

February 27, 2019

Melanie A. Bachman, Esq.  
Executive Director/Staff Attorney  
Connecticut Siting Council  
10 Franklin Square  
New Britain, CT 06051

**Re: Notice of Exempt Modification – Facility Modification  
691 Oxford Road, Oxford, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) antennas at the 147-foot level of the existing 150-foot tower at 691 Oxford Road in Oxford, Connecticut (the “Property”). The tower is owned by Crown Castle (“Crown”). The Council approved Cellco’s use of this tower in 2007. Cellco now intends to replace six (6) of its existing antennas with six (6) model JAHH-65B-R3B antennas and install three (3) new model JAHH-65B-R3B antennas, for a total of fifteen (15) antennas, all at the same 147-foot level on the tower. Cellco also intends to install nine (9) remote radio heads (“RRHs”) on its antenna platform 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 Oxford’s First Selectman, George R. Temple; Steven Macary, Oxford’s Zoning Enforcement Officer; Don and Dave Farm Realty LLC, the owner of the Property; and Crown, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco’s new and replacement antennas and RRHs will be installed at the 147-foot level of the 150-foot tower.

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

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

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included 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 parcel map and owner information for the Property is included in Attachment 4. A Certificate of Mailing verifying that this filing was sent to municipal officials and the owner of the Property is included in Attachment 5.

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:

George R. Temple, First Selectman  
Steven Macary, Zoning Enforcement Officer  
Don and Dave Farm Realty LLC  
Crown Castle  
Tim Parks

# **ATTACHMENT 1**

# JAHH-65B-R3B



8-port sector antenna, 2x 698–787, 2x 824–894 and 4x 1695–2360 MHz, 65° HPBW, 3x RET and low bands have diplexers. Internal SBT's on first LB (Port 1) and first HB (Port 5).

- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- One RET for 700MHz, one RET for 850MHz, and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO
- Internal filter on low band and interleaved dipole technology providing for attractive, low wind load mechanical package
- Separate RS-485 RET input/output for low and high band

## Electrical Specifications

Frequency Band, MHz	698–787	824–894	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.5	15.8	18.0	18.4	18.5	18.8
Beamwidth, Horizontal, degrees	67	65	63	63	65	68
Beamwidth, Vertical, degrees	12.4	10.5	5.7	5.2	4.9	4.4
Beam Tilt, degrees	2–14	2–14	0–10	0–10	0–10	0–10
USLS (First Lobe), dB	18	18	20	20	21	23
Front-to-Back Ratio at 180°, dB	32	34	31	35	36	38
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 at 50°C, maximum, watts	200	200	300	300	300	250
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	698–787	824–894	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.3	14.9	17.6	18.1	18.2	18.5
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.5	±0.6	±0.4	±0.5	±0.6
Gain by Beam Tilt, average, dBi	2 °   14.3 8 °   14.3 14 °   14.3	2 °   15.0 8 °   14.9 14 °   15.4	0 °   17.2 5 °   17.6 10 °   17.6	0 °   17.6 5 °   18.2 10 °   18.2	0 °   17.7 5 °   18.3 10 °   18.3	0 °   17.9 5 °   18.7 10 °   18.7
Beamwidth, Horizontal Tolerance, degrees	±1.2	±1.4	±4	±2.4	±2.9	±2.7
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.5	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	18	17	17	18	19	18
Front-to-Back Total Power at 180° ± 30°, dB	25	24	26	29	27	29
CPR at Boresight, dB	22	23	20	21	21	24
CPR at Sector, dB	11	12	11	11	11	8

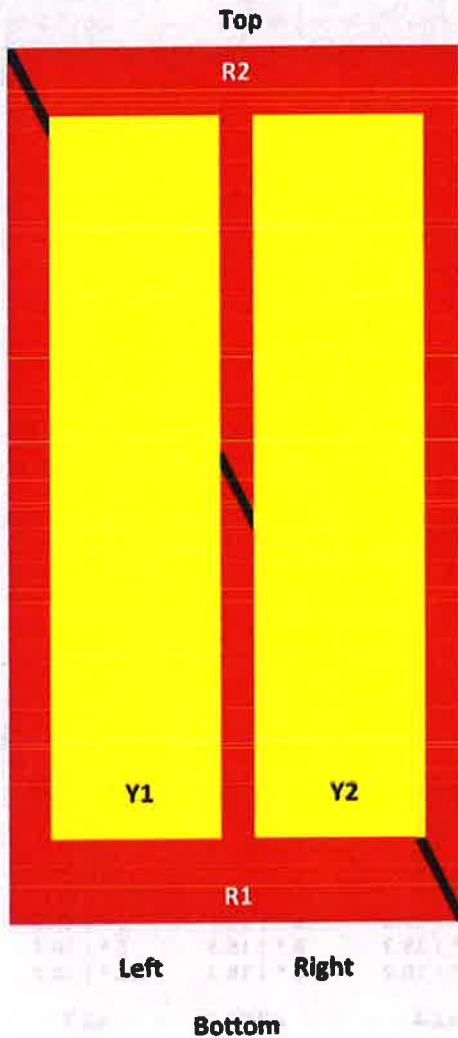
\* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, [download the whitepaper Time to Raise the Bar on BSAs.](#)

# JAHH-65B-R3B

## Array Layout

JAHH-65A-R3B JAHH-65B-R3B JAHH-65C-R3B

Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-798	1-2	1	ANXXXXXXXXXXXXX1
R2	824-894	3-4	2	ANXXXXXXXXXXXXX2
Y1	1695-2360	5-6	3	ANXXXXXXXXXXXXX3
Y2	1695-2360	7-8		



View from the front of the antenna  
 (Sizes of colored boxes are not true depictions of array sizes)

## General Specifications

Operating Frequency Band

1695 – 2360 MHz | 698 – 787 MHz | 824 – 894 MHz

# JAHH-65B-R3B

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<b>Antenna Type</b>	Sector
<b>Band</b>	Multiband
<b>Performance Note</b>	Outdoor usage

## Mechanical Specifications

<b>RF Connector Quantity, total</b>	8
<b>RF Connector Quantity, low band</b>	4
<b>RF Connector Quantity, high band</b>	4
<b>RF Connector Interface</b>	4.3-10 Female
<b>Color</b>	Light gray
<b>Grounding Type</b>	RF connector body grounded to reflector and mounting bracket
<b>Radiator Material</b>	Aluminum   Low loss circuit board
<b>Radome Material</b>	Fiberglass, UV resistant
<b>Reflector Material</b>	Aluminum
<b>RF Connector Location</b>	Bottom
<b>Wind Loading, frontal</b>	301.0 N @ 150 km/h 67.7 lbf @ 150 km/h
<b>Wind Loading, lateral</b>	254.0 N @ 150 km/h 57.1 lbf @ 150 km/h
<b>Wind Loading, maximum</b>	638.0 N @ 150 km/h 143.4 lbf @ 150 km/h
<b>Wind Speed, maximum</b>	241 km/h   150 mph

## Dimensions

<b>Length</b>	1828.0 mm   72.0 in
<b>Width</b>	350.0 mm   13.8 in
<b>Depth</b>	208.0 mm   8.2 in
<b>Net Weight, without mounting kit</b>	28.7 kg   63.3 lb

## Remote Electrical Tilt (RET) Information

<b>Input Voltage</b>	10–30 Vdc
<b>Internal Bias Tee</b>	Port 1   Port 5
<b>Internal RET</b>	High band (1)   Low band (2)
<b>Power Consumption, idle state, maximum</b>	2 W
<b>Power Consumption, normal conditions, maximum</b>	13 W
<b>Protocol</b>	3GPP/AISG 2.0 (Single RET)
<b>RET Interface</b>	8-pin DIN Female   8-pin DIN Male
<b>RET interface, quantity</b>	2 female   2 male

# JAHH-65B-R3B

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## Packed Dimensions

<b>Length</b>	1975.0 mm   77.8 in
<b>Width</b>	456.0 mm   18.0 in
<b>Depth</b>	357.0 mm   14.1 in
<b>Shipping Weight</b>	42.0 kg   92.6 lb

## Regulatory Compliance/Certifications

### Agency

RoHS 2011/65/EU

ISO 9001:2015

China RoHS SJ/T 11364-2014

### Classification

Compliant by Exemption

Designed, manufactured and/or distributed under this quality management system

Above Maximum Concentration Value (MCV)



## Included Products

BSAMNT-3 — 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.

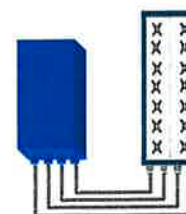


## FEATURES

- 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



## TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Size (HxWxD) in mm (in.)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield)
Volume in L	38 (with solar shield)
Weight in kg (lb) (w/o mounting HW)	26 (57.2) (with solar shield)
DC voltage range	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
DC power consumption	550W typical @100% RF load ( in 2Tx or 4TX mode)
Environmental conditions	-40°C (-40°F) / +55°C (+131°F)
Wind load (@130km/h or 83mph)	IP65 Frontal:<200N / Lateral :<130N
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
AI5G 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

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# ALCATEL-LUCENT B25 RRH4X30

Alcatel-Lucent Band 25 Remote Radio Head 4x30W is the new 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 B25 RRH4x30 allows operators to have a compact radio solution to deploy LTE in the PCS band (1.9 GHz, 3GPP band 25), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B25 RRH4x30 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, LTE carriers from 3 MHz up to 20 MHz and up to 65 MHz instantaneous bandwidth.

The Alcatel-Lucent B25 RRH4x30 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 B25 RRH4x30 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.

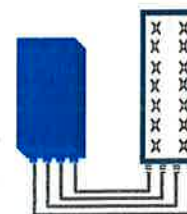


## FEATURES

- Supporting LTE in 1.9 GHz band (PCS, 3GPP band 2 & 25)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- Ready for 3, 5, 10, 15 or 20MHz LTE carrier operation with 4Rx Diversity
- Ready to support up to 4 carriers anywhere in 65MHz instantaneous bandwidth
- Convection-cooled (fan-less)
- Supports AISG 2.0 devices (RET, TMA) through RS485 or RF ports

## BENEFITS

- Compact to reduce additional footprint when adding LTE in PCS band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Full flexibility for multiple carriers operation over entire PCS spectrum
- Improves downlink spectral efficiency and cell edge throughput through MIMO4
- Increases LTE coverage thanks to 4-way Rx 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

## TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	3GPP bands 2 & 25 (PCS-G) DL: 1930 - 1995 MHz UL: 1850 - 1915 MHz
Instantaneous bandwidth - #carriers	65MHz – Up to 4 LTE carriers (in 40MHz occupied bandwidth)
LTE carrier bandwidth	3, 5, 10, 15 or 20 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure (3GPP band 1)	2.0 dB typ. (<2.5 dB max)
RX Diversity scheme	2 or 4 way Rx diversity
Size (HxWxD)(w/ solar shield) in mm (in.)	538 x 304 x 182 (21.2" x 12.0" x 7.2")
Volume (w/ solar shield) in L	30
Weight (w/ solar shield) in kg (lb)	24 (53)
DC voltage range	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
DC power consumption	580W typical @100% RF load
Environmental conditions	-40°C (-40°F) / +55°C (+131°F) IP65
Wind load (@150km/h or 93mph)	Frontal: <200N / Lateral : <150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5 (> 14dB)
CPRI ports	2 CPRI ports (HW ready for Rate7 / 9.8 Gbps)
AISG interfaces	1 AISG2.0 output (RS485), +24V/2A DC power Integrated Smart Bias Tees (x2)
Misc. Interfaces	1 external alarms connector (4 alarms) 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

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B25 RRH4x30

ALCATEL-LUCENT DATA SHEET REV1.1 – JANUARY 2015

# B66a RRH4x45W

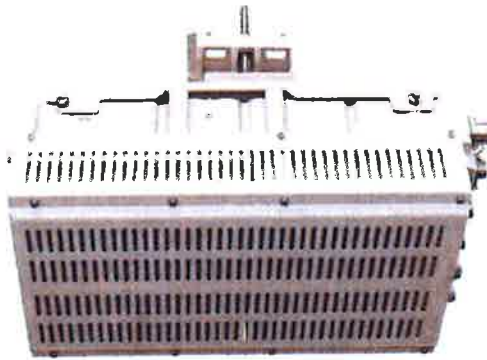
## Datasheet

Radio Technology

FDD-LTE

### Feature description:

- Remote Radio Head 4x45W or 2x90W Switchable via SW



Power Output  
4 x 45 W or 2x90W (SW Switchable)  
w/o fans

IBW  
70MHz

OBW  
60 MHz

RF Sharing  
LTE

Mass/Volume

25.8kg/56.9 lb Weight  
655H x 299W x 182D mm  
25.8"x11.8"x7.2"  
29.7L / 35.5L

Antenna Conf.

4Tx/4Rx

Temperature

-40 to 55 °C

IP class

IP65

Input Power

DC 48 V

Cooling

Natural Convection

Mounting

Wall, Pole mount

BBU connection

2x 9.8Gbps SFP(Rate 7 HW ready)



## B66a RRH 4x45 – Interfaces

### Power:

- Max power: 816W (add 58W for AISG)
- Breaker size: 25A
- Max distance with 6ga power feed and 5.5V drop: 284 feet

### RF Interfaces:

- 4.3/10 Connectors
- No monitoring ports(Spectrum analyzer SW takes place of monitoring ports)

### AISG:

- Two Smart Bias-T
- One AISG port

## B66 Details

- Max power for a single carrier is:
  - 2x60W for 10,15,20 MHz carrier
  - 2x40W for 5 MHz carrier
- Multi-Carrier Support with AWS-1 carriers: 15.1
- Multi-Carrier Support with AWS-3 carriers: 16.2

### Carrier power: Multi-carrier

- Assuming 2 Tx power can be assigned per carrier subject to 40W max for 5Mhz, 60W for larger in 2T, cut that power in half for 4T
- Example:B4 (20Mhz) and AWS3 (10MHz)
  - Power can be varied between those two carriers, can go 60W for 20 MHz carrier, 30W for 10 MHz carrier to use the 90W in 2T.
  - It could be 45/45 for 20Mhz/10Mhz if desired.



**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.

**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



Figure 1: HYBRIFLEX Series

**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
<b>Mechanical Properties</b>			
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)
<b>Electrical Properties</b>			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm <sup>2</sup> (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
<b>Optical Properties</b>			
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)			UL34-V0, UL1666 RoHS Compliant
<b>DC Power Cable Properties</b>			
Size (Power)		[mm (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm (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
<b>Operating Range</b>			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to 149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to 149)

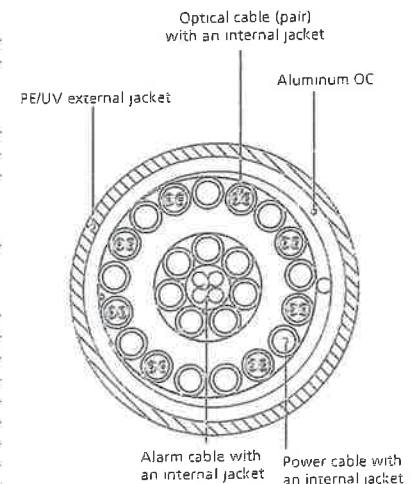


Figure 2: Construction Detail

All information contained in the present datasheet is subject to confirmation at time of ordering.



# **ATTACHMENT 2**



# **ATTACHMENT 3**

Date: **January 18, 2019**

Kevin Morrow  
Crown Castle  
3530 Toringdon Way Suite 300  
Charlotte, NC 28277



Crown Castle  
2000 Corporate Drive  
Canonsburg, PA 15317  
(724) 416-2000

**Subject:** **Structural Analysis Report**

**Carrier Designation:** **Verizon Wireless Co-Locate**  
**Carrier Site Name:** Oxford North

**Crown Castle Designation:** **Crown Castle BU Number:** 873645  
**Crown Castle Site Name:** Oxford  
**Crown Castle JDE Job Number:** 552926  
**Crown Castle Work Order Number:** 1682346  
**Crown Castle Order Number:** 474799 Rev. 0

**Engineering Firm Designation:** **Crown Castle Project Number:** 1682346

**Site Data:** **691 Oxford RD, OXFORD, New Haven County, CT**  
**Latitude 41° 26' 49.51", Longitude -73° 9' 8.316"**  
**150 Foot - Monopole Tower**

Dear Kevin Morrow,

Crown Castle is pleased to submit this "**Structural Analysis Report**" to determine the structural integrity of the above mentioned tower.

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

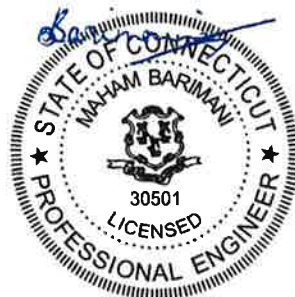
LC7: Proposed Equipment Configuration **Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Daniel Chen/ KB

Respectfully submitted by:

Maham Barimani, P.E.  
Senior Project Engineer



Jan 18 2019 4:22 PM

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## 1) INTRODUCTION

This tower is a 150 ft. Monopole tower designed by SUMMIT.

## 2) ANALYSIS CRITERIA

<b>TIA-222 Revision:</b>	TIA-222-H
<b>Risk Category:</b>	II
<b>Wind Speed:</b>	125 mph
<b>Exposure Category:</b>	C
<b>Topographic Factor:</b>	1
<b>Ice Thickness:</b>	1.5 in
<b>Wind Speed with Ice:</b>	50 mph
<b>Seismic Ss:</b>	0.196
<b>Seismic S1:</b>	0.064
<b>Service Wind Speed:</b>	60 mph

**Table 1 - Proposed Equipment Configuration**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
147.0	148.0	3	alcatel lucent	B13 RRH 4X30	9	1-5/8
		6	antel	LPA-80063/6CF w/ Mount Pipe		
		6	commscope	JAHH-65B-R3B w/ Mount Pipe		
		3	nokia	B66A RRH4X45 (UHIE)		
		1	rfs celwave	DB-C1-12C-24AB-0Z		
	147.0	3	commscope	JAHH-65B-R3B w/ Mount Pipe		
		3	nokia	B25 RRH4X30 (UHFA)		
		1	tower mounts	Platform Mount [LP 303-1]		

**Table 2 - Other Considered Equipment**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
136.0	138.0	4	andrew	SBNH-1D6565C w/ Mount Pipe	12	3/8 3/4 1-5/8
		2	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe		
		3	powerwave technologies	7770.00 w/ Mount Pipe		
	136.0	3	communication components inc.	DTMABP7819VG12A		
		3	ericsson	RRUS 11		
		3	ericsson	RRUS 12 B2		
		3	powerwave technologies	TT19-08BP111-001		
		1	raycap	DC6-48-60-18-8F		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		1	tower mounts	Miscellaneous [NA 509-3]		
		1	tower mounts	Miscellaneous [NA 510-1]		
		1	tower mounts	Platform Mount [LP-1201]		

### 3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Criscuolo Shepard Associates	2134249	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit / PJF	1339630	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit / PJF	1339644	CCISITES

#### 3.1) Analysis Method

tnxTower (version 8.0.5.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

#### 3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle should be notified to determine the effect on the structural integrity of the tower.

### 4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	150 - 110.75	Pole	TP31.38x24x0.2188	1	-9.41	1296.90	53.6	Pass
L2	110.75 - 74.75	Pole	TP37.711x30.1904x0.25	2	-14.77	1782.34	81.2	Pass
L3	74.75 - 39.5	Pole	TP43.839x36.3179x0.3125	3	-22.23	2588.89	78.7	Pass
L4	39.5 - 0	Pole	TP50.64x42.1799x0.375	4	-35.25	3674.93	75.4	Pass
							Summary	
						Pole (L2)	81.2	Pass
						Rating =	81.2	Pass



**Table 5 - Tower Component Stresses vs. Capacity – LC7**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	66.3	Pass
1	Base Plate	0	55.0	Pass
1	Base Foundation Structure	0	47.8	Pass
1	Base Foundation Soil Interaction	0	59.5	Pass
<b>Structure Rating (max from all components) =</b>				<b>81.2%</b>

Notes:

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

#### 4.1) Recommendations

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

**APPENDIX A**  
**TNXTOWER OUTPUT**

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	39.25	18	0.2188	4.00	24.0000	31.3800	A607-85	2.5
2	40.00	18	0.2500	4.75	30.1904	37.7110	A607-85	3.6
3	40.00	18	0.3125	5.50	36.3179	43.8390	A607-85	5.4
4	45.00	18	0.3750	42.1799	50.6400		A607-85	8.4
								19.9

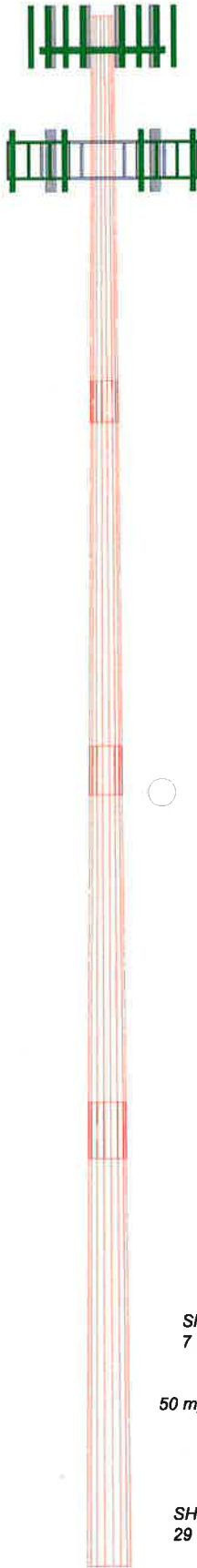
150.0 ft

110.8 ft

74.8 ft

39.5 ft

0.0 ft



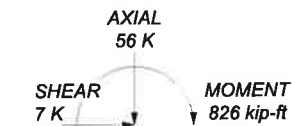
### MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-85	65 ksi	80 ksi			

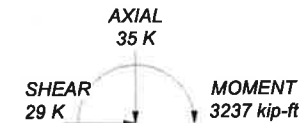
### TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TIA-222-H Annex S
9. TOWER RATING: 81.2%


ALL REACTIONS  
ARE FACTORED



TORQUE 0 kip-ft  
50 mph WIND - 1.5000 in ICE



TORQUE 1 kip-ft  
REACTIONS - 125 mph WIND

 <b>CROWN CASTLE</b> The pathway to Possible	<b>Crown Castle</b> 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2000 FAX:		Job: <b>BU# 873645</b>
	Project:	Client: Crown Castle	Drawn by: KGebremariam
	Code: TIA-222-H	Date: 01/18/19	App'd:
	Path:	Scale: N	Dwg No.
	C:\Users\KGebremariam\Desktop\22873845.dwg		

## Tower Input Data

The tower is a monopole.

This tower is designed using the TIA-222-H standard.

The following design criteria apply:

- 1) Tower is located in New Haven County, Connecticut.
- 2) Tower base elevation above sea level: 670.00 ft.
- 3) Basic wind speed of 125 mph.
- 4) Risk Category II.
- 5) Exposure Category C.
- 6) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- 7) Topographic Category: 1.
- 8) Crest Height: 0.00 ft.
- 9) Nominal ice thickness of 1.5000 in.
- 10) Ice thickness is considered to increase with height.
- 11) Ice density of 56.00 pcf.
- 12) A wind speed of 50 mph is used in combination with ice.
- 13) Temperature drop of 50 °F.
- 14) Deflections calculated using a wind speed of 60 mph.
- 15) TIA-222-H Annex S.
- 16) A non-linear (P-delta) analysis was used.
- 17) Pressures are calculated at each section.
- 18) Stress ratio used in pole design is 1.05.
- 19) Tower analysis based on target reliabilities in accordance with Annex S.
- 20) Load Modification Factors used:  $K_{es}(F_w) = 0.95$ ,  $K_{es}(t_i) = 0.85$ .
- 21) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile  Include Bolts In Member Capacity  Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt.  Autocalc Torque Arm Areas  Add IBC .6D+W Combination ✓ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs	Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-H Bracing Resist. Exemption Use TIA-222-H Tension Splice Exemption  <div style="text-align: center; background-color: #e0e0e0; padding: 2px;"><b>Poles</b></div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets Pole Without Linear Attachments Pole With Shroud Or No Appurtenances Outside and Inside Corner Radii Are Known
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## Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	150.00-110.75	39.25	4.00	18	24.0000	31.3800	0.2188	0.8750	A607-65 (65 ksi)
L2	110.75-74.75	40.00	4.75	18	30.1904	37.7110	0.2500	1.0000	A607-65 (65 ksi)
L3	74.75-39.50	40.00	5.50	18	36.3179	43.8390	0.3125	1.2500	A607-65 (65 ksi)
L4	39.50-0.00	45.00		18	42.1799	50.6400	0.3750	1.5000	A607-65 (65 ksi)

### Tapered Pole Properties

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	I/Q in <sup>2</sup>	w in	w/t
L1	24.3365	16.5116	1179.7676	8.4423	12.1920	96.7657	2361.0876	8.2574	3.8390	17.55
	31.8303	21.6356	2654.2208	11.0622	15.9410	166.5024	5311.9341	10.8199	5.1379	23.487
L2	31.3812	23.7577	2690.6493	10.6288	15.3367	175.4384	5384.8390	11.8811	4.8735	19.494
	38.2542	29.7253	5270.1440	13.2987	19.1572	275.1001	10547.222	14.8655	6.1971	24.789
L3	37.7369	35.7129	5849.2253	12.7819	18.4495	317.0396	11706.147	17.8598	5.8420	18.694
	44.4671	43.1728	10333.694	15.4519	22.2702	464.0142	20680.987	21.5905	7.1657	22.93
L4	43.8227	49.7582	10986.408	14.8407	21.4274	512.7279	21987.272	24.8838	6.7637	18.036
	51.3634	59.8279	19097.332	17.8441	25.7251	742.3612	38219.793	29.9196	8.2526	22.007

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>r</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 150.00- 110.75				1	1	1			
L2 110.75- 74.75				1	1	1			
L3 74.75- 39.50				1	1	1			
L4 39.50-0.00				1	1	1			

### Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Componen t Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diamete r in	Perimete r in	Weight plf
****											

### Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Componen t Type	Placement ft	Total Number	C <sub>A</sub> A <sub>A</sub> ft <sup>2</sup> /ft	Weight plf	
**Level 147** AVA7-50(1-5/8)	C	No	No	Inside Pole	147.00 - 0.00	9	No Ice 1/2" Ice	0.00 0.00	0.70 0.70

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C <sub>A</sub> A <sub>A</sub> ft <sup>2</sup> /ft	Weight plf
							1" Ice	0.00	0.70
							2" Ice	0.00	0.70
<b>**Level 136**</b>									
LCF158-50JA-A0(1-5/8)	B	No	No	Inside Pole	136.00 - 0.00	12	No Ice	0.00	0.80
							1/2" Ice	0.00	0.80
							1" Ice	0.00	0.80
							2" Ice	0.00	0.80
FB-L98B-034-XXX(3/8)	B	No	No	Inside Pole	136.00 - 0.00	1	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
							2" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	B	No	No	Inside Pole	136.00 - 0.00	2	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
							2" Ice	0.00	0.58
2" Rigid Conduit	B	No	No	Inside Pole	136.00 - 0.00	1	No Ice	0.00	2.80
							1/2" Ice	0.00	2.80
							1" Ice	0.00	2.80
							2" Ice	0.00	2.80

\*\*\*\*

### Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
L1	150.00-110.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.34
		C	0.000	0.000	0.000	0.000	0.23
L2	110.75-74.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.49
		C	0.000	0.000	0.000	0.000	0.23
L3	74.75-39.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.48
		C	0.000	0.000	0.000	0.000	0.22
L4	39.50-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.54
		C	0.000	0.000	0.000	0.000	0.25

### Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
L1	150.00-110.75	A	1.462	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.34
		C		0.000	0.000	0.000	0.000	0.23
L2	110.75-74.75	A	1.413	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.49
		C		0.000	0.000	0.000	0.000	0.23
L3	74.75-39.50	A	1.346	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.48
		C		0.000	0.000	0.000	0.000	0.22
L4	39.50-0.00	A	1.212	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.54
		C		0.000	0.000	0.000	0.000	0.25

### Feed Line Center of Pressure

Section	Elevation	CP <sub>x</sub>	CP <sub>z</sub>	CP <sub>x</sub> Ice	CP <sub>z</sub> Ice
	ft	in	in	in	in
L1	150.00-110.75	0.0000	0.0000	0.0000	0.0000
L2	110.75-74.75	0.0000	0.0000	0.0000	0.0000
L3	74.75-39.50	0.0000	0.0000	0.0000	0.0000
L4	39.50-0.00	0.0000	0.0000	0.0000	0.0000

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

### Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
---------------	----------------------	-------------	-------------------------	--------------------------	-----------------------

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t	Placement ft	C <sub>A</sub> A <sub>A</sub> Front ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Side ft <sup>2</sup>	Weight K	
Lighting Rod 1/2" x 2'	C	None		0.0000	150.00	No Ice	0.10	0.10	0.02
						1/2" Ice	0.26	0.26	0.02
						Ice	0.40	0.40	0.02
						1" Ice	0.68	0.68	0.03
						2" Ice			
**Level 147** Platform Mount [LP 303-1]	C	None		0.0000	147.00	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						Ice	23.08	23.08	1.71
						1" Ice	31.50	31.50	2.18
						2" Ice			
(2) LPA-80063/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice	9.83	10.22	0.05
						1/2" Ice	10.40	11.38	0.14
						Ice	10.93	12.27	0.25
						1" Ice	12.03	14.09	0.48
						2" Ice			
(2) LPA-80063/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice	9.83	10.22	0.05
						1/2" Ice	10.40	11.38	0.14
						Ice	10.93	12.27	0.25
						1" Ice	12.03	14.09	0.48
						2" Ice			
(2) LPA-80063/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice	9.83	10.22	0.05
						1/2" Ice	10.40	11.38	0.14
						Ice	10.93	12.27	0.25
						1" Ice	12.03	14.09	0.48
						2" Ice			
(2) JAHH-65B-R3B w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice	9.35	7.65	0.09
						1/2" Ice	9.92	8.83	0.16
						Ice	10.46	9.73	0.25
						1" Ice	11.55	11.56	0.45
						2" Ice			
(2) JAHH-65B-R3B w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice	9.35	7.65	0.09
						1/2" Ice	9.92	8.83	0.16
						Ice	10.46	9.73	0.25
						1" Ice	11.55	11.56	0.45
						2" Ice			



Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>Front</sub>	C <sub>A</sub> A <sub>Side</sub>	Weight
			Horz	Lateral					
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
(2) JAHH-65B-R3B w/ Mount Pipe	C	From Leg	4.00	0.0000	147.00	2" Ice	9.35	7.65	0.09
			0.00			No Ice	9.35	7.65	0.09
			1.00			1/2"	9.92	8.83	0.16
						Ice	10.46	9.73	0.25
JAHH-65B-R3B w/ Mount Pipe	A	From Leg	4.00	0.0000	147.00	1" Ice	11.55	11.56	0.45
			0.00			2" Ice	9.35	7.65	0.09
			0.00			No Ice	9.35	7.65	0.09
						1/2"	9.92	8.83	0.16
JAHH-65B-R3B w/ Mount Pipe	B	From Leg	4.00	0.0000	147.00	Ice	10.46	9.73	0.25
			0.00			1" Ice	11.55	11.56	0.45
			0.00			2" Ice	9.35	7.65	0.09
						No Ice	9.35	7.65	0.09
JAHH-65B-R3B w/ Mount Pipe	C	From Leg	4.00	0.0000	147.00	1/2"	9.92	8.83	0.16
			0.00			Ice	10.46	9.73	0.25
			0.00			1" Ice	11.55	11.56	0.45
						2" Ice	9.35	7.65	0.09
B13 RRH 4X30	A	From Leg	4.00	0.0000	147.00	No Ice	2.06	1.32	0.06
			0.00			1/2"	2.24	1.48	0.07
			1.00			Ice	2.43	1.64	0.09
						1" Ice	2.84	2.00	0.14
B13 RRH 4X30	B	From Leg	4.00	0.0000	147.00	2" Ice	2.06	1.32	0.06
			0.00			No Ice	2.06	1.32	0.06
			1.00			1/2"	2.24	1.48	0.07
						Ice	2.43	1.64	0.09
B13 RRH 4X30	C	From Leg	4.00	0.0000	147.00	1" Ice	2.84	2.00	0.14
			0.00			2" Ice	2.06	1.32	0.06
			1.00			No Ice	2.06	1.32	0.06
						1/2"	2.24	1.48	0.07
B25 RRH4X30 (UHFA)	A	From Leg	4.00	0.0000	147.00	Ice	2.43	1.64	0.09
			0.00			1" Ice	2.91	1.96	0.14
			0.00			2" Ice	2.11	1.29	0.05
						No Ice	2.11	1.29	0.05
B25 RRH4X30 (UHFA)	B	From Leg	4.00	0.0000	147.00	1/2"	2.30	1.45	0.07
			0.00			Ice	2.50	1.61	0.09
			0.00			1" Ice	2.91	1.96	0.14
						2" Ice	2.11	1.29	0.05
B25 RRH4X30 (UHFA)	C	From Leg	4.00	0.0000	147.00	No Ice	2.11	1.29	0.05
			0.00			1/2"	2.30	1.45	0.07
			0.00			Ice	2.50	1.61	0.09
						1" Ice	2.91	1.96	0.14
B66A RRH4X45 (UHIE)	A	From Leg	4.00	0.0000	147.00	2" Ice	2.11	1.29	0.05
			0.00			No Ice	2.54	1.61	0.06
			1.00			1/2"	2.75	1.79	0.08
						Ice	2.97	1.98	0.10
B66A RRH4X45 (UHIE)	B	From Leg	4.00	0.0000	147.00	1" Ice	3.43	2.37	0.16
			0.00			2" Ice	2.54	1.61	0.06
			1.00			1/2"	2.75	1.79	0.08
						Ice	2.97	1.98	0.10
B66A RRH4X45 (UHIE)	C	From Leg	4.00	0.0000	147.00	1" Ice	3.43	2.37	0.16
			0.00			2" Ice	2.54	1.61	0.06
			1.00			1/2"	2.75	1.79	0.08
						Ice	2.97	1.98	0.10
B66A RRH4X45 (UHIE)			4.00	0.0000	147.00	1" Ice	3.43	2.37	0.16
			0.00			No Ice	2.54	1.61	0.06
			1.00			1/2"	2.75	1.79	0.08
						Ice	2.97	1.98	0.10

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz Lateral	Vert					
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
DB-C1-12C-24AB-0Z	A	From Leg	4.00	0.0000	147.00	2" Ice			
			0.00			No Ice	4.06	3.10	0.03
			1.00			1/2"	4.32	3.34	0.07
						Ice	4.58	3.58	0.11
						1" Ice	5.14	4.09	0.20
					2" Ice				
**Level 136** Platform Mount [LP-1201]	C	None		0.0000	136.00	No Ice	23.10	23.10	2.10
						1/2"	26.80	26.80	2.50
						Ice	30.50	30.50	2.90
						1" Ice	37.90	37.90	3.70
						2" Ice			
Miscellaneous [NA 510-1]	C	None		0.0000	136.00	No Ice	6.00	6.00	0.26
						1/2"	8.50	8.50	0.34
						Ice	11.00	11.00	0.42
						1" Ice	16.00	16.00	0.59
						2" Ice			
Miscellaneous [NA 509-3]	C	None		0.0000	136.00	No Ice	11.84	11.84	0.28
						1/2"	16.96	16.96	0.30
						Ice	22.08	22.08	0.32
						1" Ice	32.32	32.32	0.36
						2" Ice			
7770.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	136.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			2.00			Ice	6.61	5.71	0.16
						1" Ice	7.49	7.16	0.29
						2" Ice			
7770.00 w/ Mount Pipe	B	From Leg	4.00	0.0000	136.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			2.00			Ice	6.61	5.71	0.16
						1" Ice	7.49	7.16	0.29
						2" Ice			
7770.00 w/ Mount Pipe	C	From Leg	4.00	0.0000	136.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			2.00			Ice	6.61	5.71	0.16
						1" Ice	7.49	7.16	0.29
						2" Ice			
(2) SBNH-1D6565C w/ Mount Pipe	B	From Leg	4.00	0.0000	136.00	No Ice	11.68	9.84	0.09
			0.00			1/2"	12.40	11.37	0.18
			2.00			Ice	13.14	12.91	0.28
						1" Ice	14.51	15.27	0.52
						2" Ice			
(2) SBNH-1D6565C w/ Mount Pipe	C	From Leg	4.00	0.0000	136.00	No Ice	11.68	9.84	0.09
			0.00			1/2"	12.40	11.37	0.18
			2.00			Ice	13.14	12.91	0.28
						1" Ice	14.51	15.27	0.52
						2" Ice			
(2) AM-X-CD-16-65-00T- RET w/ Mount Pipe	A	From Leg	4.00	0.0000	136.00	No Ice	8.26	6.30	0.07
			0.00			1/2"	8.82	7.48	0.14
			2.00			Ice	9.35	8.37	0.21
						1" Ice	10.42	10.18	0.38
						2" Ice			
TT19-08BP111-001	A	From Leg	4.00	0.0000	136.00	No Ice	0.55	0.44	0.02
			0.00			1/2"	0.64	0.53	0.02
			0.00			Ice	0.74	0.63	0.03
						1" Ice	0.97	0.84	0.05
						2" Ice			
TT19-08BP111-001	B	From Leg	4.00	0.0000	136.00	No Ice	0.55	0.44	0.02
			0.00			1/2"	0.64	0.53	0.02
			0.00			Ice	0.74	0.63	0.03
						1" Ice	0.97	0.84	0.05
						2" Ice			
TT19-08BP111-001	C	From Leg	4.00	0.0000	136.00	No Ice	0.55	0.44	0.02
			0.00			1/2"	0.64	0.53	0.02
			0.00			Ice	0.74	0.63	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CAAA Front ft <sup>2</sup>	CAAA Side ft <sup>2</sup>	Weight K
						1" Ice 0.97	0.84	0.05
						2" Ice		
DC6-48-60-18-8F	B	From Leg	4.00	0.0000	136.00	No Ice 0.79	0.79	0.02
			0.00			1/2" 1.27	1.27	0.04
			0.00			Ice 1.45	1.45	0.05
						1" Ice 1.83	1.83	0.10
						2" Ice		
RRUS 11	A	From Leg	4.00	0.0000	136.00	No Ice 2.78	1.19	0.05
			0.00			1/2" 2.99	1.33	0.07
			0.00			Ice 3.21	1.49	0.09
						1" Ice 3.66	1.83	0.15
						2" Ice		
RRUS 11	B	From Leg	4.00	0.0000	136.00	No Ice 2.78	1.19	0.05
			0.00			1/2" 2.99	1.33	0.07
			0.00			Ice 3.21	1.49	0.09
						1" Ice 3.66	1.83	0.15
						2" Ice		
RRUS 11	C	From Leg	4.00	0.0000	136.00	No Ice 2.78	1.19	0.05
			0.00			1/2" 2.99	1.33	0.07
			0.00			Ice 3.21	1.49	0.09
						1" Ice 3.66	1.83	0.15
						2" Ice		
DTMABP7819VG12A	A	From Leg	4.00	0.0000	136.00	No Ice 0.98	0.34	0.02
			0.00			1/2" 1.10	0.42	0.03
			0.00			Ice 1.23	0.51	0.04
						1" Ice 1.52	0.71	0.06
						2" Ice		
DTMABP7819VG12A	B	From Leg	4.00	0.0000	136.00	No Ice 0.98	0.34	0.02
			0.00			1/2" 1.10	0.42	0.03
			0.00			Ice 1.23	0.51	0.04
						1" Ice 1.52	0.71	0.06
						2" Ice		
DTMABP7819VG12A	C	From Leg	4.00	0.0000	136.00	No Ice 0.98	0.34	0.02
			0.00			1/2" 1.10	0.42	0.03
			0.00			Ice 1.23	0.51	0.04
						1" Ice 1.52	0.71	0.06
						2" Ice		
RRUS 12 B2	A	From Leg	4.00	0.0000	136.00	No Ice 3.14	1.28	0.05
			0.00			1/2" 3.36	1.43	0.07
			0.00			Ice 3.59	1.60	0.10
						1" Ice 4.07	1.95	0.16
						2" Ice		
RRUS 12 B2	B	From Leg	4.00	0.0000	136.00	No Ice 3.14	1.28	0.05
			0.00			1/2" 3.36	1.43	0.07
			0.00			Ice 3.59	1.60	0.10
						1" Ice 4.07	1.95	0.16
						2" Ice		
RRUS 12 B2	C	From Leg	4.00	0.0000	136.00	No Ice 3.14	1.28	0.05
			0.00			1/2" 3.36	1.43	0.07
			0.00			Ice 3.59	1.60	0.10
						1" Ice 4.07	1.95	0.16
						2" Ice		

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### Load Combinations

Comb. No.	Description
1	Dead Only

Comb. No.	Description
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

### Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	150 - 110.75	Pole	Max Tension	2	0.00	0.00	-0.00
			Max. Compression	26	-22.93	-0.34	-0.45
			Max. Mx	8	-9.42	-480.92	-0.07
			Max. My	14	-9.41	-0.10	-482.58
			Max. Vy	8	18.26	-480.92	-0.07
			Max. Vx	14	18.31	-0.10	-482.58
			Max. Torque	21			0.93
L2	110.75 - 74.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-30.30	-0.34	-0.45
			Max. Mx	8	-14.77	-1187.35	-0.11
			Max. My	14	-14.77	-0.11	-1190.89

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L3	74.75 - 39.5	Pole	Max. Vy	8	21.80	-1187.35	-0.11
			Max. Vx	14	21.85	-0.11	-1190.89
			Max. Torque	21			0.92
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-39.88	-0.34	-0.45
			Max. Mx	8	-22.23	-2000.74	-0.12
			Max. My	14	-22.23	-0.11	-2006.11
			Max. Vy	8	25.28	-2000.74	-0.12
			Max. Vx	14	25.33	-0.11	-2006.11
			Max. Torque	21			0.92
L4	39.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-55.60	-0.34	-0.45
			Max. Mx	8	-35.25	-3229.63	-0.12
			Max. My	14	-35.25	-0.11	-3237.34
			Max. Vy	8	29.10	-3229.63	-0.12
			Max. Vx	14	29.15	-0.11	-3237.34
			Max. Torque	21			0.92

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	33	55.60	-0.00	-7.40
	Max. H <sub>x</sub>	21	26.46	29.07	-0.00
	Max. H <sub>z</sub>	2	35.28	-0.00	29.12
	Max. M <sub>x</sub>	2	3237.07	-0.00	29.12
	Max. M <sub>z</sub>	8	3229.63	-29.07	0.00
	Max. Torsion	21	0.92	29.07	-0.00
	Min. Vert	7	26.46	-25.18	14.56
	Min. H <sub>x</sub>	9	26.46	-29.07	-0.00
	Min. H <sub>z</sub>	14	35.28	-0.00	-29.12
	Min. M <sub>x</sub>	14	-3237.34	-0.00	-29.12
	Min. M <sub>z</sub>	20	-3229.41	29.07	0.00
	Min. Torsion	9	-0.92	-29.07	-0.00

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overtuning Moment, M <sub>x</sub> kip-ft	Overtuning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	29.40	0.00	0.00	0.10	-0.09	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	35.28	0.00	-29.12	-3237.07	-0.11	0.14
0.9 Dead+1.0 Wind 0 deg - No Ice	26.46	0.00	-29.12	-3201.96	-0.08	0.14
1.2 Dead+1.0 Wind 30 deg - No Ice	35.28	14.54	-25.22	-2803.40	-1614.85	0.58
0.9 Dead+1.0 Wind 30 deg - No Ice	26.46	14.54	-25.22	-2772.98	-1597.29	0.58
1.2 Dead+1.0 Wind 60 deg - No Ice	35.28	25.18	-14.56	-1618.50	-2796.94	0.86
0.9 Dead+1.0 Wind 60 deg - No Ice	26.46	25.18	-14.56	-1600.95	-2766.55	0.86
1.2 Dead+1.0 Wind 90 deg - No Ice	35.28	29.07	0.00	0.12	-3229.63	0.91
0.9 Dead+1.0 Wind 90 deg - No Ice	26.46	29.07	0.00	0.09	-3194.53	0.92
1.2 Dead+1.0 Wind 120 deg - No Ice	35.28	25.18	14.56	1618.75	-2796.95	0.72
0.9 Dead+1.0 Wind 120 deg	26.46	25.18	14.56	1601.14	-2766.55	0.72

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturing Moment, M <sub>x</sub> kip-ft	Overturing Moment, M <sub>z</sub> kip-ft	Torque kip-ft
- No Ice						
1.2 Dead+1.0 Wind 150 deg	35.28	14.54	25.22	2803.66	-1614.86	0.34
- No Ice						
0.9 Dead+1.0 Wind 150 deg	26.46	14.54	25.22	2773.17	-1597.30	0.34
- No Ice						
1.2 Dead+1.0 Wind 180 deg	35.28	0.00	29.12	3237.34	-0.11	-0.14
- No Ice						
0.9 Dead+1.0 Wind 180 deg	26.46	0.00	29.12	3202.16	-0.08	-0.14
- No Ice						
1.2 Dead+1.0 Wind 210 deg	35.28	-14.54	25.22	2803.66	1614.64	-0.58
- No Ice						
0.9 Dead+1.0 Wind 210 deg	26.46	-14.54	25.22	2773.17	1597.13	-0.58
- No Ice						
1.2 Dead+1.0 Wind 240 deg	35.28	-25.18	14.56	1618.75	2796.73	-0.86
- No Ice						
0.9 Dead+1.0 Wind 240 deg	26.46	-25.18	14.56	1601.14	2766.39	-0.86
- No Ice						
1.2 Dead+1.0 Wind 270 deg	35.28	-29.07	0.00	0.12	3229.41	-0.91
- No Ice						
0.9 Dead+1.0 Wind 270 deg	26.46	-29.07	0.00	0.09	3194.37	-0.92
- No Ice						
1.2 Dead+1.0 Wind 300 deg	35.28	-25.18	-14.56	-1618.50	2796.72	-0.72
- No Ice						
0.9 Dead+1.0 Wind 300 deg	26.46	-25.18	-14.56	-1600.95	2766.38	-0.72
- No Ice						
1.2 Dead+1.0 Wind 330 deg	35.28	-14.54	-25.22	-2803.40	1614.63	-0.34
- No Ice						
0.9 Dead+1.0 Wind 330 deg	26.46	-14.54	-25.22	-2772.98	1597.12	-0.34
- No Ice						
1.2 Dead+1.0 Ice+1.0 Temp	55.60	0.00	0.00	0.45	-0.34	0.00
1.2 Dead+1.0 Wind 0	55.60	0.00	-7.40	-824.74	-0.40	0.04
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 30	55.60	3.69	-6.41	-714.17	-411.58	0.15
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 60	55.60	6.39	-3.70	-412.11	-712.59	0.21
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 90	55.60	7.38	0.00	0.53	-822.76	0.22
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 120	55.60	6.39	3.70	413.16	-712.59	0.17
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 150	55.60	3.69	6.41	715.23	-411.58	0.07
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 180	55.60	0.00	7.40	825.80	-0.40	-0.04
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 210	55.60	-3.69	6.41	715.23	410.78	-0.15
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 240	55.60	-6.39	3.70	413.16	711.79	-0.21
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 270	55.60	-7.38	0.00	0.53	821.96	-0.22
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 300	55.60	-6.39	-3.70	-412.11	711.79	-0.17
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	55.60	-3.69	-6.41	-714.17	410.78	-0.07
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	29.40	0.00	-6.32	-698.86	-0.09	0.03
Dead+Wind 30 deg - Service	29.40	3.15	-5.47	-605.21	-348.74	0.13
Dead+Wind 60 deg - Service	29.40	5.46	-3.16	-349.37	-603.97	0.19
Dead+Wind 90 deg - Service	29.40	6.31	0.00	0.11	-697.39	0.20
Dead+Wind 120 deg - Service	29.40	5.46	3.16	349.60	-603.97	0.16
Dead+Wind 150 deg - Service	29.40	3.15	5.47	605.44	-348.74	0.07
Dead+Wind 180 deg - Service	29.40	0.00	6.32	699.08	-0.09	-0.03
Dead+Wind 210 deg - Service	29.40	-3.15	5.47	605.44	348.55	-0.13
Dead+Wind 240 deg - Service	29.40	-5.46	3.16	349.60	603.78	-0.19
Dead+Wind 270 deg - Service	29.40	-6.31	0.00	0.11	697.20	-0.20

Load Combination	Vertical	Shear <sub>x</sub>	Shear <sub>z</sub>	Overturing Moment, M <sub>x</sub>	Overturing Moment, M <sub>z</sub>	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Service Dead+Wind 300 deg -	29.40	-5.46	-3.16	-349.37	603.78	-0.16
Service Dead+Wind 330 deg -	29.40	-3.15	-5.47	-605.21	348.55	-0.07

### Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-29.40	0.00	0.00	29.40	0.00	0.000%
2	0.00	-35.28	-29.12	-0.00	35.28	29.12	0.000%
3	0.00	-26.46	-29.12	-0.00	26.46	29.12	0.000%
4	14.54	-35.28	-25.22	-14.54	35.28	25.22	0.000%
5	14.54	-26.46	-25.22	-14.54	26.46	25.22	0.000%
6	25.18	-35.28	-14.56	-25.18	35.28	14.56	0.000%
7	25.18	-26.46	-14.56	-25.18	26.46	14.56	0.000%
8	29.07	-35.28	0.00	-29.07	35.28	0.00	0.000%
9	29.07	-26.46	0.00	-29.07	26.46	-0.00	0.000%
10	25.18	-35.28	14.56	-25.18	35.28	-14.56	0.000%
11	25.18	-26.46	14.56	-25.18	26.46	-14.56	0.000%
12	14.54	-35.28	25.22	-14.54	35.28	-25.22	0.000%
13	14.54	-26.46	25.22	-14.54	26.46	-25.22	0.000%
14	0.00	-35.28	29.12	-0.00	35.28	-29.12	0.000%
15	0.00	-26.46	29.12	-0.00	26.46	-29.12	0.000%
16	-14.54	-35.28	25.22	14.54	35.28	-25.22	0.000%
17	-14.54	-26.46	25.22	14.54	26.46	-25.22	0.000%
18	-25.18	-35.28	14.56	25.18	35.28	-14.56	0.000%
19	-25.18	-26.46	14.56	25.18	26.46	-14.56	0.000%
20	-29.07	-35.28	0.00	29.07	35.28	0.00	0.000%
21	-29.07	-26.46	0.00	29.07	26.46	-0.00	0.000%
22	-25.18	-35.28	-14.56	25.18	35.28	14.56	0.000%
23	-25.18	-26.46	-14.56	25.18	26.46	14.56	0.000%
24	-14.54	-35.28	-25.22	14.54	35.28	25.22	0.000%
25	-14.54	-26.46	-25.22	14.54	26.46	25.22	0.000%
26	0.00	-55.60	0.00	0.00	55.60	0.00	0.000%
27	0.00	-55.60	-7.40	-0.00	55.60	7.40	0.000%
28	3.69	-55.60	-6.41	-3.69	55.60	6.41	0.000%
29	6.39	-55.60	-3.70	-6.39	55.60	3.70	0.000%
30	7.38	-55.60	0.00	-7.38	55.60	-0.00	0.000%
31	6.39	-55.60	3.70	-6.39	55.60	-3.70	0.000%
32	3.69	-55.60	6.41	-3.69	55.60	-6.41	0.000%
33	0.00	-55.60	7.40	-0.00	55.60	-7.40	0.000%
34	-3.69	-55.60	6.41	3.69	55.60	-6.41	0.000%
35	-6.39	-55.60	3.70	6.39	55.60	-3.70	0.000%
36	-7.38	-55.60	0.00	7.38	55.60	-0.00	0.000%
37	-6.39	-55.60	-3.70	6.39	55.60	3.70	0.000%
38	-3.69	-55.60	-6.41	3.69	55.60	6.41	0.000%
39	0.00	-29.40	-6.32	0.00	29.40	6.32	0.000%
40	3.15	-29.40	-5.47	-3.15	29.40	5.47	0.000%
41	5.46	-29.40	-3.16	-5.46	29.40	3.16	0.000%
42	6.31	-29.40	0.00	-6.31	29.40	0.00	0.000%
43	5.46	-29.40	3.16	-5.46	29.40	-3.16	0.000%
44	3.15	-29.40	5.47	-3.15	29.40	-5.47	0.000%
45	0.00	-29.40	6.32	0.00	29.40	-6.32	0.000%
46	-3.15	-29.40	5.47	3.15	29.40	-5.47	0.000%
47	-5.46	-29.40	3.16	5.46	29.40	-3.16	0.000%
48	-6.31	-29.40	0.00	6.31	29.40	0.00	0.000%
49	-5.46	-29.40	-3.16	5.46	29.40	3.16	0.000%
50	-3.15	-29.40	-5.47	3.15	29.40	5.47	0.000%

### Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00055487
3	Yes	4	0.00000001	0.00019146
4	Yes	6	0.00000001	0.00010259
5	Yes	5	0.00000001	0.00090001
6	Yes	6	0.00000001	0.00010002
7	Yes	5	0.00000001	0.00087677
8	Yes	5	0.00000001	0.00005493
9	Yes	4	0.00000001	0.00070050
10	Yes	6	0.00000001	0.00010282
11	Yes	5	0.00000001	0.00090214
12	Yes	6	0.00000001	0.00010096
13	Yes	5	0.00000001	0.00088519
14	Yes	4	0.00000001	0.00055487
15	Yes	4	0.00000001	0.00019145
16	Yes	6	0.00000001	0.00010053
17	Yes	5	0.00000001	0.00088128
18	Yes	6	0.00000001	0.00010307
19	Yes	5	0.00000001	0.00090445
20	Yes	5	0.00000001	0.00005494
21	Yes	4	0.00000001	0.00070052
22	Yes	6	0.00000001	0.00010025
23	Yes	5	0.00000001	0.00087892
24	Yes	6	0.00000001	0.00010215
25	Yes	5	0.00000001	0.00089594
26	Yes	4	0.00000001	0.00000001
27	Yes	5	0.00000001	0.00059875
28	Yes	5	0.00000001	0.00087277
29	Yes	5	0.00000001	0.00086352
30	Yes	5	0.00000001	0.00059840
31	Yes	5	0.00000001	0.00087497
32	Yes	5	0.00000001	0.00087047
33	Yes	5	0.00000001	0.00060036
34	Yes	5	0.00000001	0.00086642
35	Yes	5	0.00000001	0.00087388
36	Yes	5	0.00000001	0.00059714
37	Yes	5	0.00000001	0.00086226
38	Yes	5	0.00000001	0.00086852
39	Yes	4	0.00000001	0.00006866
40	Yes	4	0.00000001	0.00083655
41	Yes	4	0.00000001	0.00078086
42	Yes	4	0.00000001	0.00010108
43	Yes	4	0.00000001	0.00084255
44	Yes	4	0.00000001	0.00080138
45	Yes	4	0.00000001	0.00006871
46	Yes	4	0.00000001	0.00079141
47	Yes	4	0.00000001	0.00084758
48	Yes	4	0.00000001	0.00010102
49	Yes	4	0.00000001	0.00078456
50	Yes	4	0.00000001	0.00082522

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 110.75	26.292	45	1.5369	0.0016
L2	114.75 - 74.75	15.436	45	1.3256	0.0012
L3	79.5 - 39.5	7.166	45	0.8733	0.0005
L4	45 - 0	2.258	45	0.4600	0.0002



### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	Lighting Rod 1/2" x 2'	45	26.292	1.5369	0.0016	34372
147.00	Platform Mount [LP 303-1]	45	25.325	1.5245	0.0016	34372
136.00	Platform Mount [LP-1201]	45	21.809	1.4750	0.0015	12275

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 110.75	121.645	14	7.1196	0.0073
L2	114.75 - 74.75	71.468	14	6.1423	0.0055
L3	79.5 - 39.5	33.195	14	4.0475	0.0024
L4	45 - 0	10.462	14	2.1314	0.0010

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	Lighting Rod 1/2" x 2'	14	121.645	7.1196	0.0073	7640
147.00	Platform Mount [LP 303-1]	14	117.176	7.0622	0.0071	7640
136.00	Platform Mount [LP-1201]	14	100.931	6.8334	0.0067	2726

### Compression Checks

#### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	KI/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio P <sub>u</sub> / φP <sub>n</sub>
L1	150 - 110.75 (1)	TP31.38x24x0.2188	39.25	0.00	0.0	21.113 5	-9.41	1235.14	0.008
L2	110.75 - 74.75 (2)	TP37.711x30.1904x0.25	40.00	0.00	0.0	29.016 7	-14.77	1697.47	0.009
L3	74.75 - 39.5 (3)	TP43.839x36.3179x0.312 5	40.00	0.00	0.0	42.147 1	-22.23	2465.61	0.009
L4	39.5 - 0 (4)	TP50.64x42.1799x0.375	45.00	0.00	0.0	59.827 9	-35.25	3499.93	0.010

#### Pole Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>nx</sub> kip-ft	Ratio M <sub>ux</sub> / φM <sub>nx</sub>	M <sub>uy</sub> kip-ft	φM <sub>ny</sub> kip-ft	Ratio M <sub>uy</sub> / φM <sub>ny</sub>
L1	150 - 110.75 (1)	TP31.38x24x0.2188	482.58	873.35	0.553	0.00	873.35	0.000

Section No.	Elevation ft	Size	$M_{ux}$	$\phi M_{nx}$	Ratio	$M_{uy}$	$\phi M_{ny}$	Ratio
			kip-ft	kip-ft	$\frac{M_{ux}}{\phi M_{nx}}$	kip-ft	kip-ft	$\frac{M_{uy}}{\phi M_{ny}}$
L2	110.75 - 74.75 (2)	TP37.711x30.1904x0.25	1190.89	1414.33	0.842	0.00	1414.33	0.000
L3	74.75 - 39.5 (3)	TP43.839x36.3179x0.3125	2006.12	2456.62	0.817	0.00	2456.62	0.000
L4	39.5 - 0 (4)	TP50.64x42.1799x0.375	3237.34	4146.91	0.781	0.00	4146.91	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual $V_u$	$\phi V_n$	Ratio	Actual $T_u$	$\phi T_n$	Ratio
			K	K	$\frac{V_u}{\phi V_n}$	kip-ft	kip-ft	$\frac{T_u}{\phi T_n}$
L1	150 - 110.75 (1)	TP31.38x24x0.2188	18.31	370.54	0.049	0.14	986.78	0.000
L2	110.75 - 74.75 (2)	TP37.711x30.1904x0.25	21.85	509.24	0.043	0.14	1630.82	0.000
L3	74.75 - 39.5 (3)	TP43.839x36.3179x0.3125	25.33	739.68	0.034	0.14	2752.55	0.000
L4	39.5 - 0 (4)	TP50.64x42.1799x0.375	29.15	1049.98	0.028	0.14	4621.97	0.000

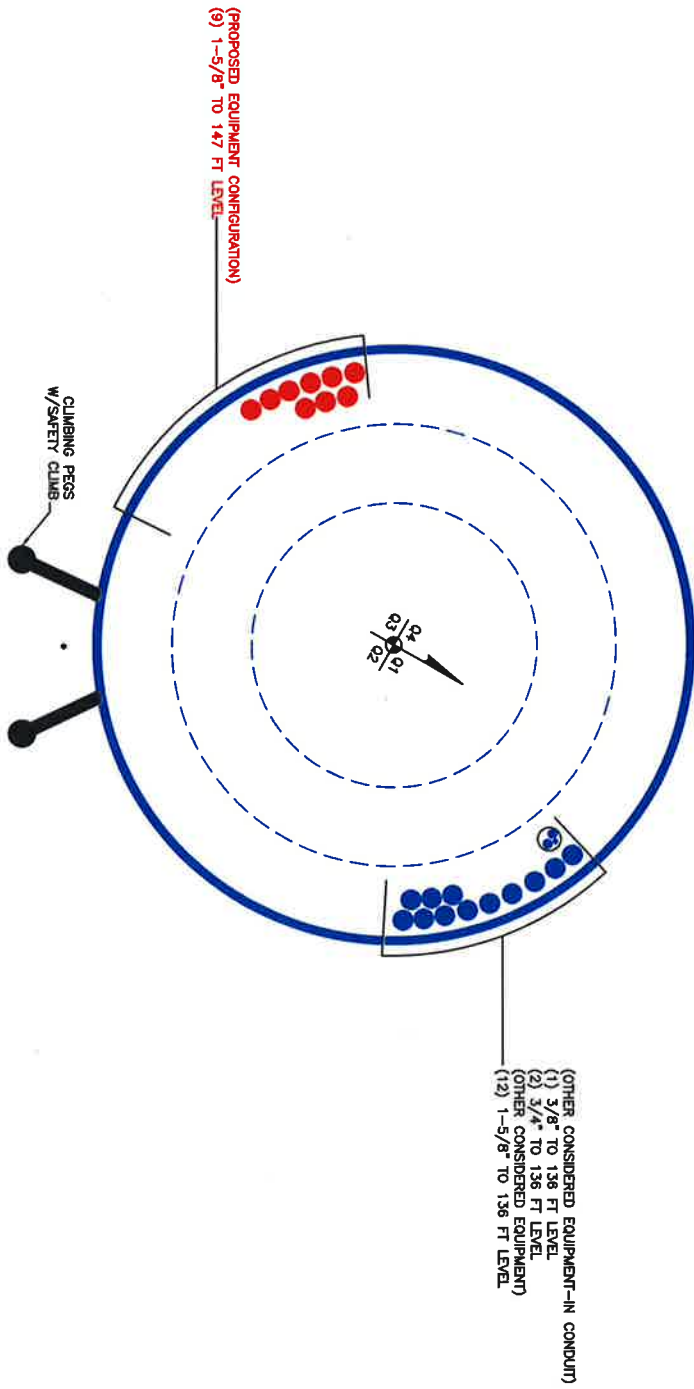
### Pole Interaction Design Data

Section No.	Elevation ft	Ratio $P_u$	Ratio $M_{ux}$	Ratio $M_{uy}$	Ratio $V_u$	Ratio $T_u$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$\frac{P_u}{\phi P_n}$	$\frac{M_{ux}}{\phi M_{nx}}$	$\frac{M_{uy}}{\phi M_{ny}}$	$\frac{V_u}{\phi V_n}$	$\frac{T_u}{\phi T_n}$			
L1	150 - 110.75 (1)	0.008	0.553	0.000	0.049	0.000	0.563	1.050	4.8.2
L2	110.75 - 74.75 (2)	0.009	0.842	0.000	0.043	0.000	0.853	1.050	4.8.2
L3	74.75 - 39.5 (3)	0.009	0.817	0.000	0.034	0.000	0.827	1.050	4.8.2
L4	39.5 - 0 (4)	0.010	0.781	0.000	0.028	0.000	0.792	1.050	4.8.2

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail
L1	150 - 110.75	Pole	TP31.38x24x0.2188	1	-9.41	1296.90	53.6	Pass
L2	110.75 - 74.75	Pole	TP37.711x30.1904x0.25	2	-14.77	1782.34	81.2	Pass
L3	74.75 - 39.5	Pole	TP43.839x36.3179x0.3125	3	-22.23	2588.89	78.7	Pass
L4	39.5 - 0	Pole	TP50.64x42.1799x0.375	4	-35.25	3674.93	75.4	Pass
Summary								
Pole (L2)							81.2	Pass
<b>RATING =</b>							<b>81.2</b>	<b>Pass</b>

**APPENDIX B**  
**BASE LEVEL DRAWING**



**APPENDIX C**  
**ADDITIONAL CALCULATIONS**

# Monopole Base Plate Connection

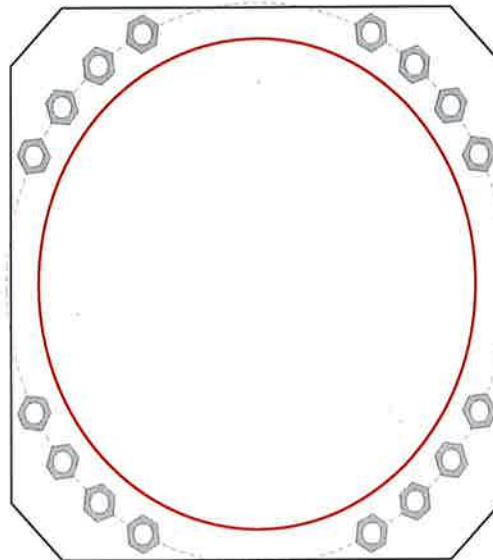


Site Info	
BU #	873645
Site Name	Oxford
Order #	474799 Rev 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
$l_{br}$ (in)	1

Applied Loads	
Moment (kip-ft)	3237.34
Axial Force (kips)	35.25
Shear Force (kips)	29.15

\*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results
-----------------------	------------------

**Anchor Rod Data**

(16) 2-1/4"  $\phi$  bolts (A615-75 N;  $F_y=75$  ksi,  $F_u=100$  ksi) on 58" BC

**Base Plate Data**

57" OD x 3" Plate (A572-55;  $F_y=55$  ksi,  $F_u=70$  ksi)

**Stiffener Data**

N/A

**Pole Data**

50.64" x 0.375" 18-sided pole (A607-65;  $F_y=65$  ksi,  $F_u=80$  ksi)

**Anchor Rod Summary**

(units of kips, kip-in)

$P_{u,c} = 169.55$	$\phi P_{n,c} = 243.75$	<b>Stress Rating</b>
$V_u = 1.82$	$\phi V_n = 73.13$	<b>66.3%</b>
$\mu = n/a$	$\phi M_n = n/a$	<b>Pass</b>

**Base Plate Summary**

Max Stress (ksi):	28.6	(Flexural)
Allowable Stress (ksi):	49.5	
Stress Rating:	<b>55.0%</b>	<b>Pass</b>

# Pier and Pad Foundation



**BU #:** 873645  
**Site Name:** Oxford  
**App. Number:** 474799 Rev 0

**TIA-222 Revision:** H  
**Tower Type:** Monopole

**Top & Bot. Pad Rein. Different?:**   
**Block Foundation?:**

Superstructure Analysis Reactions		
Compression, $P_{comp}$ :	35	kips
Base Shear, $V_{u\_comp}$ :	29	kips
Moment, $M_u$ :	3237	ft-kips
Tower Height, $H$ :	150	ft
BP Dist. Above Fdn, $bp_{dist}$ :	3	in

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
<i>Lateral (Sliding) (kips)</i>	226.63	29.00	12.2%	Pass
<i>Bearing Pressure (ksf)</i>	9.00	2.44	27.2%	Pass
<i>Overturing (kip*ft)</i>	5820.86	3461.75	59.5%	Pass
<i>Pier Flexure (Comp.) (kip*ft)</i>	6711.88	3367.50	47.8%	Pass
<i>Pier Compression (kip)</i>	23390.64	74.69	0.3%	Pass
<i>Pad Flexure (kip*ft)</i>	4415.72	1218.17	26.3%	Pass
<i>Pad Shear - 1-way (kips)</i>	720.43	200.46	26.5%	Pass
<i>Pad Shear - 2-way (Comp) (ksi)</i>	0.164	0.033	19.2%	Pass
<i>Flexural 2-way (Comp) (kip*ft)</i>	5938.20	2020.50	32.4%	Pass

Pier Properties		
Pier Shape:	Square	
Pier Diameter, $dpier$ :	7	ft
Ext. Above Grade, $E$ :	0.5	ft
Pier Rebar Size, $Sc$ :	11	
Pier Rebar Quantity, $mc$ :	28	
Pier Tie/Spiral Size, $St$ :	4	
Pier Tie/Spiral Quantity, $mt$ :	7	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, $cc_{pier}$ :	3	in

\*Rating per TIA-222-H Section 15.5

Soil Rating*:	59.5%
Structural Rating*:	47.8%

Pad Properties		
Depth, $D$ :	7	ft
Pad Width, $W$ :	23.5	ft
Pad Thickness, $T$ :	3	ft
Pad Rebar Size (Bottom), $Sp$ :	10	
Pad Rebar Quantity (Bottom), $mp$ :	26	
Pad Clear Cover, $cc_{pad}$ :	3	in

Material Properties		
Rebar Grade, $F_y$ :	60000	psi
Concrete Compressive Strength, $F'_c$ :	3000	psi
Dry Concrete Density, $\delta_c$ :	150	pcf

Soil Properties		
Total Soil Unit Weight, $\gamma$ :	125	pcf
Ultimate Gross Bearing, $Q_{ult}$ :	12.000	ksf
Cohesion, $C_u$ :	0.000	ksf
Friction Angle, $\phi$ :	30	degrees
SPT Blow Count, $N_{blows}$ :		
Base Friction, $\mu$ :	0.3	
Neglected Depth, $N$ :	3.50	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, $gw$ :	None	ft

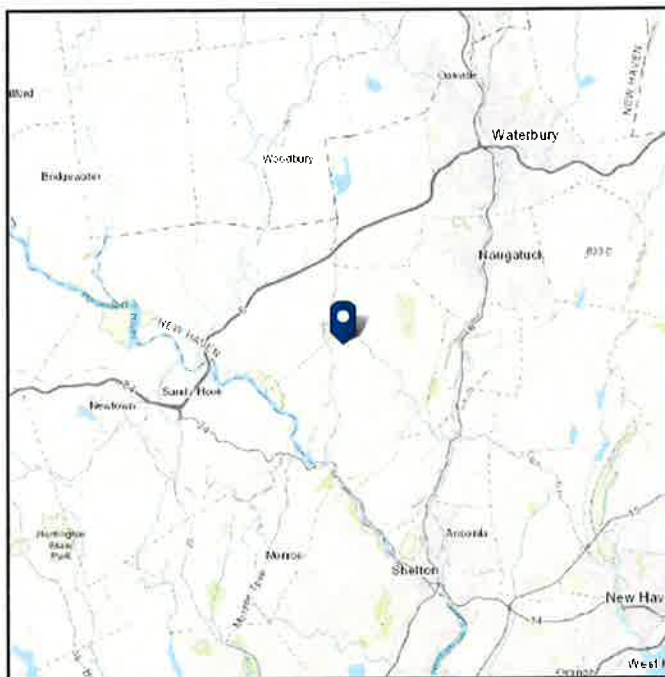
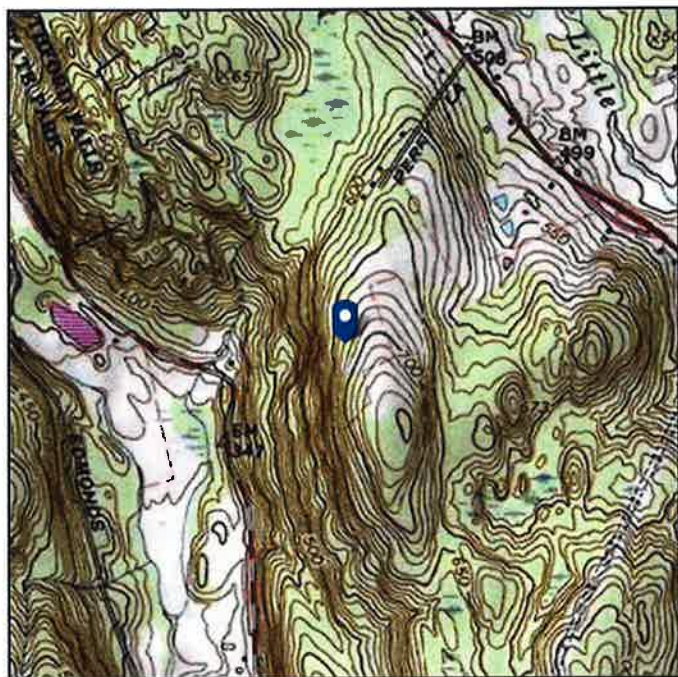
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# ASCE 7 Hazards Report

**Address:**  
No Address at This  
Location

**Standard:** ASCE/SEI 7-10  
**Risk Category:** II  
**Soil Class:** D - Stiff Soil

**Elevation:** 669.86 ft (NAVD 88)  
**Latitude:** 41.447086  
**Longitude:** -73.15231



## Wind

### Results:

Wind Speed:	120 Vmph
10-year MRI	76 Vmph
25-year MRI	86 Vmph
50-year MRI	91 Vmph
100-year MRI	98 Vmph

**Data Source:** ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

**Date Accessed:** Thu Jan 17 2019

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

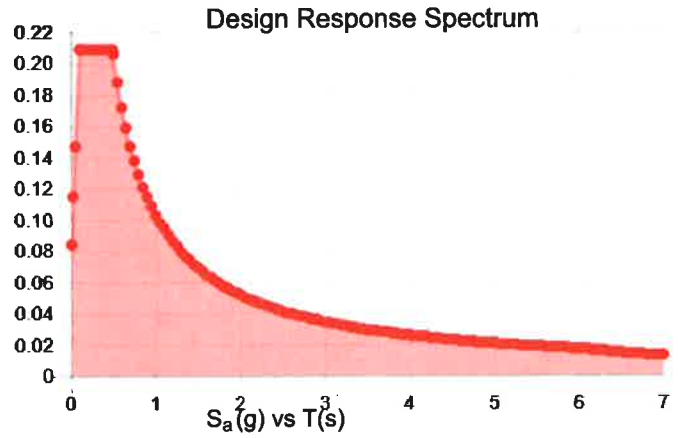
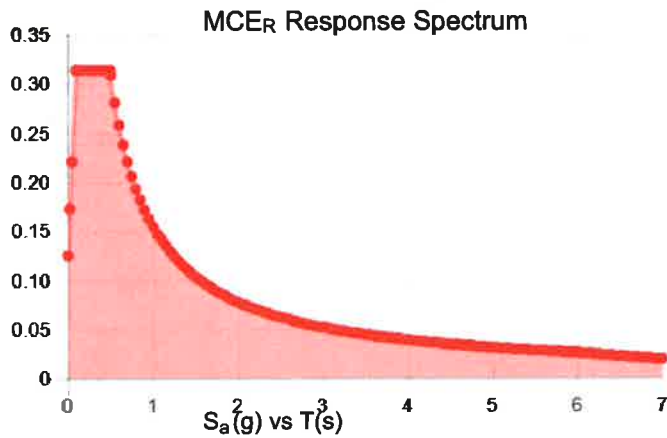


**Site Soil Class:** D - Stiff Soil

**Results:**

$S_s$ :	0.196	$S_{DS}$ :	0.209
$S_1$ :	0.064	$S_{D1}$ :	0.103
$F_a$ :	1.6	$T_L$ :	6
$F_v$ :	2.4	$PGA$ :	0.103
$S_{MS}$ :	0.314	$PGA_M$ :	0.165
$S_{M1}$ :	0.155	$F_{PGA}$ :	1.593
		$I_e$ :	1

**Seismic Design Category** B



**Data Accessed:**

Thu Jan 17 2019

**Date Source:**

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

## Ice

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**Results:**

Ice Thickness: 0.75 in.

Concurrent Temperature: 15 F

Gust Speed: 50 mph

**Data Source:** Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

**Date Accessed:** Thu Jan 17 2019

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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# **ATTACHMENT 4**





### Property Information

Owner	DON & DAVE FARM REALTY LLC
Address	691 OXFORD RD
Mailing Address	691 OXFORD RD OXFORD , CT 06478
Land Use	- Commercial
Land Class	C

Census Tract	L 92
Neighborhood	C05
Zoning	OPD
Acreage	65.88
Utilities	
Lot Setting/ Desc	/ Clear

### Photo



### PARCEL VALUATIONS (Assessed value = 70% of Appraised Value)

	Appraised	Assessed
Buildings	301800	211300
Outbuildings	71900	50400
Improvements	373700	261700
Extras	0	0
Land	955800	237900
Total	1329500	499600
Previous		

### Construction Details

Year Built	
Stories	
Building Style	
Building Use	
Building Condition	
Total Rooms	
Bedrooms	
Full Bathrooms	0
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	Gable
Roof Cover	Metal/Tin

#### EXTERIOR WALLS:

Primary	NONE
Secondary	Stone/Masonry

#### INTERIOR WALLS:

Primary	Minim/Masonry
Secondary	

#### FLOORS:

Primary	Concr-Finished
Secondary	

#### HEATING/AC:

Heating Type	None
Heating Fuel	Coal or Wood
AC Type	None

#### BUILDING AREA:

Effective Building Area	
Gross Building Area	
Total Living Area	

#### SALES HISTORY:

Sale Date	11/7/2007
Sale Price	0
Book/ Page	332/ 764

# **ATTACHMENT 5**



# Certificate of Mailing — Firm

Name and Address of Sender

Kenneth C. Baldwin, Esq.  
Robinson & Cole LLP  
280 Trumbull Street  
Hartford, CT 06103

TOTAL NO.  
of Pieces Listed by Sender

3

TOTAL NO.  
of Pieces Received at Post Office™

3

Affix Stamp Here  
Postmark with Date of Receipt.

neopost®  
02/27/2019  
**US POSTAGE \$002.79**  
ZIP 06103  
041L1220937

Postmaster, per (name of receiving employee)

*George R. Temple*

USPS® Tracking Number  
Firm-specific Identifier

Address  
(Name, Street, City, State, and ZIP Code™)

Parcel Airlift

Postage

Special Handling

Fee

1.

George R. Temple, First Selectman  
Town of Oxford  
486 Oxford Road  
Oxford, CT 06478

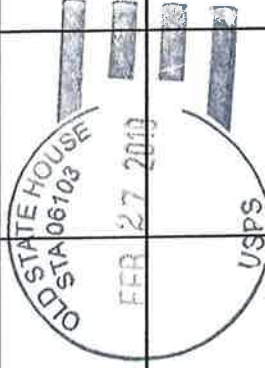
2.

Steven Macary, Zoning Enforcement Officer  
Town of Oxford  
486 Oxford Road  
Oxford, CT 06478

3.

Don and Dave Farm Realty LLC  
691 Oxford Road  
Oxford, CT 06478

4.



5.

6.