Robinson+Cole

KENNETH C. BALDWIN

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Also admitted in Massachusetts

July 21, 2016

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

Re: **Notice of Exempt Modification – Facility Modification**
940 Meriden Road, Waterbury, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 87-foot level of the existing 119-foot tower at 940 Meriden Road in Waterbury, Connecticut (the "Property"). The tower is owned by SBA Communications Corporation ("SBA"). The Council approved Cellco's use of the tower in 2008. Cellco now intends to modify its facility by replacing nine (9) of its existing antennas with three (3) model SBNHH-1D65B, 700 MHz antennas; three (3) model SBNHH-1D65B, 1900 MHz antennas; and three (3) model SBNHH-1D65B, 2100 MHz antennas, all at the same level on the tower. Cellco also intends to replace three (3) existing remote radio heads ("RRHs") and install six (6) new RRHs and one (1) HYBRIFLEX™ fiber optic antenna cable. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Neil M. O'Leary, Mayor for the City of Waterbury. A copy of this letter is being sent to Pine Grove Cemetery Association, the owner of the Property and 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).

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1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be located at the 87-foot level on the 119-foot tower.

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

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

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

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

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Neil M. O'Leary, Waterbury Mayor
Pine Grove Cemetery Association
SBA
Tim Parks

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

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

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

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

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

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

General Specifications

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

Product Specifications

SBNHH-1D65B

Mechanical Specifications

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

Dimensions

Depth	180.0 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

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

Packed Dimensions

Depth	299.0 mm | 11.8 in
Length	1970.0 mm | 77.6 in
Width	409.0 mm | 16.1 in
Shipping Weight	31.0 kg | 68.3 lb

Regulatory Compliance/Certifications

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

Included Products

Product Specifications

SBNHH-1D65B

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

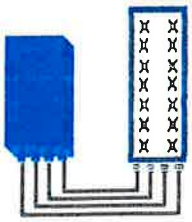
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

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

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

	RRH2x60
RF Output Power	2x60W
Instantaneous Bandwidth	20MHz
Transmitter	2 TX
Receiver 1900 HW version 1900A HW version	2 Branch RX – LA6.0.1 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)

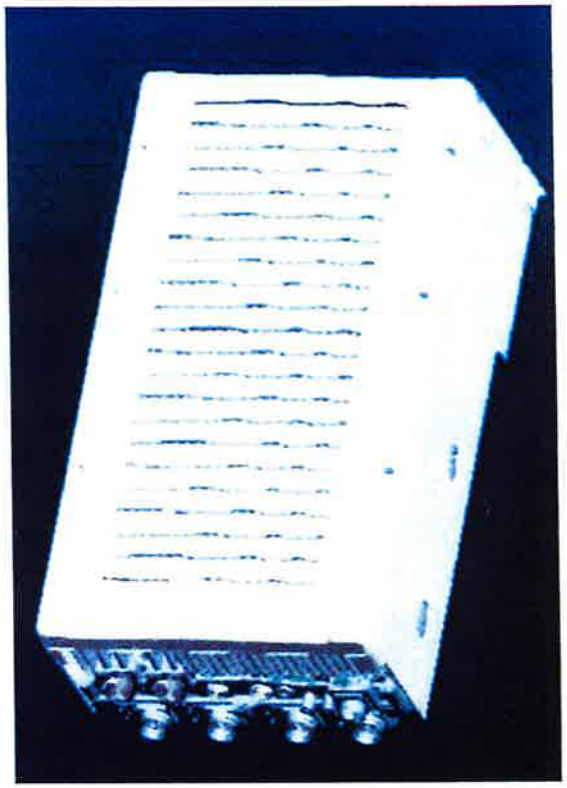
** Not a Verizon Wireless deployed product

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.)

B66A RRH 4X45 - PHYSICAL CHARACTERISTICS- TARGET 15.1

B4 RRH4x45-4R (AWS-Extension Band)	
Frequency Band	LR15.1 – B4 / LR16.1 B66 (AWS 1 and 3 only)
RF Output Power	2x90W/4x45W (SW configurable)
Operational range	2110-2180 MHz, DL/ 1710-1780 MHz UL
Instantaneous Bandwidth	70MHz
Configuration (HW readiness)	LTE: 2T2R, 2T4R, 4T4R
Carrier Bandwidths	5, 10, 15 and 20 MHz
Interfaces	2x CPRI Rate 7 Ports Antenna Connectors 4.3-10
AISG Support	AISG 2.0 for RET Internal Smart Bias T
Monitor Ports	NA (Spec An to replace ports)
Environmental	GR487 Compliance / GR3178 Compliance (with exceptions)
Mounting options	Pole/Wall
Connectors location	All bottom
External Alarms	4
Annual Return Rate (Target)	<2%
Operating Temperature	-40 C to +55 C (without solar load)

- Commercial Product Will include B66 support of AWS 1 and 3.
- Lower AWS 3 UL Not in 3GPP Band 66 Definition

Physical Dimensions – Not to Exceed		
	W/O Solar Shield	With Solar Shield
Dimensions HxWxD	H = 26in (H=660mm) W = 11.4in (W=290mm) D = 5.9in (D=150mm)	H = 26.6in (H=675mm) W = 12in (W=304mm) D = 6.8n (D=173mm)
Volume	29l	35.5l
Weight		64lbs / 29kg

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket:	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	.068 (0.205)
DC-Resistance Power Cable, 8.4mm² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

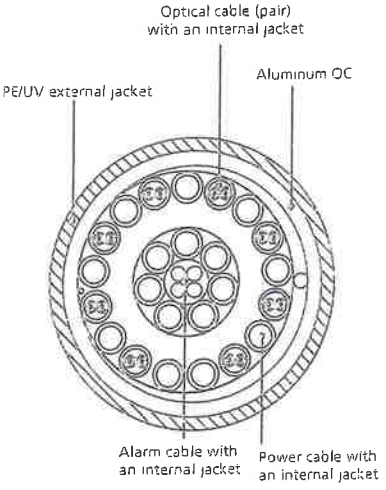


Figure 2: Construction Detail

* This data is provisional and subject to change

	General	Power	Density					
Site Name: Waterbury E								
Tower Height: 119'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Nextel	12	50	107	0.0212	851	0.5673	0.37%	
*Clearwire	2	153	117	0.0089	2496	1.0000	0.09%	
*Clearwire	1	211	117	0.0062	11 GHz	1.0000	0.06%	
*MetroPCS CDMA	3	727	77	0.1556	2135	1.0000	1.56%	
*MetroPCS LTE	1	1200	77	0.0856	2130	1.0000	0.86%	
*T-Mobile AWS LTE	2	1829	99	0.1521	2100	1.0000	1.52%	
*T-Mobile LTE	1	743	99	0.0309	700	0.4667	0.66%	
*T-Mobile GSM/UMTS	2	923	99	0.0767	1900	1.0000	0.77%	
*T-Mobile AWS UMTS	2	914	99	0.0760	2100	1.0000	0.76%	
Verizon	**1**	**2349**	**87**	**0.1116**	**1970**	**1.0000**	**11.16%**	
Verizon	**9**	**300**	**87**	**0.1283**	**869**	**0.5793**	**22.14%**	
Verizon	**1**	**2306**	**87**	**0.1095**	**2145**	**1.0000**	**10.95%**	
Verizon	**1**	**1036**	**87**	**0.0492**	**746**	**0.4973**	**9.90%**	
								60.8%
* Source: Siting Council								

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

Structural Analysis Report

Existing 119 ft SABRE Monopole

Customer Name: SBA Communications Corp

Customer Site Number: CT13070-A

Customer Site Name: Waterbury 4, CT

Carrier Name: Verizon

Carrier Site ID / Name: Waterbury East CT

Site Location: 940 Meriden Road

Waterbury, CT

New Haven County

Latitude: 41.553278

Longitude: -72.993361

Analysis Result:

Max Structural Usage: 59.5% [Pass]

Max Foundation Usage: 58% [Pass]

Report Prepared By : Jarryd Tibbetts

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

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Report Prepared By : Jarryd Tibbetts

Introduction

The purpose of this report is to summarize the analysis results on the 119 ft SABRE Monopole to support the proposed antennas and transmission lines in addition to those currently installed. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

Sources of Information

Tower Drawings	Tower Drawing prepared by Sabre, Job #07-03039 dated 4/23/07 Structural Analysis prepared by FDH, Project #12-06C54E S2 dated 6/17/11
Foundation Drawing	Foundation Drawing prepared by Sabre, Job #03039 dated 4/23/07
Geotechnical Report	Geotechnical Report prepared by Gemini Geotechnical Associates, Project #07023CT dated 3/13/07
Modification Drawings	Modification Drawing prepared by FDH, Project #09-01077E S3 dated 10/13/09

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:	85.0 mph (Fastest mile)
Basic Wind Speed with Ice:	74 mph (Fastest mile) with 1/2" radial ice concurrent
Operational Wind Speed:	50 mph + 0" Radial ice
Standard/Codes:	ANSI/TIA/EIA 222-F / 2005 Connecticut State Building Code

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	120.0	2	Andrew - VHLP2.5-11 - Dish	(3) Standoff	(3) 5/16" (2) 1/2" (3) 5/8" (3) 3/4"	Clearwire
2	118.0	3	Argus - LLPX310R - Panel			
3		3	2.5GHz RRH			
4	99.0	6	RFS - APX16DWV-16DWVS - Panel	Low Profile Platform	(18) 1 5/8" (1) 1 5/8" Fiber	T-Mobile
5		3	Commscope - LNX-6515DS-VTM - Panel			
6		3	Ericsson - Double TMA 17/21 - TMA/TTA			
7		3	RFS - ATMAA1412D-1A20 - TMA/TTA			
8		3	Kathrein - 782 11056 - Bias T's			
10	87.0	6	Antel - BXA-80063/4CF - Panel	Low Profile Platform	(18) 1 5/8" (1) 1 5/8" Hybrid	Verizon
11		3	Antel - BXA-171063-8BF - Panel			
12		3	Antel - BXA-70063-6CF - Panel			
18	77.0	3	RFS - APXV18-206517S-C - Panel	Pipe	(6) 1 5/8"	Metro PCS

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
10	87.0	3	Antel - BXA-80063/4CF - Panel	Low Profile Platform	(18) 1 5/8" (2) 1 5/8" Hybrid	Verizon
13		9	Andrew - SBNHH-1D65B - Panel			
14		3	Alcatel Lucent - RRH4X45-19 - RRU			
15		3	Alcatel Lucent - RRH2X60-700 - RRU			
16		3	Alcatel Lucent - RRH2X60-PCS - RRU			
17		2	RFS - 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:	**52.6%**	**59.5%**	**39.5%**
Pass/Fail	**Pass**	**Pass**	**Pass**

Foundations

	Moment (Kip-Ft)	Shear (Kips)	Axial (Kips)
Original Design Reactions	3142.0	29.0	42.0
Analysis Reactions	1579.7	19.6	32.4
% of Design Reactions	50.3%	67.6%	77.2%

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

Operational Condition (Rigidity):

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

Elevation (ft)	Dish	Carrier	Twist (deg)	Sway (deg)
120.0	Andrew - VHLP2.5-11 - Dish	Clearwire	0.003	0.702

It is recommended that the carrier reviews the twist and sway values of the microwave dish.

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 52.6% at 0.0ft

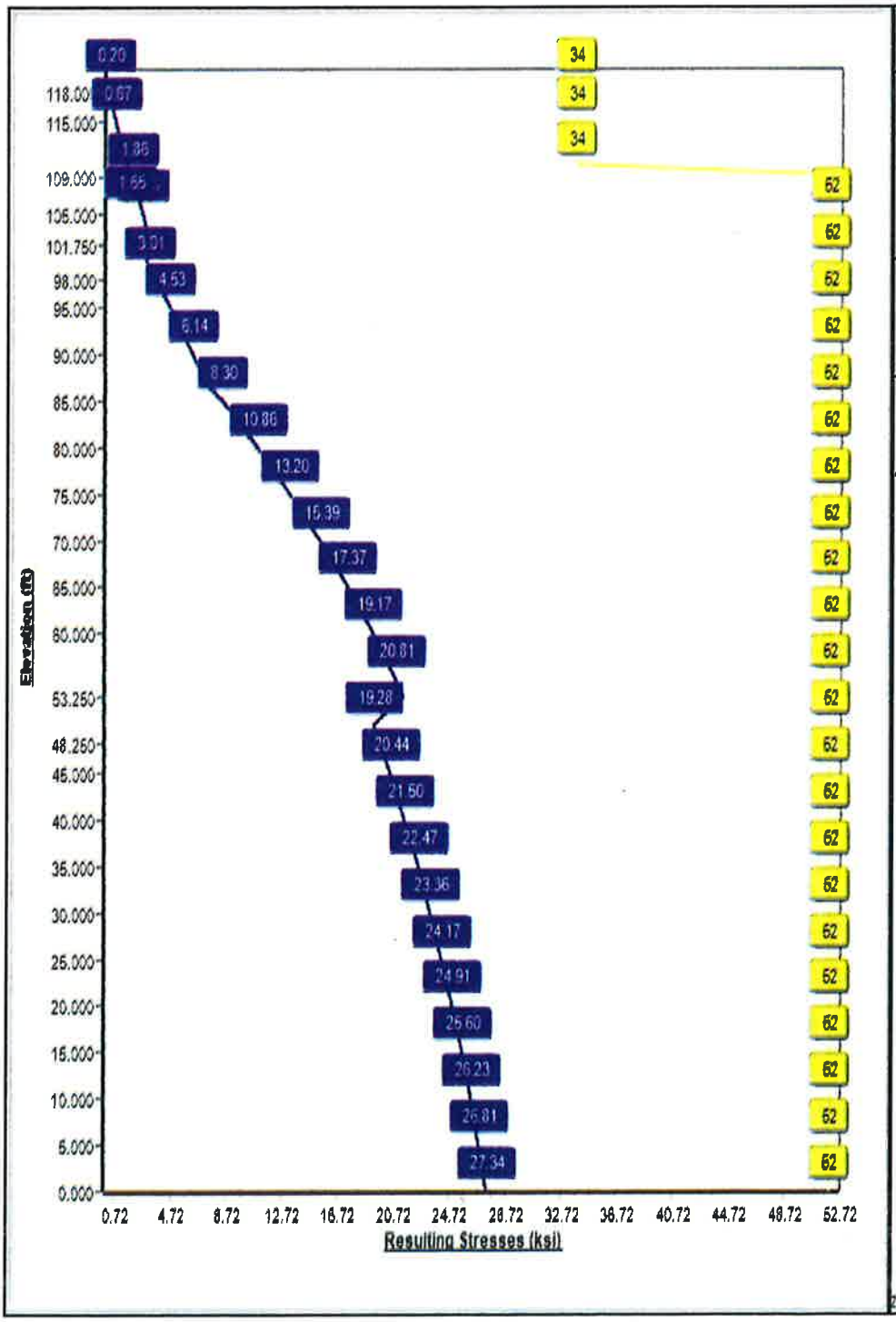
Structure:	CT13070-A-SBA	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)			Page: 1	

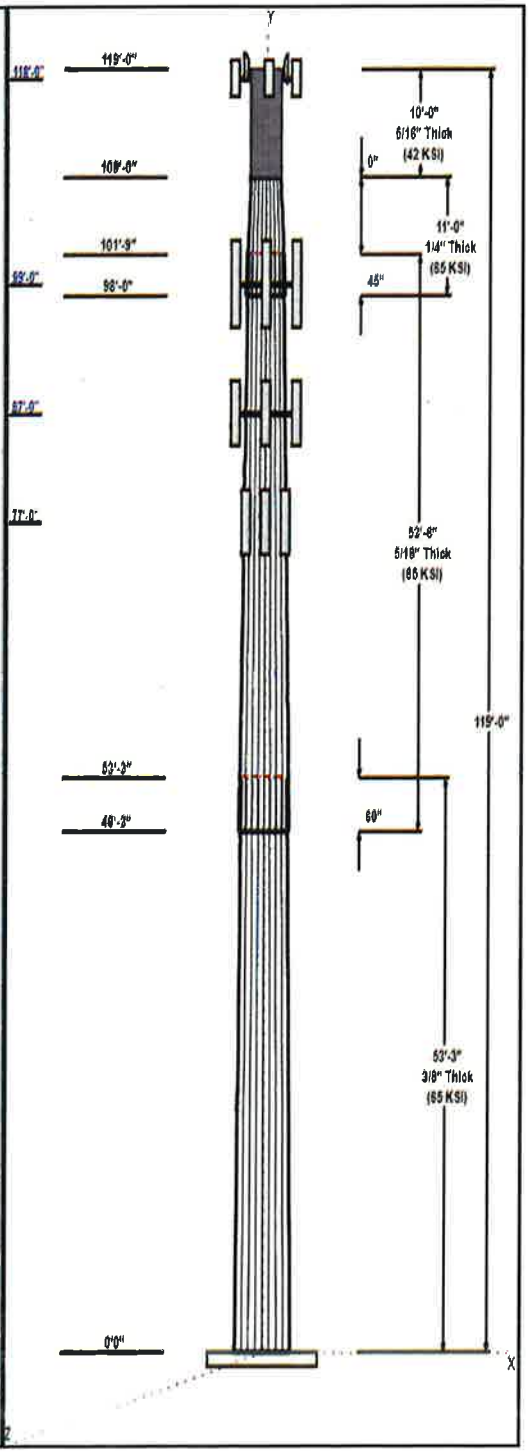
Tower Engineering Solutions

Dead Load Factor:	1.00
Wind Load Factor:	1.00
52 Alllowable Stress	
27 Resulting Stress	

Load Case : 85 mph Wind with 0 in Ice

Iterations: 22





Structure: CT13070-A-SBA

Type: Custom
Site Name: Waterbury 4, CT
Height: 119.00 (ft)
Base Elev: 0.00 (ft)

Base Shape: 18 Sided
Taper: 0.00000

2/15/2016

Tower Engineering Solutions

Shaft Properties

Seq	Length (ft)	Top (in)	Bottom (in)	Thick (in)	Joint Type	Taper	Grade (ksi)
1	53.25	37.99	49.39	0.375		0.21408	65
2	53.50	28.23	39.69	0.313	Slip	0.21408	65
3	11.00	27.18	29.53	0.250	Slip	0.21408	65
4	10.00	26.00	26.00	0.312	Butt	0.00000	42

Discrete Appurtenances

Attach Elev (ft)	Force Elev (ft)	Qty	Description	Carrier
119.00	120.00	2	VHLP2.5-11	Clearwire
118.00	118.00	3	2.5GHz RRH	Clearwire
118.00	118.00	3	3 ft Standoff	Clearwire
118.00	118.00	3	LLPX310R	Clearwire
99.00	99.00	3	782 11056	T-Mobile
99.00	99.00	6	APX16DWV-16DWV-S-E-	T-Mobile
99.00	99.00	3	ATMAA1412D-1A20	T-Mobile
99.00	99.00	3	Double TMA 17/21	T-Mobile
99.00	99.00	3	LNX-6515DS-VTM	T-Mobile
99.00	99.00	1	Low Profile Platform	T-Mobile
87.00	87.00	3	1900 MHz 4X45 RRH	Verizon
87.00	87.00	3	BXA-80063/4CF	Verizon
87.00	87.00	2	DB-T1-6Z-8AB-0Z	Verizon
87.00	87.00	1	Low Profile Platform	Verizon
87.00	87.00	3	RRH2X60-700	Verizon
87.00	87.00	3	RRH2X60-PCS	Verizon
87.00	87.00	9	SBNHH-1D65B	Verizon
77.00	77.00	3	APXV18-206517S-C	Metro PCS

Linear Appurtenances

Elev From (ft)	Elev To (ft)	Placement	Description	Carrier
0.00	118.00	Inside	1/2" Coax	Clearwire
0.00	118.00	Inside	3/4" DC	Clearwire
0.00	118.00	Inside	5/16" Coax	Clearwire
0.00	118.00	Inside	5/8" Coax	Clearwire
0.00	99.00	Inside	1 5/8" Coax	T-Mobile
0.00	99.00	Inside	1 5/8" Hybrid	T-Mobile
0.00	87.00	Inside	1 5/8" Coax	Verizon
0.00	87.00	Inside	1 5/8" Hybrid	Verizon
0.00	77.00	Inside	1 5/8" Coax	Metro PCS

Anchor Bolts

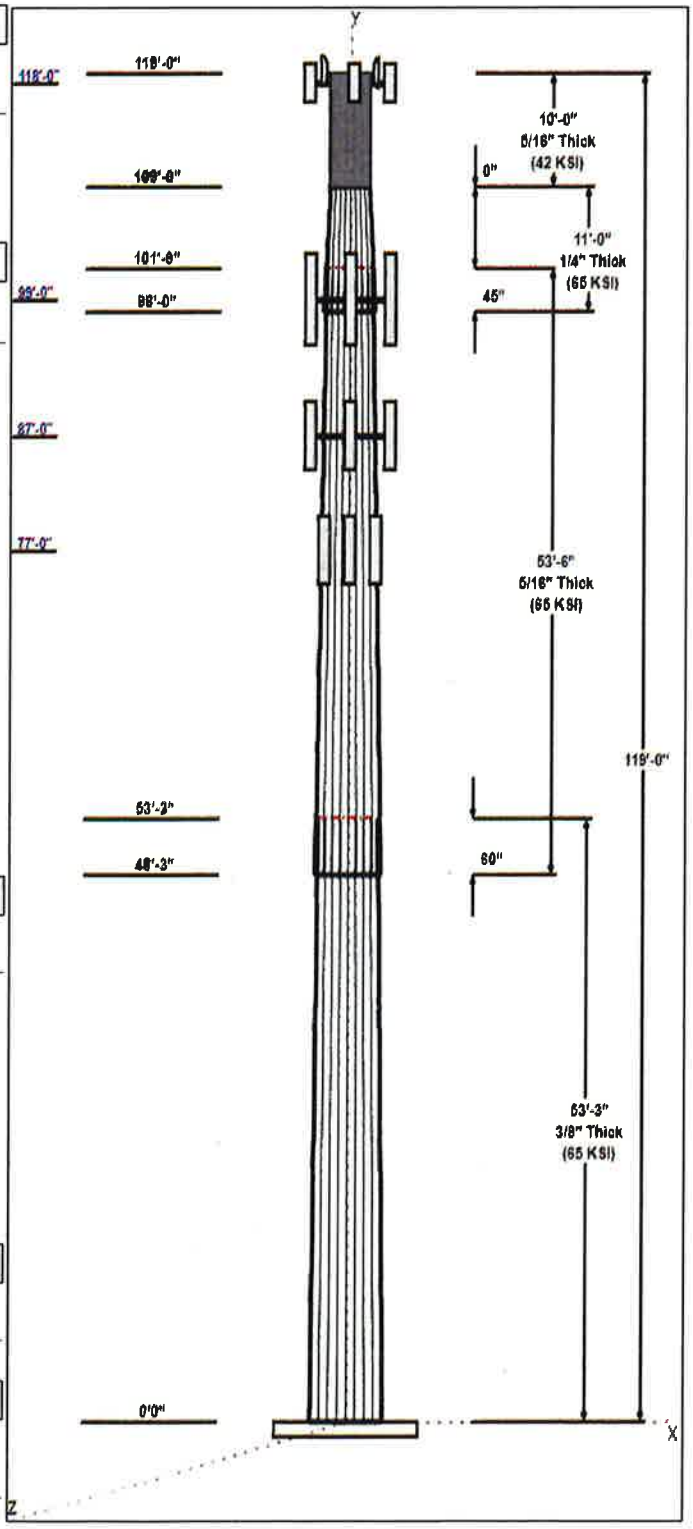
Qty	Specifications	Grade (ksi)	Arrangement
12	2.25" 18J	75.0	Cluster

Base Plate

Thickness (in)	Specifications (in)	Grade (ksi)	Geometry
3.0000	53.3	60.0	Clipped

Reactions

Load Case	Moment	Shear	Axial
85 mph Wind with 0" Ice	1579.7	19.6	27.6



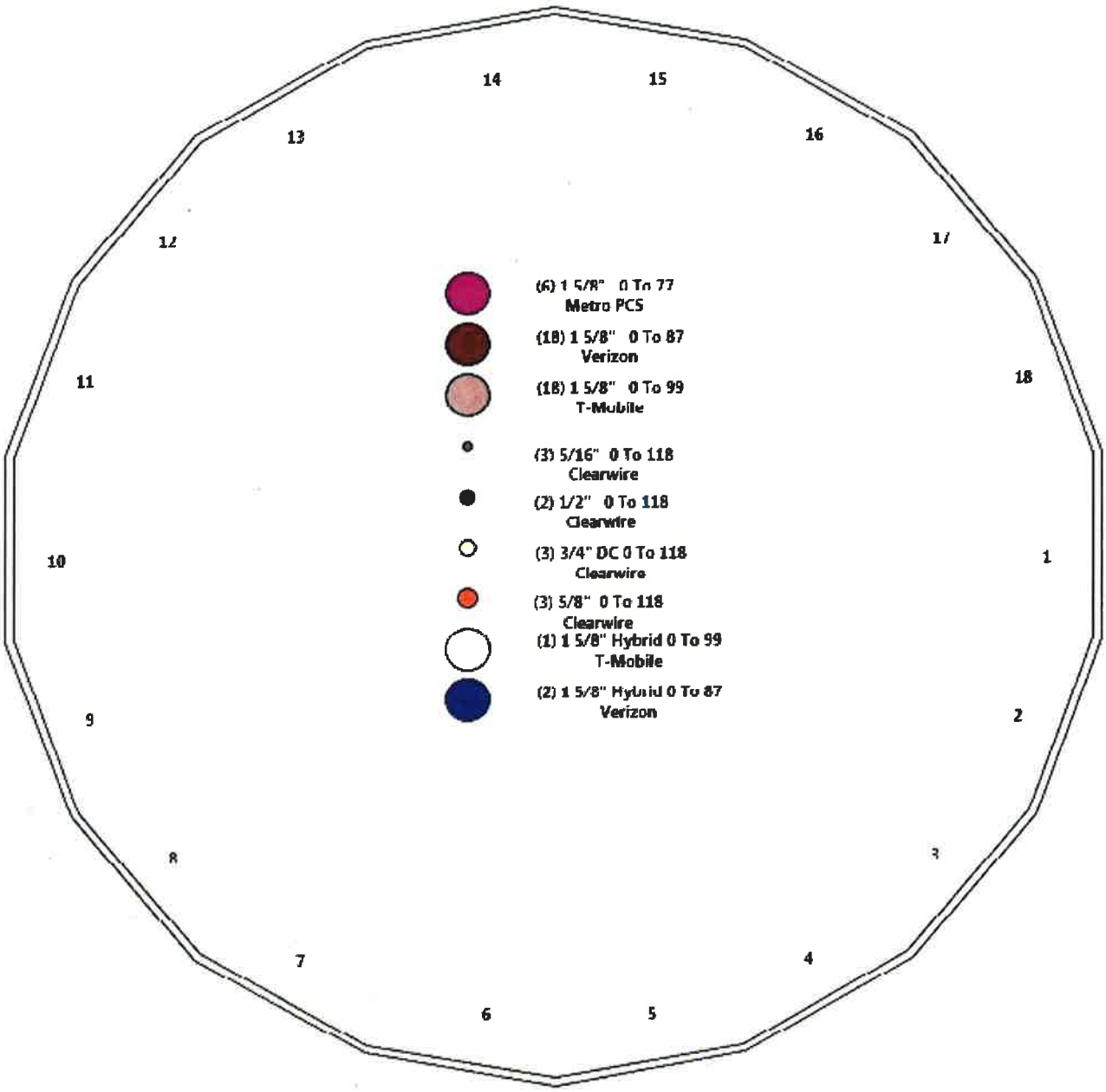
73.61 mph Wind with 0.5" Ice	1295.7	15.8	32.4
50 mph Wind with 0" Ice	546.7	6.8	27.7

Structure: CT13070-A-SBA - Coax Line Placement

Type: Monopole
Site Name: Waterbury 4, CT
Height: 119.00 (ft)

2/15/2016

Tower Engineering Solutions



Shaft Properties

Structure:	CT13070-A-SBA	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 5	

TES Tower Engineering Solutions

Sec. No.	Shape	Length (ft)	Thick (in)	Fy (ksi)	Joint Type	Overlap (in)	Weight (lb)
1	18	53.250	0.3750	65		0.00	9,341
2	18	53.500	0.3125	65	Slip	60.00	6,075
3	18	11.000	0.2500	65	Slip	45.00	835
4	R	10.000	0.3120	42	Flange	0.00	857
					Total Shaft Weight:		**17,108**

	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	49.39	0.00	58.34	17707.72	21.81	131.71	37.99	53.25	44.77	8003.18	16.45	101.31	0.214083
2	39.69	48.25	39.05	7648.75	20.98	126.99	28.23	101.7	27.69	2727.23	14.52	90.34	0.214083
3	29.53	98.00	23.24	2517.77	19.42	118.14	27.18	109.0	21.37	1957.91	17.76	108.72	0.214083
4	26.00	109.0	25.18	2078.44	0.00	83.33	26.00	119.0	25.18	2078.44	0.00	83.33	0.000000

Discrete Appurtenances

No.	Elev (ft)	Description	Qty	No Ice Weight (lb)	No Ice CaAa (sf)	No Ice CaAa Factor	Ice Weight (lb)	Ice CaAa (sf)	Ice CaAa Factor	Hor. Ecc. (ft)	Vert Ecc (ft)
1	119.00	VHLP2.5-11	2	47.60	8.43	1.00	97.00	8.920	1.00	0.50	1.00
2	118.00	2.5GHz RRH	3	33.00	1.82	0.73	44.90	2.090	0.75	0.00	0.00
3	118.00	3 ft Standoff	3	40.00	2.63	0.75	63.00	4.340	0.75	0.00	0.00
4	118.00	LLPX310R	3	28.60	4.83	0.69	54.50	5.360	0.71	0.00	0.00
5	99.00	782 11056	3	1.80	0.17	0.78	2.83	0.230	0.82	0.00	0.00
6	99.00	APX16DWV-16DWV-S-E-ACU	6	40.70	7.23	0.65	71.92	7.620	0.66	0.00	0.00
7	99.00	ATMAA1412D-1A20	3	13.00	1.17	0.70	18.75	1.290	0.72	0.00	0.00
8	99.00	Double TMA 17/21	3	11.00	0.41	0.72	13.14	0.490	0.75	0.00	0.00
9	99.00	LNX-6515DS-VTM	3	50.30	11.45	0.84	112.11	11.920	0.84	0.00	0.00
10	99.00	Low Profile Platform	1	1500.00	22.00	1.00	1800.00	27.000	1.00	0.00	0.00
11	87.00	1900 MHz 4X45 RRH	3	59.50	2.77	0.99	78.37	2.980	0.99	0.00	0.00
12	87.00	BXA-80063/4CF	3	9.90	5.16	0.72	35.22	5.490	0.72	0.00	0.00
13	87.00	DB-T1-6Z-8AB-0Z	2	44.00	5.69	0.85	71.51	5.970	0.86	0.00	0.00
14	87.00	Low Profile Platform	1	1500.00	22.00	1.00	1800.00	27.000	1.00	0.00	0.00
15	87.00	RRH2X60-700	3	60.00	3.96	0.73	80.13	4.230	0.74	0.00	0.00
16	87.00	RRH2X60-PCS	3	55.00	2.57	0.89	70.82	2.760	0.90	0.00	0.00
17	87.00	SBNHH-1D65B	9	40.00	8.40	0.82	86.55	8.870	0.82	0.00	0.00
18	77.00	APXV18-206517S-C	3	26.40	5.16	0.74	53.00	5.840	0.76	0.00	0.00
		Totals:	**57**	**4,952.90**			**7,027.80**				

Linear Appurtenances

Bottom Elev. (ft)	Top Elev. (ft)	Description	No Ice Weight (lb/ft)	No Ice CaAa (sf/ft)	Ice Weight (lb/ft)	Ice CaAa (sf/ft)	Exposed
0.00	118.00	(2) 1/2" Coax	0.32	0.00	0.00	0.00	Inside
0.00	118.00	(3) 3/4" DC	1.20	0.00	0.00	0.00	Inside
0.00	118.00	(3) 5/16" Coax	0.24	0.00	0.00	0.00	Inside
0.00	118.00	(3) 5/8" Coax	0.45	0.00	0.00	0.00	Inside
0.00	99.00	(18) 1 5/8" Coax	18.72	0.00	0.00	0.00	Inside
0.00	99.00	(1) 1 5/8" Hybrid	1.10	0.00	0.00	0.00	Inside
0.00	87.00	(18) 1 5/8" Coax	31.20	0.00	0.00	0.00	Inside
0.00	87.00	(2) 1 5/8" Hybrid	2.20	0.00	0.00	0.00	Inside
0.00	77.00	(6) 1 5/8" Coax	6.24	0.00	0.00	0.00	Inside
		Totals:	**5,609.24**		**0.00**		

Shaft Section Properties

Structure: CT13070-A-SBA
Site Name: Waterbury 4, CT
Height: 119.00 (ft)
Base Elev: 0.000 (ft)
Code: EIA/TIA-222-F
Exposure: C
Gh: 1.69
Struct Class: II
2/15/2016

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		0.3750	49.390	58.338	17707.7	21.81	131.71	65	52	0.0
5.00		0.3750	48.320	57.064	16572.7	21.31	128.85	65	52	981.7
10.00		0.3750	47.249	55.790	15487.3	20.81	126.00	65	52	960.0
15.00		0.3750	46.179	54.516	14450.4	20.30	123.14	65	52	938.4
20.00		0.3750	45.108	53.242	13460.8	19.80	120.29	65	52	916.7
25.00		0.3750	44.038	51.968	12517.4	19.30	117.43	65	52	895.0
30.00		0.3750	42.968	50.694	11619.2	18.79	114.58	65	52	873.3
35.00		0.3750	41.897	49.420	10765.0	18.29	111.73	65	52	851.7
40.00		0.3750	40.827	48.146	9953.7	17.79	108.87	65	52	830.0
45.00		0.3750	39.756	46.872	9184.3	17.28	106.02	65	52	808.3
48.25	Bot - Section 2	0.3750	39.061	46.044	8706.0	16.96	104.16	65	52	513.8
50.00		0.3750	38.686	45.598	8455.5	16.78	103.16	65	52	504.3
53.25	Top - Section 1	0.3125	38.615	37.990	7041.7	20.38	123.57	65	52	923.6
55.00		0.3125	38.240	37.618	6837.1	20.17	122.37	65	52	225.1
60.00		0.3125	37.170	36.557	6274.4	19.56	118.94	65	52	631.0
65.00		0.3125	36.100	35.495	5743.5	18.96	115.52	65	52	612.9
70.00		0.3125	35.029	34.433	5243.4	18.35	112.09	65	52	594.9
75.00		0.3125	33.959	33.372	4773.2	17.75	108.67	65	52	576.8
77.00		0.3125	33.531	32.947	4593.3	17.51	107.30	65	52	225.7
80.00		0.3125	32.888	32.310	4332.0	17.15	105.24	65	52	333.1
85.00		0.3125	31.818	31.248	3918.8	16.54	101.82	65	52	540.7
87.00		0.3125	31.390	30.824	3761.2	16.30	100.45	65	52	211.2
90.00		0.3125	30.748	30.187	3532.8	15.94	98.39	65	52	311.4
95.00		0.3125	29.677	29.125	3173.0	15.33	94.97	65	52	504.6
98.00	Bot - Section 3	0.3125	29.035	28.488	2969.3	14.97	92.91	65	52	294.1
99.00		0.3125	28.821	28.276	2903.4	14.85	92.23	65	52	175.4
100.00		0.3125	28.607	28.063	2838.5	14.73	91.54	65	52	174.1
101.75	Top - Section 2	0.2500	28.732	22.600	2316.3	18.85	114.93	65	52	301.5
105.00		0.2500	28.036	22.048	2150.7	18.36	112.15	65	52	246.9
109.00	Top - Section 3	0.0000	0.000	0.000	0.0	NAN	NAN	0	0	295.5
109.00	Bot - Section 4	0.2500	27.180	21.368	1957.9	17.76	108.72	65	52	
110.00		0.3120	26.000	25.179	2078.4	0.00	83.33	42	34	85.7
115.00		0.3120	26.000	25.179	2078.4	0.00	83.33	42	34	428.4
118.00		0.3120	26.000	25.179	2078.4	0.00	83.33	42	34	257.0
119.00		0.3120	26.000	25.179	2078.4	0.00	83.33	42	34	85.7
										17108.3

Wind Loading - Shaft

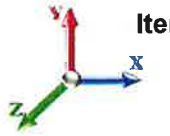
Structure: CT13070-A-SBA
Site Name: Waterbury 4, CT
Height: 119.00 (ft)
Base Elev: 0.000 (ft)

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

2/15/2016

TES Tower Engineering Solutions

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



Iterations: 22

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		0.00	1.00	18.496	31.26	349.85	0.650	0.000	0.00	0.000	0.00	0.0	0.0	0.0
5.00		0.00	1.00	18.496	31.26	342.26	0.650	0.000	5.00	20.356	13.23	413.6	0.0	981.7
10.00		0.00	1.00	18.496	31.26	334.68	0.650	0.000	5.00	19.910	12.94	404.5	0.0	960.0
15.00		0.00	1.00	18.496	31.26	327.10	0.650	0.000	5.00	19.464	12.65	395.5	0.0	938.4
20.00		0.00	1.00	18.496	31.26	319.52	0.650	0.000	5.00	19.018	12.36	386.4	0.0	916.7
25.00		0.00	1.00	18.496	31.26	311.94	0.650	0.000	5.00	18.572	12.07	377.3	0.0	895.0
30.00		0.00	1.00	18.496	31.26	304.35	0.650	0.000	5.00	18.126	11.78	368.3	0.0	873.3
35.00		0.00	1.02	18.810	31.79	299.28	0.650	0.000	5.00	17.680	11.49	365.3	0.0	851.7
40.00		0.00	1.06	19.541	33.02	297.25	0.650	0.000	5.00	17.234	11.20	369.9	0.0	830.0
45.00		0.00	1.09	20.210	34.15	294.36	0.650	0.000	5.00	16.788	10.91	372.7	0.0	808.3
48.25	Bot - Section 2	0.00	1.11	20.617	34.84	292.11	0.650	0.000	3.25	10.673	6.94	241.7	0.0	513.8
50.00		0.00	1.13	20.827	35.20	290.78	0.650	0.000	1.75	5.760	3.74	131.8	0.0	504.3
53.25	Top - Section 1	0.00	1.15	21.206	35.84	288.13	0.650	0.000	3.25	10.552	6.86	245.8	0.0	923.6
55.00		0.00	1.16	21.402	36.17	291.38	0.650	0.000	1.75	5.604	3.64	131.8	0.0	225.1
60.00		0.00	1.19	21.941	37.08	286.76	0.650	0.000	5.00	15.711	10.21	378.7	0.0	631.0
65.00		0.00	1.21	22.449	37.94	281.71	0.650	0.000	5.00	15.265	9.92	376.4	0.0	612.9
70.00		0.00	1.24	22.929	38.75	276.26	0.650	0.000	5.00	14.819	9.63	373.2	0.0	594.9
75.00		0.00	1.26	23.386	39.52	270.47	0.650	0.000	5.00	14.373	9.34	369.2	0.0	576.8
77.00	Appurtenance(s)	0.00	1.27	23.562	39.82	268.07	0.650	0.000	2.00	5.624	3.66	145.6	0.0	225.7
80.00		0.00	1.29	23.821	40.26	264.37	0.650	0.000	3.00	8.302	5.40	217.2	0.0	333.1
85.00		0.00	1.31	24.237	40.96	257.99	0.650	0.000	5.00	13.480	8.76	358.9	0.0	540.7
87.00	Appurtenance(s)	0.00	1.32	24.399	41.23	255.37	0.650	0.000	2.00	5.267	3.42	141.2	0.0	211.2
90.00		0.00	1.33	24.636	41.63	251.36	0.650	0.000	3.00	7.767	5.05	210.2	0.0	311.4
95.00		0.00	1.35	25.020	42.28	244.49	0.650	0.000	5.00	12.588	8.18	346.0	0.0	504.6
98.00	Bot - Section 3	0.00	1.36	25.243	42.66	240.26	0.650	0.000	3.00	7.339	4.77	203.5	0.0	294.1
99.00	Appurtenance(s)	0.00	1.37	25.316	42.78	238.84	0.650	0.000	1.00	2.452	1.59	68.2	0.0	175.4
100.00		0.00	1.37	25.389	42.91	237.40	0.650	0.000	1.00	2.434	1.58	67.9	0.0	174.1
101.75	Top - Section 2	0.00	1.38	25.515	43.12	234.88	0.650	0.000	1.75	4.217	2.74	118.2	0.0	301.5
105.00		0.00	1.39	25.745	43.51	234.30	0.650	0.000	3.25	7.687	5.00	217.4	0.0	246.9
109.00	Top - Section 3	0.00	1.41	26.022	43.98	228.36	0.650	0.000	4.00	9.203	5.98	263.1	0.0	295.5
110.00		0.00	1.41	26.090	44.09	218.73	0.590	0.000	1.00	2.167	1.28	56.4	0.0	85.7
115.00		0.00	1.43	26.423	44.66	220.12	0.590	0.000	5.00	10.833	6.39	285.4	0.0	428.4
118.00	Appurtenance(s)	0.00	1.44	26.618	44.99	220.93	0.590	0.000	3.00	6.500	3.83	172.5	0.0	257.0
119.00	Appurtenance(s)	0.00	1.44	26.683	45.09	221.20	0.590	0.000	1.00	2.167	1.28	57.6	0.0	85.7
								Totals:	**119.00**			**8,631.5**		**17,108.3**

Discrete Appurtenance Forces

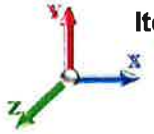
Structure:	CT13070-A-SB	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 9	

TES Tower Engineering Solutions

Load Case: 85 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 22

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	119.00	VHLP2.5-11	2	26.747	45.202	1.00	16.86	95.20	1.583	1.000	762.10	1206.6	762.10
2	118.00	LLPX310R	3	26.618	44.985	0.69	10.00	85.80	0.000	0.000	449.77	0.00	0.00
3	118.00	3 ft Standoff	3	26.618	44.985	0.75	5.92	120.00	0.000	0.000	266.20	0.00	0.00
4	118.00	2.5GHz RRH	3	26.618	44.985	0.73	3.99	99.00	0.000	0.000	179.30	0.00	0.00
5	99.00	APX16DWV-16DWV-S-E-AC	6	25.316	42.784	0.65	28.15	244.20	0.000	0.000	1204.53	0.00	0.00
6	99.00	Low Profile Platform	1	25.316	42.784	1.00	22.00	1500.00	0.000	0.000	941.26	0.00	0.00
7	99.00	LNX-6515DS-VTM	3	25.316	42.784	0.84	28.72	150.90	0.000	0.000	1228.62	0.00	0.00
8	99.00	Double TMA 17/21	3	25.316	42.784	0.72	0.89	33.00	0.000	0.000	37.94	0.00	0.00
9	99.00	ATMAA1412D-1A20	3	25.316	42.784	0.70	2.46	39.00	0.000	0.000	105.12	0.00	0.00
10	99.00	782 11056	3	25.316	42.784	0.78	0.40	5.40	0.000	0.000	17.04	0.00	0.00
11	87.00	SBNHH-1D65B	9	24.399	41.234	0.82	62.07	360.00	0.000	0.000	2559.27	0.00	0.00
12	87.00	RRH2X60-PCS	3	24.399	41.234	0.89	6.88	165.00	0.000	0.000	283.58	0.00	0.00
13	87.00	RRH2X60-700	3	24.399	41.234	0.73	8.66	180.00	0.000	0.000	357.10	0.00	0.00
14	87.00	Low Profile Platform	1	24.399	41.234	1.00	22.00	1500.00	0.000	0.000	907.14	0.00	0.00
15	87.00	DB-T1-6Z-8AB-0Z	2	24.399	41.234	0.85	9.72	88.00	0.000	0.000	400.73	0.00	0.00
16	87.00	BXA-80063/4CF	3	24.399	41.234	0.72	11.11	29.70	0.000	0.000	458.30	0.00	0.00
17	87.00	1900 MHz 4X45 RRH	3	24.399	41.234	0.99	8.20	178.50	0.000	0.000	338.20	0.00	0.00
18	77.00	APXV18-206517S-C	3	23.562	39.820	0.74	11.46	79.20	0.000	0.000	456.15	0.00	0.00
						Totals:		**4,952.90**			**10,952.35**		

Total Applied Force Summary

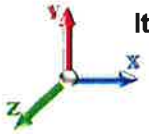
Structure:	CT13070-A-SB	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 10	

TES Tower Engineering Solutions

Load Case: 85 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 22

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		413.59	1290.07	0.00	0.00
10.00		404.53	1268.39	0.00	0.00
15.00		395.47	1246.72	0.00	0.00
20.00		386.41	1225.04	0.00	0.00
25.00		377.35	1203.36	0.00	0.00
30.00		368.28	1181.69	0.00	0.00
35.00		365.31	1160.01	0.00	0.00
40.00		369.95	1138.34	0.00	0.00
45.00		372.71	1116.66	0.00	0.00
48.25		241.72	714.21	0.00	0.00
50.00		131.79	612.22	0.00	0.00
53.25		245.81	1124.07	0.00	0.00
55.00		131.75	333.04	0.00	0.00
60.00		378.66	939.35	0.00	0.00
65.00		376.42	921.29	0.00	0.00
70.00		373.24	903.23	0.00	0.00
75.00		369.22	885.16	0.00	0.00
77.00	(3) appurtenances	601.71	428.21	0.00	0.00
80.00		217.25	499.37	0.00	0.00
85.00		358.91	817.84	0.00	0.00
87.00	(24) appurtenances	5445.49	2823.28	0.00	0.00
90.00		210.20	377.50	0.00	0.00
95.00		345.98	614.71	0.00	0.00
98.00		203.51	360.16	0.00	0.00
99.00	(19) appurtenances	3602.71	2169.89	0.00	0.00
100.00		67.90	176.27	0.00	0.00
101.75		118.21	305.34	0.00	0.00
105.00		217.41	254.06	0.00	0.00
109.00		263.06	304.31	0.00	0.00
110.00		56.36	87.89	0.00	0.00
115.00		285.42	439.44	0.00	0.00
118.00	(9) appurtenances	1067.79	568.46	0.00	0.00
119.00	(2) appurtenances	819.75	180.88	1206.66	762.10
	Totals:	**19,583.87**	**27,670.44**	**1,206.66**	**762.10**

Resulting Forces and Deflections

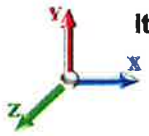
Structure: CT13070-A-SB
Site Name: Waterbury 4, CT
Height: 119.00 (ft)
Base Elev: 0.000 (ft)

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

2/15/2016

Tower Engineering Solutions

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



Iterations: 22

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	-19.614	-27.649	0.000	-0.004	-1.204	-1579.745	0.000	0.000	0.000	0.000	0.000
5.00	-19.256	-26.318	0.000	-0.004	-1.204	-1481.675	-0.066	0.000	0.066	-0.123	0.000
10.00	-18.901	-25.010	0.000	-0.004	-1.204	-1385.397	-0.262	0.000	0.262	-0.246	0.000
15.00	-18.550	-23.726	0.000	-0.004	-1.204	-1290.893	-0.586	0.000	0.586	-0.369	0.000
20.00	-18.202	-22.465	0.000	-0.005	-1.204	-1198.146	-1.039	0.000	1.039	-0.491	0.000
25.00	-17.858	-21.228	0.000	-0.006	-1.204	-1107.138	-1.619	0.000	1.619	-0.613	-0.001
30.00	-17.518	-20.014	0.000	-0.007	-1.204	-1017.849	-2.327	0.000	2.327	-0.734	-0.001
35.00	-17.175	-18.824	0.000	-0.008	-1.204	-930.261	-3.160	0.000	3.160	-0.853	-0.001
40.00	-16.823	-17.657	0.000	-0.009	-1.204	-844.386	-4.118	0.000	4.118	-0.970	-0.001
45.00	-16.457	-16.521	0.000	-0.010	-1.204	-760.272	-5.196	0.000	5.196	-1.085	-0.001
48.25	-16.217	-15.795	0.000	-0.011	-1.204	-706.786	-5.961	0.000	5.961	-1.159	-0.001
50.00	-16.088	-15.170	0.000	-0.012	-1.204	-678.406	-6.394	0.000	6.394	-1.199	-0.001
53.25	-15.831	-14.037	0.000	-0.013	-1.204	-626.122	-7.235	0.000	7.235	-1.270	-0.001
55.00	-15.711	-13.685	0.000	-0.014	-1.205	-598.418	-7.708	0.000	7.708	-1.308	-0.002
60.00	-15.335	-12.725	0.000	-0.016	-1.205	-519.866	-9.142	0.000	9.142	-1.424	-0.002
65.00	-14.956	-11.786	0.001	-0.019	-1.205	-443.194	-10.694	0.001	10.694	-1.534	-0.002
70.00	-14.576	-10.870	0.001	-0.021	-1.205	-368.414	-12.355	0.001	12.355	-1.634	-0.002
75.00	-14.192	-9.981	0.001	-0.024	-1.205	-295.534	-14.117	0.001	14.117	-1.724	-0.003
77.00	-13.584	-9.561	0.001	-0.025	-1.205	-267.151	-14.847	0.001	14.847	-1.758	-0.003
80.00	-13.360	-9.056	0.001	-0.028	-1.205	-226.400	-15.967	0.001	15.967	-1.804	-0.003
85.00	-12.981	-8.241	0.001	-0.031	-1.206	-159.600	-17.892	0.001	17.892	-1.867	-0.003
87.00	-7.448	-5.595	0.000	-0.032	-1.206	-133.638	-18.679	0.002	18.679	-1.888	-0.004
90.00	-7.229	-5.220	0.000	-0.034	-1.206	-111.294	-19.875	0.002	19.875	-1.916	-0.004
95.00	-6.864	-4.614	0.001	-0.036	-1.206	-75.151	-21.903	0.002	21.903	-1.953	-0.004
98.00	-6.649	-4.260	0.001	-0.037	-1.206	-54.559	-23.136	0.003	23.136	-1.971	-0.005
99.00	-2.974	-2.215	0.000	-0.038	-1.206	-47.910	-23.550	0.003	23.550	-1.976	-0.005
100.00	-2.900	-2.041	0.000	-0.038	-1.206	-44.936	-23.964	0.003	23.964	-1.980	-0.005
101.75	-2.772	-1.740	0.000	-0.039	-1.206	-39.860	-24.691	0.003	24.691	-1.988	-0.005
105.00	-2.546	-1.493	0.000	-0.039	-1.206	-30.851	-26.048	0.003	26.048	-2.000	-0.006
109.00	-2.273	-1.197	0.000	-0.040	-1.206	-20.667	-27.730	0.004	27.730	-2.013	-0.006
110.00	-2.214	-1.111	0.000	-0.041	-1.206	-18.394	-28.152	0.004	28.152	-2.016	-0.006
115.00	-1.913	-0.682	0.000	-0.042	-1.206	-7.326	-30.269	0.005	30.269	-2.025	-0.007
118.00	-0.826	-0.152	0.000	-0.042	-1.206	-1.588	-31.542	0.006	31.542	-2.027	-0.008
119.00	-0.820	0.000	0.000	0.000	-1.207	-0.762	0.000	0.000	31.966	-2.027	-0.008

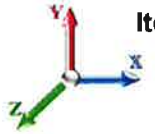
Resulting Stresses

Structure:	CT13070-A-SBA	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 12	

Load Case: 85 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 22

	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	0.47	0.68	0.00	0.01	0.00	26.84	27.34	52.0		0.526
5.00	0.46	0.68	0.00	0.01	0.00	26.32	26.81	52.0		0.516
10.00	0.45	0.68	0.00	0.01	0.00	25.75	26.23	52.0		0.505
15.00	0.44	0.69	0.00	0.01	0.00	25.13	25.60	52.0		0.492
20.00	0.42	0.69	0.00	0.01	0.00	24.46	24.91	52.0		0.479
25.00	0.41	0.69	0.00	0.01	0.00	23.73	24.17	52.0		0.465
30.00	0.39	0.70	0.00	0.01	0.00	22.93	23.36	52.0		0.449
35.00	0.38	0.70	0.00	0.01	0.00	22.06	22.47	52.0		0.432
40.00	0.37	0.70	0.00	0.02	0.00	21.10	21.50	52.0		0.414
45.00	0.35	0.71	0.00	0.02	0.00	20.05	20.44	52.0		0.393
48.25	0.34	0.71	0.00	0.02	0.00	19.32	19.70	52.0		0.379
50.00	0.33	0.71	0.00	0.02	0.00	18.91	19.28	52.0		0.371
53.25	0.37	0.84	0.00	0.02	0.00	20.92	21.34	52.0		0.411
55.00	0.36	0.84	0.00	0.02	0.00	20.39	20.81	52.0		0.400
60.00	0.35	0.85	0.00	0.02	0.00	18.76	19.17	52.0		0.369
65.00	0.33	0.85	0.00	0.02	0.00	16.97	17.37	52.0		0.334
70.00	0.32	0.85	0.00	0.02	0.00	15.00	15.39	52.0		0.296
75.00	0.30	0.86	0.00	0.03	0.00	12.81	13.20	52.0		0.254
77.00	0.29	0.83	0.00	0.03	0.00	11.88	12.26	52.0		0.236
80.00	0.28	0.83	0.00	0.03	0.00	10.47	10.86	52.0		0.209
85.00	0.26	0.84	0.00	0.03	0.00	7.90	8.30	52.0		0.160
87.00	0.18	0.49	0.00	0.03	0.00	6.80	7.03	52.0		0.135
90.00	0.17	0.48	0.00	0.03	0.00	5.90	6.14	52.0		0.118
95.00	0.16	0.47	0.00	0.03	0.00	4.28	4.53	52.0		0.087
98.00	0.15	0.47	0.00	0.04	0.00	3.25	3.51	52.0		0.068
99.00	0.08	0.21	0.00	0.04	0.00	2.90	3.01	52.0		0.058
100.00	0.07	0.21	0.00	0.04	0.00	2.76	2.86	52.0		0.055
101.75	0.08	0.25	0.00	0.05	0.00	3.01	3.13	52.0		0.060
105.00	0.07	0.23	0.00	0.05	0.00	2.45	2.56	52.0		0.049
109.00	0.06	0.21	0.00	0.05	0.00	1.75	1.86	52.0		0.036
109.00	0.06	0.21	0.00	0.05	0.00	1.75	1.86	52.0		0.032
110.00	0.04	0.18	0.00	0.05	0.00	1.38	1.48	33.6	33.6	0.044
115.00	0.03	0.15	0.00	0.05	0.00	0.55	0.67	33.6	33.6	0.020
118.00	0.01	0.07	0.00	0.05	0.00	0.12	0.23	33.6	33.6	0.007
119.00	0.00	0.07	0.00	0.05	0.00	0.06	0.20	33.6	33.6	0.006

Wind Loading - Shaft

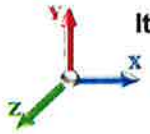
Structure: CT13070-A-SBA
Site Name: Waterbury 4, CT
Height: 119.00 (ft)
Base Elev: 0.000 (ft)

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

2/15/2016
Page: 13

Tower Engineering Solutions

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



Iterations: 22

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		0.00	1.00	13.871	23.44	302.97	0.650	0.500	0.00	0.000	0.00	0.0	0.0	0.0
5.00		0.00	1.00	13.871	23.44	296.40	0.650	0.500	5.00	20.773	13.50	316.5	149.1	1130.8
10.00		0.00	1.00	13.871	23.44	289.83	0.650	0.500	5.00	20.327	13.21	309.7	145.8	1105.9
15.00		0.00	1.00	13.871	23.44	283.27	0.650	0.500	5.00	19.881	12.92	302.9	142.6	1080.9
20.00		0.00	1.00	13.871	23.44	276.70	0.650	0.500	5.00	19.435	12.63	296.1	139.3	1056.0
25.00		0.00	1.00	13.871	23.44	270.14	0.650	0.500	5.00	18.989	12.34	289.3	136.0	1031.0
30.00		0.00	1.00	13.871	23.44	263.57	0.650	0.500	5.00	18.543	12.05	282.5	132.8	1006.1
35.00		0.00	1.02	14.106	23.84	259.17	0.650	0.500	5.00	18.097	11.76	280.4	129.5	981.2
40.00		0.00	1.06	14.655	24.77	257.42	0.650	0.500	5.00	17.651	11.47	284.2	126.2	956.2
45.00		0.00	1.09	15.156	25.61	254.92	0.650	0.500	5.00	17.205	11.18	286.4	123.0	931.3
48.25	Bot - Section 2	0.00	1.11	15.462	26.13	252.97	0.650	0.500	3.25	10.944	7.11	185.9	78.5	592.3
50.00		0.00	1.13	15.620	26.40	251.82	0.650	0.500	1.75	5.906	3.84	101.3	42.6	546.9
53.25	Top - Section 1	0.00	1.15	15.903	26.88	249.52	0.650	0.500	3.25	10.823	7.04	189.1	77.7	1001.3
55.00		0.00	1.16	16.051	27.13	252.33	0.650	0.500	1.75	5.750	3.74	101.4	41.4	266.5
60.00		0.00	1.19	16.455	27.81	248.34	0.650	0.500	5.00	16.127	10.48	291.5	115.1	746.1
65.00		0.00	1.21	16.836	28.45	243.96	0.650	0.500	5.00	15.681	10.19	290.0	111.8	724.7
70.00		0.00	1.24	17.196	29.06	239.24	0.650	0.500	5.00	15.235	9.90	287.8	108.5	703.4
75.00		0.00	1.26	17.538	29.64	234.23	0.650	0.500	5.00	14.789	9.61	284.9	105.2	682.1
77.00	Appurtenance(s)	0.00	1.27	17.671	29.86	232.15	0.650	0.500	2.00	5.791	3.76	112.4	41.6	267.2
80.00		0.00	1.29	17.865	30.19	228.95	0.650	0.500	3.00	8.552	5.56	167.8	61.2	394.3
85.00		0.00	1.31	18.177	30.72	223.42	0.650	0.500	5.00	13.897	9.03	277.5	98.7	639.4
87.00	Appurtenance(s)	0.00	1.32	18.298	30.92	221.15	0.650	0.500	2.00	5.434	3.53	109.2	39.0	250.2
90.00		0.00	1.33	18.476	31.22	217.68	0.650	0.500	3.00	8.017	5.21	162.7	57.3	368.7
95.00		0.00	1.35	18.764	31.71	211.73	0.650	0.500	5.00	13.005	8.45	268.1	92.2	596.7
98.00	Bot - Section 3	0.00	1.36	18.931	31.99	208.07	0.650	0.500	3.00	7.589	4.93	157.8	54.1	348.2
99.00	Appurtenance(s)	0.00	1.37	18.986	32.09	206.83	0.650	0.500	1.00	2.536	1.65	52.9	18.2	193.6
100.00		0.00	1.37	19.041	32.18	205.59	0.650	0.500	1.00	2.518	1.64	52.7	18.1	192.1
101.75	Top - Section 2	0.00	1.38	19.135	32.34	203.40	0.650	0.500	1.75	4.363	2.84	91.7	31.2	332.7
105.00		0.00	1.39	19.308	32.63	202.90	0.650	0.500	3.25	7.958	5.17	168.8	56.7	303.5
109.00	Top - Section 3	0.00	1.41	19.515	32.98	197.76	0.650	0.500	4.00	9.536	6.20	204.4	67.6	363.1
110.00		0.00	1.41	19.566	33.07	189.42	0.590	0.500	1.00	2.250	1.33	43.9	16.2	101.9
115.00		0.00	1.43	19.816	33.49	190.63	0.590	0.500	5.00	11.250	6.64	222.3	80.9	509.3
118.00	Appurtenance(s)	0.00	1.44	19.963	33.74	191.33	0.590	0.500	3.00	6.750	3.98	134.4	48.6	305.6
119.00	Appurtenance(s)	0.00	1.44	20.011	33.82	191.56	0.590	0.500	1.00	2.250	1.33	44.9	16.2	101.9
								Totals:	**119.00**			**6,651.6**		**19,811.1**

Discrete Appurtenance Forces

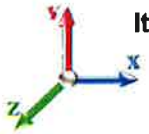
Structure:	CT13070-A-SB	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 14	

TES Tower Engineering Solutions

Load Case: 73.61 mph Wind with 0.5" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 22

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	119.00	VHLP2.5-11	2	20.059	33.899	1.00	17.84	194.00	1.583	1.000	604.76	957.54	604.76
2	118.00	LLPX310R	3	19.963	33.737	0.71	11.42	163.50	0.000	0.000	385.17	0.00	0.00
3	118.00	3 ft Standoff	3	19.963	33.737	0.75	9.77	189.00	0.000	0.000	329.44	0.00	0.00
4	118.00	2.5GHz RRH	3	19.963	33.737	0.75	4.70	134.70	0.000	0.000	158.65	0.00	0.00
5	99.00	APX16DWV-16DWV-S-E-AC	6	18.986	32.086	0.66	29.99	431.52	0.000	0.000	962.34	0.00	0.00
6	99.00	Low Profile Platform	1	18.986	32.086	1.00	27.00	1800.00	0.000	0.000	866.33	0.00	0.00
7	99.00	LNX-6515DS-VTM	3	18.986	32.086	0.84	30.04	336.33	0.000	0.000	963.82	0.00	0.00
8	99.00	Double TMA 17/21	3	18.986	32.086	0.75	1.10	39.42	0.000	0.000	35.19	0.00	0.00
9	99.00	ATMAA1412D-1A20	3	18.986	32.086	0.72	2.77	56.25	0.000	0.000	89.03	0.00	0.00
10	99.00	782 11056	3	18.986	32.086	0.82	0.56	8.49	0.000	0.000	18.07	0.00	0.00
11	87.00	SBNHH-1D65B	9	18.298	30.923	0.82	65.70	778.95	0.000	0.000	2031.67	0.00	0.00
12	87.00	RRH2X60-PCS	3	18.298	30.923	0.90	7.43	212.46	0.000	0.000	229.67	0.00	0.00
13	87.00	RRH2X60-700	3	18.298	30.923	0.74	9.40	240.39	0.000	0.000	290.78	0.00	0.00
14	87.00	Low Profile Platform	1	18.298	30.923	1.00	27.00	1800.00	0.000	0.000	834.93	0.00	0.00
15	87.00	DB-T1-6Z-8AB-0Z	2	18.298	30.923	0.86	10.24	143.02	0.000	0.000	316.80	0.00	0.00
16	87.00	BXA-80063/4CF	3	18.298	30.923	0.72	11.94	105.66	0.000	0.000	369.25	0.00	0.00
17	87.00	1900 MHz 4X45 RRH	3	18.298	30.923	0.99	8.82	235.11	0.000	0.000	272.86	0.00	0.00
18	77.00	APXV18-206517S-C	3	17.671	29.863	0.76	13.32	159.00	0.000	0.000	397.63	0.00	0.00
						Totals:		**7,027.80**			**9,156.41**		

Total Applied Force Summary

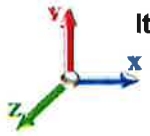
Structure:	CT13070-A-SB	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 15	

TES Tower Engineering Solutions

Load Case: 73.61 mph Wind with 0.5" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 22

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		316.53	1439.18	0.00	0.00
10.00		309.73	1414.23	0.00	0.00
15.00		302.93	1389.29	0.00	0.00
20.00		296.14	1364.34	0.00	0.00
25.00		289.34	1339.40	0.00	0.00
30.00		282.55	1314.45	0.00	0.00
35.00		280.42	1289.51	0.00	0.00
40.00		284.15	1264.56	0.00	0.00
45.00		286.45	1239.62	0.00	0.00
48.25		185.88	792.75	0.00	0.00
50.00		101.34	654.78	0.00	0.00
53.25		189.08	1201.72	0.00	0.00
55.00		101.38	374.46	0.00	0.00
60.00		291.51	1054.41	0.00	0.00
65.00		290.01	1033.08	0.00	0.00
70.00		287.79	1011.75	0.00	0.00
75.00		284.92	990.41	0.00	0.00
77.00	(3) appurtenances	510.04	549.58	0.00	0.00
80.00		167.83	560.56	0.00	0.00
85.00		277.49	916.55	0.00	0.00
87.00	(24) appurtenances	4455.19	3876.63	0.00	0.00
90.00		162.72	434.76	0.00	0.00
95.00		268.06	706.88	0.00	0.00
98.00		157.82	414.28	0.00	0.00
99.00	(19) appurtenances	2987.67	2887.61	0.00	0.00
100.00		52.66	194.35	0.00	0.00
101.75		91.72	336.59	0.00	0.00
105.00		168.79	310.71	0.00	0.00
109.00		204.43	371.94	0.00	0.00
110.00		43.90	104.08	0.00	0.00
115.00		222.29	520.38	0.00	0.00
118.00	(9) appurtenances	1007.61	799.43	0.00	0.00
119.00	(2) appurtenances	649.66	295.87	957.54	604.76
	Totals:	**15,808.01**	**32,448.14**	**957.54**	**604.76**

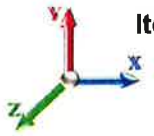
Resulting Forces and Deflections

Structure:	CT13070-A-SB	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 16	

Load Case: 73.61 mph Wind with 0.5" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 22

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	-15.837	-32.434	0.000	-0.003	-0.956	-1295.676	0.000	0.000	0.000	0.000	0.000
5.00	-15.574	-30.967	0.000	-0.003	-0.956	-1216.491	-0.055	0.000	0.055	-0.101	0.000
10.00	-15.313	-29.527	0.000	-0.003	-0.956	-1138.621	-0.215	0.000	0.215	-0.202	0.000
15.00	-15.053	-28.113	0.000	-0.003	-0.956	-1062.059	-0.481	0.000	0.481	-0.303	0.000
20.00	-14.796	-26.724	0.000	-0.004	-0.956	-986.794	-0.853	0.000	0.853	-0.404	0.000
25.00	-14.540	-25.362	0.000	-0.004	-0.956	-912.817	-1.330	0.000	1.330	-0.504	0.000
30.00	-14.286	-24.026	0.000	-0.005	-0.956	-840.118	-1.912	0.000	1.912	-0.604	-0.001
35.00	-14.030	-22.715	0.000	-0.006	-0.956	-768.688	-2.598	0.000	2.598	-0.702	-0.001
40.00	-13.765	-21.432	0.000	-0.006	-0.956	-698.540	-3.386	0.000	3.386	-0.799	-0.001
45.00	-13.488	-20.178	0.000	-0.007	-0.956	-629.715	-4.275	0.000	4.275	-0.894	-0.001
48.25	-13.305	-19.378	0.000	-0.008	-0.956	-585.881	-4.906	0.000	4.906	-0.955	-0.001
50.00	-13.207	-18.714	0.000	-0.008	-0.956	-562.598	-5.262	0.000	5.262	-0.988	-0.001
53.25	-13.011	-17.506	0.000	-0.009	-0.956	-519.674	-5.956	0.000	5.956	-1.047	-0.001
55.00	-12.922	-17.118	0.000	-0.010	-0.956	-496.906	-6.346	0.000	6.346	-1.079	-0.001
60.00	-12.636	-16.049	0.000	-0.011	-0.957	-432.296	-7.529	0.000	7.529	-1.176	-0.001
65.00	-12.347	-15.004	0.000	-0.013	-0.957	-369.117	-8.811	0.000	8.811	-1.267	-0.002
70.00	-12.056	-13.982	0.000	-0.014	-0.957	-307.383	-10.183	0.000	10.183	-1.350	-0.002
75.00	-11.758	-12.989	0.000	-0.016	-0.957	-247.106	-11.639	0.001	11.639	-1.426	-0.002
77.00	-11.242	-12.445	0.000	-0.017	-0.957	-223.590	-12.243	0.001	12.243	-1.454	-0.002
80.00	-11.069	-11.880	0.000	-0.018	-0.957	-189.865	-13.170	0.001	13.170	-1.492	-0.002
85.00	-10.774	-10.965	0.000	-0.020	-0.957	-134.519	-14.763	0.001	14.763	-1.545	-0.003
87.00	-6.218	-7.209	0.000	-0.021	-0.957	-112.971	-15.414	0.001	15.414	-1.563	-0.003
90.00	-6.047	-6.775	0.000	-0.022	-0.957	-94.318	-16.404	0.001	16.404	-1.587	-0.003
95.00	-5.761	-6.074	0.000	-0.024	-0.957	-64.085	-18.084	0.002	18.084	-1.619	-0.004
98.00	-5.593	-5.664	0.000	-0.025	-0.957	-46.801	-19.107	0.002	19.107	-1.634	-0.004
99.00	-2.524	-2.862	0.000	-0.025	-0.957	-41.208	-19.449	0.002	19.449	-1.638	-0.004
100.00	-2.466	-2.669	0.000	-0.025	-0.957	-38.684	-19.793	0.002	19.793	-1.642	-0.004
101.75	-2.365	-2.335	0.000	-0.025	-0.957	-34.369	-20.396	0.002	20.396	-1.648	-0.004
105.00	-2.188	-2.029	0.000	-0.026	-0.957	-26.683	-21.521	0.002	21.521	-1.658	-0.004
109.00	-1.973	-1.663	0.000	-0.026	-0.957	-17.932	-22.916	0.003	22.916	-1.670	-0.005
110.00	-1.926	-1.560	0.000	-0.027	-0.957	-15.959	-23.266	0.003	23.266	-1.673	-0.005
115.00	-1.689	-1.046	0.000	-0.027	-0.957	-6.329	-25.023	0.003	25.023	-1.680	-0.006
118.00	-0.658	-0.277	0.000	-0.028	-0.957	-1.263	-26.079	0.004	26.079	-1.682	-0.006
119.00	-0.650	0.000	0.000	0.000	-0.958	-0.605	0.000	0.000	26.431	-1.682	-0.006

Resulting Stresses

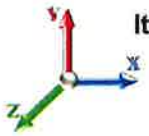
Structure:	CT13070-A-SBA	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 17	

Tower Engineering Solutions

Load Case: 73.61 mph Wind with 0.5" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 22

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	0.56	0.55	0.00	0.01	0.00	22.02	22.59	52.0		0.435
5.00	0.54	0.55	0.00	0.01	0.00	21.61	22.17	52.0		0.427
10.00	0.53	0.55	0.00	0.01	0.00	21.16	21.72	52.0		0.418
15.00	0.52	0.56	0.00	0.01	0.00	20.68	21.22	52.0		0.408
20.00	0.50	0.56	0.00	0.01	0.00	20.15	20.67	52.0		0.398
25.00	0.49	0.56	0.00	0.01	0.00	19.57	20.08	52.0		0.386
30.00	0.47	0.57	0.00	0.01	0.00	18.93	19.43	52.0		0.374
35.00	0.46	0.57	0.00	0.01	0.00	18.23	18.71	52.0		0.360
40.00	0.45	0.58	0.00	0.01	0.00	17.46	17.93	52.0		0.345
45.00	0.43	0.58	0.00	0.01	0.00	16.61	17.07	52.0		0.328
48.25	0.42	0.58	0.00	0.01	0.00	16.01	16.47	52.0		0.317
50.00	0.41	0.58	0.00	0.01	0.00	15.68	16.13	52.0		0.310
53.25	0.46	0.69	0.00	0.02	0.00	17.36	17.87	52.0		0.344
55.00	0.46	0.69	0.00	0.02	0.00	16.93	17.43	52.0		0.335
60.00	0.44	0.70	0.00	0.02	0.00	15.60	16.09	52.0		0.310
65.00	0.42	0.70	0.00	0.02	0.00	14.13	14.61	52.0		0.281
70.00	0.41	0.71	0.00	0.02	0.00	12.51	12.98	52.0		0.250
75.00	0.39	0.71	0.00	0.02	0.00	10.71	11.17	52.0		0.215
77.00	0.38	0.69	0.00	0.02	0.00	9.94	10.39	52.0		0.200
80.00	0.37	0.69	0.00	0.02	0.00	8.78	9.23	52.0		0.178
85.00	0.35	0.69	0.00	0.02	0.00	6.65	7.11	52.0		0.137
87.00	0.23	0.41	0.00	0.02	0.00	5.74	6.02	52.0		0.116
90.00	0.22	0.40	0.00	0.03	0.00	5.00	5.28	52.0		0.102
95.00	0.21	0.40	0.00	0.03	0.00	3.65	3.93	52.0		0.076
98.00	0.20	0.40	0.00	0.03	0.00	2.79	3.08	52.0		0.059
99.00	0.10	0.18	0.00	0.03	0.00	2.49	2.62	52.0		0.050
100.00	0.10	0.18	0.00	0.03	0.00	2.38	2.50	52.0		0.048
101.75	0.10	0.21	0.00	0.04	0.00	2.60	2.73	52.0		0.053
105.00	0.09	0.20	0.00	0.04	0.00	2.12	2.25	52.0		0.043
109.00	0.08	0.19	0.00	0.04	0.00	1.52	1.64	52.0		0.032
109.00	0.08	0.19	0.00	0.04	0.00	1.52	1.64	52.0		0.028
110.00	0.06	0.15	0.00	0.04	0.00	1.20	1.30	33.6	33.6	0.039
115.00	0.04	0.13	0.00	0.04	0.00	0.48	0.59	33.6	33.6	0.018
118.00	0.01	0.05	0.00	0.04	0.00	0.09	0.19	33.6	33.6	0.006
119.00	0.00	0.05	0.00	0.04	0.00	0.05	0.16	33.6	33.6	0.005

Wind Loading - Shaft

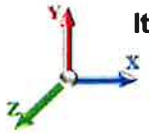
Structure: CT13070-A-SBA
Site Name: Waterbury 4, CT
Height: 119.00 (ft)
Base Elev: 0.000 (ft)

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

2/15/2016

TES Tower Engineering Solutions

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



Iterations: 20

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	205.79	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	201.33	0.650	0.000	5.00	20.356	13.23	143.1	0.0	981.7
10.00		0.00	1.00	6.400	10.82	196.87	0.650	0.000	5.00	19.910	12.94	140.0	0.0	960.0
15.00		0.00	1.00	6.400	10.82	192.41	0.650	0.000	5.00	19.464	12.65	136.8	0.0	938.4
20.00		0.00	1.00	6.400	10.82	187.95	0.650	0.000	5.00	19.018	12.36	133.7	0.0	916.7
25.00		0.00	1.00	6.400	10.82	183.49	0.650	0.000	5.00	18.572	12.07	130.6	0.0	895.0
30.00		0.00	1.00	6.400	10.82	179.03	0.650	0.000	5.00	18.126	11.78	127.4	0.0	873.3
35.00		0.00	1.02	6.509	11.00	176.04	0.650	0.000	5.00	17.680	11.49	126.4	0.0	851.7
40.00		0.00	1.06	6.762	11.43	174.85	0.650	0.000	5.00	17.234	11.20	128.0	0.0	830.0
45.00		0.00	1.09	6.993	11.82	173.16	0.650	0.000	5.00	16.788	10.91	129.0	0.0	808.3
48.25	Bot - Section 2	0.00	1.11	7.134	12.06	171.83	0.650	0.000	3.25	10.673	6.94	83.6	0.0	513.8
50.00		0.00	1.13	7.207	12.18	171.05	0.650	0.000	1.75	5.760	3.74	45.6	0.0	504.3
53.25	Top - Section 1	0.00	1.15	7.338	12.40	169.49	0.650	0.000	3.25	10.552	6.86	85.1	0.0	923.6
55.00		0.00	1.16	7.406	12.52	171.40	0.650	0.000	1.75	5.604	3.64	45.6	0.0	225.1
60.00		0.00	1.19	7.592	12.83	168.68	0.650	0.000	5.00	15.711	10.21	131.0	0.0	631.0
65.00		0.00	1.21	7.768	13.13	165.71	0.650	0.000	5.00	15.265	9.92	130.2	0.0	612.9
70.00		0.00	1.24	7.934	13.41	162.51	0.650	0.000	5.00	14.819	9.63	129.1	0.0	594.9
75.00		0.00	1.26	8.092	13.68	159.10	0.650	0.000	5.00	14.373	9.34	127.8	0.0	576.8
77.00	Appurtenance(s)	0.00	1.27	8.153	13.78	157.69	0.650	0.000	2.00	5.624	3.66	50.4	0.0	225.7
80.00		0.00	1.29	8.242	13.93	155.51	0.650	0.000	3.00	8.302	5.40	75.2	0.0	333.1
85.00		0.00	1.31	8.387	14.17	151.76	0.650	0.000	5.00	13.480	8.76	124.2	0.0	540.7
87.00	Appurtenance(s)	0.00	1.32	8.442	14.27	150.22	0.650	0.000	2.00	5.267	3.42	48.8	0.0	211.2
90.00		0.00	1.33	8.525	14.41	147.86	0.650	0.000	3.00	7.767	5.05	72.7	0.0	311.4
95.00		0.00	1.35	8.657	14.63	143.82	0.650	0.000	5.00	12.588	8.18	119.7	0.0	504.6
98.00	Bot - Section 3	0.00	1.36	8.735	14.76	141.33	0.650	0.000	3.00	7.339	4.77	70.4	0.0	294.1
99.00	Appurtenance(s)	0.00	1.37	8.760	14.80	140.49	0.650	0.000	1.00	2.452	1.59	23.6	0.0	175.4
100.00		0.00	1.37	8.785	14.85	139.65	0.650	0.000	1.00	2.434	1.58	23.5	0.0	174.1
101.75	Top - Section 2	0.00	1.38	8.829	14.92	138.16	0.650	0.000	1.75	4.217	2.74	40.9	0.0	301.5
105.00		0.00	1.39	8.908	15.06	137.82	0.650	0.000	3.25	7.687	5.00	75.2	0.0	246.9
109.00	Top - Section 3	0.00	1.41	9.004	15.22	134.33	0.650	0.000	4.00	9.203	5.98	91.0	0.0	295.5
110.00		0.00	1.41	9.028	15.26	128.66	0.590	0.000	1.00	2.167	1.28	19.5	0.0	85.7
115.00		0.00	1.43	9.143	15.45	129.48	0.590	0.000	5.00	10.833	6.39	98.8	0.0	428.4
118.00	Appurtenance(s)	0.00	1.44	9.211	15.57	129.96	0.590	0.000	3.00	6.500	3.83	59.7	0.0	257.0
119.00	Appurtenance(s)	0.00	1.44	9.233	15.60	130.12	0.590	0.000	1.00	2.167	1.28	19.9	0.0	85.7
								Totals:	**119.00**			**2,986.7**		**17,108.3**

Discrete Appurtenance Forces

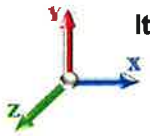
Structure:	CT13070-A-SB	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 19	

Tower Engineering Solutions

Load Case: 50 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 20

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	119.00	VHLP2.5-11	2	9.255	15.641	1.00	16.86	95.20	1.583	1.000	263.70	417.53	263.70
2	118.00	LLPX310R	3	9.211	15.566	0.69	10.00	85.80	0.000	0.000	155.63	0.00	0.00
3	118.00	3 ft Standoff	3	9.211	15.566	0.75	5.92	120.00	0.000	0.000	92.11	0.00	0.00
4	118.00	2.5GHz RRH	3	9.211	15.566	0.73	3.99	99.00	0.000	0.000	62.04	0.00	0.00
5	99.00	APX16DWV-16DWV-S-E-AC	6	8.760	14.804	0.65	28.15	244.20	0.000	0.000	416.79	0.00	0.00
6	99.00	Low Profile Platform	1	8.760	14.804	1.00	22.00	1500.00	0.000	0.000	325.69	0.00	0.00
7	99.00	LNX-6515DS-VTM	3	8.760	14.804	0.84	28.72	150.90	0.000	0.000	425.13	0.00	0.00
8	99.00	Double TMA 17/21	3	8.760	14.804	0.72	0.89	33.00	0.000	0.000	13.13	0.00	0.00
9	99.00	ATMAA1412D-1A20	3	8.760	14.804	0.70	2.46	39.00	0.000	0.000	36.37	0.00	0.00
10	99.00	782 11056	3	8.760	14.804	0.78	0.40	5.40	0.000	0.000	5.90	0.00	0.00
11	87.00	SBNHH-1D65B	9	8.442	14.268	0.82	62.07	360.00	0.000	0.000	885.56	0.00	0.00
12	87.00	RRH2X60-PCS	3	8.442	14.268	0.89	6.88	165.00	0.000	0.000	98.12	0.00	0.00
13	87.00	RRH2X60-700	3	8.442	14.268	0.73	8.66	180.00	0.000	0.000	123.57	0.00	0.00
14	87.00	Low Profile Platform	1	8.442	14.268	1.00	22.00	1500.00	0.000	0.000	313.89	0.00	0.00
15	87.00	DB-T1-6Z-8AB-0Z	2	8.442	14.268	0.85	9.72	88.00	0.000	0.000	138.66	0.00	0.00
16	87.00	BXA-80063/4CF	3	8.442	14.268	0.72	11.11	29.70	0.000	0.000	158.58	0.00	0.00
17	87.00	1900 MHz 4X45 RRH	3	8.442	14.268	0.99	8.20	178.50	0.000	0.000	117.02	0.00	0.00
18	77.00	APXV18-206517S-C	3	8.153	13.779	0.74	11.46	79.20	0.000	0.000	157.84	0.00	0.00
						Totals:		**4,952.90**			**3,789.74**		

Total Applied Force Summary

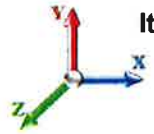
Structure:	CT13070-A-SB	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 20	

TES Tower Engineering Solutions

Load Case: 50 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 20

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		143.11	1290.07	0.00	0.00
10.00		139.98	1268.39	0.00	0.00
15.00		136.84	1246.72	0.00	0.00
20.00		133.71	1225.04	0.00	0.00
25.00		130.57	1203.36	0.00	0.00
30.00		127.43	1181.69	0.00	0.00
35.00		126.41	1160.01	0.00	0.00
40.00		128.01	1138.34	0.00	0.00
45.00		128.96	1116.66	0.00	0.00
48.25		83.64	714.21	0.00	0.00
50.00		45.60	612.22	0.00	0.00
53.25		85.06	1124.07	0.00	0.00
55.00		45.59	333.04	0.00	0.00
60.00		131.02	939.35	0.00	0.00
65.00		130.25	921.29	0.00	0.00
70.00		129.15	903.23	0.00	0.00
75.00		127.76	885.16	0.00	0.00
77.00	(3) appurtenances	208.21	428.21	0.00	0.00
80.00		75.17	499.37	0.00	0.00
85.00		124.19	817.84	0.00	0.00
87.00	(24) appurtenances	1884.25	2823.28	0.00	0.00
90.00		72.73	377.50	0.00	0.00
95.00		119.72	614.71	0.00	0.00
98.00		70.42	360.16	0.00	0.00
99.00	(19) appurtenances	1246.61	2169.89	0.00	0.00
100.00		23.49	176.27	0.00	0.00
101.75		40.90	305.34	0.00	0.00
105.00		75.23	254.06	0.00	0.00
109.00		91.02	304.31	0.00	0.00
110.00		19.50	87.89	0.00	0.00
115.00		98.76	439.44	0.00	0.00
118.00	(9) appurtenances	369.48	568.46	0.00	0.00
119.00	(2) appurtenances	283.65	180.88	417.53	263.70
	Totals:	**6,776.43**	**27,670.44**	**417.53**	**263.70**

Resulting Forces and Deflections

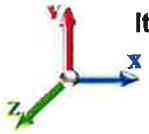
Structure: CT13070-A-SB
Site Name: Waterbury 4, CT
Height: 119.00 (ft)
Base Elev: 0.000 (ft)

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

2/15/2016

Tower Engineering Solutions

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



Iterations: 20

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	-6.786	-27.668	0.000	0.000	-0.417	-546.651	0.000	0.000	0.000	0.000	0.000
5.00	-6.662	-26.373	0.000	0.000	-0.417	-512.721	-0.023	0.000	0.023	-0.043	0.000
10.00	-6.539	-25.100	0.000	0.000	-0.417	-479.411	-0.091	0.000	0.091	-0.085	0.000
15.00	-6.418	-23.849	0.000	0.000	-0.417	-446.714	-0.203	0.000	0.203	-0.128	0.000
20.00	-6.298	-22.619	0.000	-0.001	-0.417	-414.625	-0.359	0.000	0.359	-0.170	0.000
25.00	-6.179	-21.412	0.000	-0.001	-0.417	-383.138	-0.560	0.000	0.560	-0.212	0.000
30.00	-6.061	-20.226	0.000	-0.001	-0.417	-352.244	-0.805	0.000	0.805	-0.254	0.000
35.00	-5.943	-19.063	0.000	-0.001	-0.417	-321.939	-1.094	0.000	1.094	-0.295	0.000
40.00	-5.821	-17.921	0.000	-0.001	-0.417	-292.225	-1.425	0.000	1.425	-0.336	0.000
45.00	-5.695	-16.802	0.000	-0.001	-0.417	-263.119	-1.798	0.000	1.798	-0.376	0.000
48.25	-5.612	-16.086	0.000	-0.001	-0.417	-244.612	-2.063	0.000	2.063	-0.401	0.000
50.00	-5.567	-15.473	0.000	-0.001	-0.417	-234.791	-2.213	0.000	2.213	-0.415	0.000
53.25	-5.478	-14.347	0.000	-0.002	-0.417	-216.699	-2.504	0.000	2.504	-0.439	-0.001
55.00	-5.437	-14.012	0.000	-0.002	-0.417	-207.112	-2.668	0.000	2.668	-0.453	-0.001
60.00	-5.307	-13.070	0.000	-0.002	-0.417	-179.929	-3.164	0.000	3.164	-0.493	-0.001
65.00	-5.176	-12.147	0.000	-0.002	-0.417	-153.394	-3.701	0.000	3.701	-0.531	-0.001
70.00	-5.045	-11.242	0.000	-0.003	-0.417	-127.514	-4.276	0.000	4.276	-0.565	-0.001
75.00	-4.912	-10.356	0.000	-0.003	-0.417	-102.290	-4.886	0.000	4.886	-0.597	-0.001
77.00	-4.702	-9.929	0.000	-0.003	-0.417	-92.466	-5.138	0.000	5.138	-0.608	-0.001
80.00	-4.624	-9.429	0.000	-0.003	-0.417	-78.362	-5.526	0.000	5.526	-0.624	-0.001
85.00	-4.493	-8.612	0.000	-0.004	-0.417	-55.240	-6.192	0.000	6.192	-0.646	-0.001
87.00	-2.578	-5.810	0.000	-0.004	-0.417	-46.254	-6.465	0.000	6.465	-0.653	-0.001
90.00	-2.502	-5.433	0.000	-0.004	-0.417	-38.521	-6.879	0.000	6.879	-0.663	-0.001
95.00	-2.376	-4.819	0.000	-0.004	-0.417	-26.011	-7.581	0.000	7.581	-0.676	-0.002
98.00	-2.302	-4.459	0.000	-0.004	-0.417	-18.883	-8.008	0.000	8.008	-0.682	-0.002
99.00	-1.029	-2.305	0.000	-0.005	-0.417	-16.582	-8.151	0.000	8.151	-0.684	-0.002
100.00	-1.004	-2.128	0.000	-0.005	-0.417	-15.553	-8.294	0.000	8.294	-0.685	-0.002
101.75	-0.959	-1.824	0.000	-0.005	-0.417	-13.796	-8.546	0.000	8.546	-0.688	-0.002
105.00	-0.881	-1.570	0.000	-0.005	-0.417	-10.678	-9.016	0.000	9.016	-0.692	-0.002
109.00	-0.787	-1.267	0.000	-0.005	-0.417	-7.153	-9.598	0.000	9.598	-0.697	-0.002
110.00	-0.766	-1.180	0.000	-0.005	-0.417	-6.367	-9.744	0.001	9.744	-0.698	-0.002
115.00	-0.662	-0.741	0.000	-0.005	-0.417	-2.536	-10.476	0.001	10.476	-0.701	-0.003
118.00	-0.286	-0.177	0.000	-0.005	-0.417	-0.549	-10.917	0.001	10.917	-0.701	-0.003
119.00	-0.284	0.000	0.000	0.000	-0.418	-0.264	0.000	0.000	11.064	-0.702	-0.003

Resulting Stresses

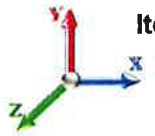
Structure:	CT13070-A-SBA	**Code:**	EIA/TIA-222-F	2/15/2016	
Site Name:	Waterbury 4, CT	**Exposure:**	C		
Height:	119.00 (ft)	**Gh:**	1.69		
Base Elev:	0.000 (ft)	**Struct Class:**	II	Page: 22	

TES Tower Engineering Solutions

Load Case: 50 mph Wind with 0" Ice

Dead Load Factor 1.00

Wind Load Factor 1.00



Iterations: 20

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	0.47	0.23	0.00	0.00	0.00	9.29	9.77	52.0		0.188
5.00	0.46	0.24	0.00	0.00	0.00	9.11	9.58	52.0		0.184
10.00	0.45	0.24	0.00	0.00	0.00	8.91	9.37	52.0		0.180
15.00	0.44	0.24	0.00	0.00	0.00	8.70	9.14	52.0		0.176
20.00	0.42	0.24	0.00	0.00	0.00	8.47	8.90	52.0		0.171
25.00	0.41	0.24	0.00	0.00	0.00	8.21	8.63	52.0		0.166
30.00	0.40	0.24	0.00	0.00	0.00	7.94	8.35	52.0		0.161
35.00	0.39	0.24	0.00	0.00	0.00	7.63	8.03	52.0		0.155
40.00	0.37	0.24	0.00	0.01	0.00	7.30	7.69	52.0		0.148
45.00	0.36	0.24	0.00	0.01	0.00	6.94	7.31	52.0		0.141
48.25	0.35	0.25	0.00	0.01	0.00	6.69	7.05	52.0		0.136
50.00	0.34	0.25	0.00	0.01	0.00	6.54	6.90	52.0		0.133
53.25	0.38	0.29	0.00	0.01	0.00	7.24	7.64	52.0		0.147
55.00	0.37	0.29	0.00	0.01	0.00	7.06	7.45	52.0		0.143
60.00	0.36	0.29	0.00	0.01	0.00	6.49	6.87	52.0		0.132
65.00	0.34	0.29	0.00	0.01	0.00	5.87	6.24	52.0		0.120
70.00	0.33	0.30	0.00	0.01	0.00	5.19	5.54	52.0		0.107
75.00	0.31	0.30	0.00	0.01	0.00	4.43	4.77	52.0		0.092
77.00	0.30	0.29	0.00	0.01	0.00	4.11	4.44	52.0		0.085
80.00	0.29	0.29	0.00	0.01	0.00	3.62	3.95	52.0		0.076
85.00	0.28	0.29	0.00	0.01	0.00	2.73	3.05	52.0		0.059
87.00	0.19	0.17	0.00	0.01	0.00	2.35	2.56	52.0		0.049
90.00	0.18	0.17	0.00	0.01	0.00	2.04	2.24	52.0		0.043
95.00	0.17	0.16	0.00	0.01	0.00	1.48	1.68	52.0		0.032
98.00	0.16	0.16	0.00	0.01	0.00	1.12	1.32	52.0		0.025
99.00	0.08	0.07	0.00	0.01	0.00	1.00	1.09	52.0		0.021
100.00	0.08	0.07	0.00	0.01	0.00	0.95	1.04	52.0		0.020
101.75	0.08	0.09	0.00	0.02	0.00	1.04	1.14	52.0		0.022
105.00	0.07	0.08	0.00	0.02	0.00	0.85	0.93	52.0		0.018
109.00	0.06	0.07	0.00	0.02	0.00	0.61	0.68	52.0		0.013
109.00	0.06	0.07	0.00	0.02	0.00	0.61	0.68	52.0		0.012
110.00	0.05	0.06	0.00	0.02	0.00	0.48	0.54	33.6	33.6	0.016
115.00	0.03	0.05	0.00	0.02	0.00	0.19	0.25	33.6	33.6	0.007
118.00	0.01	0.02	0.00	0.02	0.00	0.04	0.08	33.6	33.6	0.002
119.00	0.00	0.02	0.00	0.02	0.00	0.02	0.07	33.6	33.6	0.002

Reactions

Load Case	Shear FX (kips)	Shear FZ (kips)	Axial FY (kips)	Moment MX (ft-kips)	Moment MY (ft-kips)	Moment MZ (ft-kips)
85 mph Wind with 0" Ice	19.6	0.00	27.65	0.00	1.20	1579.74
73.61 mph Wind with 0.5" Ice	15.8	0.00	32.43	0.00	0.96	1295.68
50 mph Wind with 0" Ice	6.8	0.00	27.67	0.00	0.42	546.65

Max Stresses

Load Case	fa Axial (Y) (ksi)	fvx Shear (X) (ksi)	fvz Shear (Z) (ksi)	fvt Torsion (ksi)	fbx Bending (X) (ksi)	fbz Bending (Z) (ksi)	Combined Stress (ksi)	Allowable Stress (ksi)	Elev (ft)	Stress Ratio
85 mph Wind with 0" Ice	0.47	0.68	0.00	0.01	0.00	26.84	27.34	52.0	0.00	0.526
73.61 mph Wind with 0.5" Ice	0.56	0.55	0.00	0.01	0.00	22.02	22.59	52.0	0.00	0.435
50 mph Wind with 0" Ice	0.47	0.23	0.00	0.00	0.00	9.29	9.77	52.0	0.00	0.188

Monopole Mat Foundation Design

			Date: 2/15/2016
Customer Name:	Verizon	EIA/TIA Standard:	EIA-222-F
Site Name:	Waterbury 4, CT	Structure Height (Ft.):	119
Site Number:	CT13070-A-SBA	Engineer Name:	J. Tibbetts
Engr. Number:	20578	Engineer Login ID:	

Foundation Info Obtained from: Drawings/Calculations

Structure Type: Monopole

Analysis or Design? Analysis

Base Reactions (Unfactored)

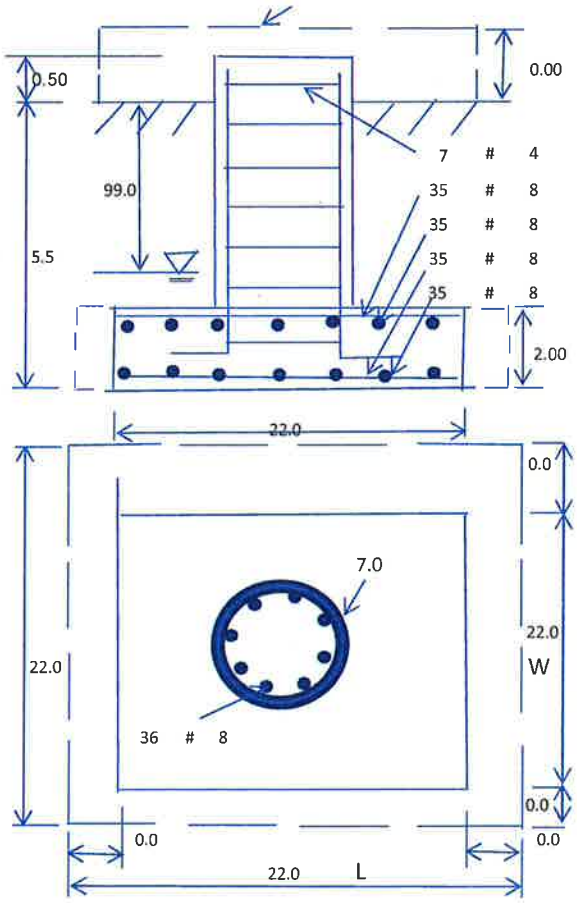
Axial Load (Kips):	27.7	Shear Force (Kips):	19.6
Uplift Force (Kips):	0.0	Moment (Kips-ft):	1579.7

Foundation Geometries:

		Mods required -Yes/No ?:	No
Diameter of Pier (ft.):	7.0	Depth of Base BG (ft.):	5.5
Pier Height A. G. (ft.):	0.50	Thickness of Pad (ft):	2.00
Length of Pad (ft.):	22	Width of Pad (ft.):	22
Final Length of pad (ft)	22.0	Final width of pad (ft):	22.0
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 #:	8	Tie / Stirrup Size #:	4	
Qty. of Vertical Rebars:	36	Tie Spacing (in):	12.0	
Pad Rebar Yield (Ksi):	60	Pad Steel Rebar Size (#):	8	
Concrete Cover (in.):	3	Unit Weight of Concrete:	150.0	pcf
Rebar at the bottom of the concrete pad:				
Qty. of Rebar in Pad (L):	35	Qty. of Rebar in Pad (W):	35	
Rebar at the top of the concrete pad:				
Qty. of Rebar in Pad (L):	35	Qty. of Rebar in Pad (W):	35	



Soil Design Parameters:

Soil Unit Weight (pcf):	130.0	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):	16000	Allowable Skin Friction:	0	Psf	Angle from Bottm of Pad:	25
Consider Friction for O.T.M. (Y/N):	No	Consider Friction for bearing (Y/N):	No		Angle from Bottm of Pad:	25
Consider soil hori. force for O.T.M.:	No	Reduction factor on the maximum soil bearing pressure:			1.00	

Foundation Analysis and Design:

Total Dry Soil Volume (cu. Ft.):	1559.30	Total Dry Soil Weight (Kips):	202.71
Total Buoyant Soil Volume (cu. Ft.):	0.00	Total Buoyant Soil Weight (Kips):	0.00
Total Effective Soil Weight (Kips):	202.71	Weight from the Concrete Block at Top (K):	0.00
Total Dry Concrete Volume (cu. Ft.):	1121.94	Total Dry Concrete Weight (Kips):	168.29
Total Buoyant Concrete Volume (cu. Ft.):	0.00	Total Buoyant Concrete Weight (Kips):	0.00
Total Effective Concrete Weight (Kips):	168.29	Total Vertical Load on Base (Kips):	398.65

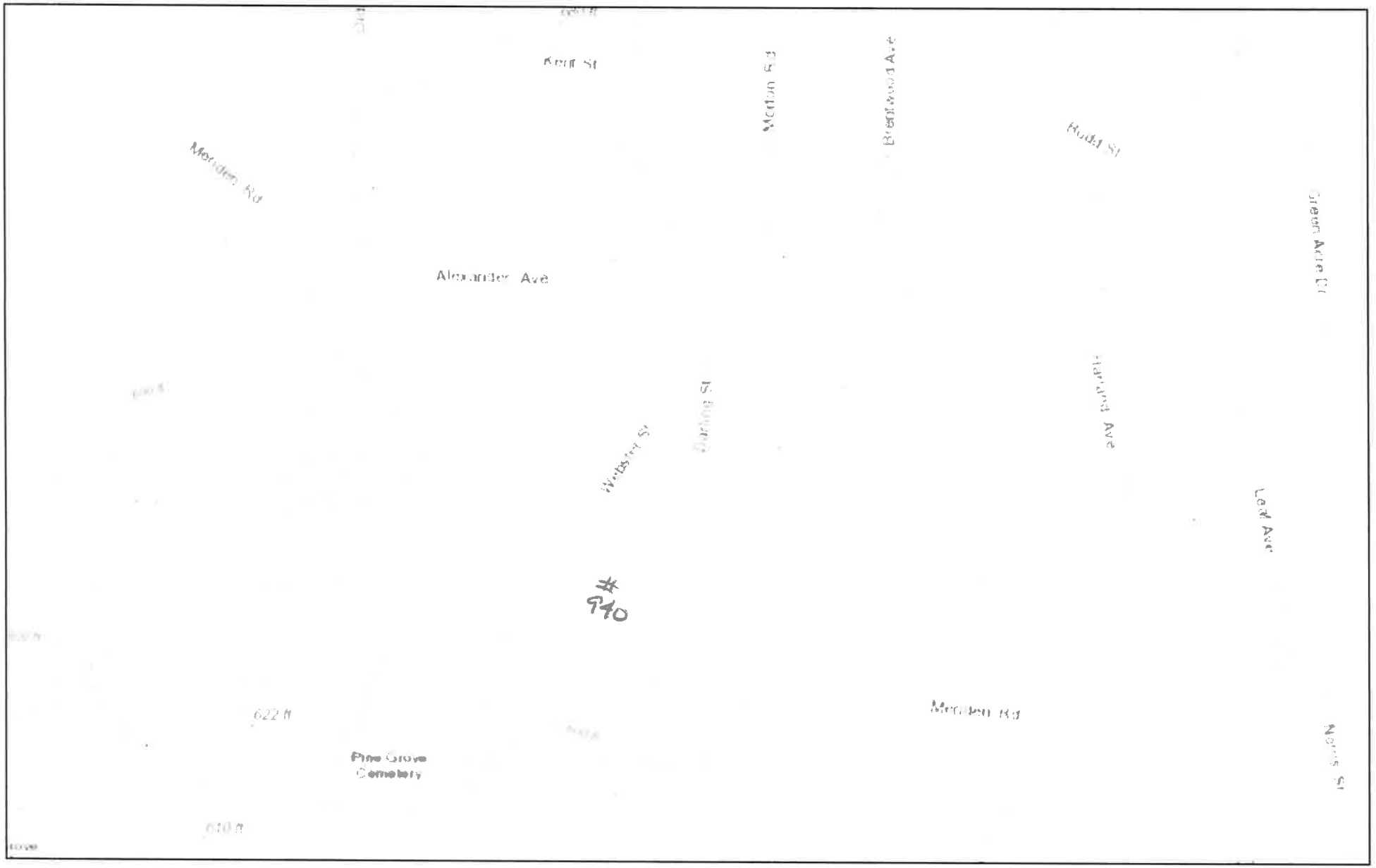
Check Soil Capacities:

				Load/ Capacity Ratio	
Calculated Maxium Net Soil Pressure under the base (psf):	1521	<	Allowable Soil Bearing (psf): 16000	0.10	OK!
Allowable Foundation Overturning Resistance (SF=1.5, kips-ft.):	2923.4	>	Applied Momont (kips-ft): 1697	0.58	OK!
Factor of Safety Against Overturning (O. R. Moment/Design Moment):	2.58	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):	0.79		Tie / Stirrup Area (sq. in./each):	0.20		
Calculated Moment Capacity (Mn,Kips-Ft):	4845.7	>	Design Factored Moment (Mu, Kips-Ft	1658.1	0.34	OK!
Calculated Shear Capacity (Kips):	660.1	>	Design Factored Shear (Kips):	25.5	0.04	OK!
Calculated Tension Capacity (Tn, Kips):	1535.8	>	Design Factored Tension (Tu Kips):	0.0	0.00	OK!
Calculated Compression Capacity (Pn, Kips):	9747.6	>	Design Factored Axial Load (Pu Kips):	35.9	0.00	OK!
Moment & Axial Strength Combination:	0.34	OK!	Check Tie Spacing (Design/Required):		1	OK!
Pier Reinforcement Ratio:	0.005		Reinforcement Ratio is satisfied per ACI			
(2).Concrete Pad:						
One-Way Design Shear Capacity (L-Direction, Kips):	513.4	>	One-Way Factored Shear (L-D. Kips):	133.7	0.26	OK!
One-Way Design Shear Capacity (W-Direction, Kips):	513.4	>	One-Way Factored Shear (W-D., Kips):	133.7	0.26	OK!
One-Way Design Shear Capacity (Corner-Corner. Kips):	562.7	>	One-Way Factored Shear (C-C, Kips):	192.5	0.34	OK!
Lower Steel Pad Reinforcement Ratio (L-Direct.):	0.0051	OK!	Lower Steel Pad Reinf. Ratio (W-Direc	0.0051		
Lower Steel Pad Moment Capacity (L-Direction. Kips-ft):	2435.7	>	Moment at Bottom (L-Direct. K-Ft):	297.9	0.12	OK!
Lower Steel Pad Moment Capacity (W-Direction. Kips-ft):	2435.7	>	Moment at Bottom (W-Direct. K-Ft):	297.9	0.12	OK!
Lower Steel Pad Moment Capacity (Corner-Corner,K-ft):	3397.4	>	Moment at Bottom (C-C Dir. K-Ft):	421.3	0.12	OK!
Upper Steel Pad Reinforcement Ratio (L-Direct.):	0.0051	OK!	Upper Steel Reinf. Ratio (W-Direct.):	0.0051		
Upper Steel Pad Moment Capacity (L-Direction. Kips-ft):	2435.7	>	Moment at the top (L-Dir Kips-Ft):	57.7	0.02	OK!
Upper Steel Pad Moment Capacity (W-Direction. Kips-ft):	2435.7	>	Moment at the top (W-Dir Kips-Ft):	57.7	0.02	OK!
Upper Steel Pad Moment Capacity (Corner-Corner. K-ft):	3397.4	>	Moment at the top (C-C Direc. K-Ft):	332.9	0.10	OK!

940 meriden rd



July 20, 2016

1:4,514

0 0.0375 0.075 0.15 mi

0 0.05 0.1 0.2 km

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey,

The Assessor's office is responsible for the maintenance of records on the ownership of properties. Assessments are computed at 70% of the estimated market value of real property at the time of the last revaluation which was 2012.

CITY OF WATERBURY

Information on the Property Records for the Municipality of Waterbury was last updated on 7/20/2016.

Parcel Information

Location:	940 MERIDEN RD	Property Use:	Church	Primary Use:	Church - Sanctuary (Chapel)
Unique ID:	030203770070	Map Block Lot:	0302-0377-0070	Acres:	104.00
490 Acres:	0.00	Zone:	RL	Volume / Page:	368/ 217
Developers Map / Lot:		Census:			

Value Information

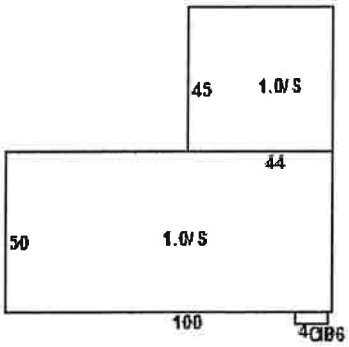
	Appraised Value	70% Assessed Value
Land	1,394,998	976,490
Buildings	364,741	255,320
Detached Outbuildings	89,467	62,630
Total	1,849,206	1,294,440

Owner's Information

Owner's Data

PINE GROVE CEMETERY ASSOCIATION
850 MERIDEN RD
WATERBURY CT 06705-0000

Building 1



Category:	Public Use	Use:	Funeral Home	GLA:	6,980
Stories:	1.00	Construction:	Average	Year Built:	1984
Heating:	Forced Air	Fuel:		Cooling Percent:	0%
Siding:	Wood Siding /Metal on Steel Frame	Roof Material:		Beds/Units:	0

Special Features

Sprinklers	80

Attached Components

Type:	Year Built:	Area:
Canopy Canopy	1984	40

Detached Outbuildings

Type:	Year Built:	Length:	Width:	Area:
Asphalt Paving	1984			61,000

Building Permits

Permit Number	Permit Type	Date Opened	Date Closed	Permit Status	Reason
2015.3462	Electrical	11/17/2015		Closed	INSTALL 3 NEW ANTENNAS TO EXISTING POLE
2015.3463	Electrical	11/17/2015		Closed	UPGRADE EQUIPMENT IN EXISTING CELL TOWER SHELTER PINE GROVE CEMETARY
2015.1894	Mechanical	07/20/2015		Closed	INSTALL A/C CONDENSOR AND COIL
2015.0049	Commercial Demolition	01/08/2015		Closed	DECONSTRUCT CELL TOWER/REMOVE ANTENNAS & EQUIPMENT
2013.2811	Electrical	10/02/2013		Closed	REPLACE 1 COAXIAL CABLE1 FIBER OPTIC ETC