	216.36	0.00	0.00
						Totals:		**8,354.15**			**20,036.49**		

Total Applied Force Summary

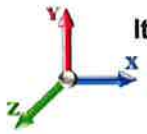
Structure: CT01080-S-SB
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

TES Tower Engineering Solutions

Load Case: 85 mph Wind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 25

Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
5.00		520.52	1607.27	0.00	0.00
10.00		510.57	1579.51	0.00	0.00
15.00		500.62	1551.75	0.00	0.00
20.00		490.67	1523.99	0.00	0.00
25.00		480.73	1496.23	0.00	0.00
30.00		470.78	1468.47	0.00	0.00
35.00		468.65	1440.71	0.00	0.00
40.00		476.36	1412.95	0.00	0.00
45.00		481.80	1385.19	0.00	0.00
45.25		23.84	68.53	0.00	0.00
50.00		467.58	2203.90	0.00	0.00
51.25		122.23	572.24	0.00	0.00
55.00		369.84	891.92	0.00	0.00
60.00		495.20	1168.41	0.00	0.00
65.00		494.58	1144.62	0.00	0.00
70.00		492.84	1120.83	0.00	0.00
75.00		490.07	1097.03	0.00	0.00
80.00		486.38	1073.24	0.00	0.00
85.00		481.84	1049.44	0.00	0.00
90.00		476.53	1025.65	0.00	0.00
91.75		164.56	353.36	0.00	0.00
95.00		308.01	977.01	0.00	0.00
96.50		140.87	445.28	0.00	0.00
100.00		327.28	519.53	0.00	0.00
103.00	(8) appurtenances	1099.45	1050.92	0.00	0.00
105.00		183.27	289.58	0.00	0.00
107.00	(16) appurtenances	3754.03	1982.94	0.00	0.00
110.00		271.01	386.35	0.00	0.00
115.00		446.09	631.23	0.00	0.00
120.00		437.16	615.37	0.00	0.00
125.00		427.74	599.51	0.00	0.00
130.00		417.84	583.65	0.00	0.00
133.00		245.23	342.57	0.00	0.00
135.00		163.75	378.52	0.00	0.00
136.75		141.85	327.04	0.00	0.00
137.00	(22) appurtenances	3219.32	1564.93	0.00	0.00
140.00		240.07	295.86	0.00	0.00
145.00		391.99	480.41	0.00	0.00
146.00	(30) appurtenances	5180.89	2288.97	0.00	0.00
150.00		303.16	322.12	0.00	0.00
151.00	(3) appurtenances	636.37	179.74	831.20	0.00
155.00		293.63	308.79	0.00	0.00
158.00	(31) appurtenances	6992.15	2438.89	0.00	0.00
	Totals:	**34,587.34**	**42,244.44**	**831.20**	**0.00**

Resulting Forces and Deflections

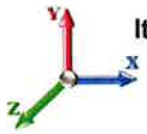
Structure: CT01080-S-SB
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

TES Tower Engineering Solutions

Load Case: 85 mph Wind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 25

Elev (ft)	Lateral FX (-) (kips)	Axial FY (-) (kips)	Lateral FZ (kips)	Moment MX (ft-kips)	Torsion MY (ft-kips)	Moment MZ (ft-kips)	Deflect X (in)	Deflect Z (in)	Deflect Resultant (in)	Rotation Sway (deg)	Rotation Twist (deg)
0.00	-34.650	-42.193	0.000	-0.012	-0.812	-4047.5	0.000	0.000	0.000	0.000	0.000
5.00	-34.245	-40.487	0.000	-0.012	-0.812	-3874.2	-0.089	0.000	0.089	-0.165	0.000
10.00	-33.842	-38.810	0.000	-0.012	-0.812	-3703.0	-0.352	0.000	0.352	-0.333	0.000
15.00	-33.442	-37.162	0.000	-0.012	-0.812	-3533.8	-0.793	0.000	0.793	-0.504	0.000
20.00	-33.044	-35.542	0.000	-0.012	-0.812	-3366.6	-1.414	0.000	1.414	-0.677	0.000
25.00	-32.649	-33.951	0.000	-0.013	-0.812	-3201.4	-2.218	0.000	2.218	-0.854	0.000
30.00	-32.256	-32.389	0.000	-0.014	-0.812	-3038.2	-3.209	0.000	3.209	-1.033	0.000
35.00	-31.858	-30.856	0.000	-0.014	-0.812	-2876.9	-4.388	0.000	4.388	-1.215	0.000
40.00	-31.445	-29.353	0.000	-0.015	-0.813	-2717.6	-5.760	0.000	5.760	-1.400	0.000
45.00	-30.975	-27.928	0.000	-0.015	-0.813	-2560.4	-7.326	0.000	7.326	-1.587	0.000
45.25	-30.996	-27.808	0.000	-0.016	-0.813	-2552.6	-7.410	0.000	7.410	-1.596	0.000
50.00	-30.514	-25.558	0.000	-0.016	-0.813	-2405.4	-9.090	0.000	9.090	-1.777	0.000
51.25	-30.417	-24.938	0.000	-0.017	-0.813	-2367.2	-9.562	0.000	9.562	-1.826	0.000
55.00	-30.093	-23.965	0.000	-0.019	-0.813	-2253.2	-11.055	0.000	11.055	-1.971	-0.001
60.00	-29.641	-22.704	0.000	-0.020	-0.814	-2102.7	-13.234	0.000	13.234	-2.185	-0.001
65.00	-29.182	-21.470	0.000	-0.021	-0.814	-1954.5	-15.638	0.000	15.638	-2.401	-0.001
70.00	-28.718	-20.263	0.000	-0.023	-0.815	-1808.6	-18.268	0.000	18.268	-2.617	-0.001
75.00	-28.249	-19.084	0.000	-0.025	-0.815	-1665.0	-21.126	0.001	21.126	-2.834	-0.001
80.00	-27.776	-17.933	0.000	-0.027	-0.816	-1523.8	-24.210	0.001	24.210	-3.051	-0.001
85.00	-27.300	-16.809	0.000	-0.029	-0.816	-1384.9	-27.520	0.001	27.520	-3.267	-0.001
90.00	-26.803	-15.746	0.001	-0.031	-0.817	-1248.4	-31.055	0.001	31.055	-3.480	-0.001
91.75	-26.646	-15.353	0.001	-0.032	-0.817	-1201.5	-32.345	0.001	32.345	-3.557	-0.001
95.00	-26.302	-14.352	0.001	-0.034	-0.817	-1114.9	-34.813	0.001	34.813	-3.695	-0.001
96.50	-26.158	-13.868	0.001	-0.035	-0.818	-1075.5	-35.984	0.001	35.984	-3.759	-0.001
100.00	-25.834	-13.299	0.001	-0.037	-0.819	-983.95	-38.793	0.002	38.793	-3.904	-0.002
103.00	-24.695	-12.266	0.001	-0.039	-0.820	-906.44	-41.302	0.002	41.302	-4.079	-0.002
105.00	-24.515	-11.941	0.001	-0.040	-0.820	-857.05	-43.035	0.002	43.035	-4.194	-0.002
107.00	-20.649	-10.192	0.001	-0.042	-0.821	-808.02	-44.815	0.002	44.815	-4.307	-0.002
110.00	-20.386	-9.751	0.001	-0.044	-0.821	-746.08	-47.573	0.002	47.573	-4.472	-0.002
115.00	-19.932	-9.069	0.001	-0.048	-0.822	-644.15	-52.394	0.003	52.394	-4.733	-0.002
120.00	-19.480	-8.411	0.001	-0.052	-0.823	-544.49	-57.481	0.004	57.481	-4.982	-0.003
125.00	-19.030	-7.778	0.001	-0.056	-0.825	-447.09	-62.820	0.005	62.820	-5.214	-0.003
130.00	-18.580	-7.184	0.001	-0.060	-0.825	-351.94	-68.390	0.006	68.390	-5.424	-0.004
133.00	-18.314	-6.837	0.001	-0.063	-0.826	-296.20	-71.832	0.007	71.832	-5.539	-0.004
135.00	-18.122	-6.456	0.001	-0.065	-0.826	-259.57	-74.165	0.007	74.165	-5.610	-0.004
136.75	-17.952	-6.135	0.001	-0.067	-0.827	-227.86	-76.230	0.008	76.230	-5.667	-0.004
137.00	-14.598	-4.884	0.001	-0.067	-0.827	-223.37	-76.527	0.008	76.527	-5.675	-0.004
140.00	-14.337	-4.590	0.001	-0.071	-0.827	-179.58	-80.115	0.009	80.115	-5.756	-0.005
145.00	-13.902	-4.138	0.001	-0.076	-0.827	-107.89	-86.194	0.011	86.194	-5.860	-0.005
146.00	-8.516	-2.386	0.001	-0.077	-0.828	-93.996	-87.421	0.011	87.421	-5.877	-0.005
150.00	-8.182	-2.092	0.001	-0.080	-0.828	-59.932	-92.361	0.013	92.361	-5.929	-0.006
151.00	-7.532	-1.977	0.001	0.005	0.000	-51.750	-93.602	0.013	93.602	-5.940	-0.006
155.00	-7.208	-1.698	0.001	0.002	0.000	-21.624	-98.584	0.014	98.584	-5.968	-0.006
158.00	-6.992	0.000	0.000	0.000	0.000	0.000	0.000	0.000	102.331	-5.975	-0.006

Resulting Stresses

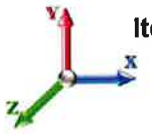
Structure: CT01080-S-SBA
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

Tower Engineering Solutions

Load Case: 85 mph Wind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 25

Applied Stresses

Elev (ft)	fa Axial (Y) (ksi)	fvx Shear (X) (ksi)	fvz Shear (Z) (ksi)	fvt Torsion (ksi)	fbx Bending (X) (ksi)	fbz Bending (Z) (ksi)	fb Combined (ksi)	Fb Allow Stress (ksi)	f/Fb Stress Ratio
0.00	0.52	0.87	0.00	0.00	0.00	42.18	42.73	52.0	0.822
5.00	0.51	0.88	0.00	0.00	0.00	42.07	42.61	52.0	0.820
10.00	0.50	0.88	0.00	0.00	0.00	41.94	42.47	52.0	0.817
15.00	0.49	0.89	0.00	0.00	0.00	41.78	42.30	52.0	0.814
20.00	0.48	0.90	0.00	0.01	0.00	41.58	42.09	52.0	0.810
25.00	0.47	0.91	0.00	0.01	0.00	41.35	41.85	52.0	0.805
30.00	0.46	0.92	0.00	0.01	0.00	41.09	41.58	52.0	0.800
35.00	0.45	0.93	0.00	0.01	0.00	40.77	41.25	52.0	0.794
40.00	0.44	0.94	0.00	0.01	0.00	40.41	40.88	52.0	0.786
45.00	0.42	0.95	0.00	0.01	0.00	40.00	40.45	52.0	0.778
45.25	0.42	0.95	0.00	0.01	0.00	39.97	40.43	52.0	0.778
50.00	0.40	0.96	0.00	0.01	0.00	39.52	39.95	52.0	0.769
51.25	0.45	1.10	0.00	0.01	0.00	44.31	44.80	52.0	0.862
55.00	0.44	1.11	0.00	0.01	0.00	43.82	44.30	52.0	0.852
60.00	0.43	1.12	0.00	0.01	0.00	43.08	43.55	52.0	0.838
65.00	0.41	1.14	0.00	0.01	0.00	42.25	42.71	52.0	0.822
70.00	0.40	1.15	0.00	0.01	0.00	41.31	41.76	52.0	0.803
75.00	0.39	1.16	0.00	0.01	0.00	40.24	40.68	52.0	0.783
80.00	0.38	1.18	0.00	0.01	0.00	39.04	39.47	52.0	0.759
85.00	0.36	1.19	0.00	0.01	0.00	37.67	38.09	52.0	0.733
90.00	0.35	1.21	0.00	0.01	0.00	36.13	36.54	52.0	0.703
91.75	0.35	1.21	0.00	0.01	0.00	35.55	35.96	52.0	0.692
95.00	0.33	1.22	0.00	0.01	0.00	34.39	34.79	52.0	0.669
96.50	0.48	1.81	0.00	0.02	0.00	48.85	49.43	52.0	0.951
100.00	0.47	1.83	0.00	0.02	0.00	46.77	47.35	52.0	0.911
103.00	0.44	1.78	0.00	0.02	0.00	44.84	45.39	52.0	0.873
105.00	0.43	1.79	0.00	0.02	0.00	43.56	44.10	52.0	0.848
107.00	0.38	1.53	0.00	0.02	0.00	42.20	42.66	52.0	0.821
110.00	0.37	1.54	0.00	0.02	0.00	40.63	41.09	52.0	0.790
115.00	0.35	1.56	0.00	0.02	0.00	37.68	38.14	52.0	0.734
120.00	0.34	1.59	0.00	0.03	0.00	34.31	34.76	52.0	0.669
125.00	0.33	1.61	0.00	0.03	0.00	30.43	30.89	52.0	0.594
130.00	0.31	1.64	0.00	0.03	0.00	25.96	26.43	52.0	0.508
133.00	0.31	1.65	0.00	0.03	0.00	22.96	23.45	52.0	0.451
135.00	0.29	1.66	0.00	0.03	0.01	20.81	21.31	52.0	0.410
136.75	0.28	1.64	0.00	0.03	0.01	18.15	18.66	52.0	0.359
137.00	0.22	1.34	0.00	0.03	0.01	17.87	18.25	48.0	0.380
140.00	0.21	1.35	0.00	0.03	0.01	15.13	15.53	48.0	0.324
145.00	0.20	1.37	0.00	0.04	0.01	9.94	10.43	48.0	0.217
146.00	0.12	0.85	0.00	0.04	0.01	8.82	9.07	48.0	0.189
150.00	0.11	0.84	0.00	0.04	0.01	6.07	6.36	48.0	0.133
151.00	0.10	0.78	0.00	0.00	0.00	5.34	5.61	48.0	0.117
155.00	0.09	0.78	0.00	0.00	0.00	2.41	2.85	48.0	0.059
158.00	0.00	0.78	0.00	0.00	0.00	0.00	1.35	48.0	0.028

Wind Loading - Shaft

Structure: CT01080-S-SBA
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

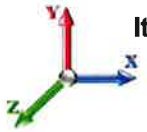
Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

Tower Engineering Solutions

Load Case: 73.61 mph Wind with 0.5" Ice

Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 25

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		0.00	1.00	13.871	23.44	358.11	0.650	0.500	0.00	0.000	0.00	0.0	0.0	0.0
5.00		0.00	1.00	13.871	23.44	350.91	0.650	0.500	5.00	24.497	15.92	373.3	178.1	1533.1
10.00		0.00	1.00	13.871	23.44	343.70	0.650	0.500	5.00	24.007	15.60	365.8	174.4	1501.7
15.00		0.00	1.00	13.871	23.44	336.49	0.650	0.500	5.00	23.518	15.29	358.4	170.8	1470.3
20.00		0.00	1.00	13.871	23.44	329.28	0.650	0.500	5.00	23.028	14.97	350.9	167.2	1438.9
25.00		0.00	1.00	13.871	23.44	322.07	0.650	0.500	5.00	22.539	14.65	343.4	163.6	1407.5
30.00		0.00	1.00	13.871	23.44	314.87	0.650	0.500	5.00	22.049	14.33	336.0	159.9	1376.2
35.00		0.00	1.02	14.106	23.84	310.26	0.650	0.500	5.00	21.559	14.01	334.1	156.3	1344.8
40.00		0.00	1.06	14.655	24.77	308.82	0.650	0.500	5.00	21.070	13.70	339.2	152.7	1313.4
45.00		0.00	1.09	15.156	25.61	306.53	0.650	0.500	5.00	20.580	13.38	342.6	149.1	1282.0
45.25	Bot - Section 2	0.00	1.09	15.181	25.66	306.39	0.650	0.500	0.25	1.016	0.66	16.9	7.4	63.4
50.00		0.00	1.13	15.620	26.40	303.53	0.650	0.500	4.75	19.371	12.59	332.4	140.4	2104.6
51.25	Top - Section 1	0.00	1.13	15.730	26.58	302.68	0.650	0.500	1.25	5.024	3.27	86.8	36.7	545.9
55.00		0.00	1.16	16.051	27.13	304.89	0.650	0.500	3.75	14.889	9.68	262.5	108.1	810.8
60.00		0.00	1.19	16.455	27.81	300.85	0.650	0.500	5.00	19.424	12.63	351.1	140.5	1056.7
65.00		0.00	1.21	16.836	28.45	296.37	0.650	0.500	5.00	18.934	12.31	350.2	136.9	1029.2
70.00		0.00	1.24	17.196	29.06	291.50	0.650	0.500	5.00	18.445	11.99	348.4	133.2	1001.8
75.00		0.00	1.26	17.538	29.64	286.28	0.650	0.500	5.00	17.955	11.67	345.9	129.6	974.4
80.00		0.00	1.29	17.865	30.19	280.75	0.650	0.500	5.00	17.466	11.35	342.7	126.0	947.0
85.00		0.00	1.31	18.177	30.72	274.94	0.650	0.500	5.00	16.976	11.03	339.0	122.4	919.6
90.00		0.00	1.33	18.476	31.22	268.88	0.650	0.500	5.00	16.486	10.72	334.6	118.7	892.1
91.75	Bot - Section 3	0.00	1.34	18.578	31.40	266.70	0.650	0.500	1.75	5.655	3.68	115.4	41.1	306.2
95.00		0.00	1.35	18.764	31.71	262.58	0.650	0.500	3.25	10.478	6.81	216.0	75.8	888.9
96.50	Top - Section 2	0.00	1.36	18.848	31.85	260.65	0.650	0.500	1.50	4.766	3.10	98.7	34.7	404.3
100.00		0.00	1.37	19.041	32.18	259.66	0.650	0.500	3.50	10.950	7.12	229.0	79.1	422.1
103.00	Appurtenance(s)	0.00	1.38	19.202	32.45	255.67	0.650	0.500	3.00	9.194	5.98	193.9	66.5	354.3
105.00		0.00	1.39	19.308	32.63	252.97	0.650	0.500	2.00	6.032	3.92	127.9	43.8	232.4
107.00	Appurtenance(s)	0.00	1.40	19.412	32.81	250.25	0.650	0.500	2.00	5.953	3.87	127.0	43.2	229.3
110.00		0.00	1.41	19.566	33.07	246.10	0.650	0.500	3.00	8.783	5.71	188.8	63.5	337.9
115.00		0.00	1.43	19.816	33.49	239.05	0.650	0.500	5.00	14.247	9.26	310.1	102.2	546.9
120.00		0.00	1.45	20.059	33.90	231.84	0.650	0.500	5.00	13.757	8.94	303.1	98.5	527.4
125.00		0.00	1.46	20.294	34.30	224.48	0.650	0.500	5.00	13.268	8.62	295.8	94.9	507.9
130.00		0.00	1.48	20.523	34.68	216.98	0.650	0.500	5.00	12.778	8.31	288.1	91.3	488.4
133.00	Bot - Section 4	0.00	1.49	20.657	34.91	212.41	0.650	0.500	3.00	7.432	4.83	168.6	53.5	284.1
135.00		0.00	1.50	20.745	35.06	209.33	0.650	0.500	2.00	4.940	3.21	112.6	35.7	339.6
136.75	Top - Section 3	0.00	1.50	20.822	35.19	206.63	0.650	0.500	1.75	4.258	2.77	97.4	30.8	292.5
137.00	Appurtenance(s)	0.00	1.50	20.833	35.21	210.00	0.650	0.500	0.25	0.603	0.39	13.8	4.4	23.1
140.00		0.00	1.51	20.962	35.43	205.33	0.650	0.500	3.00	7.146	4.64	164.5	51.3	272.7
145.00		0.00	1.53	21.173	35.78	197.46	0.650	0.500	5.00	11.518	7.49	267.9	81.9	438.2
146.00	Appurtenance(s)	0.00	1.53	21.215	35.85	195.87	0.650	0.500	1.00	2.245	1.46	52.3	16.2	85.6
150.00		0.00	1.54	21.379	36.13	189.47	0.650	0.500	4.00	8.783	5.71	206.3	62.7	333.7
151.00	Appurtenance(s)	0.00	1.54	21.420	36.20	187.86	0.650	0.500	1.00	2.147	1.40	50.5	15.5	81.7
155.00		0.00	1.56	21.581	36.47	181.37	0.650	0.500	4.00	8.392	5.45	198.9	59.8	318.1
158.00	Appurtenance(s)	0.00	1.56	21.699	36.67	176.46	0.650	0.500	3.00	6.088	3.96	145.1	43.5	230.6
								Totals:	**158.00**			**10,226.0**		**30,959.4**

Discrete Appurtenance Forces

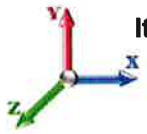
Structure: CT01080-S-SB
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

TES Tower Engineering Solutions

Load Case: 73.61 mph Wind with 0.5" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 25

No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa Factor	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	158.00	Low Profile Platform-flat	1	21.699	36.671	1.00	31.00	1500.00	0.000	0.000	1136.81	0.00	0.00
2	158.00	6' Lightning rod	1	21.699	36.671	1.00	0.98	11.80	0.000	0.000	35.94	0.00	0.00
3	158.00	APL866513-42T0	4	21.699	36.671	0.94	17.37	188.00	0.000	0.000	637.03	0.00	0.00
4	158.00	DB-T1-6C-8AB-0Z	2	21.699	36.671	1.00	10.08	102.20	0.000	0.000	369.65	0.00	0.00
5	158.00	FD9R6004/2C-3L	6	21.699	36.671	0.65	1.72	32.40	0.000	0.000	62.93	0.00	0.00
6	158.00	SBNHH-1D65B	6	21.699	36.671	0.82	43.30	522.00	0.000	0.000	1587.72	0.00	0.00
7	158.00	LPA-80063-6CF-EDIN-5	2	21.699	36.671	1.00	22.70	203.80	0.000	0.000	832.44	0.00	0.00
8	158.00	RRH2X60-700	3	21.699	36.671	0.74	9.39	240.30	0.000	0.000	344.37	0.00	0.00
9	158.00	RRH2X60-AWS	3	21.699	36.671	0.74	9.39	240.30	0.000	0.000	344.37	0.00	0.00
10	158.00	RRH2X60-PCS	3	21.699	36.671	0.90	7.45	240.30	0.000	0.000	273.27	0.00	0.00
11	151.00	ODU	1	21.420	36.200	1.00	1.47	21.70	0.000	0.000	53.21	0.00	0.00
12	151.00	Pipe	1	21.420	36.200	0.75	3.25	63.00	0.000	0.000	117.83	0.00	0.00
13	151.00	VHLP2.5	1	21.420	36.200	1.00	8.92	97.00	2.043	0.000	322.90	659.59	0.00
14	146.00	TD-RRH8x20-25	3	21.215	35.853	0.69	10.29	276.00	0.000	0.000	368.85	0.00	0.00
15	146.00	RRH	3	21.215	35.853	0.88	7.71	195.00	0.000	0.000	276.38	0.00	0.00
16	146.00	Low Profile Platform-flat	1	21.215	35.853	1.00	31.00	1500.00	0.000	0.000	1111.44	0.00	0.00
17	146.00	GPS	1	21.215	35.853	1.00	1.17	18.00	0.000	0.000	41.95	0.00	0.00
18	146.00	APXVTM14-C-120	3	21.215	35.853	0.77	16.84	275.70	0.000	0.000	603.76	0.00	0.00
19	146.00	APXVSPP18-C-A20	3	21.215	35.853	0.82	21.48	319.50	0.000	0.000	769.97	0.00	0.00
20	146.00	840 10054	3	21.215	35.853	0.64	10.56	177.30	0.000	0.000	378.61	0.00	0.00
21	146.00	800MHz External Notch Filt	3	21.215	35.853	0.71	1.87	41.40	0.000	0.000	67.20	0.00	0.00
22	146.00	800 MHz RRH	3	21.215	35.853	0.92	7.40	222.30	0.000	0.000	265.20	0.00	0.00
23	146.00	1900MHz RRH	3	21.215	35.853	1.00	9.33	225.60	0.000	0.000	334.51	0.00	0.00
24	146.00	ACU-A20-N	4	21.215	35.853	1.00	0.48	9.20	0.000	0.000	17.21	0.00	0.00
25	137.00	FE15S01P77/75	12	20.833	35.207	0.70	5.29	145.20	0.000	0.000	186.32	0.00	0.00
26	137.00	782 11056	3	20.833	35.207	0.99	1.90	48.00	0.000	0.000	66.92	0.00	0.00
27	137.00	APXV18-209014-C	3	20.833	35.207	0.79	9.10	0.00	0.000	0.000	320.41	0.00	0.00
28	137.00	LNX-6515DS-A1M	3	20.833	35.207	0.84	30.04	346.80	0.000	0.000	1057.57	0.00	0.00
29	137.00	Low Profile Platform-flat	1	20.833	35.207	1.00	31.00	1500.00	0.000	0.000	1091.42	0.00	0.00
30	107.00	Low Profile Platform-flat	1	19.412	32.807	1.00	31.00	1500.00	0.000	0.000	1017.01	0.00	0.00
31	107.00	LGP21401	3	19.412	32.807	0.66	2.81	63.60	0.000	0.000	92.24	0.00	0.00
32	107.00	DTMABP7819VG12A	3	19.412	32.807	0.69	2.61	79.50	0.000	0.000	85.57	0.00	0.00
33	107.00	AM-X-CD-16-65-00T-RET	6	19.412	32.807	0.78	40.86	570.00	0.000	0.000	1340.37	0.00	0.00
34	107.00	7770.00	3	19.412	32.807	0.75	14.06	0.00	0.000	0.000	461.34	0.00	0.00
35	103.00	RRU-11	6	19.202	32.452	0.72	13.56	0.00	0.000	0.000	440.20	0.00	0.00
36	103.00	DC6-48-60-18-8F	1	19.202	32.452	1.00	1.67	49.50	0.000	0.000	54.19	0.00	0.00
37	103.00	Collar Mount	1	19.202	32.452	1.00	7.50	425.00	0.000	0.000	243.39	0.00	0.00
						Totals:		**11,450.40**			**16,810.49**		

Total Applied Force Summary

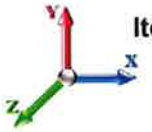
Structure: CT01080-S-SB
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

TES Tower Engineering Solutions

Load Case: 73.61 mph Wind with 0.5" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 25

Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
5.00		408.43	1799.33	0.00	0.00
10.00		400.97	1767.94	0.00	0.00
15.00		393.51	1736.56	0.00	0.00
20.00		386.05	1705.17	0.00	0.00
25.00		378.59	1673.79	0.00	0.00
30.00		371.13	1642.40	0.00	0.00
35.00		369.84	1611.02	0.00	0.00
40.00		376.34	1579.63	0.00	0.00
45.00		381.07	1548.25	0.00	0.00
45.25		18.87	76.67	0.00	0.00
50.00		369.99	2357.55	0.00	0.00
51.25		96.79	612.45	0.00	0.00
55.00		293.04	1010.51	0.00	0.00
60.00		392.82	1322.91	0.00	0.00
65.00		392.85	1295.49	0.00	0.00
70.00		392.01	1268.07	0.00	0.00
75.00		390.38	1240.65	0.00	0.00
80.00		388.04	1213.23	0.00	0.00
85.00		385.04	1185.81	0.00	0.00
90.00		381.44	1158.39	0.00	0.00
91.75		131.88	399.37	0.00	0.00
95.00		246.88	1061.94	0.00	0.00
96.50		113.01	484.15	0.00	0.00
100.00		262.81	608.45	0.00	0.00
103.00	(8) appurtenances	960.93	988.54	0.00	0.00
105.00		147.51	338.94	0.00	0.00
107.00	(16) appurtenances	3143.16	2548.92	0.00	0.00
110.00		218.54	458.22	0.00	0.00
115.00		360.36	747.39	0.00	0.00
120.00		353.98	727.90	0.00	0.00
125.00		347.22	708.41	0.00	0.00
130.00		340.10	688.92	0.00	0.00
133.00		200.06	404.43	0.00	0.00
135.00		133.61	419.79	0.00	0.00
136.75		115.87	362.71	0.00	0.00
137.00	(22) appurtenances	2739.09	2073.12	0.00	0.00
140.00		196.42	355.60	0.00	0.00
145.00		321.56	576.35	0.00	0.00
146.00	(30) appurtenances	4298.16	3373.22	0.00	0.00
150.00		249.63	395.97	0.00	0.00
151.00	(3) appurtenances	555.32	278.96	659.59	0.00
155.00		242.70	379.74	0.00	0.00
158.00	(31) appurtenances	5802.64	3557.94	0.00	0.00
	Totals:	**28,448.68**	**49,744.79**	**659.59**	**0.00**

Resulting Forces and Deflections

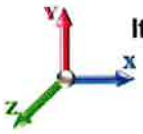
Structure: CT01080-S-SB
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

Tower Engineering Solutions

Load Case: 73.61 mph Wind with 0.5" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 25

Elev (ft)	Lateral FX (-) (kips)	Axial FY (-) (kips)	Lateral FZ (kips)	Moment MX (ft-kips)	Torsion MY (ft-kips)	Moment MZ (ft-kips)	Deflect X (in)	Deflect Z (in)	Deflect Resultant (in)	Rotation Sway (deg)	Rotation Twist (deg)
0.00	-28.510	-49.710	0.000	-0.010	-0.649	-3385.0	0.000	0.000	0.000	0.000	0.000
5.00	-28.216	-47.842	0.000	-0.010	-0.649	-3242.5	-0.074	0.000	0.074	-0.138	0.000
10.00	-27.922	-46.007	0.000	-0.010	-0.649	-3101.4	-0.295	0.000	0.295	-0.279	0.000
15.00	-27.630	-44.203	0.000	-0.011	-0.649	-2961.8	-0.663	0.000	0.663	-0.422	0.000
20.00	-27.338	-42.431	0.000	-0.011	-0.649	-2823.6	-1.183	0.000	1.183	-0.567	0.000
25.00	-27.046	-40.692	0.000	-0.011	-0.649	-2687.0	-1.857	0.000	1.857	-0.715	0.000
30.00	-26.756	-38.984	0.000	-0.012	-0.649	-2551.7	-2.687	0.000	2.687	-0.866	0.000
35.00	-26.460	-37.308	0.000	-0.012	-0.649	-2417.9	-3.676	0.000	3.676	-1.019	0.000
40.00	-26.151	-35.665	0.000	-0.013	-0.649	-2285.6	-4.827	0.000	4.827	-1.174	0.000
45.00	-25.785	-34.088	0.000	-0.012	-0.649	-2154.9	-6.141	0.000	6.141	-1.331	0.000
45.25	-25.812	-33.976	0.000	-0.013	-0.649	-2148.5	-6.211	0.000	6.211	-1.339	0.000
50.00	-25.437	-31.586	0.000	-0.013	-0.649	-2025.8	-7.621	0.000	7.621	-1.491	0.000
51.25	-25.368	-30.940	0.000	-0.014	-0.649	-1994.1	-8.017	0.000	8.017	-1.533	0.000
55.00	-25.127	-29.871	0.000	-0.015	-0.650	-1898.9	-9.270	0.000	9.270	-1.655	0.000
60.00	-24.784	-28.482	0.000	-0.016	-0.650	-1773.3	-11.101	0.000	11.101	-1.836	0.000
65.00	-24.434	-27.123	0.000	-0.017	-0.650	-1649.4	-13.121	0.000	13.121	-2.017	-0.001
70.00	-24.078	-25.794	0.000	-0.018	-0.650	-1527.2	-15.331	0.000	15.331	-2.200	-0.001
75.00	-23.717	-24.494	0.000	-0.019	-0.650	-1406.8	-17.734	0.000	17.734	-2.383	-0.001
80.00	-23.351	-23.224	0.000	-0.020	-0.651	-1288.2	-20.328	0.000	20.328	-2.567	-0.001
85.00	-22.981	-21.985	0.000	-0.022	-0.651	-1171.5	-23.114	0.001	23.114	-2.749	-0.001
90.00	-22.587	-20.799	0.000	-0.023	-0.651	-1056.6	-26.090	0.001	26.090	-2.930	-0.001
91.75	-22.467	-20.371	0.000	-0.024	-0.652	-1017.0	-27.176	0.001	27.176	-2.994	-0.001
95.00	-22.193	-19.291	0.000	-0.025	-0.652	-944.07	-29.255	0.001	29.255	-3.111	-0.001
96.50	-22.083	-18.779	0.000	-0.026	-0.652	-910.79	-30.241	0.001	30.241	-3.166	-0.001
100.00	-21.829	-18.134	0.000	-0.027	-0.653	-833.50	-32.608	0.001	32.608	-3.289	-0.001
103.00	-20.849	-17.160	0.000	-0.028	-0.653	-768.01	-34.722	0.001	34.722	-3.436	-0.001
105.00	-20.709	-16.795	0.000	-0.029	-0.653	-726.31	-36.182	0.001	36.182	-3.534	-0.001
107.00	-17.442	-14.412	0.000	-0.030	-0.654	-684.90	-37.683	0.001	37.683	-3.630	-0.002
110.00	-17.239	-13.914	0.000	-0.032	-0.654	-632.57	-40.008	0.002	40.008	-3.770	-0.002
115.00	-16.879	-13.129	0.000	-0.034	-0.655	-546.38	-44.074	0.002	44.074	-3.991	-0.002
120.00	-16.518	-12.370	0.001	-0.036	-0.655	-461.99	-48.366	0.003	48.366	-4.203	-0.002
125.00	-16.157	-11.636	0.001	-0.039	-0.656	-379.40	-52.872	0.003	52.872	-4.400	-0.003
130.00	-15.790	-10.939	0.001	-0.041	-0.656	-298.62	-57.574	0.004	57.574	-4.578	-0.003
133.00	-15.572	-10.531	0.001	-0.043	-0.657	-251.25	-60.481	0.004	60.481	-4.675	-0.003
135.00	-15.414	-10.109	0.001	-0.045	-0.657	-220.10	-62.451	0.005	62.451	-4.735	-0.003
136.75	-15.273	-9.750	0.001	-0.046	-0.657	-193.13	-64.195	0.005	64.195	-4.784	-0.003
137.00	-12.376	-7.904	0.001	-0.046	-0.657	-189.31	-64.445	0.005	64.445	-4.791	-0.003
140.00	-12.161	-7.549	0.001	-0.048	-0.657	-152.19	-67.475	0.006	67.475	-4.859	-0.004
145.00	-11.797	-6.993	0.001	-0.051	-0.657	-91.389	-72.610	0.007	72.610	-4.947	-0.004
146.00	-7.225	-4.000	0.000	-0.052	-0.658	-79.592	-73.647	0.007	73.647	-4.961	-0.004
150.00	-6.944	-3.624	0.001	-0.054	-0.658	-50.691	-77.819	0.009	77.819	-5.006	-0.005
151.00	-6.367	-3.393	0.001	0.003	0.000	-43.748	-78.867	0.009	78.867	-5.015	-0.005
155.00	-6.093	-3.034	0.001	0.001	0.000	-18.279	-83.075	0.010	83.075	-5.039	-0.005
158.00	-5.803	0.000	0.000	0.000	0.000	0.000	0.000	0.000	86.240	-5.045	-0.005

Resulting Stresses

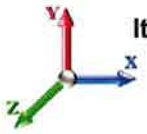
Structure:	CT01080-S-SBA	**Code:**	EIA/TIA-222-F	8/27/2015	
Site Name:	Long Hill #1	**Exposure:**	C		
Height:	158.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 18	

TES Tower Engineering Solutions

Load Case: 73.61 mph Wind with 0.5" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 25

Applied Stresses

Elev (ft)	fa Axial (Y) (ksi)	fvx Shear (X) (ksi)	fvz Shear (Z) (ksi)	fvt Torsion (ksi)	fbx Bending (X) (ksi)	fbz Bending (Z) (ksi)	fb Combined (ksi)	Fb Allow Stress (ksi)	f/Fb Stress Ratio
0.00	0.62	0.71	0.00	0.00	0.00	35.28	35.92	52.0	0.691
5.00	0.61	0.72	0.00	0.00	0.00	35.21	35.84	52.0	0.690
10.00	0.60	0.73	0.00	0.00	0.00	35.12	35.74	52.0	0.688
15.00	0.58	0.74	0.00	0.00	0.00	35.01	35.62	52.0	0.685
20.00	0.57	0.75	0.00	0.00	0.00	34.88	35.47	52.0	0.682
25.00	0.56	0.75	0.00	0.00	0.00	34.71	35.30	52.0	0.679
30.00	0.55	0.76	0.00	0.00	0.00	34.51	35.09	52.0	0.675
35.00	0.54	0.77	0.00	0.00	0.00	34.27	34.84	52.0	0.670
40.00	0.53	0.78	0.00	0.00	0.00	33.99	34.55	52.0	0.665
45.00	0.52	0.79	0.00	0.01	0.00	33.66	34.21	52.0	0.658
45.25	0.52	0.79	0.00	0.01	0.00	33.65	34.19	52.0	0.658
50.00	0.49	0.80	0.00	0.01	0.00	33.28	33.81	52.0	0.650
51.25	0.56	0.92	0.00	0.01	0.00	37.33	37.92	52.0	0.729
55.00	0.55	0.93	0.00	0.01	0.00	36.93	37.51	52.0	0.722
60.00	0.54	0.94	0.00	0.01	0.00	36.33	36.91	52.0	0.710
65.00	0.52	0.95	0.00	0.01	0.00	35.65	36.22	52.0	0.697
70.00	0.51	0.96	0.00	0.01	0.00	34.88	35.43	52.0	0.682
75.00	0.50	0.98	0.00	0.01	0.00	34.00	34.54	52.0	0.665
80.00	0.49	0.99	0.00	0.01	0.00	33.00	33.54	52.0	0.645
85.00	0.48	1.00	0.00	0.01	0.00	31.87	32.39	52.0	0.623
90.00	0.46	1.02	0.00	0.01	0.00	30.57	31.09	52.0	0.598
91.75	0.46	1.02	0.00	0.01	0.00	30.09	30.60	52.0	0.589
95.00	0.44	1.03	0.00	0.01	0.00	29.12	29.62	52.0	0.570
96.50	0.64	1.53	0.00	0.01	0.00	41.37	42.10	52.0	0.810
100.00	0.64	1.55	0.00	0.02	0.00	39.62	40.35	52.0	0.776
103.00	0.61	1.51	0.00	0.02	0.00	37.99	38.70	52.0	0.744
105.00	0.61	1.52	0.00	0.02	0.00	36.91	37.62	52.0	0.724
107.00	0.53	1.29	0.00	0.02	0.00	35.77	36.38	52.0	0.700
110.00	0.52	1.31	0.00	0.02	0.00	34.45	35.05	52.0	0.674
115.00	0.51	1.33	0.00	0.02	0.00	31.96	32.56	52.0	0.626
120.00	0.50	1.35	0.00	0.02	0.00	29.11	29.71	52.0	0.571
125.00	0.49	1.37	0.00	0.02	0.00	25.82	26.42	52.0	0.508
130.00	0.48	1.39	0.00	0.02	0.00	22.02	22.64	52.0	0.435
133.00	0.47	1.41	0.00	0.03	0.00	19.48	20.10	52.0	0.387
135.00	0.46	1.42	0.00	0.03	0.00	17.65	18.28	52.0	0.352
136.75	0.44	1.40	0.00	0.03	0.00	15.39	16.02	52.0	0.308
137.00	0.36	1.14	0.00	0.03	0.00	15.15	15.64	48.0	0.326
140.00	0.35	1.14	0.00	0.03	0.00	12.82	13.33	48.0	0.278
145.00	0.34	1.16	0.00	0.03	0.00	8.42	9.00	48.0	0.188
146.00	0.20	0.72	0.00	0.03	0.00	7.47	7.78	48.0	0.162
150.00	0.19	0.72	0.00	0.03	0.01	5.13	5.47	48.0	0.114
151.00	0.18	0.66	0.00	0.00	0.00	4.51	4.83	48.0	0.101
155.00	0.16	0.66	0.00	0.00	0.00	2.04	2.48	48.0	0.052
158.00	0.00	0.65	0.00	0.00	0.00	0.00	1.12	48.0	0.023

Wind Loading - Shaft

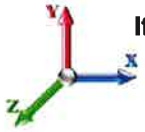
Structure: CT01080-S-SBA
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015
Page: 19

TES Tower Engineering Solutions

Load Case: 50 mph Wind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 23

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		0.00	1.00	6.400	10.82	243.25	0.650	0.000	0.00	0.000	0.00	0.0	0.0	0.0
5.00		0.00	1.00	6.400	10.82	238.35	0.650	0.000	5.00	24.080	15.65	169.3	0.0	1355.0
10.00		0.00	1.00	6.400	10.82	233.46	0.650	0.000	5.00	23.591	15.33	165.9	0.0	1327.3
15.00		0.00	1.00	6.400	10.82	228.56	0.650	0.000	5.00	23.101	15.02	162.4	0.0	1299.5
20.00		0.00	1.00	6.400	10.82	223.67	0.650	0.000	5.00	22.611	14.70	159.0	0.0	1271.7
25.00		0.00	1.00	6.400	10.82	218.77	0.650	0.000	5.00	22.122	14.38	155.5	0.0	1244.0
30.00		0.00	1.00	6.400	10.82	213.88	0.650	0.000	5.00	21.632	14.06	152.1	0.0	1216.2
35.00		0.00	1.02	6.509	11.00	210.74	0.650	0.000	5.00	21.143	13.74	151.2	0.0	1188.5
40.00		0.00	1.06	6.762	11.43	209.77	0.650	0.000	5.00	20.653	13.42	153.4	0.0	1160.7
45.00		0.00	1.09	6.993	11.82	208.21	0.650	0.000	5.00	20.164	13.11	154.9	0.0	1132.9
45.25	Bot - Section 2	0.00	1.09	7.004	11.84	208.12	0.650	0.000	0.25	0.995	0.65	7.7	0.0	55.9
50.00		0.00	1.13	7.207	12.18	206.17	0.650	0.000	4.75	18.976	12.33	150.2	0.0	1964.3
51.25	Top - Section 1	0.00	1.13	7.258	12.27	205.60	0.650	0.000	1.25	4.920	3.20	39.2	0.0	509.2
55.00		0.00	1.16	7.406	12.52	207.10	0.650	0.000	3.75	14.577	9.47	118.6	0.0	702.7
60.00		0.00	1.19	7.592	12.83	204.35	0.650	0.000	5.00	19.007	12.35	158.5	0.0	916.2
65.00		0.00	1.21	7.768	13.13	201.31	0.650	0.000	5.00	18.518	12.04	158.0	0.0	892.4
70.00		0.00	1.24	7.934	13.41	198.00	0.650	0.000	5.00	18.028	11.72	157.1	0.0	868.6
75.00		0.00	1.26	8.092	13.68	194.46	0.650	0.000	5.00	17.539	11.40	155.9	0.0	844.8
80.00		0.00	1.29	8.242	13.93	190.70	0.650	0.000	5.00	17.049	11.08	154.4	0.0	821.0
85.00		0.00	1.31	8.387	14.17	186.76	0.650	0.000	5.00	16.559	10.76	152.6	0.0	797.2
90.00		0.00	1.33	8.525	14.41	182.64	0.650	0.000	5.00	16.070	10.45	150.5	0.0	773.4
91.75	Bot - Section 3	0.00	1.34	8.572	14.49	181.16	0.650	0.000	1.75	5.509	3.58	51.9	0.0	265.1
95.00		0.00	1.35	8.657	14.63	178.36	0.650	0.000	3.25	10.207	6.63	97.1	0.0	813.0
96.50	Top - Section 2	0.00	1.36	8.696	14.70	177.05	0.650	0.000	1.50	4.641	3.02	44.3	0.0	369.6
100.00		0.00	1.37	8.785	14.85	176.38	0.650	0.000	3.50	10.658	6.93	102.9	0.0	343.0
103.00	Appurtenance(s)	0.00	1.38	8.860	14.97	173.67	0.650	0.000	3.00	8.944	5.81	87.0	0.0	287.8
105.00		0.00	1.39	8.908	15.06	171.83	0.650	0.000	2.00	5.865	3.81	57.4	0.0	188.7
107.00	Appurtenance(s)	0.00	1.40	8.957	15.14	169.98	0.650	0.000	2.00	5.787	3.76	56.9	0.0	186.1
110.00		0.00	1.41	9.028	15.26	167.17	0.650	0.000	3.00	8.533	5.55	84.6	0.0	274.4
115.00		0.00	1.43	9.143	15.45	162.38	0.650	0.000	5.00	13.830	8.99	138.9	0.0	444.7
120.00		0.00	1.45	9.255	15.64	157.48	0.650	0.000	5.00	13.341	8.67	135.6	0.0	428.9
125.00		0.00	1.46	9.363	15.82	152.48	0.650	0.000	5.00	12.851	8.35	132.2	0.0	413.0
130.00		0.00	1.48	9.469	16.00	147.38	0.650	0.000	5.00	12.361	8.03	128.6	0.0	397.1
133.00	Bot - Section 4	0.00	1.49	9.531	16.11	144.28	0.650	0.000	3.00	7.182	4.67	75.2	0.0	230.7
135.00		0.00	1.50	9.572	16.18	142.19	0.650	0.000	2.00	4.773	3.10	50.2	0.0	303.9
136.75	Top - Section 3	0.00	1.50	9.607	16.24	140.35	0.650	0.000	1.75	4.112	2.67	43.4	0.0	261.8
137.00	Appurtenance(s)	0.00	1.50	9.612	16.24	142.64	0.650	0.000	0.25	0.583	0.38	6.2	0.0	18.7
140.00		0.00	1.51	9.672	16.35	139.47	0.650	0.000	3.00	6.896	4.48	73.3	0.0	221.4
145.00		0.00	1.53	9.769	16.51	134.13	0.650	0.000	5.00	11.101	7.22	119.1	0.0	356.3
146.00	Appurtenance(s)	0.00	1.53	9.788	16.54	133.05	0.650	0.000	1.00	2.161	1.40	23.2	0.0	69.4
150.00		0.00	1.54	9.864	16.67	128.70	0.650	0.000	4.00	8.450	5.49	91.6	0.0	271.1
151.00	Appurtenance(s)	0.00	1.54	9.883	16.70	127.61	0.650	0.000	1.00	2.064	1.34	22.4	0.0	66.2
155.00		0.00	1.56	9.957	16.83	123.20	0.650	0.000	4.00	8.058	5.24	88.1	0.0	258.4
158.00	Appurtenance(s)	0.00	1.56	10.012	16.92	119.86	0.650	0.000	3.00	5.838	3.79	64.2	0.0	187.1
								Totals:	**158.00**			**4,600.5**		**26,997.7**

Discrete Appurtenance Forces

Structure: CT01080-S-SB
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

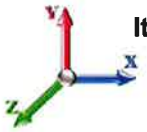
Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

Tower Engineering Solutions

Load Case: 50 mph Wind with 0" Ice

Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 23

No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa Factor	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	158.00	Low Profile Platform-flat	1	10.012	16.920	1.00	25.00	1200.00	0.000	0.000	422.99	0.00	0.00
2	158.00	6' Lightning rod	1	10.012	16.920	1.00	0.38	6.50	0.000	0.000	6.43	0.00	0.00
3	158.00	APL866513-42T0	4	10.012	16.920	0.94	16.13	62.80	0.000	0.000	272.92	0.00	0.00
4	158.00	DB-T1-6C-8AB-0Z	2	10.012	16.920	1.00	9.56	42.80	0.000	0.000	161.75	0.00	0.00
5	158.00	FD9R6004/2C-3L	6	10.012	16.920	0.62	1.34	18.60	0.000	0.000	22.66	0.00	0.00
6	158.00	SBNHH-1D65B	6	10.012	16.920	0.82	40.98	304.26	0.000	0.000	693.43	0.00	0.00
7	158.00	LPA-80063-6CF-EDIN-5	2	10.012	16.920	1.00	21.00	54.00	0.000	0.000	355.31	0.00	0.00
8	158.00	RRH2X60-700	3	10.012	16.920	0.73	8.67	180.00	0.000	0.000	146.73	0.00	0.00
9	158.00	RRH2X60-AWS	3	10.012	16.920	0.73	8.67	180.00	0.000	0.000	146.73	0.00	0.00
10	158.00	RRH2X60-PCS	3	10.012	16.920	0.89	6.86	165.00	0.000	0.000	116.10	0.00	0.00
11	151.00	ODU	1	9.883	16.702	1.00	1.24	13.20	0.000	0.000	20.71	0.00	0.00
12	151.00	Pipe	1	9.883	16.702	0.75	1.97	40.00	0.000	0.000	32.94	0.00	0.00
13	151.00	VHLP2.5	1	9.883	16.702	1.00	8.43	47.60	2.043	0.000	140.80	287.61	0.00
14	146.00	TD-RRH8x20-25	3	9.788	16.542	0.68	9.63	210.00	0.000	0.000	159.28	0.00	0.00
15	146.00	RRH	3	9.788	16.542	0.88	7.71	9.39	0.000	0.000	127.52	0.00	0.00
16	146.00	Low Profile Platform-flat	1	9.788	16.542	1.00	25.00	1200.00	0.000	0.000	413.55	0.00	0.00
17	146.00	GPS	1	9.788	16.542	1.00	1.05	10.00	0.000	0.000	17.37	0.00	0.00
18	146.00	APXVTM14-C-120	3	9.788	16.542	0.76	15.73	168.00	0.000	0.000	260.24	0.00	0.00
19	146.00	APXVSPP18-C-A20	3	9.788	16.542	0.82	20.32	171.00	0.000	0.000	336.13	0.00	0.00
20	146.00	840 10054	3	9.788	16.542	0.63	9.79	105.00	0.000	0.000	161.95	0.00	0.00
21	146.00	800MHz External Notch Filt	3	9.788	16.542	0.69	1.61	26.40	0.000	0.000	26.71	0.00	0.00
22	146.00	800 MHz RRH	3	9.788	16.542	0.92	6.87	159.00	0.000	0.000	113.68	0.00	0.00
23	146.00	1900MHz RRH	3	9.788	16.542	1.00	8.73	132.00	0.000	0.000	144.41	0.00	0.00
24	146.00	ACU-A20-N	4	9.788	16.542	1.00	0.32	4.00	0.000	0.000	5.29	0.00	0.00
25	137.00	FE15S01P77/75	12	9.612	16.244	0.68	4.41	98.40	0.000	0.000	71.58	0.00	0.00
26	137.00	782 11056	3	9.612	16.244	0.99	1.63	33.00	0.000	0.000	26.53	0.00	0.00
27	137.00	APXV18-209014-C	3	9.612	16.244	0.78	8.35	56.10	0.000	0.000	135.70	0.00	0.00
28	137.00	LNX-6515DS-A1M	3	9.612	16.244	0.84	28.75	149.40	0.000	0.000	467.07	0.00	0.00
29	137.00	Low Profile Platform-flat	1	9.612	16.244	1.00	25.00	1200.00	0.000	0.000	406.10	0.00	0.00
30	107.00	Low Profile Platform-flat	1	8.957	15.137	1.00	25.00	1200.00	0.000	0.000	378.42	0.00	0.00
31	107.00	LGP21401	3	8.957	15.137	0.64	2.48	42.30	0.000	0.000	37.49	0.00	0.00
32	107.00	DTMABP7819VG12A	3	8.957	15.137	0.67	2.29	57.60	0.000	0.000	34.68	0.00	0.00
33	107.00	AM-X-CD-16-65-00T-RET	6	8.957	15.137	0.78	38.66	291.00	0.000	0.000	585.13	0.00	0.00
34	107.00	7770.00	3	8.957	15.137	0.75	13.23	105.00	0.000	0.000	200.26	0.00	0.00
35	103.00	RRU-11	6	8.860	14.973	0.71	12.52	330.00	0.000	0.000	187.52	0.00	0.00
36	103.00	DC6-48-60-18-8F	1	8.860	14.973	1.00	1.47	31.80	0.000	0.000	22.01	0.00	0.00
37	103.00	Collar Mount	1	8.860	14.973	1.00	5.00	250.00	0.000	0.000	74.86	0.00	0.00
						Totals:		**8,354.15**			**6,933.04**		

Total Applied Force Summary

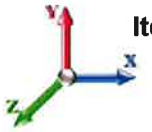
Structure: CT01080-S-SB
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

Tower Engineering Solutions

Load Case: 50 mph Wind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 23

Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
5.00		180.11	1607.27	0.00	0.00
10.00		176.67	1579.51	0.00	0.00
15.00		173.23	1551.75	0.00	0.00
20.00		169.78	1523.99	0.00	0.00
25.00		166.34	1496.23	0.00	0.00
30.00		162.90	1468.47	0.00	0.00
35.00		162.16	1440.71	0.00	0.00
40.00		164.83	1412.95	0.00	0.00
45.00		166.71	1385.19	0.00	0.00
45.25		8.25	68.53	0.00	0.00
50.00		161.79	2203.90	0.00	0.00
51.25		42.29	572.24	0.00	0.00
55.00		127.97	891.92	0.00	0.00
60.00		171.35	1168.41	0.00	0.00
65.00		171.14	1144.62	0.00	0.00
70.00		170.53	1120.83	0.00	0.00
75.00		169.57	1097.03	0.00	0.00
80.00		168.30	1073.24	0.00	0.00
85.00		166.73	1049.44	0.00	0.00
90.00		164.89	1025.65	0.00	0.00
91.75		56.94	353.36	0.00	0.00
95.00		106.58	977.01	0.00	0.00
96.50		48.74	445.28	0.00	0.00
100.00		113.25	519.53	0.00	0.00
103.00	(8) appurtenances	380.43	1050.92	0.00	0.00
105.00		63.42	289.58	0.00	0.00
107.00	(16) appurtenances	1298.97	1982.94	0.00	0.00
110.00		93.78	386.35	0.00	0.00
115.00		154.36	631.23	0.00	0.00
120.00		151.27	615.37	0.00	0.00
125.00		148.01	599.51	0.00	0.00
130.00		144.58	583.65	0.00	0.00
133.00		84.86	342.57	0.00	0.00
135.00		56.66	378.52	0.00	0.00
136.75		49.08	327.04	0.00	0.00
137.00	(22) appurtenances	1113.95	1564.93	0.00	0.00
140.00		83.07	295.86	0.00	0.00
145.00		135.64	480.41	0.00	0.00
146.00	(30) appurtenances	1792.70	2288.97	0.00	0.00
150.00		104.90	322.12	0.00	0.00
151.00	(3) appurtenances	220.20	179.74	287.61	0.00
155.00		101.60	308.79	0.00	0.00
158.00	(31) appurtenances	2419.43	2438.89	0.00	0.00
	Totals:	**11,967.94**	**42,244.44**	**287.61**	**0.00**

Resulting Forces and Deflections

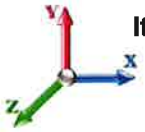
Structure: CT01080-S-SB
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

TES Tower Engineering Solutions

Load Case: 50 mph Wind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 23

Elev (ft)	Lateral FX (-) (kips)	Axial FY (-) (kips)	Lateral FZ (kips)	Moment MX (ft-kips)	Torsion MY (ft-kips)	Moment MZ (ft-kips)	Deflect X (in)	Deflect Z (in)	Deflect Resultant (in)	Rotation Sway (deg)	Rotation Twist (deg)
0.00	-11.988	-42.238	0.000	-0.001	-0.287	-1402.2	0.000	0.000	0.000	0.000	0.000
5.00	-11.848	-40.619	0.000	-0.001	-0.287	-1342.2	-0.031	0.000	0.031	-0.057	0.000
10.00	-11.709	-39.028	0.000	-0.001	-0.287	-1283.0	-0.122	0.000	0.122	-0.115	0.000
15.00	-11.571	-37.465	0.000	-0.001	-0.287	-1224.5	-0.275	0.000	0.275	-0.175	0.000
20.00	-11.434	-35.929	0.000	-0.001	-0.287	-1166.6	-0.490	0.000	0.490	-0.235	0.000
25.00	-11.298	-34.422	0.000	-0.002	-0.287	-1109.4	-0.769	0.000	0.769	-0.296	0.000
30.00	-11.162	-32.942	0.000	-0.002	-0.287	-1052.9	-1.112	0.000	1.112	-0.358	0.000
35.00	-11.025	-31.490	0.000	-0.002	-0.287	-997.18	-1.521	0.000	1.521	-0.421	0.000
40.00	-10.883	-30.066	0.000	-0.002	-0.287	-942.05	-1.996	0.000	1.996	-0.485	0.000
45.00	-10.721	-28.676	0.000	-0.002	-0.287	-887.64	-2.539	0.000	2.539	-0.550	0.000
45.25	-10.729	-28.602	0.000	-0.002	-0.287	-884.96	-2.568	0.000	2.568	-0.553	0.000
50.00	-10.562	-26.392	0.000	-0.002	-0.287	-834.00	-3.150	0.000	3.150	-0.616	0.000
51.25	-10.529	-25.814	0.000	-0.002	-0.287	-820.79	-3.314	0.000	3.314	-0.633	0.000
55.00	-10.418	-24.913	0.000	-0.002	-0.287	-781.31	-3.831	0.000	3.831	-0.683	0.000
60.00	-10.263	-23.733	0.000	-0.002	-0.287	-729.22	-4.587	0.000	4.587	-0.757	0.000
65.00	-10.106	-22.578	0.000	-0.003	-0.287	-677.91	-5.420	0.000	5.420	-0.832	0.000
70.00	-9.946	-21.447	0.000	-0.003	-0.287	-627.38	-6.332	0.000	6.332	-0.907	0.000
75.00	-9.785	-20.340	0.000	-0.003	-0.287	-577.65	-7.323	0.000	7.323	-0.983	0.000
80.00	-9.623	-19.257	0.000	-0.003	-0.287	-528.72	-8.392	0.000	8.392	-1.058	0.000
85.00	-9.460	-18.199	0.000	-0.004	-0.287	-480.61	-9.541	0.000	9.541	-1.133	0.000
90.00	-9.289	-17.169	0.000	-0.004	-0.287	-433.31	-10.767	0.000	10.767	-1.207	0.000
91.75	-9.236	-16.810	0.000	-0.004	-0.287	-417.05	-11.214	0.000	11.214	-1.233	0.000
95.00	-9.117	-15.830	0.000	-0.004	-0.287	-387.04	-12.071	0.000	12.071	-1.281	0.000
96.50	-9.069	-15.381	0.000	-0.004	-0.287	-373.36	-12.477	0.000	12.477	-1.304	-0.001
100.00	-8.958	-14.855	0.000	-0.005	-0.287	-341.62	-13.452	0.000	13.452	-1.354	-0.001
103.00	-8.564	-13.806	0.000	-0.005	-0.287	-314.75	-14.322	0.000	14.322	-1.414	-0.001
105.00	-8.503	-13.512	0.000	-0.005	-0.287	-297.62	-14.924	0.000	14.924	-1.454	-0.001
107.00	-7.163	-11.558	0.000	-0.005	-0.287	-280.61	-15.542	0.000	15.542	-1.494	-0.001
110.00	-7.074	-11.165	0.000	-0.005	-0.287	-259.13	-16.499	0.000	16.499	-1.551	-0.001
115.00	-6.918	-10.527	0.000	-0.006	-0.287	-223.76	-18.172	0.000	18.172	-1.642	-0.001
120.00	-6.763	-9.907	0.000	-0.006	-0.287	-189.17	-19.939	0.000	19.939	-1.728	-0.001
125.00	-6.609	-9.303	0.000	-0.007	-0.287	-155.35	-21.793	0.001	21.793	-1.809	-0.001
130.00	-6.455	-8.718	0.000	-0.007	-0.287	-122.31	-23.728	0.001	23.728	-1.882	-0.001
133.00	-6.363	-8.375	0.000	-0.008	-0.287	-102.94	-24.924	0.001	24.924	-1.922	-0.001
135.00	-6.297	-7.996	0.000	-0.008	-0.287	-90.221	-25.734	0.001	25.734	-1.946	-0.001
136.75	-6.238	-7.670	0.000	-0.008	-0.287	-79.202	-26.452	0.001	26.452	-1.966	-0.002
137.00	-5.073	-6.143	0.000	-0.008	-0.287	-77.642	-26.555	0.001	26.555	-1.969	-0.002
140.00	-4.983	-5.847	0.000	-0.009	-0.287	-62.424	-27.802	0.001	27.802	-1.997	-0.002
145.00	-4.832	-5.370	0.000	-0.009	-0.287	-37.509	-29.914	0.001	29.914	-2.033	-0.002
146.00	-2.960	-3.146	0.000	-0.009	-0.287	-32.677	-30.341	0.001	30.341	-2.039	-0.002
150.00	-2.844	-2.827	0.000	-0.010	-0.287	-20.836	-32.057	0.002	32.057	-2.057	-0.002
151.00	-2.618	-2.655	0.000	0.001	0.000	-17.991	-32.489	0.002	32.489	-2.061	-0.002
155.00	-2.506	-2.350	0.000	0.000	0.000	-7.518	-34.220	0.002	34.220	-2.071	-0.002
158.00	-2.419	0.000	0.000	0.000	0.000	0.000	0.000	0.000	35.522	-2.073	-0.002

Resulting Stresses

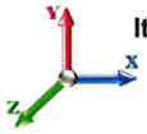
Structure: CT01080-S-SBA
Site Name: Long Hill #1
Height: 158.00 (ft)
Base Elev: 0.000 (ft)

Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

8/27/2015

TES Tower Engineering Solutions

Load Case: 50 mph Wind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 23

	Applied Stresses								
Elev (ft)	fa Axial (Y) (ksi)	fvx Shear (X) (ksi)	fvz Shear (Z) (ksi)	fvt Torsion (ksi)	fbx Bending (X) (ksi)	fbz Bending (Z) (ksi)	fb Combined (ksi)	Allow Stress (ksi)	f/Fb Stress Ratio
0.00	0.52	0.30	0.00	0.00	0.00	14.61	15.15	52.0	0.291
5.00	0.52	0.30	0.00	0.00	0.00	14.58	15.10	52.0	0.291
10.00	0.51	0.31	0.00	0.00	0.00	14.53	15.05	52.0	0.289
15.00	0.50	0.31	0.00	0.00	0.00	14.48	14.98	52.0	0.288
20.00	0.49	0.31	0.00	0.00	0.00	14.41	14.91	52.0	0.287
25.00	0.48	0.31	0.00	0.00	0.00	14.33	14.82	52.0	0.285
30.00	0.47	0.32	0.00	0.00	0.00	14.24	14.72	52.0	0.283
35.00	0.46	0.32	0.00	0.00	0.00	14.13	14.60	52.0	0.281
40.00	0.45	0.33	0.00	0.00	0.00	14.01	14.47	52.0	0.278
45.00	0.44	0.33	0.00	0.00	0.00	13.87	14.31	52.0	0.275
45.25	0.44	0.33	0.00	0.00	0.00	13.86	14.31	52.0	0.275
50.00	0.41	0.33	0.00	0.00	0.00	13.70	14.13	52.0	0.272
51.25	0.46	0.38	0.00	0.00	0.00	15.36	15.84	52.0	0.305
55.00	0.46	0.38	0.00	0.00	0.00	15.19	15.67	52.0	0.301
60.00	0.45	0.39	0.00	0.00	0.00	14.94	15.40	52.0	0.296
65.00	0.44	0.39	0.00	0.00	0.00	14.65	15.11	52.0	0.291
70.00	0.43	0.40	0.00	0.00	0.00	14.33	14.77	52.0	0.284
75.00	0.42	0.40	0.00	0.00	0.00	13.96	14.39	52.0	0.277
80.00	0.40	0.41	0.00	0.00	0.00	13.54	13.97	52.0	0.269
85.00	0.39	0.41	0.00	0.00	0.00	13.07	13.49	52.0	0.259
90.00	0.38	0.42	0.00	0.00	0.00	12.54	12.94	52.0	0.249
91.75	0.38	0.42	0.00	0.00	0.00	12.34	12.74	52.0	0.245
95.00	0.37	0.42	0.00	0.00	0.00	11.94	12.32	52.0	0.237
96.50	0.53	0.63	0.00	0.01	0.00	16.96	17.52	52.0	0.337
100.00	0.52	0.63	0.00	0.01	0.00	16.24	16.80	52.0	0.323
103.00	0.49	0.62	0.00	0.01	0.00	15.57	16.10	52.0	0.310
105.00	0.49	0.62	0.00	0.01	0.00	15.13	15.65	52.0	0.301
107.00	0.43	0.53	0.00	0.01	0.00	14.66	15.11	52.0	0.291
110.00	0.42	0.54	0.00	0.01	0.00	14.11	14.56	52.0	0.280
115.00	0.41	0.54	0.00	0.01	0.00	13.09	13.53	52.0	0.260
120.00	0.40	0.55	0.00	0.01	0.00	11.92	12.36	52.0	0.238
125.00	0.39	0.56	0.00	0.01	0.00	10.57	11.01	52.0	0.212
130.00	0.38	0.57	0.00	0.01	0.00	9.02	9.46	52.0	0.182
133.00	0.38	0.57	0.00	0.01	0.00	7.98	8.42	52.0	0.162
135.00	0.36	0.58	0.00	0.01	0.00	7.23	7.67	52.0	0.147
136.75	0.35	0.57	0.00	0.01	0.00	6.31	6.73	52.0	0.130
137.00	0.28	0.47	0.00	0.01	0.00	6.21	6.54	48.0	0.136
140.00	0.27	0.47	0.00	0.01	0.00	5.26	5.60	48.0	0.117
145.00	0.26	0.48	0.00	0.01	0.00	3.46	3.81	48.0	0.079
146.00	0.16	0.29	0.00	0.01	0.00	3.07	3.27	48.0	0.068
150.00	0.14	0.29	0.00	0.01	0.00	2.11	2.32	48.0	0.048
151.00	0.14	0.27	0.00	0.00	0.00	1.86	2.05	48.0	0.043
155.00	0.13	0.27	0.00	0.00	0.00	0.84	1.07	48.0	0.022
158.00	0.00	0.27	0.00	0.00	0.00	0.00	0.47	48.0	0.010

Reactions

Load Case	Shear FX (kips)	Shear FZ (kips)	Axial FY (kips)	Moment MX (ft-kips)	Moment MY (ft-kips)	t MZ (ft-kips)
85 mph Wind with 0" Ice	34.6	0.00	42.19	0.01	0.81	4047.54
73.61 mph Wind with 0.5" Ice	28.5	0.00	49.71	0.01	0.65	3385.07
50 mph Wind with 0" Ice	12.0	0.00	42.24	0.00	0.29	1402.23

Max Stresses

Load Case	fa Axial (Y) (ksi)	fvx Shear (X) (ksi)	fvz Shear (Z) (ksi)	fvt Torsion (ksi)	fbx Bending (X) (ksi)	fbz Bending (Z) (ksi)	Combined Stress (ksi)	Allowable Stress (ksi)	Elev (ft)	Stress Ratio
85 mph Wind with 0" Ice	0.48	1.81	0.00	0.02	0.00	48.85	49.43	52.0	96.50	0.951
73.61 mph Wind with 0.5" Ice	0.64	1.53	0.00	0.01	0.00	41.37	42.10	52.0	96.50	0.810
50 mph Wind with 0" Ice	0.53	0.63	0.00	0.01	0.00	16.96	17.52	52.0	96.50	0.337

Monopole Mat Foundation Design

			Date: 8/27/2015
Customer Name:	Verizon	EIA/TIA Standard:	EIA-222-F
Site Name:		Structure Height (Ft.):	158
Site Number:	CT01080-S-SBA	Engineer Name:	J. Tibbetts
Engr. Number:	17158	Engineer Login ID:	

Foundation Info Obtained from: Drawings/Calculations

Structure Type: Monopole

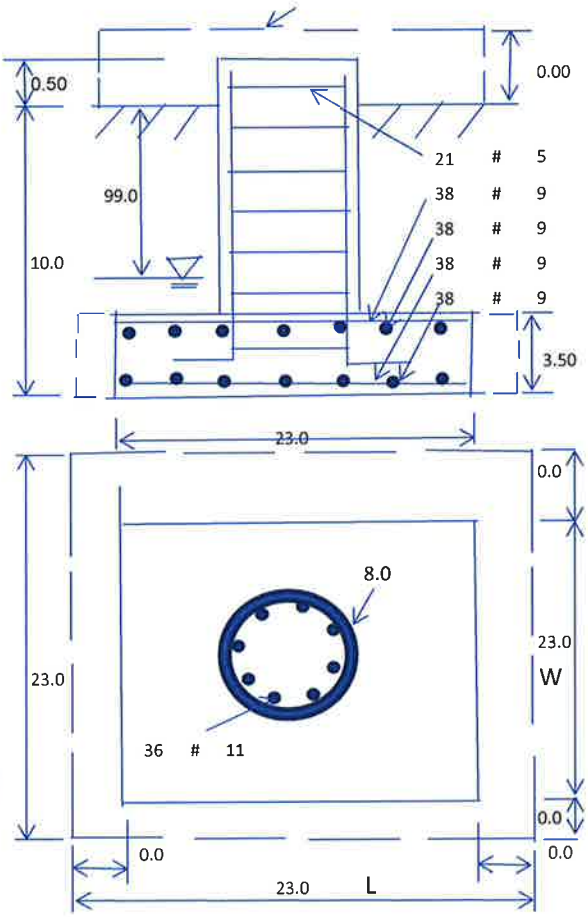
Analysis or Design? Analysis

Base Reactions (Unfactored)

Axial Load (Kips):	49.8	Shear Force (Kips):	34.7
Uplift Force (Kips):	0.0	Moment (Kips-ft):	4056.1

Foundation Geometries:

		Mods required -Yes/No ?:	No
Diameter of Pier (ft.):	8.0	Depth of Base BG (ft.):	10.0
Pier Height A. G. (ft.):	0.50	Thickness of Pad (ft):	3.50
Length of Pad (ft.):	23	Width of Pad (ft.):	23
Final Length of pad (ft)	23.0	Final width of pad (ft):	23.0
Control Value for Cell D18:	0	Control Value for Cell F18:	0



Material Properties and Reabr Info:

Concrete Strength (psi):	3000	Steel Elastic Modulus:	29000	ksi
Vertical bar yield (ksi)	60	Tie steel yield (ksi):	40	
Vertical Rebar Size #:	11	Tie / Stirrup Size #:	5	
Qty. of Vertical Rebars:	36	Tie Spacing (in):	6.0	
Pad Rebar Yield (Ksi):	60	Pad Steel Rebar Size (#):	9	
Concrete Cover (in.):	3	Unit Weight of Concrete:	150.0	pcf
Rebar at the bottom of the concrete pad:				
Qty. of Rebar in Pad (L):	38	Qty. of Rebar in Pad (W):	38	
Rebar at the top of the concrete pad:				
Qty. of Rebar in Pad (L):	38	Qty. of Rebar in Pad (W):	38	

Soil Design Parameters:

Soil Unit Weight (pcf):	125.0	Soil Buoyant Weight:	50.0	Pcf		
Water Table B.G.S. (ft):	99.0	Unit Weight of Water:	62.4	pcf	Angle from Top of Pad:	30
Allowable Net Soil Bearing (psf):	8000	Allowable Skin Friction:	0	Psf	Angle from Bottm of Pad:	25
Consider Friction for O.T.M. (Y/N):	No	Consider Friction for bearing (Y/N):	No		Angle from Bottm of Pad:	25
Consider soil hori. force for O.T.M.:	No	Reduction factor on the maximum soil bearing pressure:			1.00	

Foundation Analysis and Design:

Total Dry Soil Volume (cu. Ft.):	3111.77	Total Dry Soil Weight (Kips):	388.97
Total Buoyant Soil Volume (cu. Ft.):	0.00	Total Buoyant Soil Weight (Kips):	0.00
Total Effective Soil Weight (Kips):	388.97	Weight from the Concrete Block at Top (K):	0.00
Total Dry Concrete Volume (cu. Ft.):	2203.36	Total Dry Concrete Weight (Kips):	330.50
Total Buoyant Concrete Volume (cu. Ft.):	0.00	Total Buoyant Concrete Weight (Kips):	0.00
Total Effective Concrete Weight (Kips):	330.50	Total Vertical Load on Base (Kips):	769.28

Check Soil Capacities:

				Load/ Capacity Ratio	
Calculated Maxium Net Soil Pressure under the base (psf):	3825	<	Allowable Soil Bearing (psf): 8000	0.48	OK!
Allowable Foundation Overturning Resistance (SF=1.5, kips-ft.):	5897.8	>	Applied Momont (kips-ft): 4420	0.75	OK!
Factor of Safety Against Overturning (O. R. Moment/Design Moment):	2.00	OK!			

Check the capacities of Reinforceing Concrete:

Strength reduction factor (Flexure and axial tension):	0.90	Strength reduction factor (Shear):	0.75		
Strength reduction factor (Axial compresion):	0.65	Wind Load Factor on Concrete Design:	1.30		
				Load/ Capacity Ratio	
(1) Concrete Pier:					
Vertical Steel Rebar Area (sq. in./each):	1.56	Tie / Stirrup Area (sq. in./each):	0.31		
Calculated Moment Capacity (Mn,Kips-Ft):	10952.9 >	Design Factored Moment (Mu, Kips-Ft	5588.7	0.51	OK!
Calculated Shear Capacity (Kips):	912.1 >	Design Factored Shear (Kips):	45.1	0.05	OK!
Calculated Tension Capacity (Tn, Kips):	3032.6 >	Design Factored Tension (Tu Kips):	0.0	0.00	OK!
Calculated Compression Capacity (Pn, Kips):	9523.4 >	Design Factored Axial Load (Pu Kips):	64.7	0.01	OK!
Moment & Axial Strength Combination(Pu/Pn+Mu/Mn):	0.52 OK!	Check Tie Spacing (Design/Required):		0.5	OK!
Pier Reinforcement Ratio:	0.008	Reinforcement Ratio is satisfied per ACI			
(2).Concrete Pad:					
One-Way Design Shear Capacity (L-Direction, Kips):	871.6 >	One-Way Factored Shear (L-D. Kips):	268.8	0.31	OK!
One-Way Design Shear Capacity (W-Direction, Kips):	871.6 >	One-Way Factored Shear (W-D., Kips)	268.8	0.31	OK!
One-Way Design Shear Capacity (Corner-Corner. Kips):	929.5 >	One-Way Factored Shear (C-C, Kips):	562.6	0.61	OK!
Lower Steel Pad Reinforcement Ratio (L-Direct.):	0.0036 OK!	Lower Steel Pad Reinf. Ratio (W-Direc	0.0036		
Lower Steel Pad Moment Capacity (L-Direction. Kips-ft):	6295.8 >	Moment at Bottom (L-Direct. K-Ft):	444.2	0.07	OK!
Lower Steel Pad Moment Capacity (W-Direction. Kips-ft):	6295.8 >	Moment at Bottom (W-Direct. K-Ft):	444.2	0.07	OK!
Lower Steel Pad Moment Capacity (Corner-Corner,K-ft):	8775.9 >	Moment at Bottom (C-C Dir. K-Ft):	628.2	0.07	OK!
Upper Steel Pad Reinforcement Ratio (L-Direct.):	0.0036 OK!	Upper Steel Reinf. Ratio (W-Direct.):	0.0036		
Upper Steel Pad Moment Capacity (L-Direction. Kips-ft):	6295.8 >	Moment at the top (L-Dir Kips-Ft):	537.8	0.09	OK!
Upper Steel Pad Moment Capacity (W-Direction. Kips-ft):	6295.8 >	Moment at the top (W-Dir Kips-Ft):	537.8	0.09	OK!
Upper Steel Pad Moment Capacity (Corner-Corner. K-ft):	8775.9 >	Moment at the top (C-C Direc. K-Ft):	801.2	0.09	OK!