

April 2, 2018

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 three (3) model SBNHH-65B, 700 MHz antennas; and three (3) model SBNHH-65B, 1900 MHz antennas and install three (3) new antennas (model SBNHH-65B), 2100 MHz 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 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



SBNHH-1D65B

6-port sector antenna, 2x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 2x RET. Both high bands share the same electrical tilt.

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

Electrical Specifications

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

Electrical Specifications, BASTA*

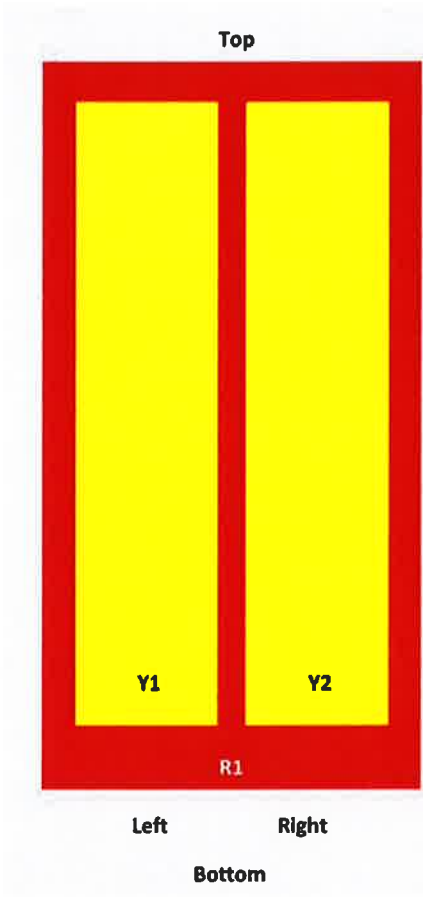
Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
	0° 14.6	0° 14.5	0° 17.4	0° 17.8	0° 18.1	0° 18.2
Gain by Beam Tilt, average, dBi	7° 14.6	7°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

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

Array Layout

SBNHH-1D65B

SBNHH 65



Array	Freq (MHz)	Conns	RET (MRET)	AISG RET UID
R1	698-896	1-2	1	AXXXXXXXXXXXXXXXXX.1
Y1	1695-2360	3-4	2	AXXXXXXXXXXXXXXXXX.2
Y2	1695-2360	5-6		

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 – 896 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage

Mechanical Specifications

RF Connector Quantity, total	6
RF Connector Quantity, low band	2
RF Connector Quantity, high band	4
RF Connector Interface	7-16 DIN Female

SBNHH-1D65B

Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Aluminum Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	618.0 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Loading, lateral	197.0 N @ 150 km/h 44.3 lbf @ 150 km/h
Wind Loading, rear	728.0 N @ 150 km/h 163.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h 150 mph

Dimensions

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

Remote Electrical Tilt (RET) Information

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

Packed Dimensions

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

Regulatory Compliance/Certifications

Agency

RoHS 2011/65/EU
China RoHS SJ/T 11364-2006
ISO 9001:2008

Classification

Compliant by Exemption
Above Maximum Concentration Value (MCV)
Designed, manufactured and/or distributed under this quality management system



SBNHH-1D65B

Included Products

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

* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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



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

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

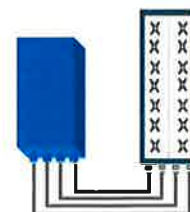
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield)
Volumes 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) IP65
Wind load (@150km/h or 93mph)	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

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ALCATEL-LUCENT B66A RRH4X45

The Alcatel-Lucent B66a Remote Radio Head 4x45 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. Its operational range covers beyond that of B4 (AWS) and B10 (AWS+).

Supporting 2Tx/4Tx MIMO and 2-way/4-way Rx diversity, the Alcatel-Lucent B66a RRH4x45 allows operators to have a compact radio solution to deploy LTE in the 2100 band (3GPP band 4, 10, and 66), providing them with the means to achieve high capacity, high quality, high reliability, large instantaneous bandwidth, and high coverage with minimum site requirements.

The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.



The Alcatel-Lucent B66a RRH4x45 is a compact (near zero-footprint) solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

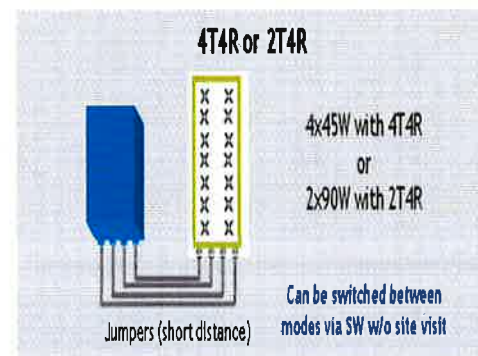
Its compactness and slim design makes the Alcatel-Lucent B66a RRH4x45 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 2110 - 2180 MHz band/DL, 1710-1780MHz/UL (3GPP band 4, 10, and 66a)
- LTE 2Tx or 4Tx MIMO (SW selectable)
- Configuration: 2T2R/2T4R/4T4R
- Output power: Up to 2x90W or 4x45W (SW configurable)
- 70MHz 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 AWS 1-3 band
- Selection of MIMO configuration (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through 4Tx MIMO
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



TECHNICAL SPECIFICATIONS

Features & Performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R selectable by SW)
Frequency band	AWS 1-3, B4/B66a DL: 2110-2180 MHz / UL: 1710-1780 MHz
Instantaneous bandwidth - #carriers	70 MHz – 4 LTE MIMO carriers (in 70 MHz occupied bandwidth)
LTE carrier bandwidth	5, 10, 15, 20 MHz
RF output power	2x90W or 4x45W (selectable by SW)
Noise figure – RX Diversity scheme Receiver Sensitivity (FRC A1-3)	2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity -104.5 dBm maximum
Sizes (HxWxD) in mm (in.)	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield)
Volume in Liters	35.5 (with solar shield) 29.7 (without solar shield)
Weight in kg (lb) (w/o mounting HW)	25.8kg (56.8lb) (with solar shield)
DC voltage range	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
DC power consumption	750W typical @100% RF load (in 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
Environmental conditions	-40°C (-40°F) / +55°C (+131°F) UL50E Type 4 Enclosure
Wind load (@150km/h or 93mph)	250N (56lb) Frontal/150N (34lb) Lateral
Antenna ports	4 ports 4.3-10 female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate 7, 9.8 Gbps) SFP: SMDF (HW supports also SMSF and MMDF)
AISG interfaces	1 AISG 2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-487 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27 / FCC Part 15 / GR-3178-CORE

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Supporting 2Tx/4Tx MIMO and 2-way/4-way Rx diversity, the Alcatel-Lucent B66a RRH4x45 allows operators to have a compact radio solution to deploy LTE in the 2100 band (3GPP band 4, 10, and 66), providing them with the means to achieve high capacity, high quality, high reliability, large instantaneous bandwidth, and high coverage with minimum site requirements.

The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.



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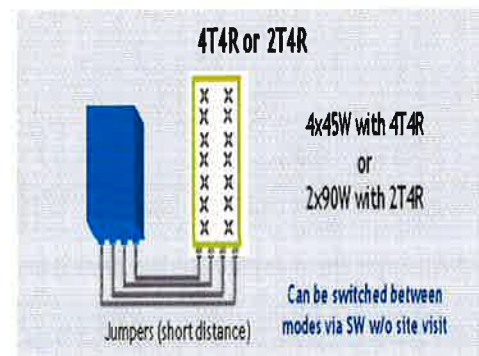
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FEATURES

- Supporting LTE in 2110 - 2180 MHz band/DL, 1710-1780MHz/UL (3GPP band 4, 10, and 66a)
- LTE 2Tx or 4Tx MIMO (SW selectable)
- Configuration: 2T2R/2T4R/4T4R
- Output power: Up to 2x90W or 4x45W (SW configurable)
- 70MHz 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 AWS 1-3 band
- Selection of MIMO configuration (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through 4Tx MIMO
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



TECHNICAL SPECIFICATIONS

Features & Performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R selectable by SW)
Frequency band	AWS 1-3, B4/B66a DL: 2110-2180 MHz / UL: 1710-1780 MHz
Instantaneous bandwidth - #carriers	70 MHz – 4 LTE MIMO carriers (in 70 MHz occupied bandwidth)
LTE carrier bandwidth	5, 10, 15, 20 MHz
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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

Mechanical Properties			
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
Mechanical Properties			
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)
Electrical Properties			
DC-Resistance Outer Conductor Armor		(Ω/km (Ω/1000ft))	0.68 (0.205)
DC-Resistance Power Cable, 8.4mm ² (8AWG)		(Ω/km (Ω/1000ft))	2.1 (0.307)
Optical Properties			
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
DC Power Cable Properties			
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
Operating Environment			
Installation Temperature		(°C (°F))	-40 to +65 (-40 to 149)
Operation Temperature		(°C (°F))	-40 to +65 (-40 to 149)

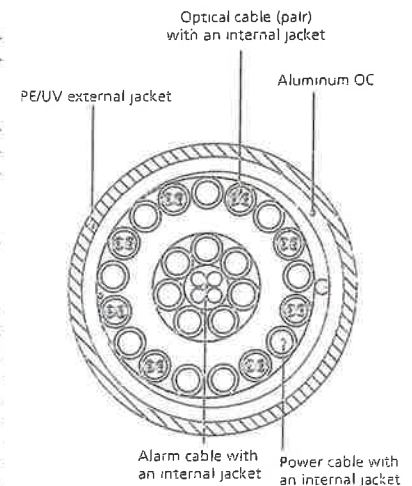


Figure 2: Construction Detail

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

* This data is provisional and subject to change

ATTACHMENT 2

		General		Power		Density					
Site Name: Oxford N Tower Height: 150Ft.											
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total			
*AT&T	2	284	137	850	0.0119	0.5667	0.21%				
*AT&T	2	411	137	1900	0.0172	1.0000	0.17%				
*AT&T	1	1119	137	734	0.0234	0.4893	0.48%				
*AT&T	4	2183	137	1900	0.1830	1.0000	1.83%				
Verizon PCS	0	5062	147	0.0000	1970	1.0000	0.00%				
Verizon Cellular	3	497	147	0.0248	869	0.5793	4.28%				
Verizon Cellular	0	3709	147	0.0000	876	0.5840	0.00%				
Verizon AWS	1	7420	147	0.1235	2145	1.0000	12.35%				
Verizon 700	1	2062	147	0.0343	746	0.4973	6.90%				
									26.22%		
* Source: Siting Council											

ATTACHMENT 3

Date: February 23, 2018

Charles McGuirt
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: 341553
Crown Castle Work Order Number: 1529487
Crown Castle Application Number: 304737 Rev. 7

Engineering Firm Designation: Crown Castle Project Number: 1529487

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 Charles McGuirt,

Crown Castle is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1529487, in accordance with application 304737, revision 7.

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: Existing + Reserved + Proposed Equipment

Sufficient Capacity

Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category C and Risk Category II were used in this analysis.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at Crown Castle appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects, please give us a call.

Structural analysis prepared by: Kenneth Sukitch, E.I.T. / VDL

Respectfully submitted by:

Terry P. Styran, P.E.
Senior Project Engineer

trxTower Report - version 7.0.5.1



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1) INTRODUCTION

This tower is a 150 ft Monopole tower designed by SUMMIT in November of 1999. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 97 mph with no ice, 50 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category C.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
147.0	149.0	3	alcatel lucent	RRH4X45-AWS4 B66	6	1-5/8	-
	148.0	3	alcatel lucent	RRH2X60-1900			
		3	alcatel lucent	RRH2X60-700			
		9	commscope	SBNHH-1D65B w/ Mount Pipe			
		2	rfs celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
147.0	148.0	3	antel	BXA-171063-12BF w/ Mount Pipe	5	1-5/8	3
		3	antel	BXA-70063-6CF-EDIN-0 w/ Mount Pipe			
		6	antel	LPA-80063/6CF w/ Mount Pipe	7	1-5/8	1
		6	rfs celwave	FD9R6004/2C-3L			
	147.0	1	tower mounts	Platform Mount [LP 303-1]			
136.0	138.0	4	andrew	SBNH-1D6565C w/ Mount Pipe	1 2 12 1	3/8 3/4 1-5/8 Conduit	1
		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	powerwave technologies	TT19-08BP111-001			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Miscellaneous [NA 509-3]			
		1	tower mounts	Miscellaneous [NA 510-1]			
		1	tower mounts	Platform Mount [LP-1201]			
136.0	3	ericsson	RRUS 12 B2	-	-	2	

- Notes:
 1) Existing Equipment
 2) Reserved Equipment
 3) Equipment To Be Removed; Not Considered in This Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
147	147	12	dapa	48000 PCS Panels	-	-
137	137	12	dapa	48000 PCS Panels	-	-
127	127	12	dapa	48000 PCS Panels	-	-
117	117	12	dapa	48000 PCS Panels	-	-
107	107	12	dapa	48000 PCS Panels	-	-
97	97	12	dapa	48000 PCS Panels	-	-

3) ANALYSIS PROCEDURE

Table 4 - 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 7.0.5.1), 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.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

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 5 - 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	-9.34	1415.41	57.7	Pass
L2	110.75 - 74.75	Pole	TP37.711x30.1904x0.25	2	-14.88	1905.99	86.5	Pass
L3	74.75 - 39.5	Pole	TP43.839x36.3179x0.3125	3	-22.49	2849.32	83.1	Pass
L4	39.5 - 0	Pole	TP50.64x42.1799x0.375	4	-35.68	4066.19	78.8	Pass
							Summary	
						Pole (L2)	86.5	Pass
						Rating =	86.5	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	67.4	Pass
1	Base Plate	0	58.5	Pass
1	Base Foundation (Structure)	0	50.7	Pass
1	Base Foundation (Soil Interaction)	0	58.7	Pass
Structure Rating (max from all components) =				86.5%

Notes:

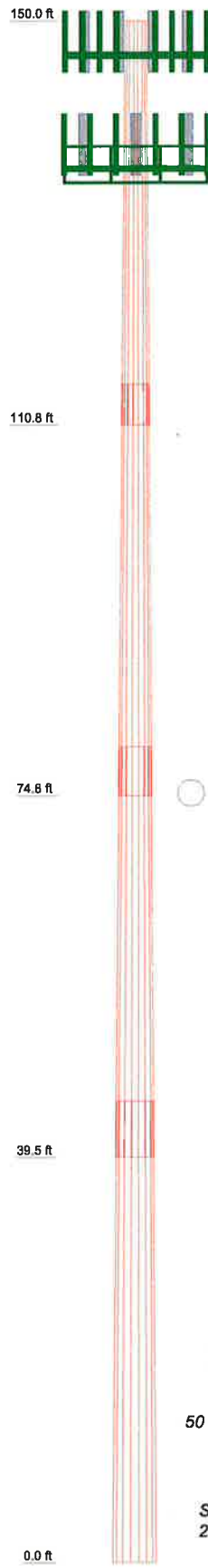
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

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	A607-65	2.5
2	40.00	18	0.2500	4.75	30.1904	37.7110	A607-65	3.6
3	40.00	18	0.3125	5.50	36.3179	43.8390	A607-65	5.4
4	45.00	18	0.3750	42.1799	50.6400		A607-65	8.4
								19.9



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lighting Rod 1/2" x 2'	150	7770.00 w/ Mount Pipe	136
(2) LPA-80063/6CF w/ Mount Pipe	147	7770.00 w/ Mount Pipe	136
(2) LPA-80063/6CF w/ Mount Pipe	147	(2) SBNH-1D6565C w/ Mount Pipe	136
(2) LPA-80063/6CF w/ Mount Pipe	147	(2) SBNH-1D6565C w/ Mount Pipe	136
(3) SBNH-1D65B w/ Mount Pipe	147	(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	136
(3) SBNH-1D65B w/ Mount Pipe	147	TT19-08BP111-001	136
(3) SBNH-1D65B w/ Mount Pipe	147	TT19-08BP111-001	136
(3) FD9R6004/2C-3L	147	TT19-08BP111-001	136
(2) FD9R6004/2C-3L	147	DC8-48-60-18-8F	136
FD9R6004/2C-3L	147	RRUS 11	136
RRH2X60-700	147	RRUS 11	136
RRH2X60-700	147	RRUS 11	136
RRH2X60-700	147	DTMABP7819VG12A	136
RRH4X45-AWS4 B66	147	DTMABP7819VG12A	136
RRH4X45-AWS4 B66	147	DTMABP7819VG12A	136
RRH4X45-AWS4 B66	147	RRUS 12 B2	136
RRH2X60-1900	147	RRUS 12 B2	136
RRH2X60-1900	147	RRUS 12 B2	136
RRH2X60-1900	147	RRUS 12 B2	136
(2) DB-T1-6Z-8AB-0Z	147	Platform Mount [LP-1201]	136
Platform Mount [LP 303-1]	147	Miscellaneous [NA 510-1]	136
7770.00 w/ Mount Pipe	136	Miscellaneous [NA 509-3]	136

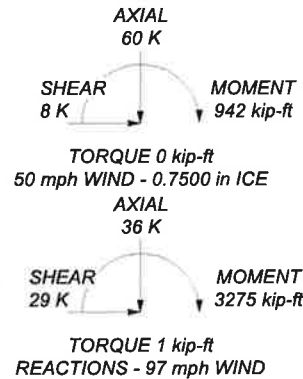
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	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-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 86.5%

ALL REACTIONS
ARE FACTORED



CROWN CASTLE The Pathway to Possible	Crown Castle 2000 Corporate Dr. Canonsburg, PA 15317 Phone: (724) 416 - 2000 FAX:	Job: BU# 873645	Project: 1529487	Client: Crown Castle	Drawn by: vlarson	App'd:
		Code: TIA-222-G	Date: 02/23/18	Scale: N	Path:	Dwg No.

Tower Input Data

There is a pole section.

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

The following design criteria apply:

- 1) Tower is located in New Haven County, Connecticut.
- 2) Basic wind speed of 97 mph.
- 3) Structure Class II.
- 4) Exposure Category C.
- 5) Topographic Category 1.
- 6) Crest Height 0.00 ft.
- 7) Nominal ice thickness of 0.7500 in.
- 8) Ice thickness is considered to increase with height.
- 9) Ice density of 56 pcf.
- 10) A wind speed of 50 mph is used in combination with ice.
- 11) Temperature drop of 50 °F.
- 12) Deflections calculated using a wind speed of 60 mph.
- 13) A non-linear (P-delta) analysis was used.
- 14) Pressures are calculated at each section.
- 15) Stress ratio used in pole design is 1.
- 16) 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	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-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
--	--	--

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	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 ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	24.3702	16.5116	1179.7676	8.4423	12.1920	96.7657	2361.0876	8.2574	3.8390	17.55
	31.8641	21.6356	2654.2208	11.0622	15.9410	166.5024	5311.9341	10.8199	5.1379	23.487
L2	31.4198	23.7577	2690.6493	10.6288	15.3367	175.4384	5384.8390	11.8811	4.8735	19.494
	38.2928	29.7253	5270.1440	13.2987	19.1572	275.1001	10547.2226	14.8655	6.1971	24.789
L3	37.7851	35.7129	5849.2253	12.7819	18.4495	317.0396	11706.1471	17.8598	5.8420	18.694
	44.5153	43.1728	10333.6949	15.4519	22.2702	464.0142	20680.9871	21.5905	7.1657	22.93
L4	43.8805	49.7582	10986.4082	14.8407	21.4274	512.7279	21987.2726	24.8838	6.7637	18.036
	51.4212	59.8279	19097.3321	17.8441	25.7251	742.3612	38219.7930	29.9196	8.2526	22.007

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor Ar	Adjust. Factor Ar	Weight Mult.	Double Angle Stitch Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	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	Component Type	Placement	Total Number	Number Per Row	Clear Spacing	Width or Diameter	Perimeter	Weight
				ft			in	in	in	plf

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	CA/A	Weight
				ft		ft ² /ft	plf
*** 147 ft ***							
AVA7-50(1-5/8)	C	No	Inside Pole	147.00 - 0.00	7	No Ice 1/2" Ice 1" Ice	0.70 0.70 0.70
AVA7-50(1-5/8)	C	No	Inside Pole	147.00 - 0.00	6	No Ice 1/2" Ice 1" Ice	0.70 0.70 0.70
*** 136 ft ***							
LCF158-50JA-A0(1-5/8)	B	No	Inside Pole	136.00 - 0.00	12	No Ice 1/2" Ice 1" Ice	0.80 0.80 0.80
FB-L98B-034-XXX(3/8)	B	No	Inside Pole	136.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.06 0.06 0.06
WR-VG86ST-BRD(3/4)	B	No	Inside Pole	136.00 - 0.00	2	No Ice 1/2" Ice 1" Ice	0.58 0.58 0.58
2" Rigid Conduit	B	No	Inside Pole	136.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	2.80 2.80 2.80

Feed Line/Linear Appurtenances Section Areas

Tower Sectio n	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	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	0.33
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	0.33
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	0.32
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	0.36

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Sectio n	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	150.00-110.75	A	1.720	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	0.33
L2	110.75-74.75	A	1.663	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	0.33
L3	74.75-39.50	A	1.584	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	0.32
L4	39.50-0.00	A	1.426	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	0.36

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice 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

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t	Placement ft	CAAA Front ft ²	CAAA Side ft ²	Weight K	
Lighting Rod 1/2" x 2'	C	None		0.0000	150.00	No Ice 1/2" Ice 1" Ice	0.10 0.26 0.40	0.10 0.26 0.40	0.02 0.02 0.02
*** 147 ft *** (2) LPA-80063/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	9.83 10.40 10.93	10.22 11.38 12.27	0.05 0.14 0.25
(2) LPA-80063/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	9.83 10.40 10.93	10.22 11.38 12.27	0.05 0.14 0.25
(2) LPA-80063/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	9.83 10.40 10.93	10.22 11.38 12.27	0.05 0.14 0.25
(3) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	8.39 8.95 9.48	7.08 8.28 9.19	0.08 0.15 0.22
(3) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	8.39 8.95 9.48	7.08 8.28 9.19	0.08 0.15 0.22
(3) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	8.39 8.95 9.48	7.08 8.28 9.19	0.08 0.15 0.22
(3) FD9R6004/2C-3L	A	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
(2) FD9R6004/2C-3L	B	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
FD9R6004/2C-3L	C	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
RRH2X60-700	A	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
RRH2X60-700	B	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
RRH2X60-700	C	From Leg	4.00 0.00 1.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
RRH4X45-AWS4 B66	A	From Leg	4.00 0.00 2.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	2.66 2.88 3.10	1.59 1.77 1.96	0.06 0.08 0.11
RRH4X45-AWS4 B66	B	From Leg	4.00 0.00 2.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	2.66 2.88 3.10	1.59 1.77 1.96	0.06 0.08 0.11
RRH4X45-AWS4 B66	C	From Leg	4.00	0.0000	147.00	No Ice	2.66	1.59	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
			0.00			1/2"	2.88	1.77	0.08
			2.00			Ice	3.10	1.96	0.11
						1" Ice			
RRH2X60-1900	A	From Leg	4.00	0.0000	147.00	No Ice	1.87	1.22	0.04
			0.00			1/2"	2.05	1.37	0.06
			1.00			Ice	2.24	1.52	0.08
						1" Ice			
RRH2X60-1900	B	From Leg	4.00	0.0000	147.00	No Ice	1.87	1.22	0.04
			0.00			1/2"	2.05	1.37	0.06
			1.00			Ice	2.24	1.52	0.08
						1" Ice			
RRH2X60-1900	C	From Leg	4.00	0.0000	147.00	No Ice	1.87	1.22	0.04
			0.00			1/2"	2.05	1.37	0.06
			1.00			Ice	2.24	1.52	0.08
						1" Ice			
(2) DB-T1-6Z-8AB-0Z	C	From Leg	4.00	0.0000	147.00	No Ice	4.80	2.00	0.04
			0.00			1/2"	5.07	2.19	0.08
			1.00			Ice	5.35	2.39	0.12
						1" Ice			
Platform Mount [LP 303-1]	C	None		0.0000	147.00	No Ice	14.66	14.66	1.25
						1/2"	18.87	18.87	1.48
						Ice	23.08	23.08	1.71
						1" Ice			
*** 136 ft ***									
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			
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			
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			
(2) SBNH-1D6565C w/ Mount Pipe	A	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			
(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			
(2) AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	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			
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			
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			
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
						1" Ice			
DC6-48-60-18-8F	A	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			
RRUS 11	A	From Leg	4.00	0.0000	136.00	No Ice	2.78	1.19	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CAAA Front ft ²	CAAA Side ft ²	Weight K	
			0.00			1/2"	2.99	1.33	0.07
			0.00			Ice	3.21	1.49	0.09
						1" 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			
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			
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			
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			
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			
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			
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			
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			
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			
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			
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			

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Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice

Comb. No.	Description
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 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

Sectio n 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	20	0.00	-0.00	0.00
			Max. Compression	26	-25.33	0.59	0.20
			Max. Mx	20	-9.36	501.95	-4.14
			Max. My	2	-9.39	-3.92	497.49
			Max. Vy	20	-18.82	501.95	-4.14
			Max. Vx	14	18.68	4.37	-497.42
			Max. Torque	25			0.95
			Max Tension	1	0.00	0.00	0.00
L2	110.75 - 74.75	Pole	Max. Compression	26	-33.27	0.59	0.20
			Max. Mx	20	-14.89	1223.72	-8.63
			Max. My	2	-14.91	-8.44	1214.53
			Max. Vy	20	-22.10	1223.72	-8.63
			Max. Vx	14	21.97	8.86	-1214.46
			Max. Torque	24			-0.69
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-43.45	0.59	0.20
L3	74.75 - 39.5	Pole	Max. Mx	20	-22.50	2042.72	-12.99
			Max. My	2	-22.51	-12.81	2028.93

Sectio n No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L4	39.5 - 0	Pole	Max. Vy	20	-25.30	2042.72	-12.99
			Max. Vx	14	25.16	13.23	-2028.85
			Max. Torque	24			-0.69
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-59.99	0.59	0.20
			Max. Mx	20	-35.68	3264.13	-18.54
			Max. My	2	-35.68	-18.36	3244.49
			Max. Vy	20	-28.75	3264.13	-18.54
			Max. Vx	14	28.63	18.78	-3244.41
			Max. Torque	24			-0.69

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	36	59.99	8.26	-0.03
	Max. H _x	20	35.71	28.72	-0.12
	Max. H _z	3	26.78	-0.12	28.60
	Max. M _x	2	3244.49	-0.12	28.60
	Max. M _z	8	3263.74	-28.72	0.12
	Max. Torsion	12	0.68	-14.26	-24.71
	Min. Vert	17	26.78	14.47	-24.83
	Min. H _x	9	26.78	-28.72	0.12
	Min. H _z	14	35.71	0.12	-28.60
	Min. M _x	14	-3244.41	0.12	-28.60
	Min. M _z	20	-3264.13	28.72	-0.12
	Min. Torsion	24	-0.68	14.26	24.71

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturing Moment, M _x kip-ft	Overturing Moment, M _z kip-ft	Torque kip-ft
Dead Only	29.76	0.00	0.00	-0.03	0.16	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	35.71	0.12	-28.60	-3244.49	-18.36	0.51
0.9 Dead+1.6 Wind 0 deg - No Ice	26.78	0.12	-28.60	-3208.65	-18.18	0.51
1.2 Dead+1.6 Wind 30 deg - No Ice	35.71	14.47	-24.83	-2818.99	-1647.84	0.21
0.9 Dead+1.6 Wind 30 deg - No Ice	26.78	14.47	-24.83	-2787.85	-1629.66	0.20
1.2 Dead+1.6 Wind 60 deg - No Ice	35.71	24.94	-14.40	-1638.25	-2835.68	-0.16
0.9 Dead+1.6 Wind 60 deg - No Ice	26.78	24.94	-14.40	-1620.13	-2804.39	-0.16
1.2 Dead+1.6 Wind 90 deg - No Ice	35.71	28.72	-0.12	-18.60	-3263.74	-0.48
0.9 Dead+1.6 Wind 90 deg - No Ice	26.78	28.72	-0.12	-18.36	-3227.72	-0.48
1.2 Dead+1.6 Wind 120 deg - No Ice	35.71	24.81	14.19	1606.13	-2817.28	-0.67
0.9 Dead+1.6 Wind 120 deg - No Ice	26.78	24.81	14.19	1588.42	-2786.21	-0.67
1.2 Dead+1.6 Wind 150 deg - No Ice	35.71	14.26	24.71	2800.53	-1615.77	-0.68
0.9 Dead+1.6 Wind 150 deg - No Ice	26.78	14.26	24.71	2769.62	-1597.99	-0.68
1.2 Dead+1.6 Wind 180 deg - No Ice	35.71	-0.12	28.60	3244.41	18.78	-0.51

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturing Moment, M _x kip-ft	Overturing Moment, M _z kip-ft	Torque kip-ft
0.9 Dead+1.6 Wind 180 deg - No Ice	26.78	-0.12	28.60	3208.60	18.49	-0.51
1.2 Dead+1.6 Wind 210 deg - No Ice	35.71	-14.47	24.83	2818.92	1648.25	-0.20
0.9 Dead+1.6 Wind 210 deg - No Ice	26.78	-14.47	24.83	2787.79	1629.96	-0.20
1.2 Dead+1.6 Wind 240 deg - No Ice	35.71	-24.94	14.40	1638.18	2836.08	0.16
0.9 Dead+1.6 Wind 240 deg - No Ice	26.78	-24.94	14.40	1620.08	2804.68	0.16
1.2 Dead+1.6 Wind 270 deg - No Ice	35.71	-28.72	0.12	18.54	3264.13	0.48
0.9 Dead+1.6 Wind 270 deg - No Ice	26.78	-28.72	0.12	18.32	3228.02	0.48
1.2 Dead+1.6 Wind 300 deg - No Ice	35.71	-24.81	-14.19	-1606.18	2817.69	0.67
0.9 Dead+1.6 Wind 300 deg - No Ice	26.78	-24.81	-14.19	-1588.46	2786.51	0.67
1.2 Dead+1.6 Wind 330 deg - No Ice	35.71	-14.26	-24.71	-2800.59	1616.20	0.68
0.9 Dead+1.6 Wind 330 deg - No Ice	26.78	-14.26	-24.71	-2769.66	1598.30	0.68
1.2 Dead+1.0 Ice+1.0 Temp	59.99	-0.00	0.00	-0.20	0.59	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	59.99	0.03	-8.23	-934.16	-3.61	0.14
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	59.99	4.15	-7.14	-811.21	-472.26	0.05
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	59.99	7.17	-4.14	-470.94	-814.18	-0.06
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	59.99	8.26	-0.03	-4.55	-937.74	-0.14
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	59.99	7.14	4.09	463.00	-809.87	-0.19
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	59.99	4.11	7.12	806.42	-464.79	-0.19
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	59.99	-0.03	8.23	933.69	5.02	-0.14
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	59.99	-4.15	7.14	810.74	473.67	-0.05
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	59.99	-7.17	4.14	470.47	815.59	0.06
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	59.99	-8.26	0.03	4.08	939.15	0.15
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	59.99	-7.14	-4.09	-463.47	811.28	0.19
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	59.99	-4.11	-7.12	-806.89	466.20	0.19
Dead+Wind 0 deg - Service	29.76	0.03	-6.12	-690.75	-3.78	0.11
Dead+Wind 30 deg - Service	29.76	3.10	-5.31	-600.19	-350.70	0.04
Dead+Wind 60 deg - Service	29.76	5.34	-3.08	-348.81	-603.60	-0.03
Dead+Wind 90 deg - Service	29.76	6.15	-0.03	-3.98	-694.72	-0.10
Dead+Wind 120 deg - Service	29.76	5.31	3.04	341.91	-599.65	-0.15
Dead+Wind 150 deg - Service	29.76	3.05	5.29	596.18	-343.86	-0.15
Dead+Wind 180 deg - Service	29.76	-0.03	6.12	690.69	4.12	-0.11
Dead+Wind 210 deg - Service	29.76	-3.10	5.31	600.13	351.04	-0.04
Dead+Wind 240 deg - Service	29.76	-5.34	3.08	348.75	603.94	0.03
Dead+Wind 270 deg - Service	29.76	-6.15	0.03	3.92	695.06	0.10
Dead+Wind 300 deg - Service	29.76	-5.31	-3.04	-341.97	599.99	0.15
Dead+Wind 330 deg - Service	29.76	-3.05	-5.29	-596.24	344.19	0.15

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	-29.76	0.00	0.00	29.76	0.00	0.000%
2	0.12	-35.71	-28.60	-0.12	35.71	28.60	0.000%
3	0.12	-26.78	-28.60	-0.12	26.78	28.60	0.000%
4	14.47	-35.71	-24.83	-14.47	35.71	24.83	0.000%
5	14.47	-26.78	-24.83	-14.47	26.78	24.83	0.000%
6	24.94	-35.71	-14.40	-24.94	35.71	14.40	0.000%
7	24.94	-26.78	-14.40	-24.94	26.78	14.40	0.000%
8	28.72	-35.71	-0.12	-28.72	35.71	0.12	0.000%
9	28.72	-26.78	-0.12	-28.72	26.78	0.12	0.000%
10	24.81	-35.71	14.19	-24.81	35.71	-14.19	0.000%
11	24.81	-26.78	14.19	-24.81	26.78	-14.19	0.000%
12	14.26	-35.71	24.71	-14.26	35.71	-24.71	0.000%
13	14.26	-26.78	24.71	-14.26	26.78	-24.71	0.000%
14	-0.12	-35.71	28.60	0.12	35.71	-28.60	0.000%
15	-0.12	-26.78	28.60	0.12	26.78	-28.60	0.000%
16	-14.47	-35.71	24.83	14.47	35.71	-24.83	0.000%
17	-14.47	-26.78	24.83	14.47	26.78	-24.83	0.000%
18	-24.94	-35.71	14.40	24.94	35.71	-14.40	0.000%
19	-24.94	-26.78	14.40	24.94	26.78	-14.40	0.000%
20	-28.72	-35.71	0.12	28.72	35.71	-0.12	0.000%
21	-28.72	-26.78	0.12	28.72	26.78	-0.12	0.000%
22	-24.81	-35.71	-14.19	24.81	35.71	14.19	0.000%
23	-24.81	-26.78	-14.19	24.81	26.78	14.19	0.000%
24	-14.26	-35.71	-24.71	14.26	35.71	24.71	0.000%
25	-14.26	-26.78	-24.71	14.26	26.78	24.71	0.000%
26	0.00	-59.99	0.00	0.00	59.99	0.00	0.000%
27	0.03	-59.99	-8.23	-0.03	59.99	8.23	0.000%
28	4.15	-59.99	-7.14	-4.15	59.99	7.14	0.000%
29	7.17	-59.99	-4.14	-7.17	59.99	4.14	0.000%
30	8.26	-59.99	-0.03	-8.26	59.99	0.03	0.000%
31	7.14	-59.99	4.09	-7.14	59.99	-4.09	0.000%
32	4.11	-59.99	7.12	-4.11	59.99	-7.12	0.000%
33	-0.03	-59.99	8.23	0.03	59.99	-8.23	0.000%
34	-4.15	-59.99	7.14	4.15	59.99	-7.14	0.000%
35	-7.17	-59.99	4.14	7.17	59.99	-4.14	0.000%
36	-8.26	-59.99	0.03	8.26	59.99	-0.03	0.000%
37	-7.14	-59.99	-4.09	7.14	59.99	4.09	0.000%
38	-4.11	-59.99	-7.12	4.11	59.99	7.12	0.000%
39	0.03	-29.76	-6.12	-0.03	29.76	6.12	0.000%
40	3.10	-29.76	-5.31	-3.10	29.76	5.31	0.000%
41	5.34	-29.76	-3.08	-5.34	29.76	3.08	0.000%
42	6.15	-29.76	-0.03	-6.15	29.76	0.03	0.000%
43	5.31	-29.76	3.04	-5.31	29.76	-3.04	0.000%
44	3.05	-29.76	5.29	-3.05	29.76	-5.29	0.000%
45	-0.03	-29.76	6.12	0.03	29.76	-6.12	0.000%
46	-3.10	-29.76	5.31	3.10	29.76	-5.31	0.000%
47	-5.34	-29.76	3.08	5.34	29.76	-3.08	0.000%
48	-6.15	-29.76	0.03	6.15	29.76	-0.03	0.000%
49	-5.31	-29.76	-3.04	5.31	29.76	3.04	0.000%
50	-3.05	-29.76	-5.29	3.05	29.76	5.29	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	5	0.00000001	0.00007010
3	Yes	4	0.00000001	0.00087514
4	Yes	6	0.00000001	0.00010651
5	Yes	5	0.00000001	0.00093083
6	Yes	6	0.00000001	0.00010652
7	Yes	5	0.00000001	0.00093075
8	Yes	5	0.00000001	0.00006952

9	Yes	4	0.00000001	0.00086792
10	Yes	6	0.00000001	0.00010361
11	Yes	5	0.00000001	0.00090544
12	Yes	6	0.00000001	0.00010599
13	Yes	5	0.00000001	0.00092717
14	Yes	4	0.00000001	0.00059507
15	Yes	4	0.00000001	0.00021165
16	Yes	6	0.00000001	0.00010581
17	Yes	5	0.00000001	0.00092462
18	Yes	6	0.00000001	0.00010595
19	Yes	5	0.00000001	0.00092548
20	Yes	4	0.00000001	0.00060315
21	Yes	4	0.00000001	0.00021725
22	Yes	6	0.00000001	0.00010607
23	Yes	5	0.00000001	0.00092766
24	Yes	6	0.00000001	0.00010355
25	Yes	5	0.00000001	0.00090522
26	Yes	4	0.00000001	0.00000288
27	Yes	5	0.00000001	0.00082554
28	Yes	6	0.00000001	0.00016222
29	Yes	6	0.00000001	0.00016262
30	Yes	5	0.00000001	0.00082846
31	Yes	6	0.00000001	0.00015804
32	Yes	6	0.00000001	0.00015944
33	Yes	5	0.00000001	0.00082448
34	Yes	6	0.00000001	0.00016244
35	Yes	6	0.00000001	0.00016256
36	Yes	5	0.00000001	0.00083079
37	Yes	6	0.00000001	0.00016069
38	Yes	6	0.00000001	0.00015876
39	Yes	4	0.00000001	0.00008547
40	Yes	4	0.00000001	0.00084668
41	Yes	4	0.00000001	0.00084843
42	Yes	4	0.00000001	0.0008543
43	Yes	4	0.00000001	0.00078432
44	Yes	4	0.00000001	0.00083331
45	Yes	4	0.00000001	0.00007417
46	Yes	4	0.00000001	0.00083381
47	Yes	4	0.00000001	0.00083753
48	Yes	4	0.00000001	0.00007426
49	Yes	4	0.00000001	0.00083857
50	Yes	4	0.00000001	0.00078432

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 110.75	26.570	47	1.5639	0.0010
L2	114.75 - 74.75	15.548	47	1.3424	0.0009
L3	79.5 - 39.5	7.193	47	0.8795	0.0004
L4	45 - 0	2.260	47	0.4610	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'	47	26.570	1.5639	0.0010	33205
147.00	(2) LPA-80063/6CF w/ Mount Pipe	47	25.587	1.5506	0.0010	33205
136.00	7770.00 w/ Mount Pipe	47	22.016	1.4980	0.0010	11859

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 110.75	124.481	18	7.3404	0.0051
L2	114.75 - 74.75	72.938	18	6.3065	0.0043
L3	79.5 - 39.5	33.778	18	4.1334	0.0018
L4	45 - 0	10.617	18	2.1665	0.0007

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'	18	124.481	7.3404	0.0051	7333
147.00	(2) LPA-80063/6CF w/ Mount Pipe	18	119.888	7.2787	0.0051	7333
136.00	7770.00 w/ Mount Pipe	18	103.191	7.0341	0.0050	2617

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _v ft	Kl/r	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
L1	150 - 110.75 (1)	TP31.38x24x0.2188	39.25	0.00	0.0	21.113 5	-9.34	1415.41	0.007
L2	110.75 - 74.75 (2)	TP37.711x30.1904x0.25	40.00	0.00	0.0	29.016 7	-14.88	1905.99	0.008
L3	74.75 - 39.5 (3)	TP43.839x36.3179x0.312 5	40.00	0.00	0.0	42.147 1	-22.49	2849.32	0.008
L4	39.5 - 0 (4)	TP50.64x42.1799x0.375	45.00	0.00	0.0	59.827 9	-35.68	4066.19	0.009

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{nx} kip-ft	Ratio M _{ux} / φM _{nx}	M _{uy} kip-ft	φM _{ny} kip-ft	Ratio M _{uy} / φM _{ny}
L1	150 - 110.75 (1)	TP31.38x24x0.2188	504.38	885.66	0.569	0.00	885.66	0.000
L2	110.75 - 74.75 (2)	TP37.711x30.1904x0.25	1228.83	1434.68	0.857	0.00	1434.68	0.000
L3	74.75 - 39.5 (3)	TP43.839x36.3179x0.312 5	2050.46	2490.93	0.823	0.00	2490.93	0.000
L4	39.5 - 0 (4)	TP50.64x42.1799x0.375	3275.21	4204.54	0.779	0.00	4204.54	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio V_u ϕV_n	Actual T_u kip-ft	ϕT_n kip-ft	Ratio T_u ϕT_n
L1	150 - 110.75 (1)	TP31.38x24x0.2188	18.89	707.71	0.027	0.16	1773.48	0.000
L2	110.75 - 74.75 (2)	TP37.711x30.1904x0.25	22.18	953.00	0.023	0.16	2872.87	0.000
L3	74.75 - 39.5 (3)	TP43.839x36.3179x0.312 5	25.37	1424.66	0.018	0.16	4987.97	0.000
L4	39.5 - 0 (4)	TP50.64x42.1799x0.375	28.83	2033.10	0.014	0.16	8419.33	0.000

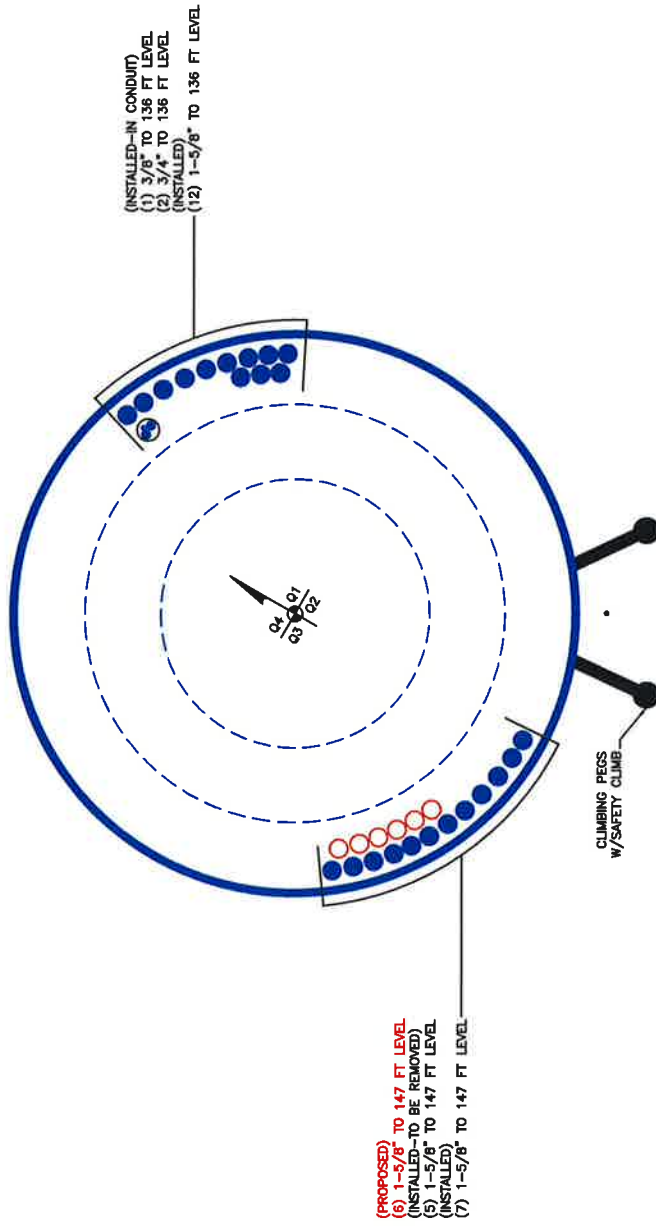
Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{nx}	Ratio M_{uy} ϕM_{ny}	Ratio V_u ϕV_n	Ratio T_u ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 110.75 (1)	0.007	0.569	0.000	0.027	0.000	0.577	1.000	4.8.2
L2	110.75 - 74.75 (2)	0.008	0.857	0.000	0.023	0.000	0.865	1.000	4.8.2
L3	74.75 - 39.5 (3)	0.008	0.823	0.000	0.018	0.000	0.831	1.000	4.8.2
L4	39.5 - 0 (4)	0.009	0.779	0.000	0.014	0.000	0.788	1.000	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	150 - 110.75	Pole	TP31.38x24x0.2188	1	-9.34	1415.41	57.7	Pass
L2	110.75 - 74.75	Pole	TP37.711x30.1904x0.25	2	-14.88	1905.99	86.5	Pass
L3	74.75 - 39.5	Pole	TP43.839x36.3179x0.3125	3	-22.49	2849.32	83.1	Pass
L4	39.5 - 0	Pole	TP50.64x42.1799x0.375	4	-35.68	4066.19	78.8	Pass
Summary								
Pole (L2)							86.5	Pass
RATING =							86.5	Pass

APPENDIX B
BASE LEVEL DRAWING



BUSINESS UNIT: 873645 TOWER ID: C_BASELEVEL

APPENDIX C
ADDITIONAL CALCULATIONS

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

- Assumptions:**
- 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
 - 2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
 - 3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: 873645
 Site Name: Oxford
 App #: 304737 - Rev. 7

Anchor Rod Data

Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, F_y :	75	ksi
Strength, F_u :	100	ksi
Bolt Circle:	58	in
Anchor Spacing:	6	in

Plate Data

W=Side:	57	in
Thick:	3	in
Grade:	55	ksi
Clip Distance:	6	in

Stiffener Data (Welding at both sides)

Configuration:	Unstiffened	
Weld Type:		**
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data

Diam:	50.64	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Base Reactions

TIA Revision:	G	
Factored Moment, M_u :	3275	ft-kips
Factored Axial, P_u :	36	kips
Factored Shear, V_u :	29	kips

Anchor Rod Results

TIA G --> Max Rod ($C_u + V_u/\eta$): 175.2 Kips
 Axial Design Strength, $\Phi * F_u * A_{net}$: 260.0 Kips
 Anchor Rod Stress Ratio: 67.4% **Pass**

Base Plate Results

Base Plate Stress: 29.0 ksi
 PL Design Bending Strength, $\Phi * F_y$: 49.5 ksi
 Base Plate Stress Ratio: 58.5% **Pass**

Flexural Check

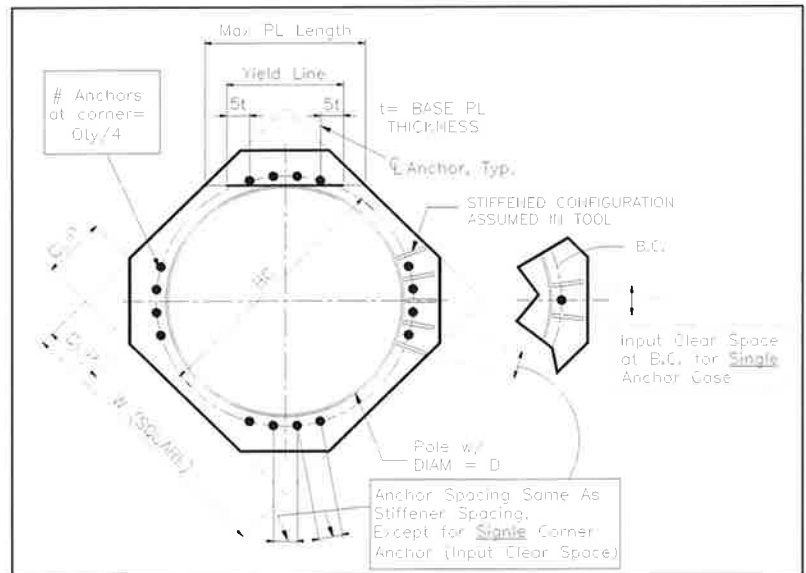
PL Ref. Data

Yield Line (in):	29.97
Max PL Length:	29.97

N/A - Unstiffened

Stiffener Results

Horizontal Weld : N/A
 Vertical Weld: N/A
 Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$: N/A
 Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$: N/A
 Plate Comp. (AISC Bracket): N/A
Pole Results
 Pole Punching Shear Check: N/A



** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Pier and Pad Foundation



BU # : 873645
Site Name: Oxford
App. Number: 304737 - Rev. 7

TIA-222 Revision: G
Tower Type: Monopole

Block Foundation?:

Superstructure Analysis Reactions		
Compression, P_{comp} :	36	kips
Base Shear, V_{u_comp} :	29	kips
Moment, M_u :	3275	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>	226.80	29.00	12.8%	Pass
<i>Bearing Pressure (ksf)</i>	9.66	2.43	25.1%	Pass
<i>Overtuning (kip*ft)</i>	5963.09	3499.75	58.7%	Pass
<i>Pier Flexure (Comp.) (kip*ft)</i>	6713.98	3405.50	50.7%	Pass
<i>Pier Compression (kip)</i>	23390.64	75.69	0.3%	Pass
<i>Pad Flexure (kip*ft)</i>	4415.72	1240.55	28.1%	Pass
<i>Pad Shear - 1-way (kips)</i>	720.43	204.12	28.3%	Pass
<i>Pad Shear - 2-way (ksi)</i>	0.16	0.03	20.4%	Pass

Soil Rating: 58.7%
Structural Rating: 50.7%

Pier Properties		
Pier Shape:	Square	
Pier Diameter, d_{pier} :	7.0	ft
Ext. Above Grade, E :	0.50	ft
Pier Rebar Size, S_c :	11	
Pier Rebar Quantity, m_c :	28	
Pier Tie/Spiral Size, S_t :	4	
Pier Tie/Spiral Quantity, m_t :	7	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	3	in

Pad Properties		
Depth, D :	7.0	ft
Pad Width, W :	23.5	ft
Pad Thickness, T :	3.0	ft
Pad Rebar Size, S_p :	10	
Pad Rebar Quantity, m_p :	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, δ_c :	150	pcf

Soil Properties		
Total Soil Unit Weight, γ :	125	pcf
Ultimate Net Bearing, Q_{net} :	12.000	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, ϕ :	30	degrees
SPT Blow Count, N_{blows} :		
Base Friction, μ :	0.3	
Neglected Depth, N :	3.50	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	none	ft

<--Toggle between Gross and Net

CCISeismic - Design Category

Per 2012/2015 IBC

Site BU: 873645
 Work Order: 1529487
 Application: 304737 Rev. 7



	Degrees	Minutes	Seconds	
Site Latitude =	41	26	49.50	41.4471 degrees
Site Longitude =	-73	9	8.31	-73.1523 degrees
Ground Supported Structure =	Yes			
Structure Class =	II			(Table 2-1)
Site Class =	D - Stiff Soil			(Table 2-11)
Spectral response acceleration short periods, S_s =	0.196			USGS Seismic Tool
Spectral response acceleration 1 s period, S_1 =	0.064			
Importance Factor, I =	1.0			(Table 2-3)
Acceleration-based site coefficient, F_a =	1.6			(Table 2-12)
Velocity-based site coefficient, F_v =	2.4			(Table 2-13)
Design spectral response acceleration short period, S_{DS} =	0.209			(2.7.6)
Design spectral response acceleration 1 s period, S_{D1} =	0.102			(2.7.6)
Seismic Design Category - Short Period Response =	B			ASCE 7-05 Table 11.6-1
Seismic Design Category - 1s Period Response =	B			ASCE 7-05 Table 11.6-2
Worst Case Seismic Design Category =	B			ASCE 7-05 Tables 11.6-1 and 6-2

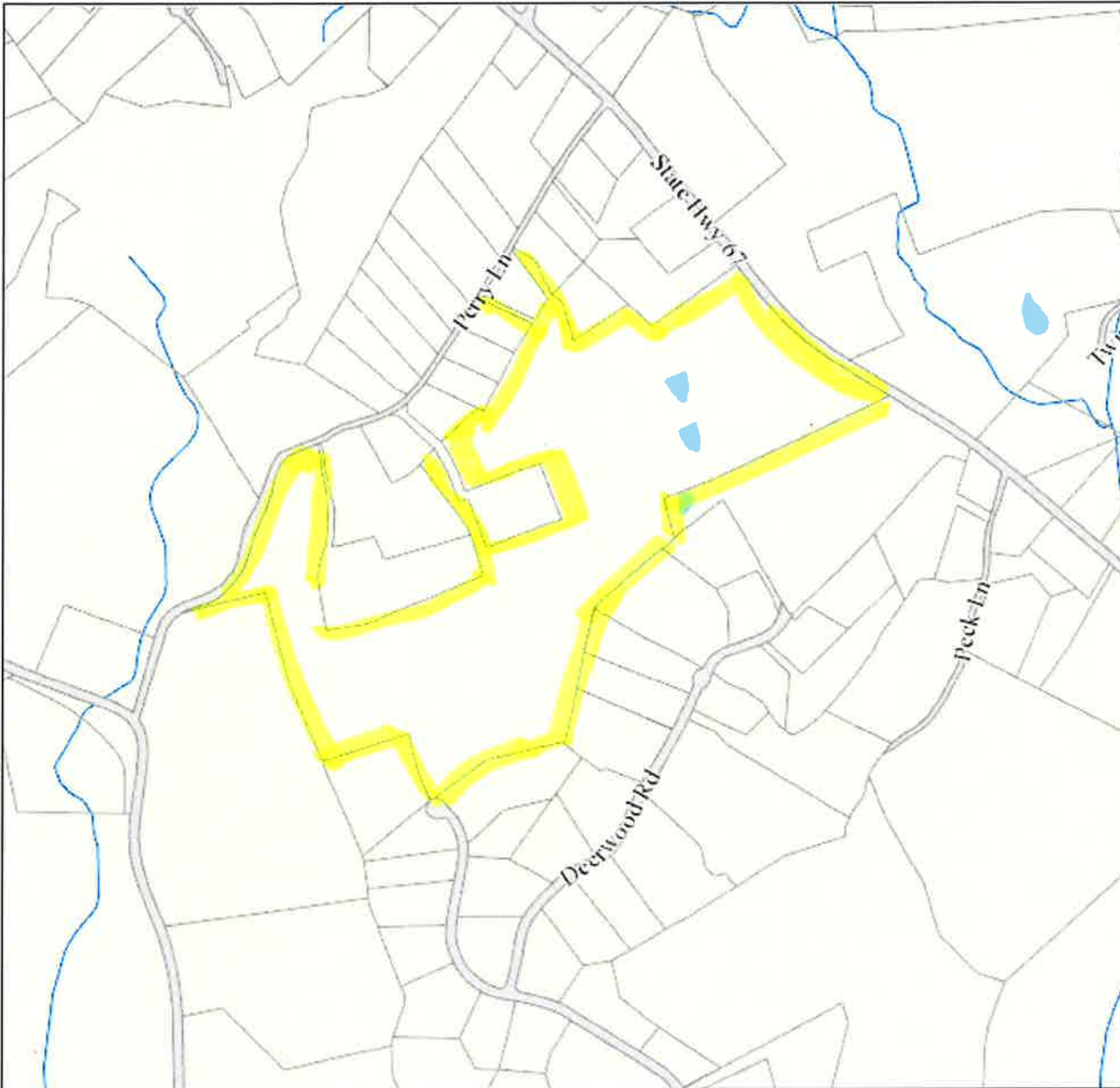
ATTACHMENT 4

Town of Oxford

Geographic Information System (GIS)



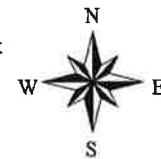
Date Printed: 3/28/2018



MAP DISCLAIMER - NOTICE OF LIABILITY

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Approximate Scale: 1 inch = 800 feet





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	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here Postmark with Date of Receipt.
UNITED STATES POSTAL SERVICE® Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	3	3	
Postmaster, per (name of receiving employee)			
USPS® Tracking Number Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)		
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.			