Robinson+Cole

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

November 4, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
215 Coatney Hill Road, Woodstock, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 167-foot level of the existing 190-foot tower at 215 Coatney Hill Road in Woodstock, Connecticut (the "Property"). The tower is owned by SBA. The Council approved Cellco's use of the existing tower in 2007. Cellco now intends to modify its facility by replacing all its existing antennas with three (3) model LNX-6514DS, 700 MHz antennas; three (3) model LNX-6514DS, 850 MHz antennas; three (3) model HBXX-6517DS, 1900 MHz antennas; and three (3) model HBXX-6517DS, 2100 MHz antennas, all at the same 167-foot level on the tower. Cellco also intends to install nine (9) remote radio heads ("RRHs") 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 Allan D. Walker, Jr., First Selectman of the Town of Woodstock ("Town"). The Town is the owner of the Property. A copy of this letter is also being sent to SBA, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. The replacement antennas and RRHs will be located at the 167-foot level on the 190-foot tower.

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

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

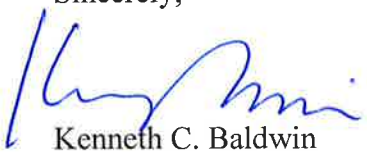
4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Attachment 2.

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:
Allan D. Walker, Jr., Woodstock First Selectman
SBA
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6514DS-VTM

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

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

Electrical Specifications

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

Electrical Specifications, BASTA*

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

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® | Teletilt®

Product Specifications

LNX-6514DS-VTM

Operating Frequency Band	698 – 896 MHz
Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

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

Remote Electrical Tilt (RET) Information

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

Regulatory Compliance/Certifications

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

Included Products

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

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

HBXX-6517DS-VTM

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

- Superior azimuth tracking and pattern symmetry with excellent passive intermodulation suppression

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain, dBi	19.0	19.1	19.2
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
CPR at Boresight, dB	21	22	21
CPR at Sector, dB	10	11	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4	0 ° | 18.4	0 ° | 18.7
	3 ° | 18.7	3 ° | 18.7	3 ° | 18.9
	6 ° | 18.4	6 ° | 18.5	6 ° | 18.6
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9

* 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® quad
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2180 MHz

Product Specifications

HBXX-6517DS-VTM

Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	166.0 mm | 6.5 in
Length	1903.0 mm | 74.9 in
Width	305.0 mm | 12.0 in
Net Weight	19.5 kg | 43.0 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	HBXX-6517DS-A2M
RET System	Teletilt®

Regulatory Compliance/Certifications

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

Included Products

600899A-2 — 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.

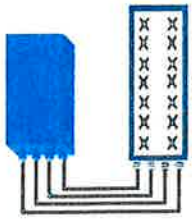
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

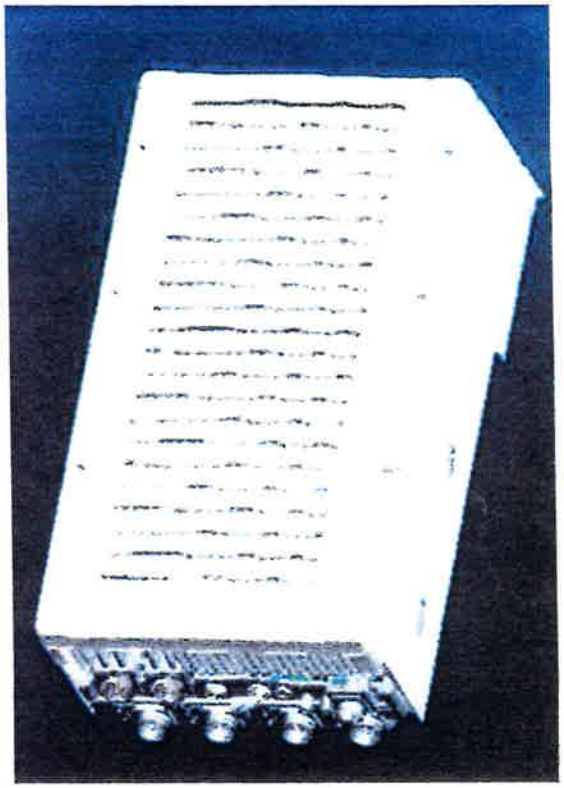
** Not a Verizon Wireless deployed product

NEW PCS RF MODULES FOR VZW

RRH2X60 - HW CHARACTERISTICS

LR14.3

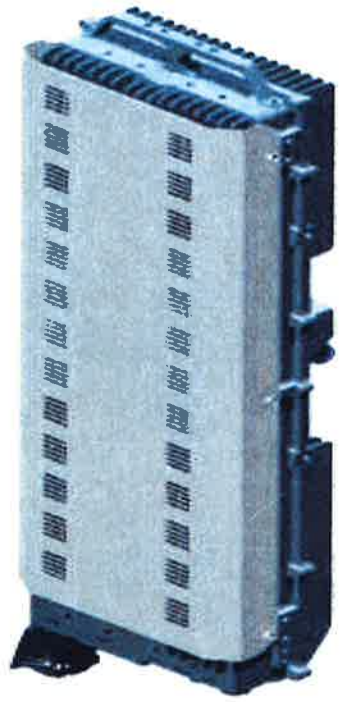
	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental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

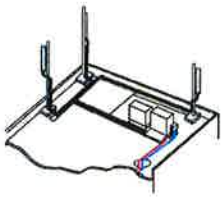
EASY INSTALLATION

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.

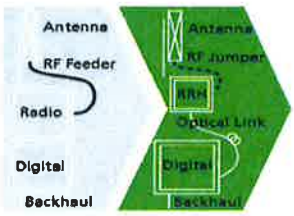
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

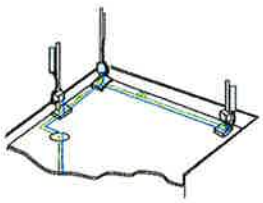
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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.

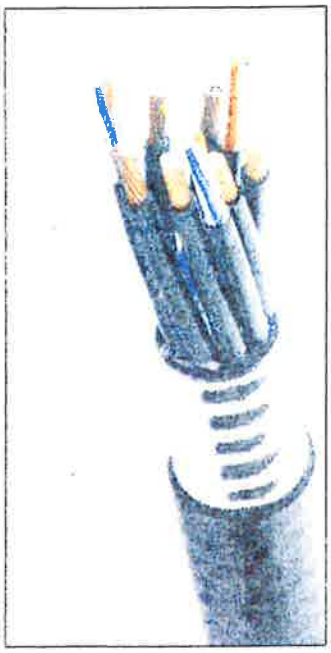


Figure 1: HYBRIFLEX Series

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-93-658 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)

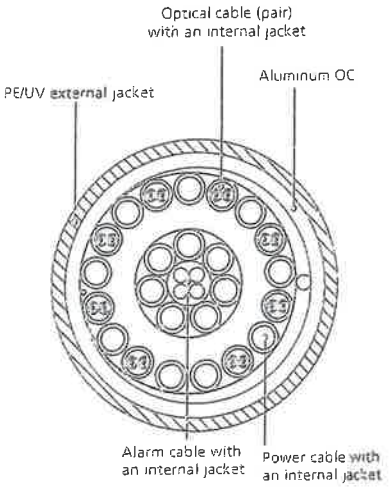


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Coatney Hill (Woodstock)								
Tower Height: 190Ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	2	565	187.5	0.0123	880	0.5867	0.21%	
*AT&T UMTS	2	875	187.5	0.0191	1900	1.0000	0.19%	
*AT&T GSM	1	283	187.5	0.0031	880	0.5867	0.05%	
*AT&T GSM	4	525	187.5	0.0229	1900	1.0000	0.23%	
*AT&T LTE	1	1771	187.5	0.0193	734	0.4893	0.40%	
*T-Mobile GSM/UMTS/LTE	6	1102	177.5	0.0808	1900/2100	1.0000	0.81%	
*T-Mobile LTE	1	865	177.5	0.0106	700	0.4667	0.23%	
Verizon	**1**	**1594**	**167**	**0.0206**	**1970**	**1.0000**	**2.06%**	
Verizon	**9**	**339**	**167**	**0.0393**	**869**	**0.5793**	**6.79%**	
Verizon	**1**	**1832**	**167**	**0.0236**	**2145**	**1.0000**	**2.36%**	
Verizon	**1**	**1035**	**167**	**0.0133**	**746**	**0.4973**	**2.68%**	
								16.00%
* Source: Siting Council								

ATTACHMENT 3

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

Structural Analysis Report

Existing 190 ft Nudd Corporation Monopole

Customer Name: SBA Communications Corp

Customer Site Number: CT08748-A

Customer Site Name: Woodstock 4, CT

Carrier Name: Verizon

Carrier Site Number: 178721

Carrier Site Name: N/A

Site Location: 215 Coatney Hill Road

Woodstock, Connecticut

Windham County

Latitude: 41.962264

Longitude: -72.018655

Analysis Result:

Max Structural Usage: 98.0% [Pass]

Max Foundation Usage: 35.0% [Pass]

Report Prepared By : Uma S Atluri

Introduction

The purpose of this report is to summarize the analysis results on the 190 ft Nudd Corporation 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	Fred A. Nudd Corporation, Project No. 01-8280, dated June 10,2001
Foundation Drawing	Fred A. Nudd Corporation, Project No. 01-8280, dated June 10,2001
Geotechnical Report	N/A
Modification Drawings	N/A

Analysis Criteria

The 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:	100.0 mph (3-Sec Gust), Equivalent to 80 mph (Fastest Mile)
Basic Wind Speed with Ice:	69 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

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	186.0	6	ADC CG-1900W800-FULL-DIN	Low Profile Platform	(12) 1 5/8" (2) 3/4" DC (1) 7/16" Fiber	Cingular
2		6	Ericsson RRUS-11			
3		3	KMW AM-X-CD-17-65-00T - Panel			
4		6	Powerwave 7770.00 - Panel			
5		6	Powerwave LGP21401			
6		6	Powerwave LGP21903			
7		1	Raycap DC2-48-60-8-18F			
8	178.0	3	Andrew LNX-6515DS-VTM - Panel	Platform w/ Hand Rails	(18) 1 5/8"	T-Mobile
9		6	EMS RR90-17-02DP - Panel			
10		3	Ericsson KRY 112 489/2			
11		3	Kathrein 782 11056			
-	167.0	1	DB-T1-6Z-8AB-0Z-Diplexer	Low Profile Platform	(12) 1 5/8" (2) 1 5/8" Fiber	Verizon
		6	Commscope - HBXX-6517DS-A2M - Panel			
		6	Commscope - LNX-6514DS-A1M - Panel			
		6	RFS FD9R6004/2C-3L-Diplexer			
		3	Alcatel-Lucent - RRH2X60-700			
		3	Alcatel-Lucent - RRH2X60-AWS			
		3	Alcatel-Lucent - RRH2x60-PCS			
20	110.0	2	Antenex Y1505 - Yagi	(2) Pipe Mounts	(2) 7/8"	Town of Woodstock
21	100.0	2	Decibel DB212-1 - Whip	(2) Standoffs	(2) 7/8"	
22	80.0	2	Telewave ANT450D6-9 - Whip	(2) Standoffs	(2) 7/8"	

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
12	167.0	6	Commscope - HBXX-6517DS-A2M - Panel	Low Profile Platform	(12) 1 5/8" (2) 1 5/8"Fiber	Verizon
13		6	Commscope - LNX-6514DS-A1M - Panel			
14		3	Alcatel-Lucent - RRH2X60-AWS - RRH			
15		3	Alcatel-Lucent - RRH2X60-700-RRH			
16		3	Alcatel-Lucent - RRH2x60-PCS-RRH			
17		6	RFS FD9R6004/2C-3L-Diplexer			
18		1	DB-T1-6Z-8AB-0Z-Distribution Box			
19		1	Rfs Celwave DB-T1-6Z-8AB-0Z-Distribution Box			

All transmission lines are considered running inside 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:	**80.4%**	**68.0%**	**98.0%**
Pass/Fail	**Pass**	**Pass**	**Pass**

Foundations

	Moment (Kip-Ft)	Shear (Kips)	Axial (Kips)
Original Design Reactions	5640.0	45.2	60.0
Analysis Reactions	4169.6	31.1	58.4
% of Design Reactions	73.9%	68.8%	97.3%

The foundation has been analyzed using the supplied documents and was found adequate. Therefore, no modification to the foundation will be required. Geotechnical soil parameters were obtained from the original foundation calculations included with the referenced tower and foundation design drawings.

Operational Condition (Rigidity):

Operational characteristics of the tower are found to be within the limits prescribed by ANSI/TIA/EIA 222-F for the installed antennas. Maximum twist/sway at the elevation of the proposed equipment is 2.263 degrees under the operational wind speed as specified in the Analysis Criteria.

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 80.4% at 91.0ft

Structure:	CT08748-A-SBA	**Code:**	EIA/TIA-222-F	9/15/2015	
Site Name:	Woodstock 4, CT	**Exposure:**	C		
Height:	190.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)			Page: 1	

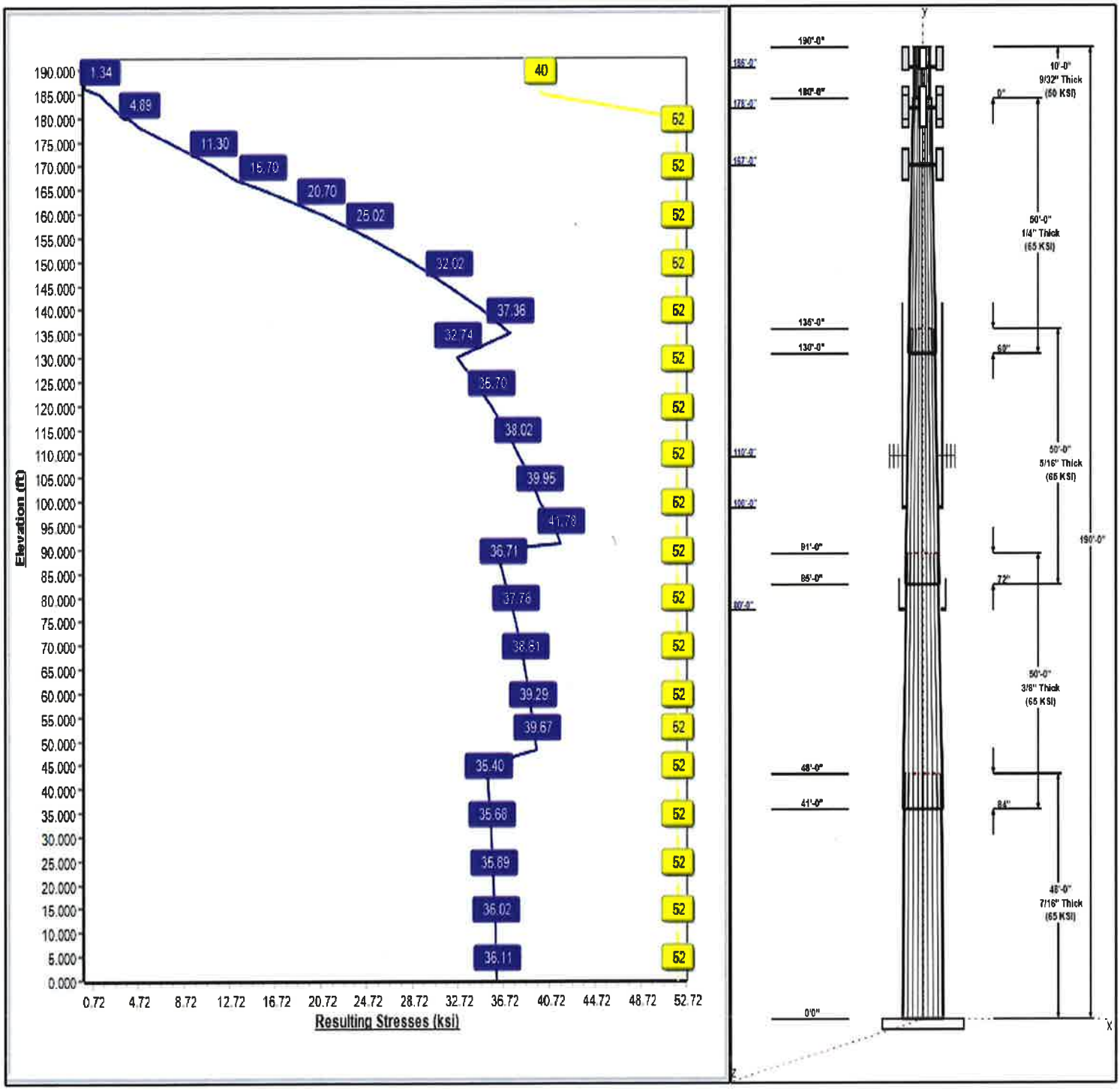
Tower Engineering Solutions

Dead Load Factor: 1.00
Wind Load Factor: 1.00

52 Alllowable Stress
42 Resulting Stress

Load Case : 80 mphWind with 0 in Ice

Iterations: 26



Structure: CT08748-A-SBA

Type: Custom
Site Name: Woodstock 4, CT
Height: 190.00 (ft)
Base Elev: 0.00 (ft)

Base Shape: 18 Sided
Taper: 0.23542

9/15/2015

Tower Engineering Solutions

Shaft Properties

Seq	Length (ft)	Top (in)	Bottom (in)	Thick (in)	Joint Type	Taper	Grade (ksi)
1	48.00	53.20	64.50	0.438		0.23542	65
2	50.00	43.83	55.60	0.375	Slip	0.23542	65
3	50.00	34.09	45.86	0.313	Slip	0.23542	65
4	50.00	24.00	35.77	0.250	Slip	0.23542	65
5	10.00	24.00	24.00	0.281	Butt	0.00000	50

Discrete Appurtenances

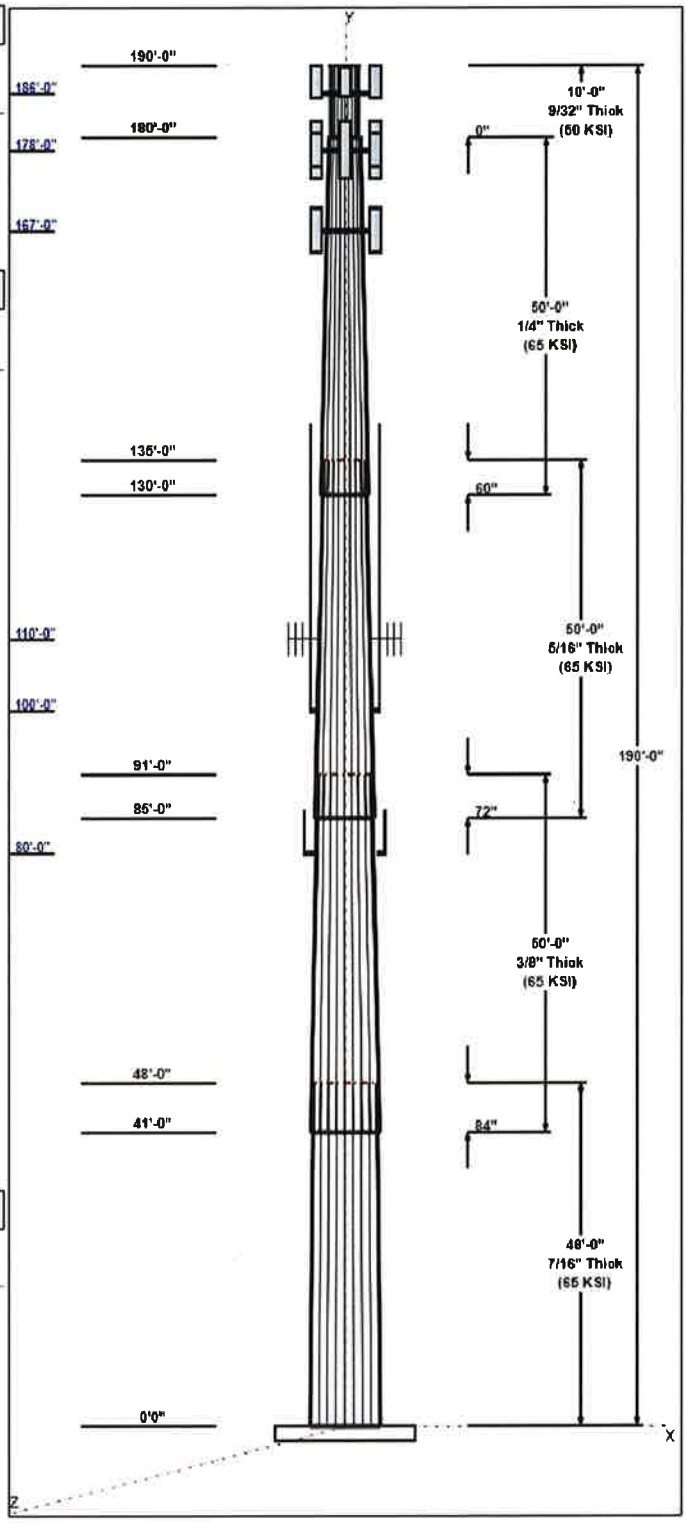
Attach Elev (ft)	Force Elev (ft)	Qty	Description	Carrier
186.00	187.50	6	ADC	Cingular
186.00	187.50	6	Ericsson RRUS-11	Cingular
186.00	187.50	3	KMW AM-X-CD-17-65-00T	Cingular
186.00	186.00	1	Low Profile Platform	Cingular
186.00	187.50	6	Powerwave 7770.00	Cingular
186.00	187.50	6	Powerwave LGP21401	Cingular
186.00	187.50	6	Powerwave LGP21903	Cingular
186.00	187.50	1	Raycap DC2-48-60-8-18F	Cingular
178.00	178.00	3	Andrew LNX-6515DS-VTM	T-Mobile
178.00	178.00	6	EMS RR90-17-02DP	T-Mobile
178.00	178.00	3	Ericsson KRY 112 489/2	T-Mobile
178.00	178.00	3	Kathrein 782 11056	T-Mobile
178.00	178.00	1	Platform w/ Hand Rails	T-Mobile
167.00	167.00	1	DB-T1-6Z-8AB-0Z	Verizon
167.00	167.00	6	HBXX-6517DS-A2M	Verizon
167.00	167.00	6	LNX-6514DS-A1M	Verizon
167.00	167.00	1	Low Profile Platform	Verizon
167.00	167.00	1	Rfs Celwave	Verizon
167.00	167.00	6	RFS FD9R6004/2C-3L	Verizon
167.00	167.00	3	RRH2X60-700	Verizon
167.00	167.00	3	RRH2X60-AWS	Verizon
167.00	167.00	3	RRH2x60-PCS	Verizon
110.00	110.00	2	Antenex Y1505	Town of Woodstock
110.00	110.00	2	Pipe Mounts	Town of Woodstock
100.00	120.00	2	Decibel DB212-1	Town of Woodstock
100.00	100.00	2	Standoffs	Town of Woodstock
80.00	80.00	2	Standoffs	Town of Woodstock
80.00	83.00	2	Telewave ANT450D6-9	Town of Woodstock

Linear Appurtenances

Elev From (ft)	Elev To (ft)	Placement	Description	Carrier
0.00	186.00	Inside	1 5/8" Coax	Cingular
0.00	186.00	Inside	3/4" DC	Cingular
0.00	186.00	Inside	7/16" Fiber	Cingular
0.00	178.00	Inside	1 5/8" Coax	T-Mobile
0.00	167.00	Inside	1 5/8" Coax	Verizon
0.00	167.00	Inside	1 5/8"Fiber	Verizon
0.00	110.00	Inside	7/8" Coax	Town of Woodstock
0.00	100.00	Inside	7/8" Coax	Town of Woodstock
0.00	80.00	Inside	7/8" Coax	Town of Woodstock

Anchor Bolts

Qty	Specifications	Grade (ksi)	Arrangement



29 2.00" F1554 105 105.0 Radial

Base Plate

Thickness (in)	Specifications (in)	Grade (ksi)	Geometry
2.2500	76.1	50.0	Round

Reactions

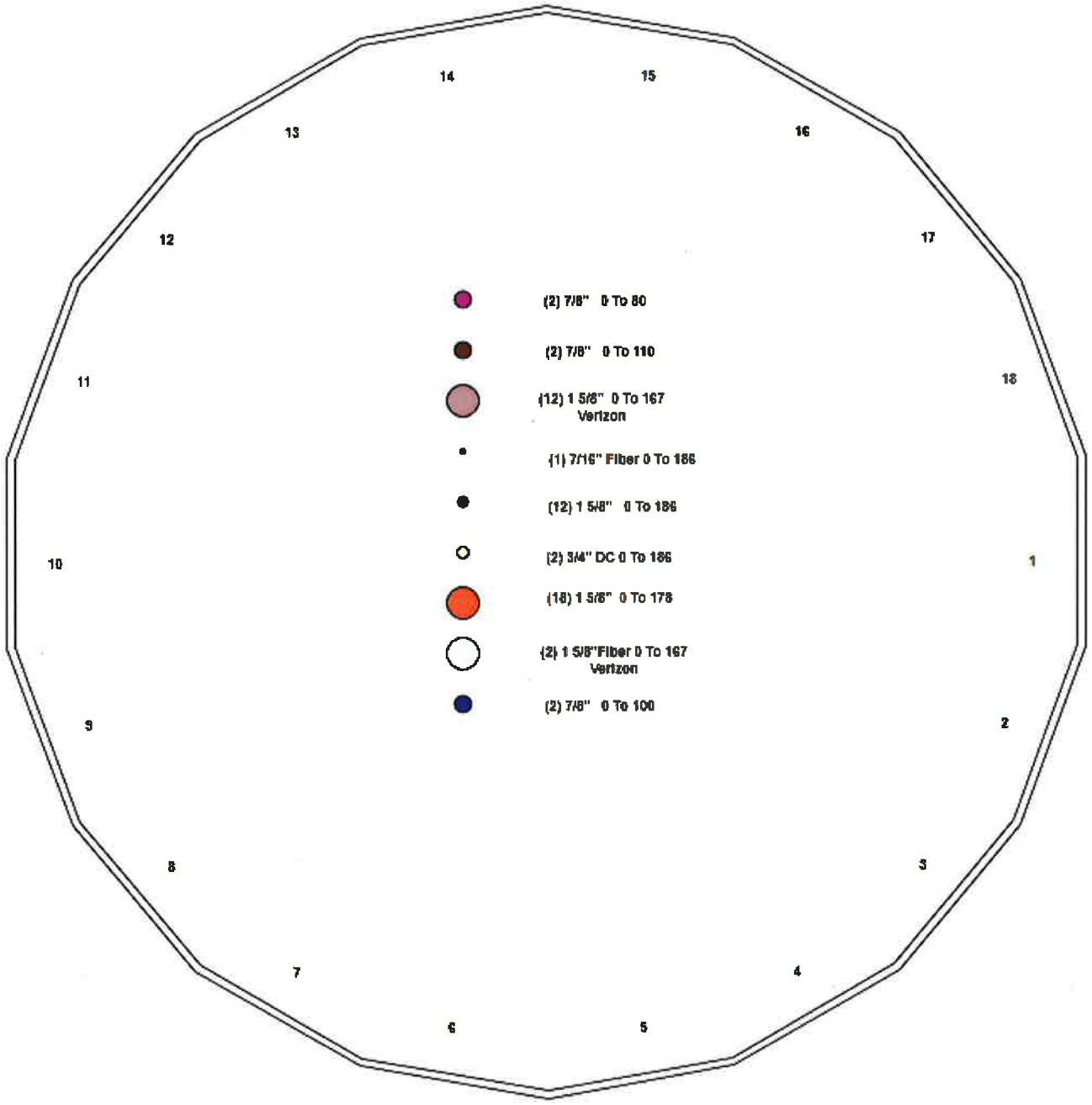
Load Case	Moment	Shear	Axial
80 mphWind with 0" Ice	4169.6	31.1	50.3
69.28 mph Wind with 0.5" Ice	3385.0	25.1	58.4
50 mph Wind with 0" Ice	1630.7	12.2	50.4

Structure: CT08748-A-SBA - Coax Line Placement

Type: Monopole
Site Name: Woodstock 4, CT
Height: 190.00 (ft)

9/15/2015

TES Tower Engineering Solutions



Shaft Properties

Structure:	CT08748-A-SBA	**Code:**	EIA/TIA-222-F	9/15/2015
Site Name:	Woodstock 4, CT	**Exposure:**	C	
Height:	190.00 (ft)	**Gh:**	1.69	
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 5

Tower Engineering Solutions

Sec. No.	Shape	Length (ft)	Thick (in)	Fy (ksi)	Joint Type	Overlap (in)	Weight (lb)
1	18	48.000	0.4375	65		0.00	13,248
2	18	50.000	0.3750	65	Slip	84.00	9,991
3	18	50.000	0.3125	65	Slip	72.00	6,694
4	18	50.000	0.2500	65	Slip	60.00	4,001
5	18	10.000	0.2813	50	Flange	0.00	720
					Total Shaft Weight:		**34,654**

	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	64.50	0.00	88.96	46124.76	24.58	147.4	53.20	48.00	73.26	25769.0	20.03	121.6	0.235417
2	55.60	41.00	65.73	25324.08	24.73	148.2	43.83	91.00	51.72	12336.9	19.19	116.8	0.235417
3	45.86	85.00	45.18	11844.57	24.46	146.7	34.09	135.0	33.51	4830.83	17.82	109.1	0.235417
4	35.77	130.0	28.18	4492.97	23.81	143.0	24.00	180.0	18.84	1343.00	15.51	96	0.235417
5	24.00	180.0	21.17	1504.92	13.63	85.33	24.00	190.0	21.17	1504.92	13.63	85.33	0.000000

Loading Summary

Structure:	CT08748-A-SBA	**Code:**	EIA/TIA-222-F	9/15/2015	
Site Name:	Woodstock 4, CT	**Exposure:**	C		
Height:	190.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 6	

Tower Engineering Solutions

Discrete Appurtenances

				No Ice			Ice				
No.	Elev (ft)	Description	Qty	Weight (lb)	CaAa (sf)	CaAa Factor	Weight (lb)	CaAa (sf)	CaAa Factor	Hor. Ecc. (ft)	Vert Ecc (ft)
1	186.0	ADC CG-1900W800-FULL-DIN	6	16.00	1.40	0.69	22.14	1.540	0.70	0.00	1.50
2	186.0	Ericsson RRUS-11	6	54.00	2.94	0.76	69.31	3.290	0.77	0.00	1.50
3	186.0	KMW AM-X-CD-17-65-00T	3	49.08	5.70	0.85	86.77	6.130	0.88	0.00	1.50
4	186.0	Low Profile Platform	1	1250.00	14.66	1.00	1481.33	18.87	1.00	0.00	0.00
5	186.0	Powerwave 7770.00	6	53.28	5.96	0.84	91.98	6.370	0.87	0.00	1.50
6	186.0	Powerwave LGP21401	6	14.10	1.29	0.64	19.97	1.420	0.67	0.00	1.50
7	186.0	Powerwave LGP21903	6	5.50	0.27	0.74	6.94	0.330	0.77	0.00	1.50
8	186.0	Raycap DC2-48-60-8-18F	1	14.50	2.91	0.66	27.74	3.110	0.67	0.00	1.50
9	178.0	Andrew LNX-6515DS-VTM	3	79.55	11.45	0.92	155.41	11.92	0.95	0.00	0.00
10	178.0	EMS RR90-17-02DP	6	39.94	4.62	0.87	71.41	5.090	0.91	0.00	0.00
11	178.0	Ericsson KRY 112 489/2	3	15.40	0.65	0.82	19.26	0.750	0.84	0.00	0.00
12	178.0	Kathrein 782 11056	3	1.80	0.17	0.78	2.83	0.230	0.83	0.00	0.00
13	178.0	Platform w/ Hand Rails	1	1588.50	32.00	1.00	2029.18	10.80	1.00	0.00	0.00
14	167.0	DB-T1-6Z-8AB-0Z	1	18.90	5.60	1.00	46.00	5.870	1.00	0.00	0.00
15	167.0	HBXX-6517DS-A2M	6	40.80	8.73	0.77	91.20	9.590	0.77	0.00	0.00
16	167.0	LNX-6514DS-A1M	6	38.80	8.41	0.83	89.30	9.240	0.83	0.00	0.00
17	167.0	Low Profile Platform	1	1250.00	14.66	1.00	1481.33	18.87	1.00	0.00	0.00
18	167.0	Rfs Celwave DB-T1-6Z-8AB-0Z	1	44.00	5.60	1.00	61.40	6.000	1.00	0.00	0.00
19	167.0	RFS FD9R6004/2C-3L	6	3.10	0.37	0.61	4.75	0.440	0.66	0.00	0.00
20	167.0	RRH2X60-700	3	60.00	3.96	0.76	80.10	4.230	0.76	0.00	0.00
21	167.0	RRH2X60-AWS	3	60.00	3.96	0.76	80.10	4.230	0.76	0.00	0.00
22	167.0	RRH2x60-PCS	3	55.00	2.60	0.82	61.40	2.900	0.82	0.00	0.00
23	110.0	Antenex Y1505	2	5.00	3.60	1.00	35.70	4.990	1.00	0.00	0.00
24	110.0	Pipe Mounts	2	40.00	1.32	1.00	60.00	1.580	1.00	0.00	0.00
25	100.0	Decibel DB212-1	2	31.00	6.50	1.00	101.60	16.57	1.00	0.00	20.00
26	100.0	Standoffs	2	60.00	3.06	1.00	70.00	5.520	1.00	0.00	0.00
27	80.00	Standoffs	2	60.00	3.06	1.00	70.00	5.520	1.00	0.00	0.00
28	80.00	Telewave ANT450D6-9	2	18.00	2.77	1.00	41.60	3.630	1.00	0.00	3.00
		Totals:	**93**	**7,149.51**			**10,144.39**				

Linear Appurtenances

			No Ice		Ice		
Bottom Elev. (ft)	Top Elev. (ft)	Description	Weight (lb/ft)	CaAa (sf/ft)	Weight (lb/ft)	CaAa (sf/ft)	Exposed
0.00	186.0	(12) 1 5/8" Coax	12.48	0.00	12.48	0.00	Inside
0.00	186.0	(2) 3/4" DC	0.80	0.00	0.80	0.00	Inside
0.00	186.0	(1) 7/16" Fiber	0.08	0.00	0.08	0.00	Inside
0.00	178.0	(18) 1 5/8" Coax	18.72	0.00	18.72	0.00	Inside
0.00	167.0	(12) 1 5/8" Coax	12.48	0.00	12.48	0.00	Inside
0.00	167.0	(2) 1 5/8"Fiber	2.20	0.00	2.20	0.00	Inside
0.00	110.0	(2) 7/8" Coax	1.04	0.00	1.04	0.00	Inside
0.00	100.0	(2) 7/8" Coax	1.04	0.00	1.04	0.00	Inside
0.00	80.00	(2) 7/8" Coax	1.04	0.00	1.04	0.00	Inside
		Totals:	**8,570.28**		**8,570.28**		

Shaft Section Properties

Structure: CT08748-A-SBA
Site Name: Woodstock 4, CT
Height: 190.00 (ft)
Base Elev: 0.000 (ft)

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

9/15/2015

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	64.500	88.956	46124.8	24.59	147.43	65	52	0.0
5.00		0.4375	63.323	87.321	43628.7	24.11	144.74	65	52	1499.6
10.00		0.4375	62.146	85.687	41224.4	23.64	142.05	65	52	1471.8
15.00		0.4375	60.969	84.052	38910.0	23.16	139.36	65	52	1444.0
20.00		0.4375	59.792	82.418	36683.9	22.69	136.67	65	52	1416.2
25.00		0.4375	58.615	80.783	34544.4	22.21	133.98	65	52	1388.3
30.00		0.4375	57.437	79.149	32489.8	21.74	131.29	65	52	1360.5
35.00		0.4375	56.260	77.514	30518.3	21.26	128.60	65	52	1332.7
40.00		0.4375	55.083	75.880	28628.2	20.79	125.90	65	52	1304.9
41.00	Bot - Section 2	0.4375	54.848	75.553	28259.8	20.69	125.37	65	52	257.6
45.00		0.4375	53.906	74.245	26817.8	20.32	123.21	65	52	1906.4
48.00	Top - Section 1	0.3750	53.950	63.765	23124.0	23.96	143.87	65	52	1408.1
50.00		0.3750	53.479	63.205	22519.6	23.74	142.61	65	52	432.1
55.00		0.3750	52.302	61.804	21055.1	23.18	139.47	65	52	1063.4
60.00		0.3750	51.125	60.403	19655.5	22.63	136.33	65	52	1039.6
65.00		0.3750	49.948	59.002	18319.3	22.08	133.19	65	52	1015.8
70.00		0.3750	48.771	57.601	17045.1	21.52	130.06	65	52	991.9
75.00		0.3750	47.594	56.200	15831.4	20.97	126.92	65	52	968.1
80.00		0.3750	46.417	54.799	14676.7	20.41	123.78	65	52	944.3
85.00	Bot - Section 3	0.3750	45.240	53.398	13579.6	19.86	120.64	65	52	920.4
90.00		0.3750	44.062	51.997	12538.5	19.31	117.50	65	52	1655.4
91.00	Top - Section 2	0.3125	44.452	43.779	10776.5	23.67	142.25	65	52	325.8
95.00		0.3125	43.510	42.845	10101.4	23.14	139.23	65	52	589.5
100.00		0.3125	42.333	41.678	9298.0	22.48	135.47	65	52	719.0
105.00		0.3125	41.156	40.510	8538.3	21.81	131.70	65	52	699.2
110.00		0.3125	39.979	39.343	7821.2	21.15	127.93	65	52	679.3
115.00		0.3125	38.802	38.175	7145.4	20.48	124.17	65	52	659.4
120.00		0.3125	37.625	37.008	6509.6	19.82	120.40	65	52	639.6
125.00		0.3125	36.448	35.841	5912.8	19.15	116.63	65	52	619.7
130.00	Bot - Section 4	0.3125	35.271	34.673	5353.6	18.49	112.87	65	52	599.9
135.00	Top - Section 3	0.2500	34.594	27.251	4060.9	22.99	138.37	65	52	1051.6
140.00		0.2500	33.417	26.317	3657.5	22.16	133.67	65	52	455.7
145.00		0.2500	32.240	25.383	3281.8	21.33	128.96	65	52	439.8
150.00		0.2500	31.062	24.449	2932.7	20.50	124.25	65	52	423.9
155.00		0.2500	29.885	23.515	2609.3	19.67	119.54	65	52	408.0
160.00		0.2500	28.708	22.581	2310.5	18.84	114.83	65	52	392.1
165.00		0.2500	27.531	21.647	2035.5	18.01	110.12	65	52	376.2
167.00		0.2500	27.060	21.273	1931.9	17.68	108.24	65	52	146.0
170.00		0.2500	26.354	20.713	1783.3	17.18	105.42	65	52	214.3
175.00		0.2500	25.177	19.779	1552.7	16.35	100.71	65	52	344.5
178.00		0.2500	24.471	19.219	1424.5	15.85	97.88	65	52	199.0
180.00	Top - Section 4	0.0000	0.000	0.000	0.0	NAN	NAN	0	0	129.5
180.00	Bot - Section 5	0.2500	24.000	18.845	1343.0	15.52	96.00	65	52	
185.00		0.2813	24.000	21.173	1504.9	13.64	85.33	50	40	360.2
186.00		0.2813	24.000	21.173	1504.9	13.64	85.33	50	40	72.0
190.00		0.2813	24.000	21.173	1504.9	13.64	85.33	50	40	288.2
										34653.9

Wind Loading - Shaft

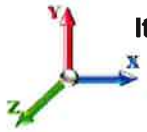
Structure: CT08748-A-SBA
Site Name: Woodstock 4, CT
Height: 190.00 (ft)
Base Elev: 0.000 (ft)

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

9/15/2015

TES Tower Engineering Solutions

Load Case: 80 mphWind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 26

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	16.384	27.69	430.00	0.650	0.000	0.00	0.000	0.00	0.0	0.0	0.0
5.00		0.00	1.00	16.384	27.69	422.15	0.650	0.000	5.00	26.630	17.31	479.3	0.0	1499.6
10.00		0.00	1.00	16.384	27.69	414.31	0.650	0.000	5.00	26.139	16.99	470.5	0.0	1471.8
15.00		0.00	1.00	16.384	27.69	406.46	0.650	0.000	5.00	25.649	16.67	461.6	0.0	1444.0
20.00		0.00	1.00	16.384	27.69	398.61	0.650	0.000	5.00	25.158	16.35	452.8	0.0	1416.2
25.00		0.00	1.00	16.384	27.69	390.76	0.650	0.000	5.00	24.668	16.03	444.0	0.0	1388.3
30.00		0.00	1.00	16.384	27.69	382.92	0.650	0.000	5.00	24.178	15.72	435.1	0.0	1360.5
35.00		0.00	1.02	16.662	28.16	378.24	0.650	0.000	5.00	23.687	15.40	433.5	0.0	1332.7
40.00		0.00	1.06	17.310	29.25	377.45	0.650	0.000	5.00	23.197	15.08	441.1	0.0	1304.9
41.00	Bot - Section 2	0.00	1.06	17.432	29.46	377.17	0.650	0.000	1.00	4.580	2.98	87.7	0.0	257.6
45.00		0.00	1.09	17.902	30.25	375.66	0.650	0.000	4.00	18.376	11.94	361.4	0.0	1906.4
48.00	Top - Section 1	0.00	1.11	18.235	30.82	374.17	0.650	0.000	3.00	13.576	8.82	271.9	0.0	1408.1
50.00		0.00	1.13	18.449	31.18	378.33	0.650	0.000	2.00	8.952	5.82	181.4	0.0	432.1
55.00		0.00	1.16	18.959	32.04	375.08	0.650	0.000	5.00	22.038	14.32	459.0	0.0	1063.4
60.00		0.00	1.19	19.436	32.85	371.22	0.650	0.000	5.00	21.547	14.01	460.0	0.0	1039.6
65.00		0.00	1.21	19.885	33.61	366.85	0.650	0.000	5.00	21.057	13.69	460.0	0.0	1015.8
70.00		0.00	1.24	20.311	34.33	362.01	0.650	0.000	5.00	20.566	13.37	458.9	0.0	991.9
75.00		0.00	1.26	20.715	35.01	356.77	0.650	0.000	5.00	20.076	13.05	456.8	0.0	968.1
80.00	Appurtenance(s)	0.00	1.29	21.101	35.66	351.17	0.650	0.000	5.00	19.586	12.73	454.0	0.0	944.3
85.00	Bot - Section 3	0.00	1.31	21.469	36.28	345.25	0.650	0.000	5.00	19.095	12.41	450.3	0.0	920.4
90.00		0.00	1.33	21.823	36.88	339.02	0.650	0.000	5.00	18.865	12.26	452.2	0.0	1655.4
91.00	Top - Section 2	0.00	1.34	21.892	37.00	337.74	0.650	0.000	1.00	3.714	2.41	89.3	0.0	325.8
95.00		0.00	1.35	22.163	37.45	337.37	0.650	0.000	4.00	14.660	9.53	356.9	0.0	589.5
100.00	Appurtenance(s)	0.00	1.37	22.490	38.01	330.65	0.650	0.000	5.00	17.884	11.62	441.8	0.0	719.0
105.00		0.00	1.39	22.806	38.54	323.71	0.650	0.000	5.00	17.394	11.31	435.7	0.0	699.2
110.00	Appurtenance(s)	0.00	1.41	23.111	39.06	316.55	0.650	0.000	5.00	16.903	10.99	429.1	0.0	679.3
115.00		0.00	1.43	23.406	39.56	309.19	0.650	0.000	5.00	16.413	10.67	422.0	0.0	659.4
120.00		0.00	1.45	23.692	40.04	301.63	0.650	0.000	5.00	15.922	10.35	414.4	0.0	639.6
125.00		0.00	1.46	23.970	40.51	293.91	0.650	0.000	5.00	15.432	10.03	406.3	0.0	619.7
130.00	Bot - Section 4	0.00	1.48	24.241	40.97	286.01	0.650	0.000	5.00	14.941	9.71	397.9	0.0	599.9
135.00	Top - Section 3	0.00	1.50	24.503	41.41	277.96	0.650	0.000	5.00	14.659	9.53	394.6	0.0	1051.6
140.00		0.00	1.51	24.759	41.84	273.86	0.650	0.000	5.00	14.169	9.21	385.4	0.0	455.7
145.00		0.00	1.53	25.009	42.26	265.54	0.650	0.000	5.00	13.678	8.89	375.8	0.0	439.8
150.00		0.00	1.54	25.252	42.68	257.09	0.650	0.000	5.00	13.188	8.57	365.8	0.0	423.9
155.00		0.00	1.56	25.490	43.08	248.51	0.650	0.000	5.00	12.697	8.25	355.5	0.0	408.0
160.00		0.00	1.57	25.722	43.47	239.81	0.650	0.000	5.00	12.207	7.93	344.9	0.0	392.1
165.00		0.00	1.58	25.949	43.85	230.99	0.650	0.000	5.00	11.717	7.62	334.0	0.0	376.2
167.00	Appurtenance(s)	0.00	1.59	26.039	44.01	227.43	0.650	0.000	2.00	4.549	2.96	130.1	0.0	146.0
170.00		0.00	1.60	26.172	44.23	222.06	0.650	0.000	3.00	6.677	4.34	192.0	0.0	214.3
175.00		0.00	1.61	26.389	44.60	213.02	0.650	0.000	5.00	10.736	6.98	311.2	0.0	344.5
178.00	Appurtenance(s)	0.00	1.62	26.518	44.81	207.55	0.650	0.000	3.00	6.206	4.03	180.8	0.0	199.0
180.00	Top - Section 4	0.00	1.62	26.602	44.96	203.88	0.650	0.000	2.00	4.039	2.63	118.0	0.0	129.5
185.00		0.00	1.64	26.812	45.31	204.68	0.650	0.000	5.00	10.000	6.50	294.5	0.0	360.2
186.00	Appurtenance(s)	0.00	1.64	26.853	45.38	204.84	0.650	0.000	1.00	2.000	1.30	59.0	0.0	72.0
190.00		0.00	1.65	27.017	45.66	205.46	0.650	0.000	4.00	8.000	5.20	237.4	0.0	288.2
								Totals:	**190.00**			**15,644.2**		**34,653.9**

Discrete Appurtenance Forces

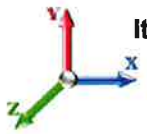
Structure: CT08748-A-SB
Site Name: Woodstock 4, CT
Height: 190.00 (ft)
Base Elev: 0.000 (ft)

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

9/15/2015

TES Tower Engineering Solutions

Load Case: 80 mphWind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 26

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	186.00	Low Profile Platform	1	26.853	45.381	1.00	14.66	1250.00	0.000	0.000	665.29	0.00	0.00
2	186.00	ADC	6	26.915	45.486	0.69	5.76	96.00	0.000	1.500	262.11	0.00	393.16
3	186.00	Ericsson RRUS-11	6	26.915	45.486	0.76	13.37	324.00	0.000	1.500	608.19	0.00	912.29
4	186.00	KMW AM-X-CD-17-65-00T	3	26.915	45.486	0.85	14.62	147.24	0.000	1.500	665.02	0.00	997.53
5	186.00	Raycap DC2-48-60-8-18F	1	26.915	45.486	0.66	1.92	14.50	0.000	1.500	87.49	0.00	131.24
6	186.00	Powerwave 7770.00	6	26.915	45.486	0.84	30.22	319.68	0.000	1.500	1374.45	0.00	2061.67
7	186.00	Powerwave LGP21401	6	26.915	45.486	0.64	4.96	84.60	0.000	1.500	225.67	0.00	338.50
8	186.00	Powerwave LGP21903	6	26.915	45.486	0.74	1.20	33.00	0.000	1.500	54.38	0.00	81.57
9	178.00	Platform w/ Hand Rails	1	26.518	44.815	1.00	32.00	1588.50	0.000	0.000	1434.08	0.00	0.00
10	178.00	Kathrein 782 11056	3	26.518	44.815	0.78	0.40	5.40	0.000	0.000	17.85	0.00	0.00
11	178.00	Ericsson KRY 112 489/2	3	26.518	44.815	0.82	1.60	46.20	0.000	0.000	71.92	0.00	0.00
12	178.00	EMS RR90-17-02DP	6	26.518	44.815	0.87	24.06	239.64	0.000	0.000	1078.29	0.00	0.00
13	178.00	Andrew LNX-6515DS-VTM	3	26.518	44.815	0.92	31.57	238.65	0.000	0.000	1414.70	0.00	0.00
14	167.00	RRH2x60-PCS	3	26.039	44.006	0.82	6.40	165.00	0.000	0.000	281.46	0.00	0.00
15	167.00	RRH2X60-AWS	3	26.039	44.006	0.76	9.03	180.00	0.000	0.000	397.32	0.00	0.00
16	167.00	LNX-6514DS-A1M	6	26.039	44.006	0.83	41.88	232.80	0.000	0.000	1843.03	0.00	0.00
17	167.00	DB-T1-6Z-8AB-0Z	1	26.039	44.006	1.00	5.60	18.90	0.000	0.000	246.43	0.00	0.00
18	167.00	HBXX-6517DS-A2M	6	26.039	44.006	0.77	40.33	244.80	0.000	0.000	1774.86	0.00	0.00
19	167.00	RRH2X60-700	3	26.039	44.006	0.76	9.03	180.00	0.000	0.000	397.32	0.00	0.00
20	167.00	Low Profile Platform	1	26.039	44.006	1.00	14.66	1250.00	0.000	0.000	645.12	0.00	0.00
21	167.00	Rfs Celwave	1	26.039	44.006	1.00	5.60	44.00	0.000	0.000	246.43	0.00	0.00
22	167.00	RFS FD9R6004/2C-3L	6	26.039	44.006	0.61	1.37	18.60	0.000	0.000	60.08	0.00	0.00
23	110.00	Pipe Mounts	2	23.111	39.057	1.00	2.64	80.00	0.000	0.000	103.11	0.00	0.00
24	110.00	Antenex Y1505	2	23.111	39.057	1.00	7.20	10.00	0.000	0.000	281.21	0.00	0.00
25	100.00	Standoffs	2	22.490	38.008	1.00	6.12	120.00	0.000	0.000	232.61	0.00	0.00
26	100.00	Decibel DB212-1	2	23.692	40.040	1.00	13.00	62.00	0.000	20.000	520.52	0.00	10410.48
27	80.00	Telewave ANT450D6-9	2	21.324	36.037	1.00	5.54	36.00	0.000	3.000	199.65	0.00	598.94
28	80.00	Standoffs	2	21.101	35.660	1.00	6.12	120.00	0.000	0.000	218.24	0.00	0.00
						Totals:		**7,149.51**			**15,406.84**		

Total Applied Force Summary

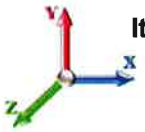
Structure: CT08748-A-SB
Site Name: Woodstock 4, CT
Height: 190.00 (ft)
Base Elev: 0.000 (ft)

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

9/15/2015

Tower Engineering Solutions

Load Case: 80 mphWind with 0" Ice
Déad Load Factor 1.00
Wind Load Factor 1.00



Iterations: 26

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		479.28	1748.98	0.00	0.00
10.00		470.45	1721.17	0.00	0.00
15.00		461.62	1693.36	0.00	0.00
20.00		452.80	1665.55	0.00	0.00
25.00		443.97	1637.74	0.00	0.00
30.00		435.14	1609.93	0.00	0.00
35.00		433.54	1582.12	0.00	0.00
40.00		441.08	1554.32	0.00	0.00
41.00		87.71	307.53	0.00	0.00
45.00		361.37	2105.97	0.00	0.00
48.00		271.94	1557.78	0.00	0.00
50.00		181.43	531.81	0.00	0.00
55.00		458.96	1312.84	0.00	0.00
60.00		460.04	1289.01	0.00	0.00
65.00		459.97	1265.17	0.00	0.00
70.00		458.87	1241.34	0.00	0.00
75.00		456.84	1217.50	0.00	0.00
80.00	(4) appurtenances	871.87	1349.66	0.00	598.94
85.00		450.34	1164.63	0.00	0.00
90.00		452.24	1899.55	0.00	0.00
91.00		89.32	374.67	0.00	0.00
95.00		356.92	784.89	0.00	0.00
100.00	(4) appurtenances	1194.96	1145.24	0.00	10410.48
105.00		435.75	938.17	0.00	0.00
110.00	(4) appurtenances	813.45	1008.31	0.00	0.00
115.00		422.00	893.25	0.00	0.00
120.00		414.40	873.38	0.00	0.00
125.00		406.34	853.52	0.00	0.00
130.00		397.86	833.66	0.00	0.00
135.00		394.58	1285.38	0.00	0.00
140.00		385.37	689.50	0.00	0.00
145.00		375.77	673.61	0.00	0.00
150.00		365.83	657.72	0.00	0.00
155.00		355.54	641.82	0.00	0.00
160.00		344.92	625.93	0.00	0.00
165.00		333.98	610.04	0.00	0.00
167.00	(30) appurtenances	6022.17	2573.67	0.00	0.00
170.00		191.96	310.54	0.00	0.00
175.00		311.21	504.86	0.00	0.00
178.00	(16) appurtenances	4197.62	2413.68	0.00	0.00
180.00		118.04	156.24	0.00	0.00
185.00		294.53	427.03	0.00	0.00
186.00	(35) appurtenances	4001.60	2354.43	0.00	4915.97
190.00		237.42	288.18	0.00	0.00
	Totals:	**31,051.00**	**50,373.67**	**0.00**	**15,925.39**

Resulting Forces and Deflections

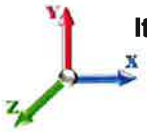
Structure: CT08748-A-SB
Site Name: Woodstock 4, CT
Height: 190.00 (ft)
Base Elev: 0.000 (ft)

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

9/15/2015

Tower Engineering Solutions

Load Case: 80 mphWind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 26

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	-31.107	-50.338	0.000	0.000	0.000	-4169.6	0.000	0.000	0.000	0.000	0.000
5.00	-30.734	-48.522	0.000	0.000	0.000	-4014.1	-0.068	0.000	0.068	-0.126	0.000
10.00	-30.364	-46.734	0.000	0.000	0.000	-3860.4	-0.269	0.000	0.269	-0.255	0.000
15.00	-29.996	-44.974	0.000	0.000	0.000	-3708.6	-0.606	0.000	0.606	-0.385	0.000
20.00	-29.631	-43.243	0.000	0.000	0.000	-3558.6	-1.081	0.000	1.081	-0.518	0.000
25.00	-29.269	-41.540	0.000	0.000	0.000	-3410.4	-1.696	0.000	1.696	-0.653	0.000
30.00	-28.910	-39.866	0.000	0.000	0.000	-3264.1	-2.454	0.000	2.454	-0.791	0.000
35.00	-28.547	-38.221	0.000	0.000	0.000	-3119.6	-3.357	0.000	3.357	-0.930	0.000
40.00	-28.134	-36.633	0.000	0.000	0.000	-2976.8	-4.408	0.000	4.408	-1.072	0.000
41.00	-28.087	-36.291	0.000	0.000	0.000	-2948.7	-4.636	0.000	4.636	-1.102	0.000
45.00	-27.744	-34.143	0.000	0.000	0.000	-2836.3	-5.609	0.000	5.609	-1.218	0.000
48.00	-27.480	-32.556	0.000	0.000	0.000	-2753.1	-6.403	0.000	6.403	-1.307	0.000
50.00	-27.350	-31.974	0.000	0.000	0.000	-2698.2	-6.964	0.000	6.964	-1.367	0.000
55.00	-26.947	-30.595	0.000	0.000	0.000	-2561.4	-8.486	0.000	8.486	-1.534	0.000
60.00	-26.537	-29.241	0.000	0.000	0.000	-2426.7	-10.182	0.000	10.182	-1.702	0.000
65.00	-26.122	-27.912	0.000	0.000	0.000	-2294.0	-12.056	0.000	12.056	-1.873	0.000
70.00	-25.702	-26.610	0.000	0.000	0.000	-2163.4	-14.110	0.000	14.110	-2.046	0.000
75.00	-25.278	-25.332	0.000	0.000	0.000	-2034.9	-16.347	0.000	16.347	-2.221	0.000
80.00	-24.427	-23.943	0.000	0.000	0.000	-1907.9	-18.768	0.000	18.768	-2.398	0.000
85.00	-23.998	-22.724	0.000	0.000	0.000	-1785.8	-21.375	0.000	21.375	-2.577	0.000
90.00	-23.497	-20.803	0.000	0.000	0.000	-1665.8	-24.171	0.000	24.171	-2.758	0.000
91.00	-23.423	-20.395	0.000	0.000	0.000	-1642.3	-24.752	0.000	24.752	-2.796	0.000
95.00	-23.089	-19.557	0.000	0.000	0.000	-1548.6	-27.157	0.000	27.157	-2.943	0.000
100.00	-21.902	-18.397	0.000	0.000	0.000	-1422.7	-30.351	0.000	30.351	-3.153	0.000
105.00	-21.477	-17.407	0.000	0.000	0.000	-1313.2	-33.764	0.000	33.764	-3.362	0.000
110.00	-20.664	-16.374	0.000	0.000	0.000	-1205.8	-37.396	0.000	37.396	-3.572	0.000
115.00	-20.243	-15.435	0.000	0.000	0.000	-1102.5	-41.248	0.000	41.248	-3.782	0.000
120.00	-19.823	-14.520	0.000	0.000	0.000	-1001.3	-45.318	0.000	45.318	-3.991	0.000
125.00	-19.406	-13.628	0.000	0.000	0.000	-902.24	-49.607	0.000	49.607	-4.199	0.000
130.00	-18.992	-12.759	0.000	0.000	0.000	-805.21	-54.112	0.000	54.112	-4.405	0.000
135.00	-18.537	-11.444	0.000	0.000	0.000	-710.25	-58.830	0.000	58.830	-4.606	0.000
140.00	-18.136	-10.722	0.000	0.000	0.000	-617.56	-63.755	0.000	63.755	-4.802	0.000
145.00	-17.742	-10.017	0.000	0.000	0.000	-526.88	-68.899	0.000	68.899	-5.024	0.000
150.00	-17.352	-9.333	0.000	0.000	0.000	-438.17	-74.268	0.000	74.268	-5.233	0.000
155.00	-16.965	-8.674	0.000	0.000	0.000	-351.42	-79.847	0.000	79.847	-5.425	0.000
160.00	-16.584	-8.040	0.000	0.000	0.000	-266.59	-85.614	0.000	85.614	-5.593	0.000
165.00	-16.203	-7.440	0.000	0.000	0.000	-183.67	-91.542	0.000	91.542	-5.732	0.000
167.00	-9.958	-5.475	0.000	0.000	0.000	-151.27	-93.950	0.000	93.950	-5.779	0.000
170.00	-9.742	-5.173	0.000	0.000	0.000	-121.39	-97.595	0.000	97.595	-5.839	0.000
175.00	-9.385	-4.694	0.000	0.000	0.000	-72.691	-103.74	0.000	103.745	-5.916	0.000
178.00	-4.961	-2.726	0.000	0.000	0.000	-44.537	-107.46	0.000	107.467	-5.948	0.000
180.00	-4.829	-2.581	0.000	0.000	0.000	-34.615	-109.95	0.000	109.958	-5.964	0.000
185.00	-4.492	-2.186	0.000	0.000	0.000	-10.472	-116.20	0.000	116.209	-5.988	0.000
186.00	-0.266	-0.262	0.000	0.000	0.000	-1.065	-117.46	0.000	117.461	-5.990	0.000
190.00	-0.237	0.000	0.000	0.000	0.000	0.000	0.000	0.000	122.470	-5.990	0.000

Resulting Stresses

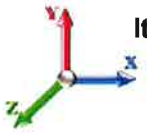
Structure: CT08748-A-SBA
Site Name: Woodstock 4, CT
Height: 190.00 (ft)
Base Elev: 0.000 (ft)

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

9/15/2015

Tower Engineering Solutions

Load Case: 80 mphWind with 0" Ice
Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 26

	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	0.57	0.70	0.00	0.00	0.00	35.52	36.11	52.0	0.695
5.00	0.56	0.71	0.00	0.00	0.00	35.50	36.07	52.0	0.694
10.00	0.55	0.71	0.00	0.00	0.00	35.46	36.02	52.0	0.693
15.00	0.54	0.72	0.00	0.00	0.00	35.40	35.96	52.0	0.692
20.00	0.52	0.72	0.00	0.00	0.00	35.34	35.89	52.0	0.690
25.00	0.51	0.73	0.00	0.00	0.00	35.26	35.79	52.0	0.689
30.00	0.50	0.74	0.00	0.00	0.00	35.16	35.68	52.0	0.686
35.00	0.49	0.74	0.00	0.00	0.00	35.04	35.55	52.0	0.684
40.00	0.48	0.75	0.00	0.00	0.00	34.90	35.40	52.0	0.681
41.00	0.48	0.75	0.00	0.00	0.00	34.87	35.37	52.0	0.680
45.00	0.46	0.75	0.00	0.00	0.00	34.74	35.22	52.0	0.678
48.00	0.51	0.87	0.00	0.00	0.00	39.13	39.67	52.0	0.763
50.00	0.51	0.87	0.00	0.00	0.00	39.04	39.57	52.0	0.761
55.00	0.50	0.88	0.00	0.00	0.00	38.77	39.29	52.0	0.756
60.00	0.48	0.89	0.00	0.00	0.00	38.46	38.97	52.0	0.750
65.00	0.47	0.89	0.00	0.00	0.00	38.11	38.61	52.0	0.743
70.00	0.46	0.90	0.00	0.00	0.00	37.71	38.21	52.0	0.735
75.00	0.45	0.91	0.00	0.00	0.00	37.27	37.76	52.0	0.726
80.00	0.44	0.90	0.00	0.00	0.00	36.76	37.23	52.0	0.716
85.00	0.43	0.91	0.00	0.00	0.00	36.25	36.71	52.0	0.706
90.00	0.40	0.91	0.00	0.00	0.00	35.67	36.10	52.0	0.694
91.00	0.47	1.08	0.00	0.00	0.00	41.27	41.78	52.0	0.804
95.00	0.46	1.09	0.00	0.00	0.00	40.64	41.14	52.0	0.791
100.00	0.44	1.06	0.00	0.00	0.00	39.47	39.95	52.0	0.769
105.00	0.43	1.07	0.00	0.00	0.00	38.57	39.04	52.0	0.751
110.00	0.42	1.06	0.00	0.00	0.00	37.56	38.02	52.0	0.731
115.00	0.40	1.07	0.00	0.00	0.00	36.48	36.93	52.0	0.710
120.00	0.39	1.08	0.00	0.00	0.00	35.26	35.70	52.0	0.687
125.00	0.38	1.09	0.00	0.00	0.00	33.88	34.32	52.0	0.660
130.00	0.37	1.10	0.00	0.00	0.00	32.32	32.74	52.0	0.630
135.00	0.42	1.37	0.00	0.00	0.00	36.86	37.36	52.0	0.719
140.00	0.41	1.39	0.00	0.00	0.00	34.38	34.87	52.0	0.671
145.00	0.39	1.41	0.00	0.00	0.00	31.54	32.02	52.0	0.616
150.00	0.38	1.43	0.00	0.00	0.00	28.28	28.76	52.0	0.553
155.00	0.37	1.45	0.00	0.00	0.00	24.52	25.02	52.0	0.481
160.00	0.36	1.48	0.00	0.00	0.00	20.18	20.70	52.0	0.398
165.00	0.34	1.51	0.00	0.00	0.00	15.14	15.70	52.0	0.302
167.00	0.26	0.94	0.00	0.00	0.00	12.91	13.27	52.0	0.255
170.00	0.25	0.95	0.00	0.00	0.00	10.93	11.30	52.0	0.217
175.00	0.24	0.96	0.00	0.00	0.00	7.18	7.60	52.0	0.146
178.00	0.14	0.52	0.00	0.00	0.00	4.66	4.89	52.0	0.094
180.00	0.14	0.52	0.00	0.00	0.00	3.77	4.01	52.0	0.077
180.00	0.14	0.52	0.00	0.00	0.00	3.77	4.01	52.0	0.069
185.00	0.10	0.43	0.00	0.00	0.00	1.02	1.34	40.0	0.034
186.00	0.01	0.03	0.00	0.00	0.00	0.10	0.12	40.0	0.003
190.00	0.00	0.02	0.00	0.00	0.00	0.00	0.04	40.0	0.001

Wind Loading - Shaft

Structure: CT08748-A-SBA
Site Name: Woodstock 4, CT
Height: 190.00 (ft)
Base Elev: 0.000 (ft)

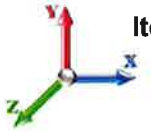
Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

9/15/2015

Tower Engineering Solutions

Load Case: 69.28 mph Wind with 0.5" Ice

Dead Load Factor 1.00
Wind Load Factor 1.00



Iterations: 26

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	12.287	20.77	372.38	0.650	0.500	0.00	0.000	0.00	0.0	0.0	0.0
5.00		0.00	1.00	12.287	20.77	365.58	0.650	0.500	5.00	27.046	17.58	365.1	196.9	1696.5
10.00		0.00	1.00	12.287	20.77	358.79	0.650	0.500	5.00	26.556	17.26	358.4	193.3	1665.1
15.00		0.00	1.00	12.287	20.77	351.99	0.650	0.500	5.00	26.066	16.94	351.8	189.7	1633.6
20.00		0.00	1.00	12.287	20.77	345.20	0.650	0.500	5.00	25.575	16.62	345.2	186.0	1602.2
25.00		0.00	1.00	12.287	20.77	338.40	0.650	0.500	5.00	25.085	16.31	338.6	182.4	1570.8
30.00		0.00	1.00	12.287	20.77	331.61	0.650	0.500	5.00	24.594	15.99	332.0	178.8	1539.3
35.00		0.00	1.02	12.496	21.12	327.55	0.650	0.500	5.00	24.104	15.67	330.9	175.1	1507.9
40.00		0.00	1.06	12.982	21.94	326.88	0.650	0.500	5.00	23.613	15.35	336.7	171.5	1476.4
41.00	Bot - Section 2	0.00	1.06	13.073	22.09	326.63	0.650	0.500	1.00	4.664	3.03	67.0	34.2	291.8
45.00		0.00	1.09	13.426	22.69	325.32	0.650	0.500	4.00	18.709	12.16	275.9	136.2	2042.6
48.00	Top - Section 1	0.00	1.11	13.676	23.11	324.03	0.650	0.500	3.00	13.826	8.99	207.7	100.8	1509.0
50.00		0.00	1.13	13.836	23.38	327.64	0.650	0.500	2.00	9.119	5.93	138.6	66.6	498.7
55.00		0.00	1.16	14.218	24.03	324.82	0.650	0.500	5.00	22.454	14.60	350.7	162.9	1226.4
60.00		0.00	1.19	14.576	24.63	321.48	0.650	0.500	5.00	21.964	14.28	351.7	159.3	1198.9
65.00		0.00	1.21	14.913	25.20	317.69	0.650	0.500	5.00	21.474	13.96	351.8	155.7	1171.4
70.00		0.00	1.24	15.232	25.74	313.50	0.650	0.500	5.00	20.983	13.64	351.1	152.0	1144.0
75.00		0.00	1.26	15.536	26.26	308.97	0.650	0.500	5.00	20.493	13.32	349.7	148.4	1116.5
80.00	Appurtenance(s)	0.00	1.29	15.825	26.74	304.12	0.650	0.500	5.00	20.002	13.00	347.7	144.8	1089.0
85.00	Bot - Section 3	0.00	1.31	16.101	27.21	298.98	0.650	0.500	5.00	19.512	12.68	345.1	141.1	1061.6
90.00		0.00	1.33	16.366	27.66	293.59	0.650	0.500	5.00	19.282	12.53	346.7	139.4	1794.8
91.00	Top - Section 2	0.00	1.34	16.418	27.75	292.48	0.650	0.500	1.00	3.797	2.47	68.5	27.7	353.6
95.00		0.00	1.35	16.621	28.09	292.16	0.650	0.500	4.00	14.994	9.75	273.8	108.6	698.2
100.00	Appurtenance(s)	0.00	1.37	16.866	28.50	286.35	0.650	0.500	5.00	18.301	11.90	339.1	132.2	851.2
105.00		0.00	1.39	17.103	28.90	280.33	0.650	0.500	5.00	17.810	11.58	334.6	128.5	827.7
110.00	Appurtenance(s)	0.00	1.41	17.332	29.29	274.13	0.650	0.500	5.00	17.320	11.26	329.8	124.9	804.2
115.00		0.00	1.43	17.554	29.67	267.75	0.650	0.500	5.00	16.829	10.94	324.5	121.3	780.7
120.00		0.00	1.45	17.768	30.03	261.22	0.650	0.500	5.00	16.339	10.62	318.9	117.6	757.2
125.00		0.00	1.46	17.977	30.38	254.52	0.650	0.500	5.00	15.849	10.30	313.0	114.0	733.7
130.00	Bot - Section 4	0.00	1.48	18.179	30.72	247.69	0.650	0.500	5.00	15.358	9.98	306.7	110.4	710.2
135.00	Top - Section 3	0.00	1.50	18.376	31.06	240.72	0.650	0.500	5.00	15.076	9.80	304.3	108.3	1159.9
140.00		0.00	1.51	18.568	31.38	237.16	0.650	0.500	5.00	14.586	9.48	297.5	104.7	560.4
145.00		0.00	1.53	18.755	31.70	229.96	0.650	0.500	5.00	14.095	9.16	290.4	101.0	540.8
150.00		0.00	1.54	18.938	32.01	222.64	0.650	0.500	5.00	13.605	8.84	283.0	97.4	521.3
155.00		0.00	1.56	19.116	32.31	215.21	0.650	0.500	5.00	13.114	8.52	275.4	93.8	501.8
160.00		0.00	1.57	19.290	32.60	207.67	0.650	0.500	5.00	12.624	8.21	267.5	90.1	482.3
165.00		0.00	1.58	19.461	32.89	200.03	0.650	0.500	5.00	12.133	7.89	259.4	86.5	462.7
167.00	Appurtenance(s)	0.00	1.59	19.528	33.00	196.95	0.650	0.500	2.00	4.716	3.07	101.2	34.0	180.1
170.00		0.00	1.60	19.628	33.17	192.30	0.650	0.500	3.00	6.927	4.50	149.3	49.7	264.0
175.00		0.00	1.61	19.791	33.45	184.47	0.650	0.500	5.00	11.152	7.25	242.5	79.2	423.7
178.00	Appurtenance(s)	0.00	1.62	19.887	33.61	179.74	0.650	0.500	3.00	6.456	4.20	141.0	46.2	245.3
180.00	Top - Section 4	0.00	1.62	19.951	33.72	176.56	0.650	0.500	2.00	4.206	2.73	92.2	30.2	159.8
185.00		0.00	1.64	20.107	33.98	177.25	0.650	0.500	5.00	10.417	6.77	230.1	75.6	435.8
186.00	Appurtenance(s)	0.00	1.64	20.138	34.03	177.39	0.650	0.500	1.00	2.083	1.35	46.1	15.1	87.2
190.00		0.00	1.65	20.261	34.24	177.93	0.650	0.500	4.00	8.333	5.42	185.5	60.5	348.7
								Totals:	**190.00**			**12,016.5**		**39,726.8**

Discrete Appurtenance Forces

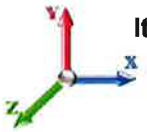
Structure:	CT08748-A-SB	**Code:**	EIA/TIA-222-F	9/15/2015	
Site Name:	Woodstock 4, CT	**Exposure:**	C		
Height:	190.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 14	

Tower Engineering Solutions

Load Case: 69.28 mph Wind with 0.5" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 26

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	186.00	Low Profile Platform	1	20.138	34.034	1.00	18.87	1481.33	0.000	0.000	642.22	0.00	0.00
2	186.00	ADC	6	20.185	34.112	0.70	6.49	132.84	0.000	1.500	221.27	0.00	331.90
3	186.00	Ericsson RRUS-11	6	20.185	34.112	0.77	15.14	415.86	0.000	1.500	516.48	0.00	774.72
4	186.00	KMW AM-X-CD-17-65-00T	3	20.185	34.112	0.88	16.11	260.31	0.000	1.500	549.54	0.00	824.30
5	186.00	Raycap DC2-48-60-8-18F	1	20.185	34.112	0.67	2.09	27.74	0.000	1.500	71.29	0.00	106.94
6	186.00	Powerwave 7770.00	6	20.185	34.112	0.87	33.14	551.88	0.000	1.500	1130.37	0.00	1695.55
7	186.00	Powerwave LGP21401	6	20.185	34.112	0.67	5.67	119.82	0.000	1.500	193.27	0.00	289.91
8	186.00	Powerwave LGP21903	6	20.185	34.112	0.77	1.52	41.64	0.000	1.500	52.01	0.00	78.01
9	178.00	Platform w/ Hand Rails	1	19.887	33.609	1.00	10.80	2029.18	0.000	0.000	362.98	0.00	0.00
10	178.00	Kathrein 782 11056	3	19.887	33.609	0.83	0.57	8.49	0.000	0.000	19.22	0.00	0.00
11	178.00	Ericsson KRY 112 489/2	3	19.887	33.609	0.84	1.89	57.78	0.000	0.000	63.67	0.00	0.00
12	178.00	EMS RR90-17-02DP	6	19.887	33.609	0.91	27.64	428.46	0.000	0.000	928.92	0.00	0.00
13	178.00	Andrew LNX-6515DS-VTM	3	19.887	33.609	0.95	34.15	466.23	0.000	0.000	1147.78	0.00	0.00
14	167.00	RRH2x60-PCS	3	19.528	33.002	0.82	7.13	184.20	0.000	0.000	235.44	0.00	0.00
15	167.00	RRH2X60-AWS	3	19.528	33.002	0.76	9.64	240.30	0.000	0.000	318.29	0.00	0.00
16	167.00	LNX-6514DS-A1M	6	19.528	33.002	0.83	46.02	535.80	0.000	0.000	1518.60	0.00	0.00
17	167.00	DB-T1-6Z-8AB-0Z	1	19.528	33.002	1.00	5.87	46.00	0.000	0.000	193.72	0.00	0.00
18	167.00	HBXX-6517DS-A2M	6	19.528	33.002	0.77	44.31	547.20	0.000	0.000	1462.19	0.00	0.00
19	167.00	RRH2X60-700	3	19.528	33.002	0.76	9.64	240.30	0.000	0.000	318.29	0.00	0.00
20	167.00	Low Profile Platform	1	19.528	33.002	1.00	18.87	1481.33	0.000	0.000	622.75	0.00	0.00
21	167.00	Rfs Celwave	1	19.528	33.002	1.00	6.00	61.40	0.000	0.000	198.01	0.00	0.00
22	167.00	RFS FD9R6004/2C-3L	6	19.528	33.002	0.66	1.73	28.50	0.000	0.000	57.07	0.00	0.00
23	110.00	Pipe Mounts	2	17.332	29.291	1.00	3.16	120.00	0.000	0.000	92.56	0.00	0.00
24	110.00	Antenex Y1505	2	17.332	29.291	1.00	9.98	71.40	0.000	0.000	292.33	0.00	0.00
25	100.00	Standoffs	2	16.866	28.504	1.00	11.04	140.00	0.000	0.000	314.69	0.00	0.00
26	100.00	Decibel DB212-1	2	17.768	30.028	1.00	33.14	203.20	0.000	20.000	995.14	0.00	19902.86
27	80.00	Telewave ANT450D6-9	2	15.992	27.026	1.00	7.26	83.20	0.000	3.000	196.21	0.00	588.64
28	80.00	Standoffs	2	15.825	26.744	1.00	11.04	140.00	0.000	0.000	295.25	0.00	0.00
						Totals:		**10,144.39**			**13,009.56**		

Total Applied Force Summary

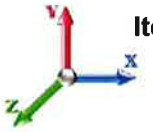
Structure:	CT08748-A-SB	**Code:**	EIA/TIA-222-F	9/15/2015	
Site Name:	Woodstock 4, CT	**Exposure:**	C		
Height:	190.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 15	

TES Tower Engineering Solutions

Load Case: 69.28 mph Wind with 0.5" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 26

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		365.06	1945.92	0.00	0.00
10.00		358.44	1914.48	0.00	0.00
15.00		351.82	1883.03	0.00	0.00
20.00		345.20	1851.59	0.00	0.00
25.00		338.58	1820.15	0.00	0.00
30.00		331.96	1788.71	0.00	0.00
35.00		330.86	1757.27	0.00	0.00
40.00		336.73	1725.83	0.00	0.00
41.00		66.98	341.68	0.00	0.00
45.00		275.93	2242.12	0.00	0.00
48.00		207.70	1658.59	0.00	0.00
50.00		138.60	598.44	0.00	0.00
55.00		350.71	1475.78	0.00	0.00
60.00		351.68	1448.31	0.00	0.00
65.00		351.78	1420.84	0.00	0.00
70.00		351.10	1393.37	0.00	0.00
75.00		349.72	1365.90	0.00	0.00
80.00	(4) appurtenances	839.17	1561.64	0.00	588.64
85.00		345.11	1305.77	0.00	0.00
90.00		346.65	2038.99	0.00	0.00
91.00		68.49	402.41	0.00	0.00
95.00		273.76	893.53	0.00	0.00
100.00	(4) appurtenances	1648.90	1438.61	0.00	19902.86
105.00		334.62	1066.71	0.00	0.00
110.00	(4) appurtenances	714.64	1234.62	0.00	0.00
115.00		324.52	1014.52	0.00	0.00
120.00		318.91	991.02	0.00	0.00
125.00		312.97	967.53	0.00	0.00
130.00		306.70	944.03	0.00	0.00
135.00		304.33	1393.67	0.00	0.00
140.00		297.51	794.15	0.00	0.00
145.00		290.40	774.63	0.00	0.00
150.00		283.02	755.11	0.00	0.00
155.00		275.39	735.59	0.00	0.00
160.00		267.50	716.06	0.00	0.00
165.00		259.38	696.54	0.00	0.00
167.00	(30) appurtenances	5025.52	3638.62	0.00	0.00
170.00		149.35	360.26	0.00	0.00
175.00		242.45	584.09	0.00	0.00
178.00	(16) appurtenances	2663.61	3331.66	0.00	0.00
180.00		92.18	186.48	0.00	0.00
185.00		230.08	502.63	0.00	0.00
186.00	(35) appurtenances	3422.53	3131.95	0.00	4101.34
190.00		185.48	348.66	0.00	0.00
	Totals:	**25,026.03**	**58,441.51**	**0.00**	**24,592.84**

Resulting Forces and Deflections

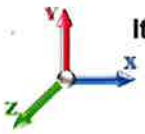
Structure:	CT08748-A-SB	**Code:**	EIA/TIA-222-F	9/15/2015	
Site Name:	Woodstock 4, CT	**Exposure:**	C		
Height:	190.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 16	

Tower Engineering Solutions

Load Case: 69.28 mph Wind with 0.5" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 26

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	-25.079	-58.418	0.000	0.000	0.000	-3384.9	0.000	0.000	0.000	0.000	0.000
5.00	-24.814	-56.428	0.000	0.000	0.000	-3259.5	-0.055	0.000	0.055	-0.102	0.000
10.00	-24.551	-54.470	0.000	0.000	0.000	-3135.4	-0.219	0.000	0.219	-0.207	0.000
15.00	-24.288	-52.543	0.000	0.000	0.000	-3012.7	-0.492	0.000	0.492	-0.313	0.000
20.00	-24.028	-50.648	0.000	0.000	0.000	-2891.2	-0.878	0.000	0.878	-0.421	0.000
25.00	-23.768	-48.785	0.000	0.000	0.000	-2771.1	-1.377	0.000	1.377	-0.531	0.000
30.00	-23.510	-46.954	0.000	0.000	0.000	-2652.3	-1.993	0.000	1.993	-0.642	0.000
35.00	-23.248	-45.154	0.000	0.000	0.000	-2534.7	-2.727	0.000	2.727	-0.756	0.000
40.00	-22.940	-43.406	0.000	0.000	0.000	-2418.5	-3.580	0.000	3.580	-0.871	0.000
41.00	-22.912	-43.041	0.000	0.000	0.000	-2395.5	-3.765	0.000	3.765	-0.895	0.000
45.00	-22.659	-40.771	0.000	0.000	0.000	-2303.9	-4.556	0.000	4.556	-0.990	0.000
48.00	-22.462	-39.093	0.000	0.000	0.000	-2235.9	-5.201	0.000	5.201	-1.062	0.000
50.00	-22.375	-38.461	0.000	0.000	0.000	-2191.0	-5.657	0.000	5.657	-1.111	0.000
55.00	-22.081	-36.940	0.000	0.000	0.000	-2079.1	-6.893	0.000	6.893	-1.246	0.000
60.00	-21.782	-35.448	0.000	0.000	0.000	-1968.7	-8.271	0.000	8.271	-1.382	0.000
65.00	-21.477	-33.985	0.000	0.000	0.000	-1859.8	-9.793	0.000	9.793	-1.521	0.000
70.00	-21.167	-32.550	0.000	0.000	0.000	-1752.4	-11.461	0.000	11.461	-1.661	0.000
75.00	-20.854	-31.143	0.000	0.000	0.000	-1646.6	-13.277	0.000	13.277	-1.803	0.000
80.00	-20.038	-29.560	0.000	0.000	0.000	-1541.8	-15.242	0.000	15.242	-1.946	0.000
85.00	-19.719	-28.217	0.000	0.000	0.000	-1441.6	-17.358	0.000	17.358	-2.091	0.000
90.00	-19.335	-26.163	0.000	0.000	0.000	-1343.0	-19.626	0.000	19.626	-2.237	0.000
91.00	-19.285	-25.738	0.000	0.000	0.000	-1323.6	-20.098	0.000	20.098	-2.267	0.000
95.00	-19.038	-24.809	0.000	0.000	0.000	-1246.5	-22.048	0.000	22.048	-2.386	0.000
100.00	-17.397	-23.392	0.000	0.000	0.000	-1131.4	-24.637	0.000	24.637	-2.554	0.000
105.00	-17.078	-22.292	0.000	0.000	0.000	-1044.4	-27.401	0.000	27.401	-2.721	0.000
110.00	-16.365	-21.046	0.000	0.000	0.000	-959.08	-30.339	0.000	30.339	-2.888	0.000
115.00	-16.047	-20.003	0.000	0.000	0.000	-877.25	-33.452	0.000	33.452	-3.055	0.000
120.00	-15.730	-18.986	0.000	0.000	0.000	-797.02	-36.740	0.000	36.740	-3.221	0.000
125.00	-15.413	-17.994	0.000	0.000	0.000	-718.37	-40.201	0.000	40.201	-3.387	0.000
130.00	-15.098	-17.027	0.000	0.000	0.000	-641.31	-43.835	0.000	43.835	-3.551	0.000
135.00	-14.749	-15.615	0.000	0.000	0.000	-565.82	-47.638	0.000	47.638	-3.711	0.000
140.00	-14.443	-14.800	0.000	0.000	0.000	-492.07	-51.606	0.000	51.606	-3.867	0.000
145.00	-14.142	-14.005	0.000	0.000	0.000	-419.86	-55.750	0.000	55.750	-4.044	0.000
150.00	-13.842	-13.234	0.000	0.000	0.000	-349.15	-60.073	0.000	60.073	-4.211	0.000
155.00	-13.544	-12.487	0.000	0.000	0.000	-279.94	-64.563	0.000	64.563	-4.363	0.000
160.00	-13.247	-11.765	0.000	0.000	0.000	-212.22	-69.204	0.000	69.204	-4.497	0.000
165.00	-12.947	-11.076	0.000	0.000	0.000	-145.99	-73.972	0.000	73.972	-4.608	0.000
167.00	-7.650	-7.849	0.000	0.000	0.000	-120.09	-75.909	0.000	75.909	-4.645	0.000
170.00	-7.479	-7.494	0.000	0.000	0.000	-97.147	-78.841	0.000	78.841	-4.693	0.000
175.00	-7.195	-6.927	0.000	0.000	0.000	-59.750	-83.786	0.000	83.786	-4.755	0.000
178.00	-4.265	-3.827	0.000	0.000	0.000	-38.166	-86.781	0.000	86.781	-4.782	0.000
180.00	-4.158	-3.647	0.000	0.000	0.000	-29.637	-88.785	0.000	88.785	-4.796	0.000
185.00	-3.888	-3.165	0.000	0.000	0.000	-8.845	-93.815	0.000	93.815	-4.816	0.000
186.00	-0.214	-0.332	0.000	0.000	0.000	-0.856	-94.823	0.000	94.823	-4.818	0.000
190.00	-0.185	0.000	0.000	0.000	0.000	0.000	0.000	0.000	98.854	-4.818	0.000

Resulting Stresses

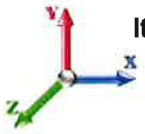
Structure:	CT08748-A-SBA	**Code:**	EIA/TIA-222-F	9/15/2015	
Site Name:	Woodstock 4, CT	**Exposure:**	C		
Height:	190.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 17	

Tower Engineering Solutions

Load Case: 69.28 mph Wind with 0.5" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 26

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	0.66	0.57	0.00	0.00	0.00	28.84	29.51	52.0	0.568
5.00	0.65	0.57	0.00	0.00	0.00	28.82	29.49	52.0	0.567
10.00	0.64	0.58	0.00	0.00	0.00	28.80	29.45	52.0	0.567
15.00	0.63	0.58	0.00	0.00	0.00	28.76	29.40	52.0	0.566
20.00	0.61	0.59	0.00	0.00	0.00	28.71	29.34	52.0	0.565
25.00	0.60	0.59	0.00	0.00	0.00	28.65	29.27	52.0	0.563
30.00	0.59	0.60	0.00	0.00	0.00	28.57	29.18	52.0	0.561
35.00	0.58	0.60	0.00	0.00	0.00	28.47	29.07	52.0	0.559
40.00	0.57	0.61	0.00	0.00	0.00	28.35	28.94	52.0	0.557
41.00	0.57	0.61	0.00	0.00	0.00	28.33	28.92	52.0	0.556
45.00	0.55	0.62	0.00	0.00	0.00	28.22	28.78	52.0	0.554
48.00	0.61	0.71	0.00	0.00	0.00	31.78	32.42	52.0	0.624
50.00	0.61	0.71	0.00	0.00	0.00	31.70	32.33	52.0	0.622
55.00	0.60	0.72	0.00	0.00	0.00	31.47	32.09	52.0	0.617
60.00	0.59	0.73	0.00	0.00	0.00	31.20	31.81	52.0	0.612
65.00	0.58	0.73	0.00	0.00	0.00	30.90	31.50	52.0	0.606
70.00	0.57	0.74	0.00	0.00	0.00	30.55	31.14	52.0	0.599
75.00	0.55	0.75	0.00	0.00	0.00	30.16	30.74	52.0	0.591
80.00	0.54	0.74	0.00	0.00	0.00	29.71	30.27	52.0	0.582
85.00	0.53	0.74	0.00	0.00	0.00	29.26	29.82	52.0	0.574
90.00	0.50	0.75	0.00	0.00	0.00	28.75	29.29	52.0	0.563
91.00	0.59	0.89	0.00	0.00	0.00	33.27	33.89	52.0	0.652
95.00	0.58	0.90	0.00	0.00	0.00	32.71	33.33	52.0	0.641
100.00	0.56	0.84	0.00	0.00	0.00	31.39	31.98	52.0	0.615
105.00	0.55	0.85	0.00	0.00	0.00	30.67	31.26	52.0	0.601
110.00	0.53	0.84	0.00	0.00	0.00	29.87	30.44	52.0	0.586
115.00	0.52	0.85	0.00	0.00	0.00	29.02	29.58	52.0	0.569
120.00	0.51	0.86	0.00	0.00	0.00	28.07	28.62	52.0	0.551
125.00	0.50	0.87	0.00	0.00	0.00	26.98	27.52	52.0	0.529
130.00	0.49	0.88	0.00	0.00	0.00	25.74	26.28	52.0	0.506
135.00	0.57	1.09	0.00	0.00	0.00	29.37	30.00	52.0	0.577
140.00	0.56	1.11	0.00	0.00	0.00	27.39	28.02	52.0	0.539
145.00	0.55	1.12	0.00	0.00	0.00	25.13	25.76	52.0	0.495
150.00	0.54	1.14	0.00	0.00	0.00	22.53	23.16	52.0	0.445
155.00	0.53	1.16	0.00	0.00	0.00	19.54	20.17	52.0	0.388
160.00	0.52	1.18	0.00	0.00	0.00	16.07	16.71	52.0	0.322
165.00	0.51	1.21	0.00	0.00	0.00	12.03	12.71	52.0	0.245
167.00	0.37	0.72	0.00	0.00	0.00	10.25	10.69	52.0	0.206
170.00	0.36	0.73	0.00	0.00	0.00	8.75	9.20	52.0	0.177
175.00	0.35	0.73	0.00	0.00	0.00	5.90	6.38	52.0	0.123
178.00	0.20	0.45	0.00	0.00	0.00	3.99	4.26	52.0	0.082
180.00	0.19	0.44	0.00	0.00	0.00	3.23	3.51	52.0	0.067
180.00	0.19	0.44	0.00	0.00	0.00	3.23	3.51	52.0	0.060
185.00	0.15	0.37	0.00	0.00	0.00	0.86	1.20	40.0	0.030
186.00	0.02	0.02	0.00	0.00	0.00	0.08	0.10	40.0	0.003
190.00	0.00	0.02	0.00	0.00	0.00	0.00	0.03	40.0	0.001

Wind Loading - Shaft

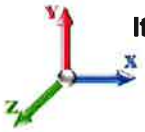
Structure: CT08748-A-SBA
Site Name: Woodstock 4, CT
Height: 190.00 (ft)
Base Elev: 0.000 (ft)

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

9/15/2015

TES Tower Engineering Solutions

Load Case: 50 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	6.400	10.82	268.75	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	263.85	0.650	0.000	5.00	26.630	17.31	187.2	0.0	1499.6
10.00		0.00	1.00	6.400	10.82	258.94	0.650	0.000	5.00	26.139	16.99	183.8	0.0	1471.8
15.00		0.00	1.00	6.400	10.82	254.04	0.650	0.000	5.00	25.649	16.67	180.3	0.0	1444.0
20.00		0.00	1.00	6.400	10.82	249.13	0.650	0.000	5.00	25.158	16.35	176.9	0.0	1416.2
25.00		0.00	1.00	6.400	10.82	244.23	0.650	0.000	5.00	24.668	16.03	173.4	0.0	1388.3
30.00		0.00	1.00	6.400	10.82	239.32	0.650	0.000	5.00	24.178	15.72	170.0	0.0	1360.5
35.00		0.00	1.02	6.509	11.00	236.40	0.650	0.000	5.00	23.687	15.40	169.4	0.0	1332.7
40.00		0.00	1.06	6.762	11.43	235.91	0.650	0.000	5.00	23.197	15.08	172.3	0.0	1304.9
41.00	Bot - Section 2	0.00	1.06	6.809	11.51	235.73	0.650	0.000	1.00	4.580	2.98	34.3	0.0	257.6
45.00		0.00	1.09	6.993	11.82	234.79	0.650	0.000	4.00	18.376	11.94	141.2	0.0	1906.4
48.00	Top - Section 1	0.00	1.11	7.123	12.04	233.86	0.650	0.000	3.00	13.576	8.82	106.2	0.0	1408.1
50.00		0.00	1.13	7.207	12.18	236.46	0.650	0.000	2.00	8.952	5.82	70.9	0.0	432.1
55.00		0.00	1.16	7.406	12.52	234.42	0.650	0.000	5.00	22.038	14.32	179.3	0.0	1063.4
60.00		0.00	1.19	7.592	12.83	232.01	0.650	0.000	5.00	21.547	14.01	179.7	0.0	1039.6
65.00		0.00	1.21	7.768	13.13	229.28	0.650	0.000	5.00	21.057	13.69	179.7	0.0	1015.8
70.00		0.00	1.24	7.934	13.41	226.26	0.650	0.000	5.00	20.566	13.37	179.2	0.0	991.9
75.00		0.00	1.26	8.092	13.68	222.98	0.650	0.000	5.00	20.076	13.05	178.5	0.0	968.1
80.00	Appurtenance(s)	0.00	1.29	8.242	13.93	219.48	0.650	0.000	5.00	19.586	12.73	177.3	0.0	944.3
85.00	Bot - Section 3	0.00	1.31	8.387	14.17	215.78	0.650	0.000	5.00	19.095	12.41	175.9	0.0	920.4
90.00		0.00	1.33	8.525	14.41	211.89	0.650	0.000	5.00	18.865	12.26	176.7	0.0	1655.4
91.00	Top - Section 2	0.00	1.34	8.552	14.45	211.09	0.650	0.000	1.00	3.714	2.41	34.9	0.0	325.8
95.00		0.00	1.35	8.657	14.63	210.85	0.650	0.000	4.00	14.660	9.53	139.4	0.0	589.5
100.00	Appurtenance(s)	0.00	1.37	8.785	14.85	206.66	0.650	0.000	5.00	17.884	11.62	172.6	0.0	719.0
105.00		0.00	1.39	8.908	15.06	202.32	0.650	0.000	5.00	17.394	11.31	170.2	0.0	699.2
110.00	Appurtenance(s)	0.00	1.41	9.028	15.26	197.84	0.650	0.000	5.00	16.903	10.99	167.6	0.0	679.3
115.00		0.00	1.43	9.143	15.45	193.24	0.650	0.000	5.00	16.413	10.67	164.8	0.0	659.4
120.00		0.00	1.45	9.255	15.64	188.52	0.650	0.000	5.00	15.922	10.35	161.9	0.0	639.6
125.00		0.00	1.46	9.363	15.82	183.69	0.650	0.000	5.00	15.432	10.03	158.7	0.0	619.7
130.00	Bot - Section 4	0.00	1.48	9.469	16.00	178.76	0.650	0.000	5.00	14.941	9.71	155.4	0.0	599.9
135.00	Top - Section 3	0.00	1.50	9.572	16.18	173.73	0.650	0.000	5.00	14.659	9.53	154.1	0.0	1051.6
140.00		0.00	1.51	9.672	16.35	171.16	0.650	0.000	5.00	14.169	9.21	150.5	0.0	455.7
145.00		0.00	1.53	9.769	16.51	165.96	0.650	0.000	5.00	13.678	8.89	146.8	0.0	439.8
150.00		0.00	1.54	9.864	16.67	160.68	0.650	0.000	5.00	13.188	8.57	142.9	0.0	423.9
155.00		0.00	1.56	9.957	16.83	155.32	0.650	0.000	5.00	12.697	8.25	138.9	0.0	408.0
160.00		0.00	1.57	10.048	16.98	149.88	0.650	0.000	5.00	12.207	7.93	134.7	0.0	392.1
165.00		0.00	1.58	10.136	17.13	144.37	0.650	0.000	5.00	11.717	7.62	130.5	0.0	376.2
167.00	Appurtenance(s)	0.00	1.59	10.171	17.19	142.14	0.650	0.000	2.00	4.549	2.96	50.8	0.0	146.0
170.00		0.00	1.60	10.223	17.28	138.79	0.650	0.000	3.00	6.677	4.34	75.0	0.0	214.3
175.00		0.00	1.61	10.308	17.42	133.14	0.650	0.000	5.00	10.736	6.98	121.6	0.0	344.5
178.00	Appurtenance(s)	0.00	1.62	10.358	17.51	129.72	0.650	0.000	3.00	6.206	4.03	70.6	0.0	199.0
180.00	Top - Section 4	0.00	1.62	10.392	17.56	127.42	0.650	0.000	2.00	4.039	2.63	46.1	0.0	129.5
185.00		0.00	1.64	10.473	17.70	127.92	0.650	0.000	5.00	10.000	6.50	115.0	0.0	360.2
186.00	Appurtenance(s)	0.00	1.64	10.489	17.73	128.02	0.650	0.000	1.00	2.000	1.30	23.0	0.0	72.0
190.00		0.00	1.65	10.553	17.84	128.41	0.650	0.000	4.00	8.000	5.20	92.7	0.0	288.2
								Totals:	**190.00**			**6,111.0**		**34,653.9**

Discrete Appurtenance Forces

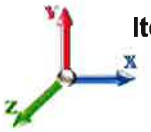
Structure:	CT08748-A-SB	**Code:**	EIA/TIA-222-F	9/15/2015	
Site Name:	Woodstock 4, CT	**Exposure:**	C		
Height:	190.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 19	

TES Tower Engineering Solutions

Load Case: 50 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 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	186.00	Low Profile Platform	1	10.489	17.727	1.00	14.66	1250.00	0.000	0.000	259.88	0.00	0.00
2	186.00	ADC	6	10.514	17.768	0.69	5.76	96.00	0.000	1.500	102.39	0.00	153.58
3	186.00	Ericsson RRUS-11	6	10.514	17.768	0.76	13.37	324.00	0.000	1.500	237.58	0.00	356.36
4	186.00	KMW AM-X-CD-17-65-00T	3	10.514	17.768	0.85	14.62	147.24	0.000	1.500	259.77	0.00	389.66
5	186.00	Raycap DC2-48-60-8-18F	1	10.514	17.768	0.66	1.92	14.50	0.000	1.500	34.18	0.00	51.26
6	186.00	Powerwave 7770.00	6	10.514	17.768	0.84	30.22	319.68	0.000	1.500	536.89	0.00	805.34
7	186.00	Powerwave LGP21401	6	10.514	17.768	0.64	4.96	84.60	0.000	1.500	88.15	0.00	132.23
8	186.00	Powerwave LGP21903	6	10.514	17.768	0.74	1.20	33.00	0.000	1.500	21.24	0.00	31.86
9	178.00	Platform w/ Hand Rails	1	10.358	17.506	1.00	32.00	1588.50	0.000	0.000	560.19	0.00	0.00
10	178.00	Kathrein 782 11056	3	10.358	17.506	0.78	0.40	5.40	0.000	0.000	6.97	0.00	0.00
11	178.00	Ericsson KRY 112 489/2	3	10.358	17.506	0.82	1.60	46.20	0.000	0.000	28.09	0.00	0.00
12	178.00	EMS RR90-17-02DP	6	10.358	17.506	0.87	24.06	239.64	0.000	0.000	421.21	0.00	0.00
13	178.00	Andrew LNX-6515DS-VTM	3	10.358	17.506	0.92	31.57	238.65	0.000	0.000	552.62	0.00	0.00
14	167.00	RRH2x60-PCS	3	10.171	17.190	0.82	6.40	165.00	0.000	0.000	109.95	0.00	0.00
15	167.00	RRH2X60-AWS	3	10.171	17.190	0.76	9.03	180.00	0.000	0.000	155.20	0.00	0.00
16	167.00	LNX-6514DS-A1M	6	10.171	17.190	0.83	41.88	232.80	0.000	0.000	719.93	0.00	0.00
17	167.00	DB-T1-6Z-8AB-0Z	1	10.171	17.190	1.00	5.60	18.90	0.000	0.000	96.26	0.00	0.00
18	167.00	HBXX-6517DS-A2M	6	10.171	17.190	0.77	40.33	244.80	0.000	0.000	693.30	0.00	0.00
19	167.00	RRH2X60-700	3	10.171	17.190	0.76	9.03	180.00	0.000	0.000	155.20	0.00	0.00
20	167.00	Low Profile Platform	1	10.171	17.190	1.00	14.66	1250.00	0.000	0.000	252.00	0.00	0.00
21	167.00	Rfs Celwave	1	10.171	17.190	1.00	5.60	44.00	0.000	0.000	96.26	0.00	0.00
22	167.00	RFS FD9R6004/2C-3L	6	10.171	17.190	0.61	1.37	18.60	0.000	0.000	23.47	0.00	0.00
23	110.00	Pipe Mounts	2	9.028	15.257	1.00	2.64	80.00	0.000	0.000	40.28	0.00	0.00
24	110.00	Antenex Y1505	2	9.028	15.257	1.00	7.20	10.00	0.000	0.000	109.85	0.00	0.00
25	100.00	Standoffs	2	8.785	14.847	1.00	6.12	120.00	0.000	0.000	90.86	0.00	0.00
26	100.00	Decibel DB212-1	2	9.255	15.641	1.00	13.00	62.00	0.000	20.000	203.33	0.00	4066.59
27	80.00	Telewave ANT450D6-9	2	8.330	14.077	1.00	5.54	36.00	0.000	3.000	77.99	0.00	233.96
28	80.00	Standoffs	2	8.242	13.930	1.00	6.12	120.00	0.000	0.000	85.25	0.00	0.00
						Totals:		**7,149.51**			**6,018.30**		

Total Applied Force Summary

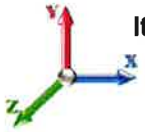
Structure:	CT08748-A-SB	**Code:**	EIA/TIA-222-F	9/15/2015	
Site Name:	Woodstock 4, CT	**Exposure:**	C		
Height:	190.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 20	

TES Tower Engineering Solutions

Load Case: 50 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		187.22	1748.98	0.00	0.00
10.00		183.77	1721.17	0.00	0.00
15.00		180.32	1693.36	0.00	0.00
20.00		176.87	1665.55	0.00	0.00
25.00		173.43	1637.74	0.00	0.00
30.00		169.98	1609.93	0.00	0.00
35.00		169.35	1582.12	0.00	0.00
40.00		172.30	1554.32	0.00	0.00
41.00		34.26	307.53	0.00	0.00
45.00		141.16	2105.97	0.00	0.00
48.00		106.23	1557.78	0.00	0.00
50.00		70.87	531.81	0.00	0.00
55.00		179.28	1312.84	0.00	0.00
60.00		179.70	1289.01	0.00	0.00
65.00		179.68	1265.17	0.00	0.00
70.00		179.25	1241.34	0.00	0.00
75.00		178.45	1217.50	0.00	0.00
80.00	(4) appurtenances	340.57	1349.66	0.00	233.96
85.00		175.91	1164.63	0.00	0.00
90.00		176.66	1899.55	0.00	0.00
91.00		34.89	374.67	0.00	0.00
95.00		139.42	784.89	0.00	0.00
100.00	(4) appurtenances	466.78	1145.24	0.00	4066.59
105.00		170.21	938.17	0.00	0.00
110.00	(4) appurtenances	317.75	1008.31	0.00	0.00
115.00		164.84	893.25	0.00	0.00
120.00		161.87	873.38	0.00	0.00
125.00		158.73	853.52	0.00	0.00
130.00		155.42	833.66	0.00	0.00
135.00		154.13	1285.38	0.00	0.00
140.00		150.53	689.50	0.00	0.00
145.00		146.79	673.61	0.00	0.00
150.00		142.90	657.72	0.00	0.00
155.00		138.88	641.82	0.00	0.00
160.00		134.73	625.93	0.00	0.00
165.00		130.46	610.04	0.00	0.00
167.00	(30) appurtenances	2352.41	2573.67	0.00	0.00
170.00		74.98	310.54	0.00	0.00
175.00		121.57	504.86	0.00	0.00
178.00	(16) appurtenances	1639.70	2413.68	0.00	0.00
180.00		46.11	156.24	0.00	0.00
185.00		115.05	427.03	0.00	0.00
186.00	(35) appurtenances	1563.13	2354.43	0.00	1920.30
190.00		92.74	288.18	0.00	0.00
	Totals:	**12,129.30**	**50,373.67**	**0.00**	**6,220.86**

Resulting Forces and Deflections

Structure: CT08748-A-SB
Site Name: Woodstock 4, CT
Height: 190.00 (ft)
Base Elev: 0.000 (ft)

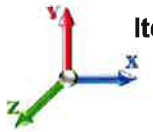
Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II

9/15/2015

Tower Engineering Solutions

Load Case: 50 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	-12.151	-50.368	0.000	0.000	0.000	-1630.6	0.000	0.000	0.000	0.000	0.000
5.00	-12.005	-48.609	0.000	0.000	0.000	-1569.9	-0.027	0.000	0.027	-0.049	0.000
10.00	-11.861	-46.878	0.000	0.000	0.000	-1509.9	-0.105	0.000	0.105	-0.100	0.000
15.00	-11.717	-45.174	0.000	0.000	0.000	-1450.6	-0.237	0.000	0.237	-0.151	0.000
20.00	-11.575	-43.499	0.000	0.000	0.000	-1392.0	-0.423	0.000	0.423	-0.203	0.000
25.00	-11.434	-41.851	0.000	0.000	0.000	-1334.1	-0.663	0.000	0.663	-0.255	0.000
30.00	-11.294	-40.231	0.000	0.000	0.000	-1276.9	-0.960	0.000	0.960	-0.309	0.000
35.00	-11.153	-38.639	0.000	0.000	0.000	-1220.5	-1.313	0.000	1.313	-0.364	0.000
40.00	-10.991	-37.080	0.000	0.000	0.000	-1164.7	-1.724	0.000	1.724	-0.419	0.000
41.00	-10.973	-36.767	0.000	0.000	0.000	-1153.7	-1.813	0.000	1.813	-0.431	0.000
45.00	-10.839	-34.655	0.000	0.000	0.000	-1109.8	-2.194	0.000	2.194	-0.477	0.000
48.00	-10.737	-33.092	0.000	0.000	0.000	-1077.3	-2.505	0.000	2.505	-0.511	0.000
50.00	-10.686	-32.553	0.000	0.000	0.000	-1055.8	-2.724	0.000	2.724	-0.535	0.000
55.00	-10.530	-31.230	0.000	0.000	0.000	-1002.4	-3.319	0.000	3.319	-0.600	0.000
60.00	-10.370	-29.931	0.000	0.000	0.000	-949.79	-3.983	0.000	3.983	-0.666	0.000
65.00	-10.209	-28.656	0.000	0.000	0.000	-897.94	-4.717	0.000	4.717	-0.733	0.000
70.00	-10.046	-27.405	0.000	0.000	0.000	-846.90	-5.520	0.000	5.520	-0.801	0.000
75.00	-9.881	-26.179	0.000	0.000	0.000	-796.67	-6.396	0.000	6.396	-0.869	0.000
80.00	-9.550	-24.823	0.000	0.000	0.000	-747.03	-7.343	0.000	7.343	-0.938	0.000
85.00	-9.383	-23.650	0.000	0.000	0.000	-699.29	-8.364	0.000	8.364	-1.009	0.000
90.00	-9.188	-21.747	0.000	0.000	0.000	-652.37	-9.458	0.000	9.458	-1.079	0.000
91.00	-9.159	-21.368	0.000	0.000	0.000	-643.18	-9.686	0.000	9.686	-1.094	0.000
95.00	-9.030	-20.574	0.000	0.000	0.000	-606.55	-10.627	0.000	10.627	-1.152	0.000
100.00	-8.567	-19.427	0.000	0.000	0.000	-557.33	-11.878	0.000	11.878	-1.234	0.000
105.00	-8.403	-18.481	0.000	0.000	0.000	-514.50	-13.214	0.000	13.214	-1.316	0.000
110.00	-8.086	-17.469	0.000	0.000	0.000	-472.49	-14.636	0.000	14.636	-1.398	0.000
115.00	-7.923	-16.568	0.000	0.000	0.000	-432.06	-16.145	0.000	16.145	-1.480	0.000
120.00	-7.760	-15.689	0.000	0.000	0.000	-392.44	-17.739	0.000	17.739	-1.562	0.000
125.00	-7.599	-14.829	0.000	0.000	0.000	-353.64	-19.420	0.000	19.420	-1.644	0.000
130.00	-7.438	-13.990	0.000	0.000	0.000	-315.65	-21.185	0.000	21.185	-1.724	0.000
135.00	-7.262	-12.700	0.000	0.000	0.000	-278.46	-23.033	0.000	23.033	-1.803	0.000
140.00	-7.106	-12.006	0.000	0.000	0.000	-242.15	-24.964	0.000	24.964	-1.880	0.000
145.00	-6.954	-11.327	0.000	0.000	0.000	-206.62	-26.980	0.000	26.980	-1.967	0.000
150.00	-6.803	-10.666	0.000	0.000	0.000	-171.85	-29.085	0.000	29.085	-2.049	0.000
155.00	-6.653	-10.021	0.000	0.000	0.000	-137.84	-31.273	0.000	31.273	-2.124	0.000
160.00	-6.505	-9.394	0.000	0.000	0.000	-104.57	-33.534	0.000	33.534	-2.191	0.000
165.00	-6.356	-8.785	0.000	0.000	0.000	-72.057	-35.859	0.000	35.859	-2.245	0.000
167.00	-3.906	-6.305	0.000	0.000	0.000	-59.345	-36.803	0.000	36.803	-2.263	0.000
170.00	-3.822	-5.996	0.000	0.000	0.000	-47.625	-38.233	0.000	38.233	-2.287	0.000
175.00	-3.682	-5.495	0.000	0.000	0.000	-28.515	-40.646	0.000	40.646	-2.317	0.000
178.00	-1.947	-3.149	0.000	0.000	0.000	-17.468	-42.106	0.000	42.106	-2.330	0.000
180.00	-1.895	-2.995	0.000	0.000	0.000	-13.574	-43.083	0.000	43.083	-2.336	0.000
185.00	-1.763	-2.573	0.000	0.000	0.000	-4.100	-45.535	0.000	45.535	-2.346	0.000
186.00	-0.104	-0.284	0.000	0.000	0.000	-0.418	-46.026	0.000	46.026	-2.346	0.000
190.00	-0.093	0.000	0.000	0.000	0.000	0.000	0.000	0.000	47.991	-2.346	0.000

Resulting Stresses

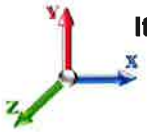
Structure: CT08748-A-SBA
Site Name: Woodstock 4, CT
Height: 190.00 (ft)
Base Elev: 0.000 (ft)

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

9/15/2015

Tower Engineering Solutions

Load Case: 50 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	0.57	0.28	0.00	0.00	0.00	13.89	14.47	52.0	0.278
5.00	0.56	0.28	0.00	0.00	0.00	13.88	14.45	52.0	0.278
10.00	0.55	0.28	0.00	0.00	0.00	13.87	14.42	52.0	0.277
15.00	0.54	0.28	0.00	0.00	0.00	13.85	14.39	52.0	0.277
20.00	0.53	0.28	0.00	0.00	0.00	13.82	14.36	52.0	0.276
25.00	0.52	0.29	0.00	0.00	0.00	13.79	14.32	52.0	0.275
30.00	0.51	0.29	0.00	0.00	0.00	13.75	14.27	52.0	0.275
35.00	0.50	0.29	0.00	0.00	0.00	13.71	14.22	52.0	0.273
40.00	0.49	0.29	0.00	0.00	0.00	13.65	14.15	52.0	0.272
41.00	0.49	0.29	0.00	0.00	0.00	13.64	14.14	52.0	0.272
45.00	0.47	0.29	0.00	0.00	0.00	13.59	14.07	52.0	0.271
48.00	0.52	0.34	0.00	0.00	0.00	15.31	15.84	52.0	0.305
50.00	0.52	0.34	0.00	0.00	0.00	15.28	15.80	52.0	0.304
55.00	0.51	0.34	0.00	0.00	0.00	15.17	15.69	52.0	0.302
60.00	0.50	0.35	0.00	0.00	0.00	15.05	15.56	52.0	0.299
65.00	0.49	0.35	0.00	0.00	0.00	14.92	15.41	52.0	0.297
70.00	0.48	0.35	0.00	0.00	0.00	14.76	15.25	52.0	0.293
75.00	0.47	0.35	0.00	0.00	0.00	14.59	15.07	52.0	0.290
80.00	0.45	0.35	0.00	0.00	0.00	14.39	14.86	52.0	0.286
85.00	0.44	0.35	0.00	0.00	0.00	14.19	14.65	52.0	0.282
90.00	0.42	0.36	0.00	0.00	0.00	13.97	14.40	52.0	0.277
91.00	0.49	0.42	0.00	0.00	0.00	16.16	16.67	52.0	0.321
95.00	0.48	0.42	0.00	0.00	0.00	15.92	16.41	52.0	0.316
100.00	0.47	0.41	0.00	0.00	0.00	15.46	15.94	52.0	0.307
105.00	0.46	0.42	0.00	0.00	0.00	15.11	15.58	52.0	0.300
110.00	0.44	0.41	0.00	0.00	0.00	14.71	15.18	52.0	0.292
115.00	0.43	0.42	0.00	0.00	0.00	14.29	14.75	52.0	0.284
120.00	0.42	0.42	0.00	0.00	0.00	13.82	14.26	52.0	0.274
125.00	0.41	0.43	0.00	0.00	0.00	13.28	13.72	52.0	0.264
130.00	0.40	0.43	0.00	0.00	0.00	12.67	13.10	52.0	0.252
135.00	0.47	0.54	0.00	0.00	0.00	14.45	14.95	52.0	0.288
140.00	0.46	0.54	0.00	0.00	0.00	13.48	13.97	52.0	0.269
145.00	0.45	0.55	0.00	0.00	0.00	12.37	12.85	52.0	0.247
150.00	0.44	0.56	0.00	0.00	0.00	11.09	11.57	52.0	0.223
155.00	0.43	0.57	0.00	0.00	0.00	9.62	10.09	52.0	0.194
160.00	0.42	0.58	0.00	0.00	0.00	7.92	8.39	52.0	0.161
165.00	0.41	0.59	0.00	0.00	0.00	5.94	6.43	52.0	0.124
167.00	0.30	0.37	0.00	0.00	0.00	5.06	5.40	52.0	0.104
170.00	0.29	0.37	0.00	0.00	0.00	4.29	4.62	52.0	0.089
175.00	0.28	0.38	0.00	0.00	0.00	2.82	3.16	52.0	0.061
178.00	0.16	0.20	0.00	0.00	0.00	1.83	2.02	52.0	0.039
180.00	0.16	0.20	0.00	0.00	0.00	1.48	1.67	52.0	0.032
180.00	0.16	0.20	0.00	0.00	0.00	1.48	1.67	52.0	0.029
185.00	0.12	0.17	0.00	0.00	0.00	0.40	0.60	40.0	0.015
186.00	0.01	0.01	0.00	0.00	0.00	0.04	0.06	40.0	0.001
190.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	40.0	0.000

Reactions

Load Case	Shear FX (kips)	Shear FZ (kips)	Axial FY (kips)	Moment MX (ft-kips)	Moment MY (ft-kips)	t MZ (ft-kips)
80 mphWind with 0" Ice	31.1	0.00	50.34	0.00	0.00	4169.65
69.28 mph Wind with 0.5" Ice	25.1	0.00	58.42	0.00	0.00	3384.95
50 mph Wind with 0" Ice	12.2	0.00	50.37	0.00	0.00	1630.68

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
80 mphWind with 0" Ice	0.47	1.08	0.00	0.00	0.00	41.27	41.78	52.0	91.00	0.804
69.28 mph Wind with 0.5" Ice	0.59	0.89	0.00	0.00	0.00	33.27	33.89	52.0	91.00	0.652
50 mph Wind with 0" Ice	0.49	0.42	0.00	0.00	0.00	16.16	16.67	52.0	91.00	0.321

Monopole Mat Foundation Design

			Date: 9/15/2015
Customer Name:	Verizon	EIA/TIA Standard:	EIA-222-F
Site Name:		Structure Height (Ft.):	190
Site Nmber:	CT08748-A-SBA	Engineer Name:	U. Atluri
Engr. Number:	17439	Engineer Login ID:	TES

Foundation Info Obtained from: Drawings/Calculations

Structure Type: Monopole

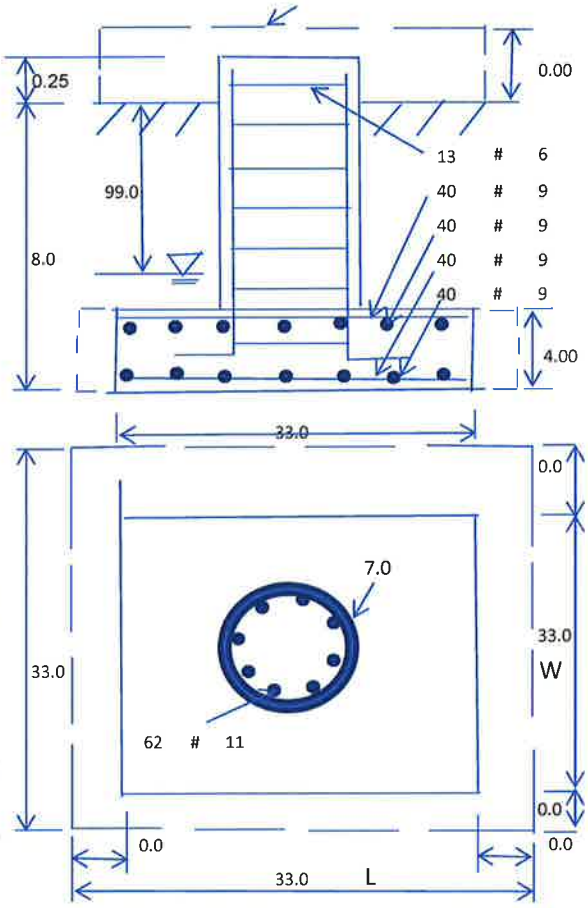
Analysis or Design? Analysis

Base Reactions (Unfactored)

Axial Load (Kips):	58.4	Shear Force (Kips):	31.1
Uplift Force (Kips):	0.0	Moment (Kips-ft):	4169.6

Foundation Geometries:

		Mods required -Yes/No ?:	No
Diameter of Pier (ft.):	7.0	Depth of Base BG (ft.):	8.0
Pier Height A. G. (ft.):	0.25	Thickness of Pad (ft):	4.00
Length of Pad (ft.):	33	Width of Pad (ft.):	33
Final Length of pad (ft)	33.0	Final width of pad (ft):	33.0
Control Value for Cell D18:	0	Control Value for Cell F18:	0



Material Properties and Reabr Info:

Concrete Strength (psi):	4000	Steel Elastic Modulus:	29000	ksi
Vertical bar yield (ksi)	60	Tie steel yield (ksi):	60	
Vertical Rebar Size #:	11	Tie / Stirrup Size #:	6	
Qty. of Vertical Rebars:	62	Tie Spacing (in):	8.0	
Pad Rebar Yield (Ksi):	60	Pad Steel Rebar Size (#):	9	
Concrete Cover (in.):	4	Unit Weight of Concrete:	150.0	pcf
Rebar at the bottom of the concrete pad:				
Qty. of Rebar in Pad (L):	40	Qty. of Rebar in Pad (W):	40	
Rebar at the top of the concrete pad:				
Qty. of Rebar in Pad (L):	40	Qty. of Rebar in Pad (W):	40	

Soil Design Parameters:

Soil Unit Weight (pcf):	100.0	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):	4000	Allowable Skin Friction:		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.):	4202.06	Total Dry Soil Weight (Kips):	420.21
Total Buoyant Soil Volume (cu. Ft.):	0.00	Total Buoyant Soil Weight (Kips):	0.00
Total Effective Soil Weight (Kips):	420.21	Weight from the Concrete Block at Top (K):	0.00
Total Dry Concrete Volume (cu. Ft.):	4519.56	Total Dry Concrete Weight (Kips):	677.93
Total Buoyant Concrete Volume (cu. Ft.):	0.00	Total Buoyant Concrete Weight (Kips):	0.00
Total Effective Concrete Weight (Kips):	677.93	Total Vertical Load on Base (Kips):	1156.54

Check Soil Capacities:

					Load/ Capacity Ratio	
Calculated Maxium Net Soil Pressure under the base (psf):	1284	<	Allowable Soil Bearing (psf):	4000	0.32	OK!
Allowable Foundation Overturning Resistance (SF=1.5, kips-ft.):	12721.9	>	Applied Momont (kips-ft):	4426	0.35	OK!
Factor of Safety Against Overturning (O. R. Moment/Design Moment):	4.31	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):	0.44		
Calculated Moment Capacity (Mn,Kips-Ft):	16308.8 >	Design Factored Moment (Mu, Kips-F	5592.3	0.34	OK!
Calculated Shear Capacity (Kips):	969.3 >	Design Factored Shear (Kips):	40.4	0.04	OK!
Calculated Tension Capacity (Tn, Kips):	5222.9 >	Design Factored Tension (Tu Kips):	0.0	0.00	OK!
Calculated Compression Capacity (Pn, Kips):	9626.8 >	Design Factored Axial Load (Pu Kips):	75.9	0.01	OK!
Moment & Axial Strength Combination(Pu/Pn+Mu/Mn):	0.35 OK!	Check Tie Spacing (Design/Required):		0.6667	OK!
Pier Reinforcement Ratio:	0.017	Reinforcement Ratio is satisfied per ACI			
(2).Concrete Pad:					
One-Way Design Shear Capacity (L-Direction, Kips):	1631.9 >	One-Way Factored Shear (L-D. Kips):	404.8	0.25	OK!
One-Way Design Shear Capacity (W-Direction, Kips):	1631.9 >	One-Way Factored Shear (W-D., Kips)	404.8	0.25	OK!
One-Way Design Shear Capacity (Corner-Corner. Kips):	1961.6 >	One-Way Factored Shear (C-C, Kips):	454.8	0.23	OK!
Lower Steel Pad Reinforcement Ratio (L-Direct.):	0.0023 OK!	Lower Steel Pad Reinf. Ratio (W-Direc	0.0023		
Lower Steel Pad Moment Capacity (L-Direction. Kips-ft):	7658.3 >	Moment at Bottom (L-Direct. K-Ft):	1460.3	0.19	OK!
Lower Steel Pad Moment Capacity (W-Direction. Kips-ft):	7658.3 >	Moment at Bottom (W-Direct. K-Ft):	1460.3	0.19	OK!
Lower Steel Pad Moment Capacity (Corner-Corner,K-ft):	10790.5 >	Moment at Bottom (C-C Dir. K-Ft):	2065.2	0.19	OK!
Upper Steel Pad Reinforcement Ratio (L-Direct.):	0.0023 OK!	Upper Steel Reinf. Ratio (W-Direct.):	0.0023		
Upper Steel Pad Moment Capacity (L-Direction. Kips-ft):	7658.3 >	Moment at the top (L-Dir Kips-Ft):	1163.8	0.15	OK!
Upper Steel Pad Moment Capacity (W-Direction. Kips-ft):	7658.3 >	Moment at the top (W-Dir Kips-Ft):	1163.8	0.15	OK!
Upper Steel Pad Moment Capacity (Corner-Corner. K-ft):	10790.5 >	Moment at the top (C-C Direc. K-Ft):	1176.4	0.11	OK!