

December 14, 2016

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

Re: **Notice of Exempt Modification – Facility Modification  
945 Center Street, Wallingford, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) antennas at the 121-foot level on an existing 147-foot tower at 945 Center Street in Wallingford, Connecticut (the “Property”). The tower is owned by Crown Castle (“Crown”). Cellco’s use of the tower was approved by the Council in 1998. Cellco now intends to modify its facility by replacing six (6) of its antennas with three (3) model SBNHH-1D65B, 1900 MHz antennas and three (3) model SBNHH-1D65B, 2100 MHz antennas, all at the same level on the tower. Cellco also intends to replace three (3) remote radio heads (“RRHs”) and install three (3) new RRHs and one (1) HYBRIFLEX™ fiber optic antenna cable. Included in Attachment 1 are specifications for Cellco’s replacement antennas, RRHs and antenna cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to William W. Dickinson, Jr., Mayor for the Town of Wallingford. A copy of this letter is also being sent to Albert W. Beaumont, 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).

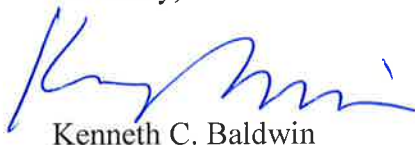
Melanie A. Bachman  
December 14, 2016  
Page 2

1. The proposed modifications will not result in an increase in the height of the existing structure. The new antennas and RRHs will be installed on Cellco's existing antenna platform at the 121-foot level on the 147-foot tower.
2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the 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 in 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 Town Assessor's Parcel Map and property owner information is included in Attachment 4.

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

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

William W. Dickinson, Jr., Wallingford Mayor  
Albert W. Beaumont  
Crown Castle  
Tim Parks

# **ATTACHMENT 1**



## SBNHH-1D65B

**Multiband Antenna, 698–896 and 2x 1695–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.**

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

### Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
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\*

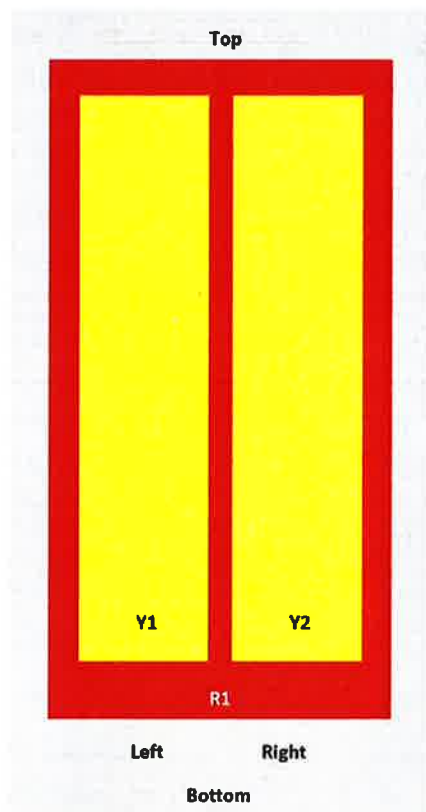
Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
	0°   14.6	0°   14.5	0°   17.4	0°   17.8	0°   18.1	0°   18.2
Gain by Beam Tilt, average, dBi	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	ARXXXXXXXXXXXXXXX 1
Y1	1695-2360	3-4	2	ARXXXXXXXXXXXXXXX 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
Color	Light gray

SBNHH-1D65B

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



## Included Products

SBNHH-1D65B

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

## \* **Footnotes**

Performance Note      Severe environmental conditions may degrade optimum performance

# ALCATEL-LUCENT B13 RRH4X30-4R

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

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



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

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

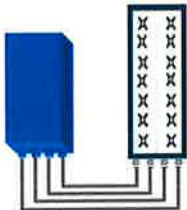
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

### FEATURES

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

### BENEFITS

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



4x30W with 4T4R  
or  
2x60W with 2T4R  
Can be switched between modes via SW w/o site visit



## 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 (Ø150km/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

[www.alcatel-lucent.com](http://www.alcatel-lucent.com) Alcatel, Lucent, Alcatel-Lucent and the Alcatel-Lucent logo are trademarks of Alcatel-Lucent. All other trademarks are the property of their respective owners. The information presented is subject to change without notice. Alcatel-Lucent assumes no responsibility for inaccuracies contained herein.  
Copyright © 2014 Alcatel-Lucent. All Rights Reserved

# 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.

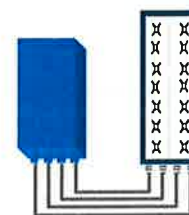


## FEATURES

- 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 2)	2.0 dB typ. (<2.5 dB max)
RX Diversity scheme	2 or 4 way Rx diversity
Sizes (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

www.alcatel-lucent.com Alcatel, Lucent, Alcatel-Lucent and the Alcatel-Lucent logo are trademarks of Alcatel-Lucent. All other trademarks are the property of their respective owners. The information presented is subject to change without notice. Alcatel-Lucent assumes no responsibility for inaccuracies contained herein. Copyright © 2014 Alcatel-Lucent. All Rights Reserved

# 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.

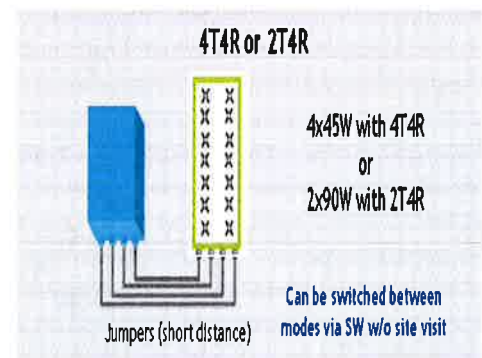
Its compactness and slim design makes the Alcatel-Lucent B66a RRH4x45 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the 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	
<b>Number of TX/RX paths</b>	4 duplexed (either 4T4R or 2T4R selectable by SW)
<b>Frequency band</b>	AWS 1-3, B4/B66a DL: 2110-2180 MHz / UL: 1710-1780 MHz
<b>Instantaneous bandwidth - #carriers</b>	70 MHz – 4 LTE MIMO carriers (in 70 MHz occupied bandwidth)
<b>LTE carrier bandwidth</b>	5, 10, 15, 20 MHz
<b>RF output power</b>	2x90W or 4x45W (selectable by SW)
<b>Noise figure – RX Diversity scheme</b> <b>Receiver Sensivity (FRC A1-3)</b>	2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity -104.5 dBm maximum
<b>Sizes (HxWxD) in mm (in.)</b>	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield)
<b>Volume in Liters</b>	35.5 (with solar shield) 29.7 (without solar shield)
<b>Weight in kg (lb) (w/o mounting HW)</b>	25.8kg (56.8lb) (with solar shield)
<b>DC voltage range</b>	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
<b>DC power consumption</b>	750W typical @100% RF load (In 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
<b>Environmental conditions</b>	-40°C (-40°F) / +55°C (+131°F) UL50E Type 4 Enclosure
<b>Wind load (@150km/h or 93mph)</b>	250N (56lb) Frontal/150N (34lb) Lateral
<b>Antenna ports</b>	4 ports 4.3-10 female (50 ohms) VSWR < 1.5
<b>CPRI ports</b>	2 CPRI ports (HW ready for Rate 7, 9.8 Gbps) SFP: SMDF (HW supports also SMSF and MMDF)
<b>AISG interfaces</b>	1 AISG 2.0 output (RS485) Integrated Smart Bias Tees (x2)
<b>Misc. Interfaces</b>	4 external alarms (1 connector) 1 DC connector (2 pins)
<b>Installation conditions</b>	Pole and wall mounting
<b>Regulatory compliance</b>	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

www.alcatel-lucent.com Alcatel, Lucent, Alcatel-Lucent and the Alcatel-Lucent logo are trademarks of Alcatel-Lucent. All other trademarks are the property of their respective owners. The information presented is subject to change without notice. Alcatel-Lucent assumes no responsibility for inaccuracies contained herein. Copyright © 2016 Alcatel-Lucent. All Rights Reserved



**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
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (.8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm <sup>2</sup> (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[μm]	50/125
Primary Coating (Acrylate)		[μm]	245
Buffer Diameter, Nominal		[μm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[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 5-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to 149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to 149)

\* This data is provisional and subject to change

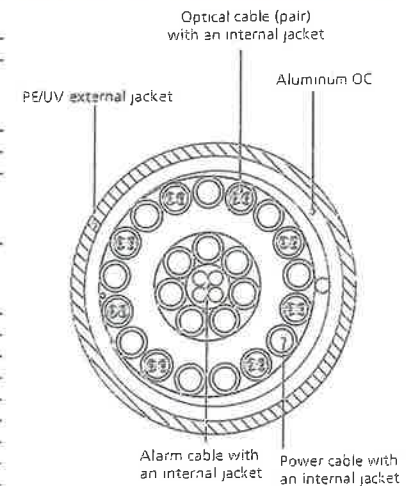


Figure 2: Construction Detail

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

# **ATTACHMENT 2**

		General		Power		Density							
		# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total				
<b>Site Name:</b> Wallingford E													
<b>Tower Height:</b> 147Ft.													
<b>CARRIER</b>													
*AT&T-UMTS	2	414	112	850	0.0265	0.5667	0.47%						
*AT&T-PCS-UMTS	2	656	112	1900	0.0420	1.0000	0.42%						
*AT&T-LTE	2	940	112	700	0.0602	0.4667	1.29%						
*AT&T-PCS-LTE	2	1791	112	1900	0.1146	1.0000	1.15%						
*AT&T-GSM	2	414	112	850	0.0265	0.5667	0.47%						
*Clearwire	2	153	128	2496	0.0074	1.0000	0.07%						
*Clearwire	1	211	128	11 GHz	0.0051	1.0000	0.05%						
*Sprint	2	693	130	1900	0.0324	1.0000	0.32%						
*Sprint	1	390	130	850	0.0091	0.5667	0.16%						
*Sprint	2	693	130	2500	0.0324	1.0000	0.32%						
*Sprint	3	562	130	2657	0.0394	1.0000	0.39%						
*Sprint	2	4	130	22500	0.0002	1.0000	0.00%						
*Sprint	2	4	130	22500	0.0002	1.0000	0.00%						
<b>Verizon PCS</b>	<b>1</b>	<b>5002</b>	<b>121</b>	<b>0.1228</b>	<b>1970</b>	<b>1.0000</b>	<b>12.28%</b>						
<b>Verizon Cellular</b>	<b>9</b>	<b>499</b>	<b>121</b>	<b>0.1103</b>	<b>869</b>	<b>0.5793</b>	<b>19.04%</b>						
<b>Verizon AWS</b>	<b>1</b>	<b>7332</b>	<b>121</b>	<b>0.1801</b>	<b>2145</b>	<b>1.0000</b>	<b>18.01%</b>						
<b>Verizon 700</b>	<b>1</b>	<b>2184</b>	<b>121</b>	<b>0.0536</b>	<b>746</b>	<b>0.4973</b>	<b>10.79%</b>						
										<b>65.24%</b>			
* Source: Siting Council													



# **ATTACHMENT 3**

Date: November 4, 2016

Sean Dempsey  
Crown Castle  
3530 Toringdon Way, Suite 300  
Charlotte, NC 28277  
(704) 405-6565



Tower Engineering Professionals  
326 Tryon Road  
Raleigh, NC 27603  
(919) 661-6351  
[crown@tepgroup.net](mailto:crown@tepgroup.net)

**Subject: Structural Analysis Report**

<b>Carrier Designation:</b>	<b>Verizon Wireless Co-Locate</b>	
	<b>Carrier Site Number:</b>	N/A
	<b>Carrier Site Name:</b>	Wallingford East, CT
<b>Crown Castle Designation:</b>	<b>Crown Castle BU Number:</b>	876310
	<b>Crown Castle Site Name:</b>	Beaumont Farm
	<b>Crown Castle JDE Job Number:</b>	398753
	<b>Crown Castle Work Order Number:</b>	1320220
	<b>Crown Castle Application Number:</b>	362962 Rev. 5
<b>Engineering Firm Designation:</b>	<b>TEP Project Number:</b>	72875.101124
<b>Site Data:</b>	<b>945 East Center St., Wallingford, New Haven County, CT 06492</b>	
	<b>Latitude 41° 26' 37.36", Longitude -72° 47' 46.56"</b>	
	<b>147 Foot - Monopole Tower</b>	

Dear Sean Dempsey,

Tower Engineering Professionals 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 966616, in accordance with application 362962, revision 5.

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:

<b>LC7: Existing + Reserved + Proposed Equipment</b>	<b>Sufficient Capacity</b>
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 (2012 International 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 1609.3.1 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 appurtenances listed in Tables 1 and 2 and the attached drawing for the determined available structural capacity to be effective.

We at Tower Engineering Professionals 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: Dan A. Reidenbach, E.I. / MZS

Respectfully submitted by:

Graham M. Andres, P.E.



11/4/16

## TABLE OF CONTENTS

### 1) INTRODUCTION

### 2) ANALYSIS CRITERIA

Table 1 - Proposed Antenna and Cable Information

Table 2 - Existing and Reserved Antenna and Cable Information

Table 3 - Design Antenna and Cable Information

### 3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

### 4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Table 6 - Tower Component Stresses vs. Capacity

4.1) Recommendations

### 5) APPENDIX A

tnxTower Output

### 6) APPENDIX B

Base Level Drawing

### 7) APPENDIX C

Additional Calculations

## 1) INTRODUCTION

This tower is a 147-ft monopole tower designed by Paul J. Ford and Company in June of 1998. The tower was originally designed to a height of 133-ft for a wind speed of 90 mph per TIA/EIA-222-F for the appurtenances listed in Table 3. The tower was previously extended 14-ft per reinforcement drawings prepared by URS Greiner Woodward Clyde in December of 1999, bringing the overall tower height to 147-ft. TEP did not visit the site. All information provided to TEP was assumed to be accurate and complete.

## 2) ANALYSIS CRITERIA

The analysis has been performed in accordance with the ANSI/TIA-222-G-2-2009 Structural Standard for Antenna Supporting Structures and Antennas – Addendum 2 using a nominal 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 with the following design criteria:

Type of Analysis: **Rigorous Structural Analysis**

Classification of Structure: **Class II**

Exposure Category: **Exposure C**

Topographic Category: **Category 1**

Earthquake Category: **Not Considered**

Earthquake effects may be ignored per this standard for site locations where  $S_s$  does not exceed 1.0.  
 (New Haven County Max  $S_s$  = 0.32).

**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
121.0	121.0	6	Commscope	SBNHH-1D65B w/ Mount Pipe	1	1-5/8	1
		3	Alcatel Lucent	RRH2x60-1900A-4R			
		3	Alcatel Lucent	B66A RRH4X45			
		3	Alcatel Lucent	B13 RRH 4X30			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			

Note:

- 1) See "Appendix B – Base Level Drawing" for assumed feed line configuration.

**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
130.0	132.0	1	Andrew	VHLP1-23	6 3 3 1	5/16 1-1/4 1/2 7/8	1
		1	Andrew	VHLP2-23			
		1	Andrew	VHLP2.5-23			
	130.0	3	RFS Celwave	APXVTM14-C-120			
		2	RFS Celwave	APXVSP18-C-A20			
		1	RFS Celwave	APXV9ERR18-C-A20			
		9	RFS Celwave	ACU-A20-N			
		3	Alcatel Lucent	TD-RRH8x20-25			
		3	Alcatel Lucent	1900MHz RRH (65MHz)			
		1	Tower Mounts	Miscellaneous [NA 510-3]			
	128.0	1	Tower Mounts	Platform Mount [LP 1201-1]			
		3	Argus Technologies	LLPX310R			
	125.0	3	Samsung Telecommunications	FDD_R6_RRH			
		3	Alcatel Lucent	800MHz RRH			
121.0	121.0	3	Commscope	HBX-6516DS-VTM w/ Mount Pipe	-	-	2
		3	Antel	BXA-171063/12CF w/ Mount Pipe			
		6	RFS Celwave	FD9R6004/2C-3L			
		3	Alcatel Lucent	RRH2x40-AWS			
		4	Antel	LPA-80080-6CF-EDIN w/ Mount Pipe	13	1-5/8	1
		2	Antel	BXA-70063/6CFx2 w/ Mount Pipe			
		2	Antel	LPA-80063/6CF w/ Mount Pipe			
		1	Antel	BXA-70063/6CFx4 w/ Mount Pipe			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			
		1	Tower Mounts	Platform Mount [LP 1201-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
111.0	112.0	3	CCI Antennas	TPA-65R-LCUUUU-H6 w/ Mount Pipe	-	-	3
		3	CCI Antennas	DTMABP7819VG12A			
		3	Ericsson	RRUS12/RRUS A2			
	3	Powerwave Technologies	7770.00 w/ Mount Pipe	6 2 1	1-1/4 3/4 3/8	1	
	3	Ericsson	RRUS-11				
	1	Raycap	DC6-48-60-18-8F				
	111.0	1	Tower Mounts	Platform Mount [LP 1201-1]			
70.0	70.0	1	Kathrein	OG-860/1920/GPS-A	1	1/2	1
		1	Tower Mounts	Side Arm Mount [SO 701-1]			

- Notes:  
 1) Existing equipment  
 2) Existing equipment to be removed; not considered in this analysis  
 3) Reserved equipment

**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)
130.0	130.0	12	Decibel	DB980H	-	-
110.0	110.0	12	Generic	3.9 sq.ft. Panel Antenna	-	-
95.0	95.0	12	Generic	3.9 sq.ft. Panel Antenna	-	-
70.0	70.0	1	Generic	GPS Antenna	-	-

### 3) ANALYSIS PROCEDURE

**Table 4 - Documents Provided**

Document	Remarks	Reference	Source
Geotechnical Report	Dr. Clarence Welti, P.E., P.C.	1531484	CCISites
Tower Foundation Drawings	Paul J. Ford and Company	1855118	CCISites
Tower Manufacturer Drawings	Paul J. Ford and Company	1855980	CCISites
Tower Reinforcement Drawings	URS Greiner Woodward Clyde	2015154	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) The tower and foundation were built in accordance with the manufacturer's specifications.
- 2) The tower and foundation 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 "Appendix B – Base Level Drawing".
- 4) All tower components are in sufficient condition to carry their full design capacity.
- 5) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
- 6) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not perform a site visit to verify the size, condition or capacity of the antenna mounts and did not analyze antennas supporting mounts as part of this structural analysis report.

This analysis may be affected if any assumptions are not valid or have been made in error. Tower Engineering Professionals 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 (lb)	$\phi P_{allow}$ (lb)	% Capacity	Pass / Fail
L1	147 - 133	Pole	TP12.75x12.75x0.5	1	-1036.16	606131.00	2.4	Pass
L2	133 - 85.5	Pole	TP29.418x19.537x0.313	2	-16827.70	2074020.00	63.6	Pass
L3	85.5 - 42.75	Pole	TP37.687x27.477x0.375	3	-26236.10	3116790.00	81.9	Pass
L4	42.75 - 0	Pole	TP45.83x35.894x0.438	4	-41207.70	4432580.00	83.4	Pass
							<b>Summary</b>	
						Pole (L4)	83.4	Pass
						<b>Rating =</b>	<b>83.4</b>	<b>Pass</b>

**Table 6 - Tower Component Stresses vs. Capacity**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Flange Connection	133.0	4.9	Pass
1	Anchor Rods	-	74.7	Pass
1	Base Plate	-	78.0	Pass
1	Base Foundation Soil Interaction	-	81.4	Pass
1	Base Foundation Structural	-	24.9	Pass

<b>Structure Rating (max from all components) =</b>	<b>83.4%</b>
---	--------------

Note:

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

#### **4.1) Recommendations**

- 1) If the load differs from that described in Tables 1 and 2 of this report, "Appendix B – Base Level Drawing" or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
- 2) 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	1	14.00	1	1	147.0 ft
Length (ft)	47.50	47.50	12	1	133.0 ft
Number of Sides	12	12	0.313	0.500	
Thickness (in)	0.375	0.375	4.75	12.750	
Socket Length (ft)	27.477	27.477	37.687	12.750	
Top Dia (in)	46.50	46.50	6153.6	916.7	
Bot Dia (in)	12	12	6153.6	916.7	
Grade	A607-85	A607-85	6153.6	916.7	
Weight (lb)	20205.2	20205.2	9204.7	916.7	



### DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXVTM14-C-120	130	SBNHH-1D65B w/ Mount Pipe	121
APXVTM14-C-120	130	(2) SBNHH-1D65B w/ Mount Pipe	121
APXVTM14-C-120	130	RRH2x60-1900A-4R	121
LLPX310R	130	RRH2x60-1900A-4R	121
LLPX310R	130	RRH2x60-1900A-4R	121
LLPX310R	130	B13 RRH 4X30	121
APXV9ERR18-C-A20	130	B13 RRH 4X30	121
APXVSP18-C-A20	130	B13 RRH 4X30	121
APXVSP18-C-A20	130	B66A RRH4X45	121
TD-RRH8x20-25	130	B66A RRH4X45	121
TD-RRH8x20-25	130	B66A RRH4X45	121
TD-RRH8x20-25	130	DB-T1-6Z-8AB-0Z	121
FDD_R6_RRH	130	Platform Mount [LP 1201-1]	121
FDD_R6_RRH	130	(2) LPA-80080-6CF-EDIN w/ Mount Pipe	121
FDD_R6_RRH	130	(2) LPA-80080-6CF-EDIN w/ Mount Pipe	121
800 EXTERNAL NOTCH FILTER	130	(2) LPA-80063/6CF w/ Mount Pipe	121
800 EXTERNAL NOTCH FILTER	130	RRUS-11	111
800 EXTERNAL NOTCH FILTER	130	RRUS-11	111
(3) ACU-A20-N	130	RRUS-11	111
(3) ACU-A20-N	130	DC6-48-60-18-8F	111
(3) ACU-A20-N	130	TPA-65R-LCUUUU-H6 w/ Mount Pipe	111
800MHZ RRH	130	TPA-65R-LCUUUU-H6 w/ Mount Pipe	111
800MHZ RRH	130	TPA-65R-LCUUUU-H6 w/ Mount Pipe	111
800MHZ RRH	130	DTMABP7819VG12A	111
1900MHz RRH (65MHz)	130	DTMABP7819VG12A	111
1900MHz RRH (65MHz)	130	DTMABP7819VG12A	111
2.4" Dia. x 6' Mount Pipe	130	RRUS12/RRUS A2	111
2.4" Dia. x 6' Mount Pipe	130	RRUS12/RRUS A2	111
2.4" Dia. x 6' Mount Pipe	130	RRUS12/RRUS A2	111
2.4" Dia. x 6' Mount Pipe	130	RRUS12/RRUS A2	111
Platform Mount [LP 1201-1]	130	2.4" Dia. x 6' Mount Pipe	111
Miscellaneous [NA 510-3]	130	2.4" Dia. x 6' Mount Pipe	111
VHLP1-23	130	2.4" Dia. x 6' Mount Pipe	111
VHLP2-23	130	Platform Mount [LP 1201-1]	111
VHLP2.5-23	130	7770.00 w/ Mount Pipe	111
BXA-70063/6CFx2 w/ Mount Pipe	121	7770.00 w/ Mount Pipe	111
BXA-70063/6CFx2 w/ Mount Pipe	121	7770.00 w/ Mount Pipe	111
BXA-70063/6CFx4 w/ Mount Pipe	121	Slope Arm Mount [SO 701-1]	70
DB-T1-6Z-8AB-0Z	121	OG-860/1920/GPS-A	70
(2) SBNHH-1D65B w/ Mount Pipe	121		
SBNHH-1D65B w/ Mount Pipe	121		

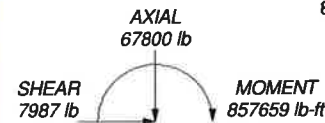
### MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	60 ksi	A607-85	65 ksi	80 ksi

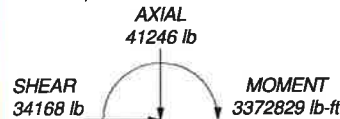
### TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-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: 83.4%

ALL REACTIONS ARE FACTORED



TORQUE 165 lb-ft  
50 mph WIND - 0.750 in ICE



TORQUE 694 lb-ft  
REACTIONS - 97 mph WIND



**Tower Engineering Professionals**  
326 Tryon Road  
Raleigh, NC 27603  
Phone: (919) 661-6351  
FAX: (919) 661-6350

Job: <b>Beaumont Farm (BU 876310)</b>		
Project: <b>TEP No. 72875.101124</b>		
Client: Crown Castle	Drawn by: mzsme	App'd:
Code: TIA-222-G	Date: 11/04/16	Scale: N
Path:		Dwg No.:

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Beaumont Farm (BU 876310)	<b>Page</b> 1 of 17
	<b>Project</b> TEP No. 72875.101124	<b>Date</b> 15:36:47 11/04/16
	<b>Client</b> Crown Castle	<b>Designed by</b> mzsmee

## Tower Input Data

There is a pole section.

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

The following design criteria apply:

Tower is located in New Haven County, Connecticut.

Basic wind speed of 97 mph.

Structure Class II.

Exposure Category C.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 0.750 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 50 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li>Consider Moments - Legs</li> <li>Consider Moments - Horizontals</li> <li>Consider Moments - Diagonals</li> <li>Use Moment Magnification</li> <li>√ Use Code Stress Ratios</li> <li>√ Use Code Safety Factors - Guys</li> <li>Escalate Ice</li> <li>Always Use Max Kz</li> <li>Use Special Wind Profile</li> <li>Include Bolts In Member Capacity</li> <li>Leg Bolts Are At Top Of Section</li> <li>Secondary Horizontal Braces Leg</li> <li>Use Diamond Inner Bracing (4 Sided)</li> <li>SR Members Have Cut Ends</li> <li>SR Members Are Concentric</li> </ul> | <ul style="list-style-type: none"> <li>Distribute Leg Loads As Uniform</li> <li>Assume Legs Pinned</li> <li>√ Assume Rigid Index Plate</li> <li>√ Use Clear Spans For Wind Area</li> <li>Use Clear Spans For KL/r</li> <li>Retension Guys To Initial Tension</li> <li>√ Bypass Mast Stability Checks</li> <li>√ Use Azimuth Dish Coefficients</li> <li>√ Project Wind Area of Appurt.</li> <li>Autocalc Torque Arm Areas</li> <li>Add IBC .6D+W Combination</li> <li>√ Sort Capacity Reports By Component</li> <li>Triangulate Diamond Inner Bracing</li> <li>Treat Feed Line Bundles As Cylinder</li> </ul> | <ul style="list-style-type: none"> <li>Use ASCE 10 X-Brace Ly Rules</li> <li>Calculate Redundant Bracing Forces</li> <li>Ignore Redundant Members in FEA</li> <li>SR Leg Bolts Resist Compression</li> <li>All Leg Panels Have Same Allowable</li> <li>Offset Girt At Foundation</li> <li>√ Consider Feed Line Torque</li> <li>Include Angle Block Shear Check</li> <li>Use TIA-222-G Bracing Resist. Exemption</li> <li>Use TIA-222-G Tension Splice Exemption</li> <li style="text-align: center;">Poles</li> <li>√ Include Shear-Torsion Interaction</li> <li>Always Use Sub-Critical Flow</li> <li>Use Top Mounted Sockets</li> </ul> |
|--|--|---|

## Tapered Pole Section Geometry

Section	Elevation <i>ft</i>	Section Length <i>ft</i>	Splice Length <i>ft</i>	Number of Sides	Top Diameter <i>in</i>	Bottom Diameter <i>in</i>	Wall Thickness <i>in</i>	Bend Radius <i>in</i>	Pole Grade
L1	147.00-133.00	14.00	0.000	Round	12.750	12.750	0.500		A53-B-35 (35 ksi)
L2	133.00-85.50	47.50	3.750	12	19.537	29.418	0.313	1.250	A607-65 (65 ksi)

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Beaumont Farm (BU 876310)	<b>Page</b> 2 of 17
	<b>Project</b> TEP No. 72875.101124	<b>Date</b> 15:36:47 11/04/16
	<b>Client</b> Crown Castle	<b>Designed by</b> mzsmee

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
L3	85.50-42.75	46.50	4.750	12	27.477	37.687	0.375	1.500	A607-65 (65 ksi)
L4	42.75-0.00	47.50		12	35.894	45.830	0.438	1.750	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>	Iv/Q in <sup>2</sup>	w in	w/t
L1	12.750	19.242	361.544	4.335	6.375	56.713	723.088	9.615	0.000	0
	12.750	19.242	361.544	4.335	6.375	56.713	723.088	9.615	0.000	0
L2	20.226	19.345	912.551	6.882	10.120	90.172	1849.075	9.521	4.398	14.075
	30.456	29.287	3166.774	10.420	15.239	207.814	6416.742	14.414	7.047	22.549
L3	29.299	32.726	3068.189	9.703	14.233	215.567	6216.983	16.107	6.359	16.957
	39.016	45.054	8006.057	13.358	19.522	410.107	16222.442	22.174	9.095	24.254
L4	38.189	49.949	8015.109	12.693	18.593	431.079	16240.785	24.584	8.447	19.308
	47.447	63.947	16817.916	16.251	23.740	708.423	34077.658	31.473	11.110	25.394

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>f</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 147.00-133.00				1	1	1			
L2 133.00-85.50				1	1	1			
L3 85.50-42.75				1	1	1			
L4 42.75-0.00				1	1	1			

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

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
<b>**Misc**</b>									
Safety Line 3/8	A	Surface Ar (CaAa)	133.00 - 0.00	1	1	-0.250 -0.250	0.375		0.220
Step Pegs (5/8" SR) 7-in. w/30" step ***	A	Surface Ar (CaAa)	147.00 - 0.00	1	1	-0.250 -0.250	0.350		0.487

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

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C <sub>A</sub> A <sub>A</sub> ft <sup>2</sup> /ft	Weight plf
<b>**130**</b> 7983A(1/2")	C	No	Inside Pole	130.00 - 0.00	3	No Ice	0.084

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Beaumont Farm (BU 876310)	<b>Page</b> 3 of 17
	<b>Project</b> TEP No. 72875.101124	<b>Date</b> 15:36:47 11/04/16
	<b>Client</b> Crown Castle	<b>Designed by</b> mzsmee

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C <sub>AA</sub>		Weight plf
						ft <sup>2</sup> /ft		
9207(5/16")	C	No	Inside Pole	130.00 - 0.00	6	1/2" Ice	0.00	0.084
						1" Ice	0.00	0.084
						No Ice	0.00	0.600
						1/2" Ice	0.00	0.600
HB114-08U3M12-xxxF(7/8")	C	No	Inside Pole	130.00 - 0.00	1	1" Ice	0.00	0.600
						No Ice	0.00	0.683
						1/2" Ice	0.00	0.683
						1" Ice	0.00	0.683
HB114-1-0813U4-M5J(1 1/4")	C	No	Inside Pole	130.00 - 0.00	3	No Ice	0.00	1.200
						1/2" Ice	0.00	1.200
						1" Ice	0.00	1.200
						No Ice	0.00	0.340
2" Flexible Conduit	C	No	Inside Pole	130.00 - 0.00	2	1/2" Ice	0.00	0.340
						1" Ice	0.00	0.340
						No Ice	0.00	0.920
						1/2" Ice	0.00	0.920
**121** FLC 158-50J(1-5/8")	A	No	Inside Pole	121.00 - 0.00	12	1" Ice	0.00	0.920
						No Ice	0.00	1.300
						1/2" Ice	0.00	1.300
						1" Ice	0.00	1.300
HB158-1-08U8-S8J18(1-5/8")	A	No	Inside Pole	121.00 - 0.00	1	No Ice	0.00	1.300
						1/2" Ice	0.00	1.300
						1" Ice	0.00	1.300
						No Ice	0.00	1.300
HB158-1-08U8-S8J18(1-5/8")	A	No	Inside Pole	121.00 - 0.00	1	1/2" Ice	0.00	1.300
						1" Ice	0.00	1.300
						No Ice	0.00	0.700
						1/2" Ice	0.00	0.700
**111** FLC 114-50J(1-1/4")	C	No	Inside Pole	111.00 - 0.00	6	1" Ice	0.00	0.700
						No Ice	0.00	0.700
						1/2" Ice	0.00	0.700
						1" Ice	0.00	0.340
2" Flexible Conduit	C	No	Inside Pole	111.00 - 0.00	2	1/2" Ice	0.00	0.340
						1" Ice	0.00	0.340
						No Ice	0.00	0.584
						1/2" Ice	0.00	0.584
WR-VG86ST-BRD(3/4")	C	No	Inside Pole	111.00 - 0.00	2	1" Ice	0.00	0.584
						No Ice	0.00	0.584
						1/2" Ice	0.00	0.584
						1" Ice	0.00	0.059
FB-L98B-002-75000(3/8")	C	No	Inside Pole	111.00 - 0.00	1	No Ice	0.00	0.059
						1/2" Ice	0.00	0.059
						1" Ice	0.00	0.059
						No Ice	0.00	0.150
**70** LDF4-50A(1/2")	C	No	Inside Pole	70.00 - 0.00	1	1/2" Ice	0.00	0.150
						1" Ice	0.00	0.150
						No Ice	0.00	0.150
						1" Ice	0.00	0.150

\*\*\*

### 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>AA</sub>		Weight lb
					In Face ft <sup>2</sup>	Out Face ft <sup>2</sup>	
L1	147.00-133.00	A	0.000	0.000	0.490	0.000	6.82
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	133.00-85.50	A	0.000	0.000	3.444	0.000	517.80
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	547.99
L3	85.50-42.75	A	0.000	0.000	3.099	0.000	613.33
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	641.99
L4	42.75-0.00	A	0.000	0.000	3.099	0.000	613.33

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Beaumont Farm (BU 876310)	<b>Page</b> 4 of 17
	<b>Project</b> TEP No. 72875.101124	<b>Date</b> 15:36:47 11/04/16
	<b>Client</b> Crown Castle	<b>Designed by</b> mzsmeem

Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight lb
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	644.31

### 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>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight lb
L1	147.00-133.00	A	1.733	0.000	0.000	5.343	0.000	68.58
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	133.00-85.50	A	1.689	0.000	0.000	35.529	0.000	919.83
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	547.99
L3	85.50-42.75	A	1.601	0.000	0.000	31.976	0.000	975.16
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	641.99
L4	42.75-0.00	A	1.437	0.000	0.000	30.484	0.000	941.87
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	644.31

### Feed Line Center of Pressure

Section	Elevation ft	CP <sub>x</sub> in	CP <sub>z</sub> in	CP <sub>x</sub> Ice in	CP <sub>z</sub> Ice in
L1	147.00-133.00	-0.052	0.000	-0.361	0.000
L2	133.00-85.50	-0.103	0.000	-0.739	0.000
L3	85.50-42.75	-0.104	0.000	-0.805	0.000
L4	42.75-0.00	-0.104	0.000	-0.818	0.000

### 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
L1	20	Step Pegs (5/8" SR) 7-in. w/30" step	133.00 - 147.00	1.0000	1.0000
L2	19	Safety Line 3/8	85.50 - 133.00	1.0000	1.0000
L2	20	Step Pegs (5/8" SR) 7-in. w/30" step	85.50 - 133.00	1.0000	1.0000
L3	19	Safety Line 3/8	42.75 - 85.50	1.0000	1.0000
L3	20	Step Pegs (5/8" SR) 7-in. w/30" step	42.75 - 85.50	1.0000	1.0000

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b>	Beaumont Farm (BU 876310)	<b>Page</b>	5 of 17
	<b>Project</b>	TEP No. 72875.101124	<b>Date</b>	15:36:47 11/04/16
	<b>Client</b>	Crown Castle	<b>Designed by</b>	mzsmee

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A		Weight	
			Horz	Vert			Front	Side		
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb	
**130**										
APXVTM14-C-120	A	From	4.00		40.000	130.00	No Ice	6.34	3.61	56.20
		Centroid-Fa	2.000				1/2" Ice	6.72	3.97	95.73
		ce	0.000				1" Ice	7.10	4.33	140.32
APXVTM14-C-120	B	From	4.00		20.000	130.00	No Ice	6.34	3.61	56.20
		Centroid-Fa	-7.000				1/2" Ice	6.72	3.97	95.73
		ce	0.000				1" Ice	7.10	4.33	140.32
APXVTM14-C-120	C	From	4.00		20.000	130.00	No Ice	6.34	3.61	56.20
		Centroid-Fa	-7.000				1/2" Ice	6.72	3.97	95.73
		ce	0.000				1" Ice	7.10	4.33	140.32
LLPX310R	A	From	4.00		20.000	130.00	No Ice	4.31	1.96	28.66
		Centroid-Fa	-2.000				1/2" Ice	4.60	2.23	54.63
		ce	-2.000				1" Ice	4.90	2.50	84.59
LLPX310R	B	From	4.00		10.000	130.00	No Ice	4.31	1.96	28.66
		Centroid-Fa	-2.000				1/2" Ice	4.60	2.23	54.63
		ce	-2.000				1" Ice	4.90	2.50	84.59
LLPX310R	C	From	4.00		20.000	130.00	No Ice	4.31	1.96	28.66
		Centroid-Fa	-2.000				1/2" Ice	4.60	2.23	54.63
		ce	-2.000				1" Ice	4.90	2.50	84.59
APXV9ERR18-C-A20	A	From	4.00		40.000	130.00	No Ice	8.02	5.81	62.00
		Centroid-Fa	7.000				1/2" Ice	8.48	6.27	113.99
		ce	0.000				1" Ice	8.94	6.73	172.12
APXVSP18-C-A20	B	From	4.00		30.000	130.00	No Ice	8.02	5.28	57.00
		Centroid-Fa	7.000				1/2" Ice	8.48	5.74	106.52
		ce	0.000				1" Ice	8.94	6.20	162.12
APXVSP18-C-A20	C	From	4.00		20.000	130.00	No Ice	8.02	5.28	57.00
		Centroid-Fa	7.000				1/2" Ice	8.48	5.74	106.52
		ce	0.000				1" Ice	8.94	6.20	162.12
TD-RRH8x20-25	A	From Face	0.50		0.000	130.00	No Ice	4.05	1.53	70.00
			2.000				1/2" Ice	4.30	1.71	97.15
			0.000				1" Ice	4.56	1.90	127.83
TD-RRH8x20-25	B	From Face	0.50		0.000	130.00	No Ice	4.05	1.53	70.00
			-7.000				1/2" Ice	4.30	1.71	97.15
			0.000				1" Ice	4.56	1.90	127.83
TD-RRH8x20-25	C	From Face	0.50		0.000	130.00	No Ice	4.05	1.53	70.00
			-7.000				1/2" Ice	4.30	1.71	97.15
			0.000				1" Ice	4.56	1.90	127.83
FDD_R6_RRH	A	From	4.00		20.000	130.00	No Ice	1.53	0.68	33.00
		Centroid-Fa	-2.000				1/2" Ice	1.69	0.80	44.50
		ce	-2.000				1" Ice	1.85	0.92	58.31
FDD_R6_RRH	B	From	4.00		10.000	130.00	No Ice	1.53	0.68	33.00
		Centroid-Fa	-2.000				1/2" Ice	1.69	0.80	44.50
		ce	-2.000				1" Ice	1.85	0.92	58.31
FDD_R6_RRH	C	From	4.00		20.000	130.00	No Ice	1.53	0.68	33.00
		Centroid-Fa	-2.000				1/2" Ice	1.69	0.80	44.50
		ce	-2.000				1" Ice	1.85	0.92	58.31
800 EXTERNAL NOTCH FILTER	A	From Face	0.50		0.000	130.00	No Ice	0.66	0.32	11.00
			0.000				1/2" Ice	0.76	0.40	16.81
			-5.000				1" Ice	0.87	0.48	24.26
800 EXTERNAL NOTCH FILTER	B	From Face	0.50		0.000	130.00	No Ice	0.66	0.32	11.00
			0.000				1/2" Ice	0.76	0.40	16.81
			-5.000				1" Ice	0.87	0.48	24.26

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b>	Beaumont Farm (BU 876310)	<b>Page</b>	6 of 17
	<b>Project</b>	TEP No. 72875.101124	<b>Date</b>	15:36:47 11/04/16
	<b>Client</b>	Crown Castle	<b>Designed by</b>	mzsmee

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub>		Weight
			Horz	Vert			Front	Side	
			Lateral	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb
800 EXTERNAL NOTCH FILTER	C	From Face	0.50	0.000		130.00	No Ice 0.66	0.32	11.00
			0.000				1/2" Ice 0.76	0.40	16.81
			-5.000				1" Ice 0.87	0.48	24.26
(3) ACU-A20-N	A	From Centroid-Face	4.00	40.000		130.00	No Ice 0.07	0.12	1.04
			7.000				1/2" Ice 0.10	0.16	2.32
			0.000				1" Ice 0.15	0.21	4.41
(3) ACU-A20-N	B	From Centroid-Face	4.00	30.000		130.00	No Ice 0.07	0.12	1.04
			7.000				1/2" Ice 0.10	0.16	2.32
			0.000				1" Ice 0.15	0.21	4.41
(3) ACU-A20-N	C	From Centroid-Face	4.00	20.000		130.00	No Ice 0.07	0.12	1.04
			7.000				1/2" Ice 0.10	0.16	2.32
			0.000				1" Ice 0.15	0.21	4.41
800MHZ RRH	A	From Face	0.50	0.000		130.00	No Ice 2.13	1.77	53.00
			0.000				1/2" Ice 2.32	1.95	74.19
			-5.000				1" Ice 2.51	2.13	98.39
800MHZ RRH	B	From Face	0.50	0.000		130.00	No Ice 2.13	1.77	53.00
			0.000				1/2" Ice 2.32	1.95	74.19
			-5.000				1" Ice 2.51	2.13	98.39
800MHZ RRH	C	From Face	0.50	0.000		130.00	No Ice 2.13	1.77	53.00
			0.000				1/2" Ice 2.32	1.95	74.19
			-5.000				1" Ice 2.51	2.13	98.39
1900MHz RRH (65MHz)	A	From Leg	0.50	0.000		130.00	No Ice 2.31	2.38	60.00
			0.000				1/2" Ice 2.52	2.58	83.90
			0.000				1" Ice 2.73	2.79	111.08
1900MHz RRH (65MHz)	B	From Leg	0.50	0.000		130.00	No Ice 2.31	2.38	60.00
			0.000				1/2" Ice 2.52	2.58	83.90
			0.000				1" Ice 2.73	2.79	111.08
1900MHz RRH (65MHz)	C	From Leg	0.50	0.000		130.00	No Ice 2.31	2.38	60.00
			0.000				1/2" Ice 2.52	2.58	83.90
			0.000				1" Ice 2.73	2.79	111.08
2.4" Dia. x 6' Mount Pipe	A	From Centroid-Leg	4.00	0.000		130.00	No Ice 1.43	1.43	21.90
			7.000				1/2" Ice 1.93	1.93	37.81
			0.000				1" Ice 2.31	2.31	55.56
2.4" Dia. x 6' Mount Pipe	B	From Centroid-Leg	4.00	0.000		130.00	No Ice 1.43	1.43	21.90
			7.000				1/2" Ice 1.93	1.93	37.81
			0.000				1" Ice 2.31	2.31	55.56
2.4" Dia. x 6' Mount Pipe	C	From Centroid-Leg	4.00	0.000		130.00	No Ice 1.43	1.43	21.90
			7.000				1/2" Ice 1.93	1.93	37.81
			0.000				1" Ice 2.31	2.31	55.56
Platform Mount [LP 1201-1]	C	None		0.000		130.00	No Ice 23.10	23.10	2100.00
							1/2" Ice 26.80	26.80	2500.00
							1" Ice 30.50	30.50	2900.00
Miscellaneous [NA 510-3]	C	None		0.000		130.00	No Ice 19.70	19.70	519.20
							1/2" Ice 28.20	28.20	721.60
							1" Ice 36.70	36.70	924.00
**121**									
(2) LPA-80080-6CF-EDIN w/ Mount Pipe	A	From Centroid-Leg	4.00	30.000		121.00	No Ice 4.56	10.27	46.22
			0.000				1/2" Ice 5.10	11.44	112.73
			0.000				1" Ice 5.61	12.32	187.10
(2) LPA-80080-6CF-EDIN w/ Mount Pipe	B	From Centroid-Leg	4.00	30.000		121.00	No Ice 4.56	10.27	46.22
			0.000				1/2" Ice 5.10	11.44	112.73
			0.000				1" Ice 5.61	12.32	187.10
(2) LPA-80063/6CF w/ Mount Pipe	C	From Centroid-Leg	4.00	30.000		121.00	No Ice 10.06	10.45	56.20
			0.000				1/2" Ice 10.75	11.74	151.25
			0.000				1" Ice 11.40	12.87	254.99
BXA-70063/6CFx2 w/ Mount Pipe	A	From Centroid-Leg	4.00	30.000		121.00	No Ice 7.83	5.42	42.55
			0.000				1/2" Ice 8.39	6.58	101.64



<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Beaumont Farm (BU 876310)	<b>Page</b> 7 of 17
	<b>Project</b> TEP No. 72875.101124	<b>Date</b> 15:36:47 11/04/16
	<b>Client</b> Crown Castle	<b>Designed by</b> mzsmee

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight lb
BXA-70063/6CFx2 w/ Mount Pipe	B	g From Centroid-Le	0.000 4.00 -3.500	30.000	121.00	1" Ice 8.91 No Ice 7.83 1/2" Ice 8.39	7.45 5.42 6.58	168.43 42.55 101.64
BXA-70063/6CFx4 w/ Mount Pipe	C	g From Centroid-Le	0.000 4.00 0.000	30.000	121.00	1" Ice 8.91 No Ice 7.81 1/2" Ice 8.36	7.45 5.40 6.55	168.43 42.25 101.12
DB-T1-6Z-8AB-0Z	A	g From Centroid-Le	0.000 4.00 3.500	30.000	121.00	1" Ice 8.87 No Ice 4.80 1/2" Ice 5.07	7.41 2.00 2.19	167.67 44.00 80.13
(2) SBNHH-1D65B w/ Mount Pipe	A	g From Centroid-Le	0.000 4.00 0.000	30.000	121.00	1" Ice 5.35 No Ice 8.16 1/2" Ice 8.62	2.39 7.12 7.94	120.22 75.34 144.51
SBNHH-1D65B w/ Mount Pipe	B	g From Centroid-Le	0.000 4.00 0.000	30.000	121.00	1" Ice 9.09 No Ice 8.16 1/2" Ice 8.62	8.78 7.12 7.94	222.29 75.34 144.51
SBNHH-1D65B w/ Mount Pipe	B	g From Centroid-Le	0.000 4.00 3.500	40.000	121.00	1" Ice 9.09 No Ice 8.16 1/2" Ice 8.62	8.78 7.12 7.94	222.29 75.34 144.51
(2) SBNHH-1D65B w/ Mount Pipe	C	g From Centroid-Le	0.000 4.00 0.000	30.000	121.00	1" Ice 9.09 No Ice 8.16 1/2" Ice 8.62	8.78 7.12 7.94	222.29 75.34 144.51
RRH2x60-1900A-4R	A	g From Centroid-Le	0.000 4.00 -3.500	30.000	121.00	1" Ice 2.20 No Ice 1.84 1/2" Ice 2.01	1.67 1.35 1.50	82.05 46.00 62.66
RRH2x60-1900A-4R	B	g From Centroid-Le	0.000 4.00 0.000	30.000	121.00	1" Ice 2.20 No Ice 1.84 1/2" Ice 2.01	1.67 1.35 1.50	82.05 46.00 62.66
RRH2x60-1900A-4R	C	g From Centroid-Le	0.000 4.00 3.500	30.000	121.00	1" Ice 2.20 No Ice 1.84 1/2" Ice 2.01	1.67 1.35 1.50	82.05 46.00 62.66
B13 RRH 4X30	A	g From Centroid-Le	0.000 4.00 0.000	30.000	121.00	1" Ice 2.43 No Ice 2.06 1/2" Ice 2.24	1.64 1.32 1.48	92.95 55.60 72.88
B13 RRH 4X30	B	g From Centroid-Le	0.000 4.00 -3.500	30.000	121.00	1" Ice 2.43 No Ice 2.06 1/2" Ice 2.24	1.64 1.32 1.48	92.95 55.60 72.88
B13 RRH 4X30	C	g From Centroid-Le	0.000 4.00 0.000	30.000	121.00	1" Ice 2.43 No Ice 2.06 1/2" Ice 2.24	1.64 1.32 1.48	92.95 55.60 72.88
B66A RRH4X45	A	g From Centroid-Le	0.000 4.00 3.500	30.000	121.00	1" Ice 3.01 No Ice 2.58 1/2" Ice 2.79	2.00 1.63 1.81	100.86 56.80 77.27
B66A RRH4X45	B	g From Centroid-Le	0.000 4.00 3.500	40.000	121.00	1" Ice 3.01 No Ice 2.58 1/2" Ice 2.79	2.00 1.63 1.81	100.86 56.80 77.27
B66A RRH4X45	C	g From Centroid-Le	0.000 4.00 -3.500	30.000	121.00	1" Ice 3.01 No Ice 2.58 1/2" Ice 2.79	2.00 1.63 1.81	100.86 56.80 77.27
DB-T1-6Z-8AB-0Z	C	g From Centroid-Le	0.000 4.00 0.000	30.000	121.00	1" Ice 3.01 No Ice 4.80 1/2" Ice 5.07	2.00 2.00 2.19	100.86 44.00 80.13
Platform Mount [LP 1201-1]	C	None		0.000	121.00	1" Ice 5.35 No Ice 23.10 1/2" Ice 26.80 1" Ice 30.50	2.39 23.10 26.80 30.50	120.22 2100.00 2500.00 2900.00

\*\*\*  
\*\*111\*\*

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b>	Beaumont Farm (BU 876310)	<b>Page</b>	8 of 17
	<b>Project</b>	TEP No. 72875.101124	<b>Date</b>	15:36:47 11/04/16
	<b>Client</b>	Crown Castle	<b>Designed by</b>	mzsmee

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb
7770.00 w/ Mount Pipe	A	From	4.00	20.000	111.00	No Ice	5.75	4.25	55.38
		Centroid-Le	-7.000			1/2" Ice	6.18	5.01	102.81
		g	1.000			1" Ice	6.61	5.71	156.64
7770.00 w/ Mount Pipe	B	From	4.00	20.000	111.00	No Ice	5.75	4.25	55.38
		Centroid-Le	-7.000			1/2" Ice	6.18	5.01	102.81
		g	1.000			1" Ice	6.61	5.71	156.64
7770.00 w/ Mount Pipe	C	From	4.00	20.000	111.00	No Ice	5.75	4.25	55.38
		Centroid-Le	-7.000			1/2" Ice	6.18	5.01	102.81
		g	1.000			1" Ice	6.61	5.71	156.64
RRUS-11	A	From	4.00	20.000	111.00	No Ice	2.79	1.19	50.00
		Centroid-Le	0.000			1/2" Ice	3.00	1.34	70.87
		g	1.000			1" Ice	3.21	1.50	94.78
RRUS-11	B	From	4.00	20.000	111.00	No Ice	2.79	1.19	50.00
		Centroid-Le	0.000			1/2" Ice	3.00	1.34	70.87
		g	1.000			1" Ice	3.21	1.50	94.78
RRUS-11	C	From	4.00	20.000	111.00	No Ice	2.79	1.19	50.00
		Centroid-Le	0.000			1/2" Ice	3.00	1.34	70.87
		g	1.000			1" Ice	3.21	1.50	94.78
DC6-48-60-18-8F	A	From	4.00	20.000	111.00	No Ice	1.21	1.21	32.80
		Centroid-Le	0.000			1/2" Ice	1.89	1.89	54.76
		g	1.000			1" Ice	2.11	2.11	79.58
TPA-65R-LCUUUU-H6 w/ Mount Pipe	A	From	4.00	20.000	111.00	No Ice	8.16	9.46	96.51
		Centroid-Le	0.000			1/2" Ice	8.71	10.63	176.35
		g	1.000			1" Ice	9.23	11.51	264.39
TPA-65R-LCUUUU-H6 w/ Mount Pipe	B	From	4.00	20.000	111.00	No Ice	8.16	9.46	96.51
		Centroid-Le	0.000			1/2" Ice	8.71	10.63	176.35
		g	1.000			1" Ice	9.23	11.51	264.39
TPA-65R-LCUUUU-H6 w/ Mount Pipe	C	From	4.00	20.000	111.00	No Ice	8.16	9.46	96.51
		Centroid-Le	0.000			1/2" Ice	8.71	10.63	176.35
		g	1.000			1" Ice	9.23	11.51	264.39
DTMABP7819VG12A	A	From	4.00	20.000	111.00	No Ice	0.98	0.34	19.18
		Centroid-Le	-7.000			1/2" Ice	1.10	0.42	26.48
		g	1.000			1" Ice	1.23	0.51	35.63
DTMABP7819VG12A	B	From	4.00	20.000	111.00	No Ice	0.98	0.34	19.18
		Centroid-Le	-7.000			1/2" Ice	1.10	0.42	26.48
		g	1.000			1" Ice	1.23	0.51	35.63
DTMABP7819VG12A	C	From	4.00	20.000	111.00	No Ice	0.98	0.34	19.18
		Centroid-Le	-7.000			1/2" Ice	1.10	0.42	26.48
		g	1.000			1" Ice	1.23	0.51	35.63
RRUS12/RRUS A2	A	From	4.00	20.000	111.00	No Ice	3.14	1.84	71.50
		Centroid-Le	0.000			1/2" Ice	3.36	2.01	98.98
		g	1.000			1" Ice	3.59	2.20	129.87
RRUS12/RRUS A2	B	From	4.00	20.000	111.00	No Ice	3.14	1.84	71.50
		Centroid-Le	0.000			1/2" Ice	3.36	2.01	98.98
		g	1.000			1" Ice	3.59	2.20	129.87
RRUS12/RRUS A2	C	From	4.00	20.000	111.00	No Ice	3.14	1.84	71.50
		Centroid-Le	0.000			1/2" Ice	3.36	2.01	98.98
		g	1.000			1" Ice	3.59	2.20	129.87
2.4" Dia. x 6' Mount Pipe	A	From	4.00	0.000	111.00	No Ice	1.43	1.43	21.90
		Centroid-Le	7.000			1/2" Ice	1.93	1.93	37.81
		g	0.000			1" Ice	2.31	2.31	55.56
2.4" Dia. x 6' Mount Pipe	B	From	4.00	0.000	111.00	No Ice	1.43	1.43	21.90
		Centroid-Le	7.000			1/2" Ice	1.93	1.93	37.81
		g	0.000			1" Ice	2.31	2.31	55.56
2.4" Dia. x 6' Mount Pipe	C	From	4.00	0.000	111.00	No Ice	1.43	1.43	21.90
		Centroid-Le	7.000			1/2" Ice	1.93	1.93	37.81
		g	0.000			1" Ice	2.31	2.31	55.56

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Beaumont Farm (BU 876310)	<b>Page</b> 9 of 17
	<b>Project</b> TEP No. 72875.101124	<b>Date</b> 15:36:47 11/04/16
	<b>Client</b> Crown Castle	<b>Designed by</b> mzsmee

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub>		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb	
Platform Mount [LP 1201-1]	C	None			0.000	111.00	No Ice	23.10	23.10	2100.00
							1/2" Ice	26.80	26.80	2500.00
							1" Ice	30.50	30.50	2900.00
**70**										
OG-860/1920/GPS-A	C	From Face	3.00		0.000	70.00	No Ice	0.14	0.14	1.65
			0.000				1/2" Ice	0.22	0.22	3.53
			0.000				1" Ice	0.30	0.30	6.44
Side Arm Mount [SO 701-1]	C	From Face	1.50		0.000	70.00	No Ice	0.85	1.67	65.00
			0.000				1/2" Ice	1.14	2.34	79.00
			0.000				1" Ice	1.43	3.01	93.00
*****										
*										

### Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight
				Horz	Lateral						
			ft	ft	°	°	ft	ft	ft <sup>2</sup>	lb	
**130**											
VHLP1-23	C	Paraboloid w/Shroud (HP)	From Centroid	4.00	-2.000	30.000		130.00	1.27	No Ice	1.28
			-Face	2.000						1/2" Ice	1.45
										1" Ice	1.62
VHLP2-23	A	Paraboloid w/Shroud (HP)	From Centroid	4.00	-2.000	70.000		130.00	2.18	No Ice	3.73
			-Face	2.000						1/2" Ice	4.02
										1" Ice	4.31
VHLP2.5-23	C	Paraboloid w/Shroud (HP)	From Centroid	4.00	2.000	-20.000		130.00	2.92	No Ice	6.68
			-Face	2.000						1/2" Ice	7.07
										1" Ice	7.46
***											

### 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
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

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Beaumont Farm (BU 876310)	<b>Page</b> 10 of 17
	<b>Project</b> TEP No. 72875.101124	<b>Date</b> 15:36:47 11/04/16
	<b>Client</b> Crown Castle	<b>Designed by</b> mzsmee

Comb. No.	Description
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

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	147 - 133	Pole	Max Tension	21	0.06	-0.00	-0.97
			Max. Compression	26	-1599.32	38.27	5.47
			Max. Mx	20	-1036.47	4389.68	2.75
			Max. My	2	-1036.03	2.02	4390.35
			Max. Vy	8	626.54	-4382.32	5.38
			Max. Vx	2	-627.05	2.02	4390.35
			Max. Torque	27			0.00
L2	133 - 85.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-37862.89	164.89	2984.44
			Max. Mx	8	-16836.17	-743720.52	3965.57
			Max. My	2	-16840.99	-2123.07	747043.66
			Max. Vy	8	24116.47	-743720.52	3965.57
			Max. Vx	2	-24059.40	-2123.07	747043.66
			Max. Torque	13			-2251.17
L3	85.5 - 42.75	Pole	Max Tension	1	0.00	0.00	0.00

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b>	Beaumont Farm (BU 876310)	<b>Page</b>	11 of 17
	<b>Project</b>	TEP No. 72875.101124	<b>Date</b>	15:36:47 11/04/16
	<b>Client</b>	Crown Castle	<b>Designed by</b>	mzsmee

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L4	42.75 - 0	Pole	Max. Compression	26	-49861.09	724.44	2704.57
			Max. Mx	8	-26242.14	-1855824.9	7494.80
			Max. My	2	-26248.26	-4648.30	1855659.85
			Max. Vy	8	29145.79	-1855824.9	7494.80
			Max. Vx	2	-29047.89	-4648.30	1855659.85
			Max. Torque	19			-914.71
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-67800.34	1419.96	2704.11
			Max. Mx	8	-41207.83	-3365342.3	11566.46
			Max. My	2	-41207.99	-7402.86	3360605.31
			Max. Vy	8	34163.67	-3365342.3	11566.46
			Max. Vx	2	-34066.73	-7402.86	3360605.31
			Max. Torque	19			-695.56

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	27	67800.34	-9.49	7962.60
	Max. H <sub>x</sub>	21	30934.72	34104.84	-1.29
	Max. H <sub>z</sub>	3	30934.72	-57.62	34020.35
	Max. M <sub>x</sub>	2	3360605.31	-57.62	34020.35
	Max. M <sub>z</sub>	8	3365342.36	-34117.22	82.84
	Max. Torsion	5	655.71	-17012.99	29556.38
	Min. Vert	19	30934.72	29529.72	-17187.84
	Min. H <sub>x</sub>	8	41246.29	-34117.22	82.84
	Min. H <sub>z</sub>	15	30934.72	86.61	-33958.39
	Min. M <sub>x</sub>	14	-3350289.85	86.61	-33958.39
	Min. M <sub>z</sub>	20	-3363184.88	34104.84	-1.29
	Min. Torsion	19	-693.92	29529.72	-17187.84

### Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear <sub>x</sub> lb	Shear <sub>z</sub> lb	Overturing Moment, M <sub>x</sub> lb-ft	Overturing Moment, M <sub>z</sub> lb-ft	Torque lb-ft
Dead Only	34371.91	0.00	-0.00	-650.93	-164.11	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	41246.29	57.62	-34020.35	-3360605.31	-7402.86	3.06
0.9 Dead+1.6 Wind 0 deg - No Ice	30934.72	57.62	-34020.35	-3314033.64	-7235.83	5.16
1.2 Dead+1.6 Wind 30 deg - No Ice	41246.29	17012.99	-29556.38	-2923158.07	-1675594.83	-653.57
0.9 Dead+1.6 Wind 30 deg - No Ice	30934.72	17012.99	-29556.38	-2882607.32	-1652490.18	-655.71
1.2 Dead+1.6 Wind 60 deg - No Ice	41246.29	29537.68	-17129.51	-1696661.90	-2912803.27	-477.79
0.9 Dead+1.6 Wind 60 deg - No Ice	30934.72	29537.68	-17129.51	-1673018.76	-2872648.76	-483.16

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Beaumont Farm (BU 876310)	<b>Page</b> 12 of 17
	<b>Project</b> TEP No. 72875.101124	<b>Date</b> 15:36:47 11/04/16
	<b>Client</b> Crown Castle	<b>Designed by</b> mzsmee

Load Combination	Vertical lb	Shear <sub>x</sub> lb	Shear <sub>z</sub> lb	Overturning Moment, M <sub>x</sub> lb-ft	Overturning Moment, M <sub>z</sub> lb-ft	Torque lb-ft
Ice						
1.2 Dead+1.6 Wind 90 deg - No Ice	41246.29	34117.22	-82.84	-11566.37	-3365342.36	-279.18
0.9 Dead+1.6 Wind 90 deg - No Ice	30934.72	34117.22	-82.84	-11172.39	-3318947.84	-286.59
1.2 Dead+1.6 Wind 120 deg - No Ice	41246.29	29415.16	17018.47	1681020.24	-2896637.17	-213.95
0.9 Dead+1.6 Wind 120 deg - No Ice	30934.72	29415.16	17018.47	1658041.86	-2856726.52	-221.60
1.2 Dead+1.6 Wind 150 deg - No Ice	41246.29	16920.85	29400.86	2900695.15	-1664296.40	-198.00
0.9 Dead+1.6 Wind 150 deg - No Ice	30934.72	16920.85	29400.86	2860921.07	-1641353.72	-203.70
1.2 Dead+1.6 Wind 180 deg - No Ice	41246.29	-86.61	33958.39	3350289.85	11026.98	-64.07
0.9 Dead+1.6 Wind 180 deg - No Ice	30934.72	-86.61	33958.39	3304313.22	10916.76	-66.19
1.2 Dead+1.6 Wind 210 deg - No Ice	41246.29	-17050.23	29519.85	2916370.68	1680371.80	506.45
0.9 Dead+1.6 Wind 210 deg - No Ice	30934.72	-17050.23	29519.85	2876357.97	1657307.25	508.82
1.2 Dead+1.6 Wind 240 deg - No Ice	41246.29	-29529.72	17187.84	1703147.68	2911230.60	687.91
0.9 Dead+1.6 Wind 240 deg - No Ice	30934.72	-29529.72	17187.84	1679830.64	2871216.39	693.92
1.2 Dead+1.6 Wind 270 deg - No Ice	41246.29	-34104.84	1.29	-1562.50	3363184.88	240.80
0.9 Dead+1.6 Wind 270 deg - No Ice	30934.72	-34104.84	1.29	-1309.35	3316925.70	248.20
1.2 Dead+1.6 Wind 300 deg - No Ice	41246.29	-29482.95	-17050.18	-1687130.28	2905639.06	143.06
0.9 Dead+1.6 Wind 300 deg - No Ice	30934.72	-29482.95	-17050.18	-1663619.13	2865701.95	150.21
1.2 Dead+1.6 Wind 330 deg - No Ice	41246.29	-16939.04	-29456.59	-2910153.46	1666380.14	294.20
0.9 Dead+1.6 Wind 330 deg - No Ice	30934.72	-16939.04	-29456.59	-2869796.07	1643520.78	299.66
1.2 Dead+1.0 Ice+1.0 Temp	67800.34	-0.00	-0.02	-2704.11	1419.96	-0.10
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	67800.34	9.49	-7962.60	-857411.82	218.18	-15.24
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	67800.34	3978.14	-6913.10	-745476.13	-424079.86	-152.38
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	67800.34	6906.66	-4003.81	-433382.36	-738219.61	-115.09
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	67800.34	7979.11	-15.58	-5008.47	-853288.95	-65.75
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	67800.34	6884.41	3985.83	425296.98	-735054.70	-41.14
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	67800.34	3963.24	6885.30	735798.56	-422137.87	-27.42
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	67800.34	-15.16	7950.12	849864.26	3577.75	8.42
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	67800.34	-3985.37	6905.82	738705.00	428111.35	129.68
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	67800.34	-6904.63	4015.39	429436.77	740861.86	164.62
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	67800.34	-7976.40	-1.54	-3238.26	855830.58	58.39
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	67800.34	-6898.42	-3991.30	-431799.32	740099.02	23.54
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	67800.34	-3966.31	-6896.37	-743137.02	425544.28	51.26

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b>	Beaumont Farm (BU 876310)	<b>Page</b>	13 of 17
	<b>Project</b>	TEP No. 72875.101124	<b>Date</b>	15:36:47 11/04/16
	<b>Client</b>	Crown Castle	<b>Designed by</b>	mzsmee

Load Combination	Vertical lb	Shear <sub>x</sub> lb	Shear <sub>z</sub> lb	Overturning Moment, M <sub>x</sub> lb-ft	Overturning Moment, M <sub>z</sub> lb-ft	Torque lb-ft
deg+1.0 Icc+1.0 Temp						
Dead+Wind 0 deg - Service	34371.91	12.33	-7279.03	-714704.92	-1707.36	0.94
Dead+Wind 30 deg - Service	34371.91	3640.12	-6323.91	-621746.90	-356230.57	-141.96
Dead+Wind 60 deg - Service	34371.91	6319.91	-3665.05	-361093.51	-619158.49	-104.33
Dead+Wind 90 deg - Service	34371.91	7299.75	-17.72	-2982.95	-715322.86	-62.42
Dead+Wind 120 deg - Service	34371.91	6293.70	3641.29	356704.08	-615702.14	-49.48
Dead+Wind 150 deg - Service	34371.91	3620.40	6290.64	615895.69	-353816.52	-45.38
Dead+Wind 180 deg - Service	34371.91	-18.53	7265.77	711448.55	2207.02	-14.34
Dead+Wind 210 deg - Service	34371.91	-3648.08	6316.10	619247.35	356975.58	112.39
Dead+Wind 240 deg - Service	34371.91	-6318.21	3677.53	361417.01	618558.00	152.92
Dead+Wind 270 deg - Service	34371.91	-7297.10	0.28	-857.28	714591.37	53.90
Dead+Wind 300 deg - Service	34371.91	-6308.20	-3648.07	-359060.56	617355.83	31.38
Dead+Wind 330 deg - Service	34371.91	-3624.29	-6302.56	-618966.97	353994.44	64.04

## Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-34371.91	0.00	-0.00	34371.91	0.00	0.000%
2	57.62	-41246.29	-34020.35	-57.62	41246.29	34020.35	0.000%
3	57.62	-30934.72	-34020.35	-57.62	30934.72	34020.35	0.000%
4	17012.99	-41246.29	-29556.38	-17012.99	41246.29	29556.38	0.000%
5	17012.99	-30934.72	-29556.38	-17012.99	30934.72	29556.38	0.000%
6	29537.68	-41246.29	-17129.51	-29537.68	41246.29	17129.51	0.000%
7	29537.68	-30934.72	-17129.51	-29537.68	30934.72	17129.51	0.000%
8	34117.22	-41246.29	-82.84	-34117.22	41246.29	82.84	0.000%
9	34117.22	-30934.72	-82.84	-34117.22	30934.72	82.84	0.000%
10	29415.16	-41246.29	17018.47	-29415.16	41246.29	-17018.47	0.000%
11	29415.16	-30934.72	17018.47	-29415.16	30934.72	-17018.47	0.000%
12	16920.85	-41246.29	29400.86	-16920.85	41246.29	-29400.86	0.000%
13	16920.85	-30934.72	29400.86	-16920.85	30934.72	-29400.86	0.000%
14	-86.61	-41246.29	33958.38	86.61	41246.29	-33958.39	0.000%
15	-86.61	-30934.72	33958.38	86.61	30934.72	-33958.39	0.000%
16	-17050.23	-41246.29	29519.85	17050.23	41246.29	-29519.85	0.000%
17	-17050.23	-30934.72	29519.85	17050.23	30934.72	-29519.85	0.000%
18	-29529.72	-41246.29	17187.84	29529.72	41246.29	-17187.84	0.000%
19	-29529.72	-30934.72	17187.84	29529.72	30934.72	-17187.84	0.000%
20	-34104.83	-41246.29	1.29	34104.84	41246.29	-1.29	0.000%
21	-34104.83	-30934.72	1.29	34104.84	30934.72	-1.29	0.000%
22	-29482.95	-41246.29	-17050.18	29482.95	41246.29	17050.18	0.000%
23	-29482.95	-30934.72	-17050.18	29482.95	30934.72	17050.18	0.000%
24	-16939.04	-41246.29	-29456.59	16939.04	41246.29	29456.59	0.000%
25	-16939.04	-30934.72	-29456.59	16939.04	30934.72	29456.59	0.000%
26	0.00	-67800.34	0.00	0.00	67800.34	0.02	0.000%
27	9.49	-67800.34	-7962.40	-9.49	67800.34	7962.60	0.000%
28	3978.12	-67800.34	-6913.08	-3978.14	67800.34	6913.10	0.000%
29	6906.64	-67800.34	-4003.79	-6906.66	67800.34	4003.81	0.000%
30	7978.91	-67800.34	-15.58	-7979.11	67800.34	15.58	0.000%
31	6884.38	-67800.34	3985.82	-6884.41	67800.34	-3985.83	0.000%
32	3963.22	-67800.34	6885.27	-3963.24	67800.34	-6885.30	0.000%
33	-15.16	-67800.34	7949.92	15.16	67800.34	-7950.12	0.000%
34	-3985.36	-67800.34	6905.79	3985.37	67800.34	-6905.82	0.000%
35	-6904.60	-67800.34	4015.38	6904.63	67800.34	-4015.39	0.000%
36	-7976.20	-67800.34	-1.53	7976.40	67800.34	1.54	0.000%
37	-6898.40	-67800.34	-3991.29	6898.42	67800.34	3991.30	0.000%
38	-3966.30	-67800.34	-6896.35	3966.31	67800.34	6896.37	0.000%
39	12.33	-34371.91	-7279.02	-12.33	34371.91	7279.03	0.000%

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b>	Beaumont Farm (BU 876310)	<b>Page</b>	14 of 17
	<b>Project</b>	TEP No. 72875.101124	<b>Date</b>	15:36:47 11/04/16
	<b>Client</b>	Crown Castle	<b>Designed by</b>	mzsmee

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
40	3640.11	-34371.91	-6323.91	-3640.12	34371.91	6323.91	0.000%
41	6319.91	-34371.91	-3665.05	-6319.91	34371.91	3665.05	0.000%
42	7299.75	-34371.91	-17.72	-7299.75	34371.91	17.72	0.000%
43	6293.69	-34371.91	3641.29	-6293.70	34371.91	-3641.29	0.000%
44	3620.40	-34371.91	6290.63	-3620.40	34371.91	-6290.64	0.000%
45	-18.53	-34371.91	7265.77	18.53	34371.91	-7265.77	0.000%
46	-3648.08	-34371.91	6316.09	3648.08	34371.91	-6316.10	0.000%
47	-6318.20	-34371.91	3677.52	6318.21	34371.91	-3677.53	0.000%
48	-7297.10	-34371.91	0.28	7297.10	34371.91	-0.28	0.000%
49	-6308.20	-34371.91	-3648.07	6308.20	34371.91	3648.07	0.000%
50	-3624.29	-34371.91	-6302.56	3624.29	34371.91	6302.56	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	0.00002233
3	Yes	4	0.00000001	0.00071831
4	Yes	6	0.00000001	0.00023587
5	Yes	6	0.00000001	0.00006838
6	Yes	6	0.00000001	0.00024374
7	Yes	6	0.00000001	0.00007091
8	Yes	5	0.00000001	0.00010874
9	Yes	5	0.00000001	0.00004767
10	Yes	6	0.00000001	0.00023576
11	Yes	6	0.00000001	0.00006862
12	Yes	6	0.00000001	0.00023814
13	Yes	6	0.00000001	0.00006970
14	Yes	5	0.00000001	0.00004302
15	Yes	4	0.00000001	0.00079614
16	Yes	6	0.00000001	0.00024314
17	Yes	6	0.00000001	0.00007099
18	Yes	6	0.00000001	0.00023611
19	Yes	6	0.00000001	0.00006822
20	Yes	5	0.00000001	0.00007406
21	Yes	4	0.00000001	0.00098913
22	Yes	6	0.00000001	0.00024023
23	Yes	6	0.00000001	0.00006994
24	Yes	6	0.00000001	0.00023663
25	Yes	6	0.00000001	0.00006894
26	Yes	4	0.00000001	0.00002831
27	Yes	5	0.00000001	0.00060154
28	Yes	6	0.00000001	0.00014859
29	Yes	6	0.00000001	0.00015262
30	Yes	5	0.00000001	0.00059678
31	Yes	6	0.00000001	0.00014495
32	Yes	6	0.00000001	0.00014540
33	Yes	5	0.00000001	0.00059114
34	Yes	6	0.00000001	0.00014863
35	Yes	6	0.00000001	0.00014640
36	Yes	5	0.00000001	0.00059768
37	Yes	6	0.00000001	0.00015148
38	Yes	6	0.00000001	0.00014910
39	Yes	4	0.00000001	0.00011150
40	Yes	4	0.00000001	0.00084837



<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Beaumont Farm (BU 876310)	<b>Page</b> 15 of 17
	<b>Project</b> TEP No. 72875.101124	<b>Date</b> 15:36:47 11/04/16
	<b>Client</b> Crown Castle	<b>Designed by</b> mzsmee

41	Yes	4	0.00000001	0.00094219
42	Yes	4	0.00000001	0.00013363
43	Yes	4	0.00000001	0.00084684
44	Yes	4	0.00000001	0.00087325
45	Yes	4	0.00000001	0.00011003
46	Yes	4	0.00000001	0.00092004
47	Yes	4	0.00000001	0.00084154
48	Yes	4	0.00000001	0.00012760
49	Yes	4	0.00000001	0.00090125
50	Yes	4	0.00000001	0.00085693

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 133	29.017	40	1.582	0.003
L2	133 - 85.5	24.382	40	1.579	0.003
L3	89.25 - 42.75	11.019	40	1.213	0.001
L4	47.5 - 0	3.011	41	0.592	0.000

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
132.00	VHLP1-23	40	24.052	1.576	0.003	45794
130.00	APXVTM14-C-120	40	23.392	1.571	0.003	32091
121.00	(2) LPA-80080-6CF-EDIN w/ Mount Pipe	40	20.450	1.531	0.003	12440
111.00	7770.00 w/ Mount Pipe	40	17.275	1.457	0.002	7388
70.00	OG-860/1920/GPS-A	40	6.606	0.932	0.000	3625

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 133	136.053	4	7.431	0.016
L2	133 - 85.5	114.381	4	7.415	0.016
L3	89.25 - 42.75	51.812	18	5.708	0.004
L4	47.5 - 0	14.175	18	2.788	0.001

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

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Beaumont Farm (BU 876310)	<b>Page</b> 16 of 17
	<b>Project</b> TEP No. 72875.101124	<b>Date</b> 15:36:47 11/04/16
	<b>Client</b> Crown Castle	<b>Designed by</b> mzsmee

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
132.00	VHLP1-23	4	112.837	7.405	0.016	10661
130.00	APXVTM14-C-120	4	109.751	7.381	0.016	7331
121.00	(2) LPA-80080-6CF-EDIN w/ Mount Pipe	4	95.984	7.194	0.014	2758
111.00	7770.00 w/ Mount Pipe	4	81.115	6.851	0.011	1623
70.00	OG-860/1920/GPS-A	18	31.094	4.392	0.001	781

### Compression Checks

### Pole Design Data

Section No.	Elevation	Size	L	L <sub>n</sub>	KI/r	A	P <sub>u</sub>	φP <sub>n</sub>	Ratio P <sub>u</sub> / φP <sub>n</sub>
	ft		ft	ft		in <sup>2</sup>	lb	lb	
L1	147 - 133 (1)	TP12.75x12.75x0.5	14.00	0.00	0.0	19.242	-1036.16	606131.00	0.002
L2	133 - 85.5 (2)	TP29.418x19.537x0.313	47.50	0.00	0.0	28.503	-16827.70	2074020.00	0.008
L3	85.5 - 42.75 (3)	TP37.687x27.477x0.375	46.50	0.00	0.0	43.795	-26236.10	3116790.00	0.008
L4	42.75 - 0 (4)	TP45.83x35.894x0.438	47.50	0.00	0.0	63.947	-41207.70	4432580.00	0.009

### Pole Bending Design Data

Section No.	Elevation	Size	M <sub>ux</sub>	φM <sub>ux</sub>	Ratio M <sub>ux</sub> / φM <sub>ux</sub>	M <sub>uy</sub>	φM <sub>uy</sub>	Ratio M <sub>uy</sub> / φM <sub>uy</sub>
	ft		lb-ft	lb-ft		lb-ft	lb-ft	
L1	147 - 133 (1)	TP12.75x12.75x0.5	4393.26	197066.67	0.022	0.00	197066.67	0.000
L2	133 - 85.5 (2)	TP29.418x19.537x0.313	748365.00	1193158.33	0.627	0.00	1193158.33	0.000
L3	85.5 - 42.75 (3)	TP37.687x27.477x0.375	1860708.33	2297475.00	0.810	0.00	2297475.00	0.000
L4	42.75 - 0 (4)	TP45.83x35.894x0.438	3372825.00	4092133.33	0.824	0.00	4092133.33	0.000

### Pole Shear Design Data

Section No.	Elevation	Size	Actual V <sub>u</sub>	φV <sub>n</sub>	Ratio V <sub>u</sub> / φV <sub>n</sub>	Actual T <sub>u</sub>	φT <sub>n</sub>	Ratio T <sub>u</sub> / φT <sub>n</sub>
	ft		lb	lb		lb-ft	lb-ft	
L1	147 - 133 (1)	TP12.75x12.75x0.5	627.48	303066.00	0.002	0.00	297741.67	0.000
L2	133 - 85.5 (2)	TP29.418x19.537x0.313	24136.70	1037010.00	0.023	781.53	2419358.33	0.000
L3	85.5 - 42.75 (3)	TP37.687x27.477x0.375	29199.40	1558400.00	0.019	689.99	4658566.67	0.000
L4	42.75 - 0 (4)	TP45.83x35.894x0.438	34214.20	2216290.00	0.015	687.97	8297566.67	0.000

<b>tnxTower</b>  <b>Tower Engineering Professionals</b> 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	<b>Job</b> Beaumont Farm (BU 876310)	<b>Page</b> 17 of 17
	<b>Project</b> TEP No. 72875.101124	<b>Date</b> 15:36:47 11/04/16
	<b>Client</b> Crown Castle	<b>Designed by</b> mzsmee

### Pole Interaction Design Data

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_u$	$M_{ux}$	$M_{uy}$	$V_u$	$T_u$			
L1	147 - 133 (1)	0.002	0.022	0.000	0.002	0.000	0.024	1.000	4.8.2
L2	133 - 85.5 (2)	0.008	0.627	0.000	0.023	0.000	0.636	1.000	4.8.2
L3	85.5 - 42.75 (3)	0.008	0.810	0.000	0.019	0.000	0.819	1.000	4.8.2
L4	42.75 - 0 (4)	0.009	0.824	0.000	0.015	0.000	0.834	1.000	4.8.2

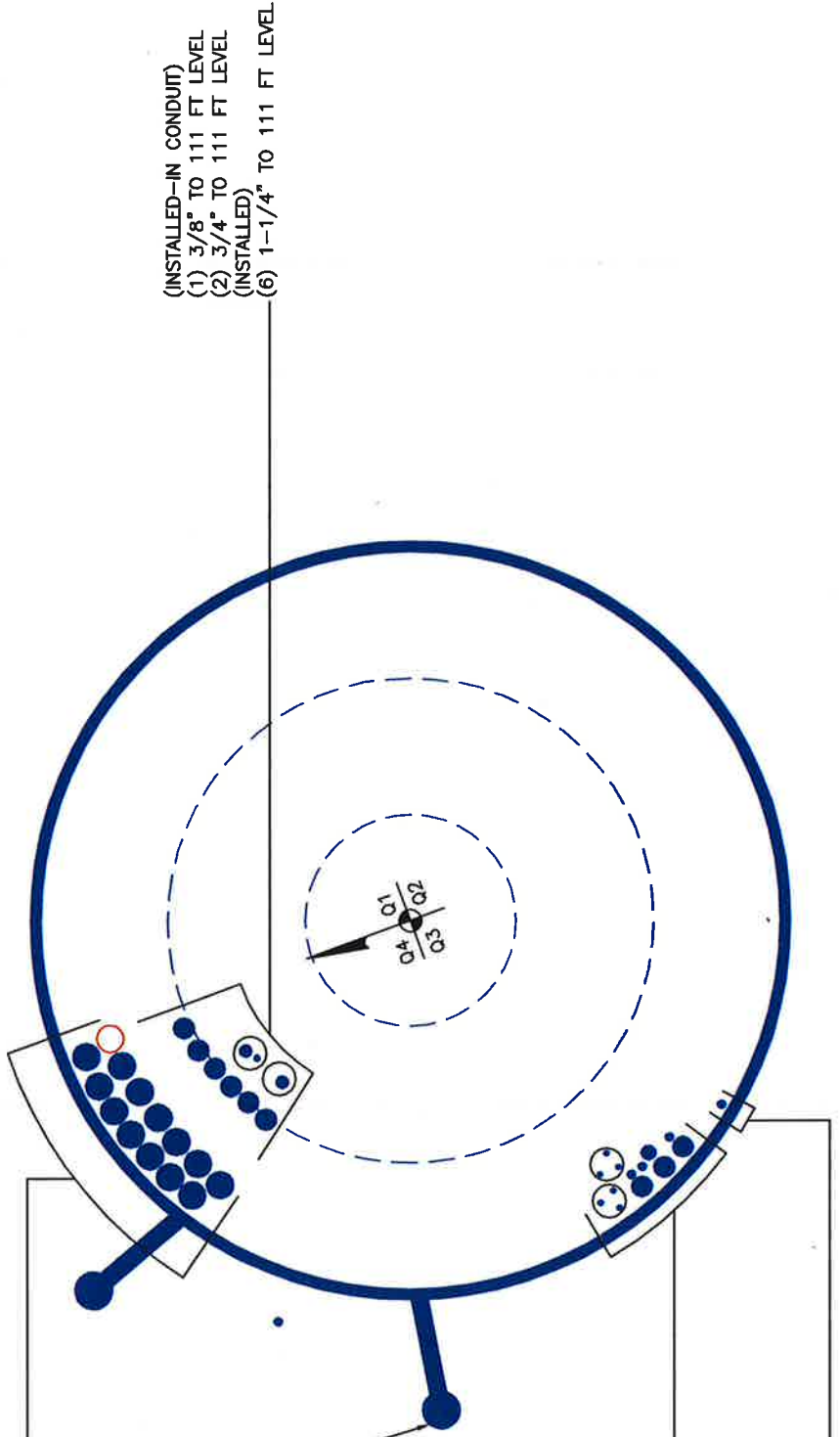
### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$\phi P_{allow}$ lb	% Capacity	Pass Fail
L1	147 - 133	Pole	TP12.75x12.75x0.5	1	-1036.16	606131.00	2.4	Pass
L2	133 - 85.5	Pole	TP29.418x19.537x0.313	2	-16827.70	2074020.00	63.6	Pass
L3	85.5 - 42.75	Pole	TP37.687x27.477x0.375	3	-26236.10	3116790.00	81.9	Pass
L4	42.75 - 0	Pole	TP45.83x35.894x0.438	4	-41207.70	4432580.00	83.4	Pass
<b>Summary</b>								
Pole (L4)							83.4	Pass
<b>Rating =</b>							<b>83.4</b>	<b>Pass</b>

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



- (PROPOSED)
- (1) 1-5/8" TO 121 FT LEVEL
- (INSTALLED)
- (13) 1-5/8" TO 121 FT LEVEL



- (INSTALLED-IN CONDUIT)
- (1) 3/8" TO 111 FT LEVEL
- (2) 3/4" TO 111 FT LEVEL
- (INSTALLED)
- (6) 1-1/4" TO 111 FT LEVEL

- (INSTALLED-IN CONDUIT)
- (6) 5/16" TO 130 FT LEVEL
- (INSTALLED)
- (3) 1/2" TO 130 FT LEVEL
- (1) 7/8" TO 130 FT LEVEL
- (3) 1-1/4" TO 130 FT LEVEL

- (INSTALLED)
- (1) 1/2" TO 70 FT LEVEL

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

# Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

## Site Data

BU#: 876310  
 Site Name: *Beaumont Farm*  
 App #: 362962 Rev. 5

Pole Manufacturer: **Other**

## Bolt Data

Qty:	20	
Diameter (in.):	1.25	Bolt Fu: 105
Bolt Material:	A325	Bolt Fy: 81
N/A:	100	<-- Disregard
N/A:	75	<-- Disregard
Circle (in.):	24	

## Plate Data

Diam:	28	in
Thick, t:	1	in
Grade (Fy):	50	ksi
Strength, Fu:	65	ksi
Single-Rod B-eff:	2.00	in

## Stiffener Data (Welding at Both Sides)

Config:	0	*
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:	12.75	in
Thick:	0.5	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

## Reactions

Mu	4.39	ft-kips
Axial, Pu:	1.04	kips
Shear, Vu:	0.63	kips
Elevation:	133	feet

## Bolt Threads:

X-Excluded
$\phi V_n = \phi(0.55 A_b F_u)$
$\phi = 0.75, \phi V_n$ (kips):
53.15

If No stiffeners, Criteria: **TIA G** <-Only Applicable to Unstiffened Cases

## Flange Bolt Results

Bolt Tension Capacity, $\phi^*T_n, B1$ :	76.31 kips
Adjusted $\phi^*T_n$ (due to $V_u = V_u/Q_t$ ), B:	76.31 kips
Max Bolt directly applied $T_u$ :	0.39 Kips
Min. PL "tc" for B cap. w/o Pry:	3.607 in
Min PL "treq" for actual T w/ Pry:	0.222 in
Min PL "t1" for actual T w/o Pry:	0.257 in
T allowable with Prying:	7.88 kips
Prying Force, q:	0.00 kips
Total Bolt Tension= $T_u+q$ :	0.39 kips
Prying Bolt Stress Ratio= $(T_u+q)/(B)$ :	0.5% <b>Pass</b>

Non-Rigid
$\phi^*T_n$
$\phi T_n [(1 - (V_u/\phi V_n)^2)^{0.5}]$

$\alpha > 1$  case

## Exterior Flange Plate Results

Flexural Check	
Compression Side Plate Stress:	2.1 ksi
Allowable Plate Stress:	45.0 ksi
Compression Plate Stress Ratio:	4.7% <b>Pass</b>
<b>No Prying</b>	
Tension Side Stress Ratio, $(t_{req}/t)^2$ :	4.9% <b>Pass</b>

Non-Rigid
TIA G
$\phi^*F_y$
Comp. Y.L. Length:
20.33

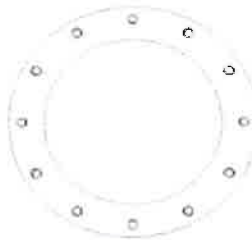
n/a

## 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



\* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

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

## 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#: 876310		
Site Name: <i>Beaumont Farm</i>		
App #: 362962 Rev. 5		
Anchor Rod Data		
Eta Factor, $\eta$	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:	54	in
Anchor Spacing:	6	in

### Plate Data

W=Side:	54	in
Thick:	3	in
Grade:	50	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:	45.83	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round

### Base Reactions

TIA Revision:	G	
Factored Moment, $M_u$ :	3372.83	ft-kips
Factored Axial, $P_u$ :	41.25	kips
Factored Shear, $V_u$ :	34.17	kips

### Anchor Rod Results

TIA G --> Max Rod ( $C_u + V_u/\eta$ ):	194.2 Kips
Axial Design Strength, $\Phi^*F_u^*A_{net}$ :	260.0 Kips
Anchor Rod Stress Ratio:	74.7% <b>Pass</b>

### Base Plate Results

Base Plate Stress:	35.1 ksi
PL Design Bending Strength, $\Phi^*F_y$ :	45.0 ksi
Base Plate Stress Ratio:	78.0% <b>Pass</b>

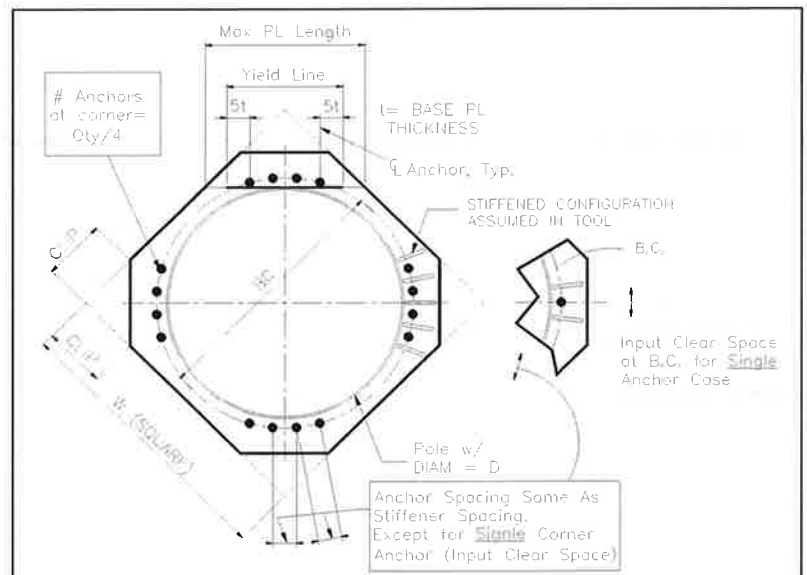
### Flexural Check

PL Ref. Data
Yield Line (in):
30.54
Max PL Length:
30.54

### 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





**TOWER  
ENGINEERING  
PROFESSIONALS**

JOB: Beaumont Farm (BU 876310); TEP No. 72875.101124  
 SHEET NUMBER: 1 OF 2  
 CALCULATED BY: DAR DATE 11/4/2016  
 CHECKED BY: MZS DATE 11/4/2016

**Pad and Pier Foundation for Monopole - TIA-222-G**

$q_a$ , ALLOWABLE SOIL PRESS. (ksf)	20.00
NET or GROSS	NET
SAFETY FACTOR IN $q_a$	2
SOIL DENSITY (pcf)	165

$\phi * q_n = 30.0$  ksf

$F'_c$ (ksi)	3
$F'_y$ (ksi)	60

**Base Reactions LC1: 1.2D + 1.6W**

$M$ , MOMENT (k-ft)	3372.83
$P_t$ , TOTAL DOWNLOAD (k)	41.25
$H$ , HORIZONTAL SHEAR (k)	34.17

**Base Reaction LC 2: 0.9D + 1.6W**

$M$ (k-ft)	3372.8
$P_t$ (k)	30.9
$H$ (k)	34.2

Try:	L (ft.)	B (ft.)	t (ft.)	Soil depth to TOP of mat (ft.)	Soil depth to BOT. of mat (ft.)	Pier dia./width (ft.)	Pier Height, h (cu.ft.)	Pier Shape
	23	23	5.00	0	4.50	3.82	0.00	Round

$W_m$ , Weight of Mat (k) =	396.8
$W_p$ , Weight of Pier (k) =	0.0
$W_s$ , Weight of Soil (k) =	0.0

Concrete Vol. (cu yd) 97.96

**CHECK BEARING PRESSURE for LC1: 1.2D + 1.6W**

$P = P_t + W_f + W_s =$	517.3 k
$e = M / P =$	6.85 ft
$L/6 =$	3.83 ft
Width of Wedge, $L' =$	9.30 ft
90° Axis: $q_{max} =$	1.68 ksf
Diag. Axis: $q_{max} =$	2.18 ksf

**Capacity:** 7.3%

**CHECK BEARING STABILITY FOR LC2: 0.9D + 1.6W**

90° Axis	$M_{\phi q_n} =$	4355.6 k-ft
	$M_{ot}/M_{\phi q_n} =$	0.81
Diag. Axis	$M_{\phi q_n} =$	5335.7 k-ft
	$M_{ot}/M_{\phi q_n} =$	0.66

**Capacity:** 81.4%

<sup>†</sup>  $M_{\phi q_n}$  is the overturning moment at which  $q_{max} = \phi q_n$

**CHECK OVERTURNING: LC2 CONTROLS**

$M_{st} = P * (L/2) + (V_f + s * L/2) =$	4462.1 k-ft
$M_{ot} = M + H * (t+h) =$	3543.7 k-ft
$M_{ot}/M_{st} =$	0.79

**Capacity:** 79.4%



JOB: Beaumont Farm (BU 876310); TEP No. 72875.101124  
 SHEET NUMBER: 2 OF 2  
 CALCULATED BY: DAR DATE 11/4/2016  
 CHECKED BY: MZS DATE 11/4/2016

**CHECK ONE WAY SHEAR**

$V_u =$    
 $V_c =$

**Capacity:** 24.9%

**CHECK TWO WAY SHEAR: PUNCHING + UNBALANCED MOMENT**

$v_u =$    
 $\phi V_c =$

**Capacity:** 12.4%

**CALCULATE REINFORCING REQUIRED**

$F'_c = 3.0$  ksi       $F_y = 60.0$  ksi

Temp & Shrinkage reinforcing,  $A_{s,t} =$   (ACI 318 Sec. 10.5.4)

**BOTTOM REINFORCING**

Bar Size =   
 Bar Spacing, c-c:   
 $d = 54.9$  in.

$M_u =$

$\phi Mn = 0.9 \cdot A_s \cdot F_y \cdot d (1 - 0.59 \cdot A_s \cdot F_y / (b \cdot d \cdot F'_c))$

Solution:  $A_{s,req} =$

Check,  $A_s =$

**Capacity:** 23.7%

**TOP REINFORCING**

Bar Size =   
 Bar Spacing, c-c:   
 $d = 54.9$  in.

$M_u =$

$\phi Mn = 0.9 \cdot A_s \cdot F_y \cdot d (1 - 0.59 \cdot A_s \cdot F_y / (b \cdot d \cdot F'_c))$

Solution:  $A_{s,req} =$

Check,  $A_s =$

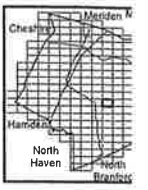
**Capacity:** 8.1%

# **ATTACHMENT 4**



Composite of Wallingford Assessors Maps 150, 151, 165, 166,

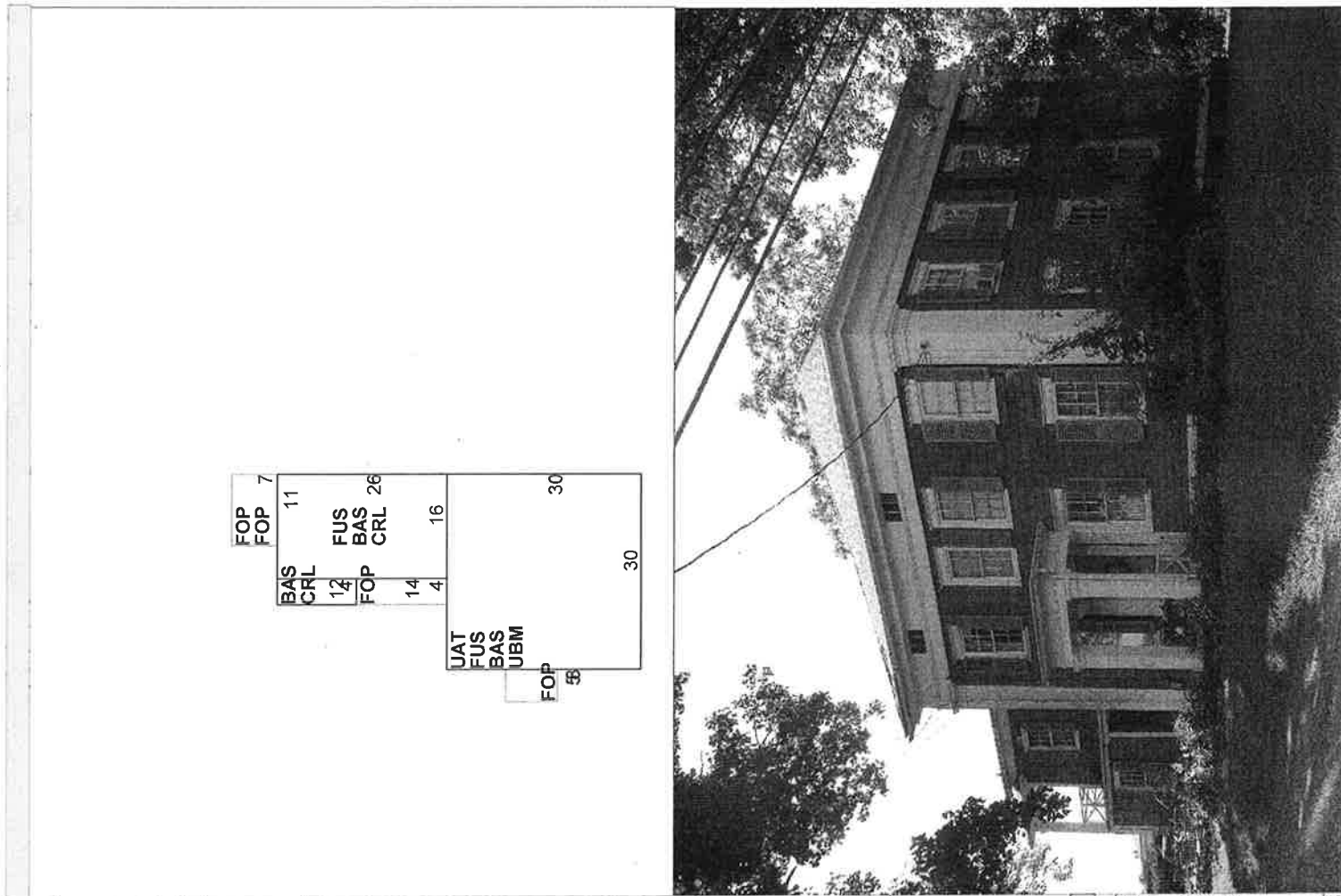
Map 150 of 233  
Town of Wallingford Assessor  
COUNTY OF NEW STATE OF CONN.



135 136  
150 151  
165 166

150 151  
165 166  
178 179

150 151  
165 166  
178 179



CONSTRUCTION DETAIL		CONSTRUCTION DETAIL (CONTINUED)												
Element	Cd. Ch.	Element	Description											
Style	03		Colonial											
Model	01		Residential											
Grade	B													
Stories	2		2 Stories											
Occupancy	1		Wood Shingle											
Exterior Wall 1	14													
Exterior Wall 2														
Roof Structure	04		Hip											
Roof Cover	03		Asphalt											
Interior Wall 1	03		Plastered											
Interior Wall 2	05		Drywall											
Interior Flr 1	12		Hardwood											
Interior Flr 2	09		Pine/Soft Wood											
Heat Fuel	02		Oil											
Heat Type	05		Hot Water											
AC Type	01		None											
Total Bedrooms	06		6 Bedrooms											
Total Bthrms	2													
Total Half Baths	0													
Total Xtra Fixtrs														
Total Rooms	12													
Bath Style	02		Average											
Kitchen Style	02		Average											
Whirlpool Tub														
Fireplaces	2													
<b>OB-OUTBUILDING &amp; YARD ITEMS(L) / XF-BUILDING EXTRA FEATURES(B)</b>														
Code	Description	Sub	Sub Description	L/B	Units	Unit Price	Yr	Gde	Dp	Rt	Cnd	%Cnd	Apr	Value
GRN3	Pipe + Plastic	G5		L	2,400	4.00	1996	C			A	50	4,800	
GRN3	Pipe + Plastic	G6		L	2,880	4.00	1996	C			F	30	3,500	
IMP	Implement She			L	1,296	6.00	1940	C			A	50	3,900	
SHD1	Shed Frame			L	1,008	10.00	1940	C			A	50	5,000	
IMP	Implement She			L	840	6.00	1940	C			A	50	2,500	
IMP	Implement She			L	720	6.00	1940	C			NV	0	0	
IMP	Implement She			L	840	6.00	1940	C			NV	0	0	
IMP	Implement She			L	1,350	6.00	1940	C			NV	0	0	
SHD1	Shed Frame			L	100	10.00	1940	C			NV	0	0	
<b>BUILDING SUB-AREA SUMMARY SECTION</b>														
Code	Description	Living Area	Gross Area	Eff. Area	Unit Cost	Undeprec. Value								
BAS	First Floor	1,364	1,364	1,364	92.63	126,345								
CRL	Crawl Space	0	0	0	0.00	0								
FOP	Porch, Open	0	250	50	18.53	4,631								
FUS	Upper Story, Finished	1,316	1,316	1,316	92.63	121,898								
UAT	Attic, Unfinished	0	900	135	13.89	12,505								
UBM	Basement, Unfinished	0	900	180	18.53	16,673								
<b>Ttl. Gross Liv/Lease Area:</b>		2,680	5,194	3,045		302,452								

BAS	11	FOP	7
CRL	14	FUS	26
FOP	14	BAS	16
UAT	4	CRL	30
FOP	5	UBM	30

CURRENT OWNER		TOPO.	UTILITIES	STRT./ROAD	LOCATION	CURRENT ASSESSMENT	
BEAUMONT ALBERT WILLIAM	945 E CENTER ST	1 Level	2 Public Water	1 Paved	2 Suburban	Code	Assessed Value
Additional Owners:		SUPPLEMENTAL DATA		6148 WALLINGFORD, CT			
Other ID: 024001002		P/Z MAP #		110,400			
Census: 1759		ENG MAP #		9,700			
Old MBLU		Town Line?		154,300			
TC MAP #		IND PARKS		780,200			
Record Lot		ASSOC PID#		100,000			
GIS ID: 151/98				224,400			
				1,379,000			
				821,100			

**RECORD OF OWNERSHIP**

Yr.	Code	Assessed Value	Yr.	Code	Assessed Value
2015	1-1	77,300	2013	1-1	77,300
2015	1-2	6,800	2013	1-2	6,800
2015	1-3	108,000	2013	1-3	108,000
2015	1-4	546,200	2013	1-4	546,200
2015	4-1	70,000	2013	4-1	70,000
<b>Total:</b>		<b>821,100</b>	<b>Total:</b>		<b>765,800</b>

**PREVIOUS ASSESSMENTS (HISTORY)**

**EXEMPTIONS**

Year	Type	Amount	Code	Description	Number	Amount	Comm. Int.

**ASSESSING NEIGHBORHOOD**

NBHD/ SUB	Street Index Name	Tracing	Batch
110/A			

**NOTES**

DOWN=VP COND/2ND FLR = F. COND  
 CORRECTED FARM BUILDING SIZES FOR THE  
 2006 GRAND LIST 4 NEW FARM BUILDINGS  
 FOR 2007 GL  
 CELL TOWER VALUED ON 151/98/2

**APPRAISED VALUE SUMMARY**

Appraised Bldg. Value (Card)	Appraised XF (B) Value (Bldg)	Appraised OB (L) Value (Bldg)	Appraised Land Value (Bldg)	Special Land Value	Total Appraised Parcel Value
154,300	0	780,200	220,100	224,400	1,379,000

Valuation Method: C  
 Adjustment: 0

**BUILDING PERMIT RECORD**

Permit ID	Issue Date	Type	Description	Amount	Insp. Date	% Comp.	Date Comp.	Comments
27234	11/13/2012	CM	Commercial	112,000	07/30/2013	100		4 GREENHOUSES
25068	10/12/2010	RS	Residential	3,500	08/22/2011	100		BARN ROOF
25067	10/12/2010	CM	Commercial	3,200	08/22/2011	100		HOUSE ROOF
24367	02/04/2010	CM	Commercial	6,000	07/23/2010	100	07/23/2010	RPL 6 ANTENNAS
24364	02/03/2010	CM	Commercial	20,000	07/23/2010	100	07/23/2010	MODIFY FACILITY
20744	07/06/2006	CM	Commercial	10,000	09/07/2006	100	09/07/2006	RPL 6 ANTENNAS/ADI

**LAND LINE VALUATION SECTION**

B #	Use Code	Description	Zone	D	Front	Depth	Units	Unit Price	Factor	S.A.	Acre	Disc	Factor	ST.	Notes-Adj	Special Pricing	Spec Calc	S Adj	Fact	Adj.	Unit Price	Land Value
1	1010	Single Family	R18		18,000	SF	0.92	AC	6.15	1,000.00	5	1,000.00	1.00	110						.95	6.13	110,400
1	1010	Single Family	R18		24.50	AC	10,000.00	1,000.00	1.00	0	1,000.00	1.00	110	1.05						1.00	10,500.00	9,700
1	7120	Tillable C	R18		1.00	AC	10,000.00	1,000.00	0.75	110	1.05	1,000.00	1.00	110						1.00	7,875.00	192,900
1	7140	Orchards	R18		1.00	AC	10,000.00	1,000.00	1.00	110	1.05	1,000.00	1.00	110						1.00	10,500.00	10,500
1	7170	Woodland	R18		2.00	AC	10,000.00	1,000.00	1.00	110	1.05	1,000.00	1.00	110						1.00	10,500.00	21,000

Total Card Land Units: 28.83 AC  
 Parcel Total Land Area: 29 AC  
 Total Land Value: 344,500

CONSTRUCTION DETAIL		CONSTRUCTION DETAIL (CONTINUED)	
Element	Description	Element	Description
Cd. Ch.		Cd. Ch.	
<b>MIXED USE</b>			
Code	Description	Code	Percentage
1010	Single Family		100
<b>COST/MARKET VALUATION</b>			
Cost Trend Factor			

OB-OUTBUILDING & YARD ITEMS(L) / XF-BUILDING EXTRA FEATURES(B)												
Code	Description	Sub	Sub Description	L/B	Units	Unit Price	Yr.	Gde	Dp Rt.	Cnd	%Cnd	Apr Value
SHD1	Shed Frame			L	270	10.00	1940	C		A	50	1,400
BRN4	1 Stry Loft & E		B1-RED BARN	L	1,500	38.00	1940	C		A	50	28,500
BRN1	Barn 1 Stry		B2- GREY BA	L	1,632	22.00	1985	C		G	75	26,900
BRN1	Barn 1 Stry		B3- YELLOW	L	1,936	22.00	1920	C		A	50	21,300
SHD4	Pump Hse			L	8,000	54.00	1999	C		A	50	216,000
LNT	Lean-To			L	1,280	4.00	2007	C		A	50	2,600
FGR1	Garage-Avg			L	484	30.00	1996	C		A	50	7,300
GRN4	Com Plastic Gc			L	60,000	6.00	2013	C		E	90	324,000
GRN4	Com Plastic Gc			L	11,250	6.00	2012	C		E	90	60,800
BUILDING SUB-AREA SUMMARY SECTION												
Code	Description	Living Area	Gross Area	Eff. Area	Unit Cost	Undeprec. Value						
		0	0	0	0	302,452						

No Photo On Record

**CURRENT OWNER**  
 BEAUMONT ALBERT WILLIAM  
 945 E CENTER ST  
 WALLINGFORD, CT 06492  
 Additional Owners:

**TOPO.**  
**UTILITIES**  
**STRT./ROAD**  
**LOCATION**

**Other ID:** 024001002  
**ASSOC PID#**  
**SALE DATE** q/u v/i **SALE PRICE** V.C.

**GIS ID:** 151/98  
**RECORD OF OWNERSHIP**

Yr.	Code	Assessed Value	Yr.	Code	Assessed Value
<b>Total:</b>		1,379,000	<b>Total:</b>		821,100

**PREVIOUS ASSESSMENTS (HISTORY)**

**EXEMPTIONS**

**OTHER ASSESSMENTS**

Year	Type	Description	Amount	Code	Description	Number	Amount	Comm. Int.
<b>ASSESSING NEIGHBORHOOD</b>								
NBHD: SUB			Street Index Name					
110/A			Tracing					
<b>Total:</b>			<b>NOTES</b>					

**APPRaised VALUE SUMMARY**

Appraised Bldg. Value (Card) 154,300  
 Appraised XF (B) Value (Bldg) 0  
 Appraised OB (L) Value (Bldg) 780,200  
 Appraised Land Value (Bldg) 220,100  
 Special Land Value 224,400  
 Total Appraised Parcel Value 1,379,000  
 Valuation Method: C  
 Adjustment: 0  
**Net Total Appraised Parcel Value 1,379,000**

**BUILDING PERMIT RECORD**

Permit ID	Issue Date	Type	Description	Amount	Insp. Date	% Comp.	Date Comp.	Comments	Date	Type	IS	ID	Cd.	Purpose/Result
<b>VISIT/CHANGE HISTORY</b>														

**LAND LINE VALUATION SECTION**

B #	Use Code	Use Description	Zone	D	Front	Depth	Units	Unit Price	I. Factor	S.A. Disc	Acre	C. Factor	ST. Idx	Notes-Adj	Special Pricing Spec Use	Spec Calc	S Adj Fact	Adj. Unit Price	Land Value
1	431V	TEL REL TW M00	R18		1.00	BL	1,600.00	100,000.00	1.0000	0	1.0000	1.00	110	CELL SITE	FF	0.01	1.00	100,000.00	100,000
1	8000	Frontage	R18		7,350	SF		0.00	1.0000	0	1.0000	1.00		CELL SITE AREA			.00	0.00	0
1	431V	TEL REL TW M00						0.00	1.0000	0	1.0000	1.00		CELL SITE AREA			.00	0.00	0
<b>Total Card Land Units: 0.17 AC Parcel Total Land Area: 29 AC</b>															<b>Total Land Value: 100,000</b>				



<b>CURRENT OWNER</b> BEAUMONT ALBERT WILLIAM 945 E CENTER ST WALLINGFORD, CT 06492 Additional Owners:		<b>UTILITIES</b>		<b>STRT./ROAD</b>		<b>LOCATION</b>		<b>CURRENT ASSESSMENT</b>	
Other ID: 024001002		SUPPLEMENTAL DATA		ASSOC PID#		SALE PRICE V.C.		Code Appraised Value Assessed Value Total: 1,379,000 821,100	
GIS ID: 151/98		BK-VOL/PAGE		SALE DATE		q/u v/i		Yr. Code Assessed Value Yr. Code Assessed Value Total:	

**RECORD OF OWNERSHIP**

Yr. Code	Assessed Value	Yr. Code	Assessed Value
<b>PREVIOUS ASSESSMENTS (HISTORY)</b>			
Total: 1,379,000		821,100	

**EXEMPTIONS**

Description	Amount	Code	Description	Number	Amount	Comm. Int.
<b>OTHER ASSESSMENTS</b>						
<b>ASSESSING NEIGHBORHOOD</b>						
NBHD/ SUB	NBHD Name	Street Index Name	Tracing	Batch		
110/A						

**APPRaised VALUE SUMMARY**

Appraised Bldg. Value (Card)	154,300
Appraised XF (B) Value (Bldg)	0
Appraised OB (L) Value (Bldg)	780,200
Appraised Land Value (Bldg)	220,100
Special Land Value	224,400
<b>Total Appraised Parcel Value</b>	<b>1,379,000</b>
Valuation Method: C	
Adjustment: 0	
<b>Net Total Appraised Parcel Value</b>	

**BUILDING PERMIT RECORD**

Permit ID	Issue Date	Type	Description	Amount	Insp. Date	% Comp.	Date Comp.	Comments	Date	Type	IS	ID	Cd.	Purpose/Result
<b>VISIT/CHANGE HISTORY</b>														

**LAND LINE VALUATION SECTION**

B Use #	Use Description	Zone D	Front Depth	Units	Unit Price	I. Factor S.A.	C. ST. Factor	Idx Adj.	Notes- Adj.	Special Pricing Spec Use	Spec Calc	S. Adj Fact	Unit Price	Land Value
<b>NOTES</b>														
Total Card Land Units: 0.00 AC Parcel Total Land Area: 29 AC Total Land Value: 0														

