

July 29, 2016

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

Re: **Notice of Exempt Modification – Antenna Swap
180 & 184 North Main Street, Branford, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains fifteen (15) wireless telecommunications antennas, six (6) at the 97-foot level and nine (9) at the 103-foot level of the existing 110-foot tower at 180 & 184 North Main Street in Branford, Connecticut (the “Property”). The tower is owned by Crown Castle (“Crown”). The Council approved Cellco’s use of the tower in 1990 (Docket No. 122). Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model SBNHH-1D65B, 700/1900 MHz antennas at the 97-foot level; and three (3) model SBNHH-1D65B, 2100 MHz antennas at the 103-foot level of the tower. Cellco also intends to replace three (3) remote radio heads (“RRHs”) with three (3) newer model RRHs behind its 2100 MHz antennas, add three (3) RRHs behind its 700/1900 MHz antennas and install one (1) HYBRIFLEX™ fiber optic antenna cable. Included in Attachment 1 are specifications for Cellco’s replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to James B. Cosgrove, First Selectman for the Town of Branford. A copy of this letter is also being sent to Three M&M Limited Partnership, 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).

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Melanie A. Bachman
July 29, 2016
Page 2

1. The proposed modifications will not result in an increase in the height of the existing tower. The replacement antennas and RRHs will be located on Cellco's existing antenna mounts at the 97-foot and 103-foot levels on the tower.
2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A worst-case 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 foundation can support Cellco's proposed facility modifications. (See Structural Analysis Report included in Attachment 3).

A copy of the Branford 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:

James B. Cosgrove, Branford First Selectman
Three M&M Limited Partnership
Crown
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
Gain by Beam Tilt, average, dBi	0° 14.6	0° 14.5	0° 17.4	0° 17.8	0° 18.1	0° 18.2
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

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

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground

SBNHH-1D65B

Radiator Material	Aluminum Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, 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

Depth	180.0 mm 7.1 in
Length	1851.0 mm 72.9 in
Width	301.0 mm 11.9 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

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

Regulatory Compliance/Certifications

Agency

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

Classification

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



SBNHH-1D65B

Included Products

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

* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

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

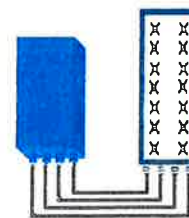


FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

TECHNICAL SPECIFICATIONS

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

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ALCATEL-LUCENT WIRELESS PRODUCT DATASHEET RRH2X60-1900A-4R FOR BAND 2/25 APPLICATIONS

The Alcatel-Lucent RRH2x60-1900A-4R is a high power, small form factor Remote Radio Head operating in the PCS 1900MHz frequency band for WCDMA and LTE technologies. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.



A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart. The Alcatel-Lucent RRH2x60-1900A-4R is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations,

administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-1900A-4R integrates all the latest technologies. This allows operators to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-1900A-4R is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

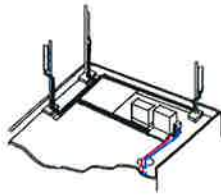
The Alcatel-Lucent RRH2x60-1900A-4R is a very cost-effective solution to deploy LTE MIMO.

EASY INSTALLATION

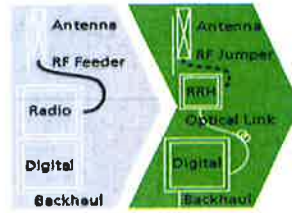
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-1900A-4R installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-1900A-4R is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

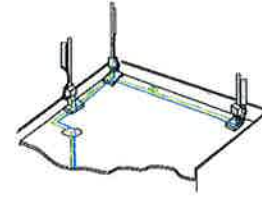
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-190A-4R is compact and weighs about 21 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-1900A-4R integrates two power amplifiers of 60W rating (at each antenna connector)
- RRH2x60-1900A-4R can operate WCDMA only, LTE only or a mix of WCDMA and LTE
- RRH2x60-1900A-4R offers the possibility for WCDMA (non MIMO) to operate the two radio chains independently (2 blocks of 20 MHz anywhere in the band)

- RRH2x60-1900A-4R is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO deployment and/or WCDMA and LTE simultaneous operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses

in RF cables and thus reducing power consumption by 50% compared to conventional solutions

- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 500x285x208 mm (30l with solar shield)
- Weight : 21 kg (46 lbs) (with solar shield)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption: 460W typ. @2x60W (100%RF)

RF Characteristics

- Supported spectrum: DL 1930-1990 / UL 1850-1910
- Frequency band: 3GPP band 2/25
- Output power: 2x60W at antenna connectors
- Technology supported: W-CDMA and LTE
- Instantaneous bandwidth: 20 MHz (MIMO) or 2x20 MHz (non MIMO)
- Rx diversity: 2-way and 4-way uplink reception

- Typical sensitivity without Rx diversity: -124.8dBm for WCDMA and -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisy chaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 15km using SM fiber
- TMA/RETA: AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%

- Environmental Conditions: ETS300-019-1-4 class4.1E
- Ingress Protection: IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

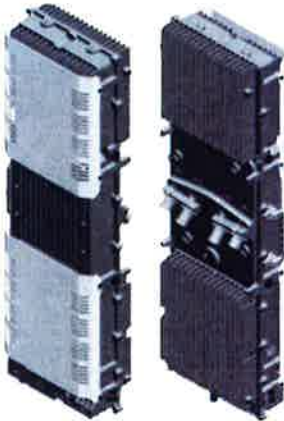
- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089
- Safety : IEC60950-1, EN 60825-1
- Regulatory: CE Mark-European Directive 2002/95/EC (RoHS), 2002/96/EC (WEEE), 1999/5/EC (R&TTE)
- Health : EN 50385

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ALCATEL-LUCENT WIRELESS PRODUCT DATASHEET B4 RRH2X60-4R FOR AWS BAND APPLICATIONS

The Alcatel-Lucent B4 RRH2x60-4R is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.



A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent B4 RRH2x60-4R is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent B4 RRH2x60-4R integrates all the latest

technologies. This allows operators to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent B4 RRH2x60-4R is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

The Alcatel-Lucent B4 RRH2x60-4R is a very cost-effective solution to deploy LTE MIMO.

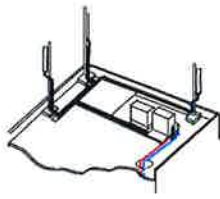
EASY INSTALLATION

The B4 RRH2x60-4R includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

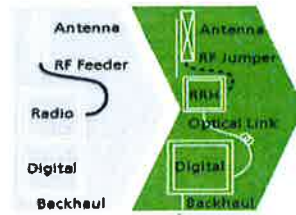
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent B4 RRH2x60-4R installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent B4 RRH2x60-4R is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

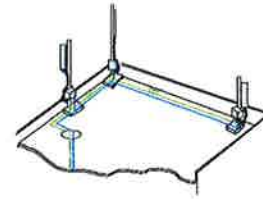
Installation can easily be done by a single person as the Alcatel-Lucent B4 RRH2x60-4R is compact and weighs about 25 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- B4 RRH2x60-4R integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- B4 RRH2x60-4R is optimized for LTE operation
- B4 RRH2x60-4R is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and

silent solutions, with minimum impact on the neighborhood, which ease the deployment

- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 930x270x146 mm (with solar shield)
- Weight : 25 kg (55 lbs) (with solar shield)

Electrical Data

- Power Supply : -48V DC (-38 to -57V)
- Power Consumption: 346W typ. @2x30W (100%RF), 560W typ. @2x60W (100%RF)

RF Characteristics

- Frequency band: 1710-1755, UL / 2110-2155 MHz, DL (3GPP band 4)
- Output power: 2x60W at antenna connectors
- Technology supported: LTE
- Instantaneous bandwidth: 45 MHz
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -105 dBm for LTE

Connectivity

- Two CPRI (3-6) optical ports for daisy chaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 300m using MM fiber, up to 15km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Four external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65

- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B
- Health : EN 50385

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Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

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 and Bending			
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			
DC-Resistance Outer Conductor Armor		(Ω/km (Ω/1000ft))	0.68 (0.205)
DC-Resistance Power Cable, 8.4mm ² (8AWG)		(Ω/km (Ω/1000ft))	2.1 (0.307)
Optical Specifications			
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
Power Specifications			
Size (Power)		(mm (AWG))	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		(mm (AWG))	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		(mm (in))	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Temperature			
Installation Temperature		(°C (°F))	-40 to +65 (-40 to 149)
Operation Temperature		(°C (°F))	-40 to +65 (-40 to 149)

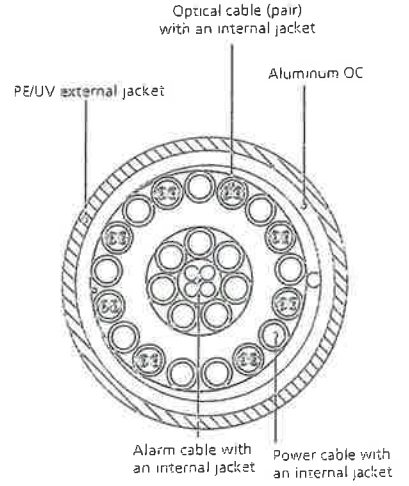


Figure 3: Construction Detail

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

* This data is provisional and subject to change

ATTACHMENT 2

Site Name: Branford CT
Cumulative Power Density

Operator	Operating Frequency (MHz)	Number of Trans.	ERP Per Trans. (watts)	Total ERP (watts)	Distance to Target (feet)	Calculated Power Density (mW/cm ²)	Maximum Permissible Exposure* (mW/cm ²)	Fraction of MPE (%)
VZW PCS	1970	1	2447	2447	103	0.0829	1.0	8.29%
VZW Cellular	880	9	490	4410	97	0.1686	0.5866666667	28.73%
VZW AWS	2120	1	2410	2410	103	0.0817	1.0	8.17%
VZW 700	751	1	1000	1000	97	0.0382	0.5006666667	7.63%

Total Percentage of Maximum Permissible Exposure

52.83%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Part 1 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

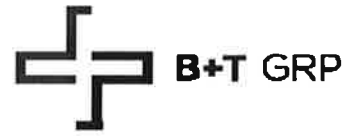
MHz = Megahertz

mW/cm² = milliwatts per square centimeter

ERP = Effective Radiated Power

Absolute worst case maximum values used.

ATTACHMENT 3



July 18, 2016

Charles McGuirt
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277
(704) 405-6607

B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630
btwo@btgrp.com

Subject: **Structural Analysis Report**

Carrier Designation: **Verizon Wireless Co-Locate**

Carrier Site Number: N/A

Carrier Site Name: N/A

Crown Castle Designation:

Crown Castle BU Number: 806360

Crown Castle Site Name: NHV 113 943126

Crown Castle JDE Job Number: 387330

Crown Castle Work Order Number: 1268898

Crown Castle Application Number: 354819 Rev. 1

Engineering Firm Designation: **B+T Group Project Number:** 87395.003.01

Site Data: **180 & 184 North Main Street, Branford, New Haven County, CT**
Latitude 41° 17' 22.77", Longitude -72° 48' 42.22"
110 Foot - Monopole Tower

Dear Charles McGuirt,

B+T Group 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 925829, in accordance with application 354819, revision 1.

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:

LC5: Existing + Proposed Equipment

Note: See Table 1 and Table 2 for the proposed and existing loading, respectively.

Sufficient Capacity

This analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 85 mph fastest mile.

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

We at B+T Group 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.

Respectfully submitted by:
B+T Engineering, Inc.

Jason Brock, E.I.
Project Engineer

Chad E. Tuttle, P.E.
Engineer of Record
COA: PEC.0001564 Expires: 02/10/2017



TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Antenna and Cable Information

Table 2 - Existing 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 Components 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 110 ft. Monopole tower designed by Valmont in May of 1990. The tower was originally designed for a wind speed of 90 mph per EIA-222-D.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

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
94.0	103.0	3	Alcatel Lucent	AWS4 (B66) 4x45 RRH	1	1-5/8	--
		3	Alcatel Lucent	RRH2X60-PCS			
		3	Commscope	SBNHH-1D65B			
	97.0	3	Alcatel Lucent	RRH2x60-700			
		3	Commscope	SBNHH-1D65B			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing 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
107.0	107.0	1	--	Platform Mount [LP 712-1]	--	--	3
97.0	97.0	1	--	Sector Mount [SM 201-3]	--	--	1
94.0	103.0	3	Kathrein	742 213	1	7/8	4
	97.0	3	Alcatel Lucent	RRH2x40-AWS			
		1	Antel	BXA-70063-6CF-2			
		2	Antel	BXA-70063-6CF-EDIN-0			
	108.0	1	GPS	GPS_A	12 5 1 1	1-1/4 7/8 1/2 1-5/8	1
	103.0	3	Kathrein	742 213			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			
	97.0	6	Decibel	DB846F65ZAXY			
94.0	1	--	Platform Mount [LP 712-1]				
83.0	83.0	1	Decibel	DB225-A	1	1/2	2
		1	--	Pipe Mount [PM 602-1]			
64.0	64.0	1	Decibel	DB225-A	1	1/2	2
		1	--	Pipe Mount [PM 602-1]			

Notes:

- 1) Existing Equipment
- 2) Abandoned equipment; Considered in this analysis
- 3) Empty Mount; Considered in this analysis
- 4) **Equipment To Be Removed; Not considered in this analysis**

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
107	110	4	Celwave	PD10017	--	--
	107	1	Generic	Platform		
94	94	12	Celwave	PD1132	--	--
		1	Generic	Platform		
79	79	1	Decibel	DB-212-2	--	--
		1	Generic	14' Pipe		
60	60	1	Decibel	DB-212-2	--	--
		1	Generic	14' Pipe		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	Verizon Wireless Co-Locate Rev# 1	354819	CCI Sites
Tower Manufacturer Drawing	Valmont, Order No. 10666-90	971913	CCI Sites
Foundation Drawing	SAC, Project No. 990-10	217660	CCI Sites
Geotech Report	AET, Date: 06/12/1990	262228	CCI Sites
Antenna Configuration	Crown CAD Package	Date: 07/12/2016	CCI Sites

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
- 5) Mount areas and weights are assumed based on photographs provided.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	110 - 67.333	Pole	TP30.45x21.91x0.219	1	-7.624	1013.902	57.5	Pass
L2	67.333 - 29.4167	Pole	TP37.6x29.078x0.313	2	-12.917	1892.127	67.6	Pass
L3	29.4167 - 0	Pole	TP42.85x35.858x0.406	3	-20.502	2886.411	65.5	Pass
							Summary	
							Pole (L2)	67.6 Pass
							Rating =	67.6 Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	Base	64.3	Pass
1	Base Plate	Base	37.7	Pass
1	Base Foundation (Structure)	Base	36.0	Pass
1	Base Foundation (Soil Interaction)	Base	31.2	Pass

Structure Rating (max from all components) =	67.6%
---	--------------

Notes:

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

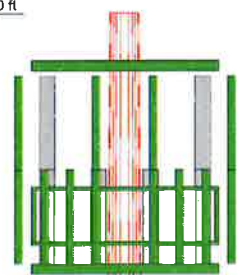
4.1) Recommendations

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

APPENDIX A
TNXTOWER OUTPUT

Section	1	2	3	4	5
Length (ft)	42.667	42.583	35.000	35.000	42.667
Number of Sides	12	12	12	12	12
Thickness (in)	0.219	0.313	0.406	0.406	0.219
Socket Length (ft)	4.667	5.583	5.583	5.583	4.667
Top Dia (in)	21.910	29.078	35.858	35.858	21.910
Bot Dia (in)	30.450	37.600	42.850	42.850	30.450
Grade		A572-65			
Weight (K)	2.7	4.8	6.1	6.1	2.7

110.0 ft



67.3 ft

29.4 ft

0.0 ft

DESIGNED APPURTENANCE LOADING

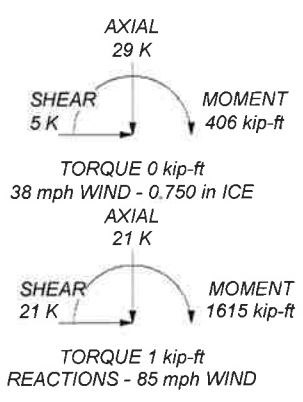
TYPE	ELEVATION	TYPE	ELEVATION
Platform Mount [LP 712-1] (E-Empty)	107	RRH2x60-700 (P)	94
Sector Mount [SM 201-3] (E-4 M.P./Sector)	97	RRH2x60-700 (P)	94
(2) DB846F65ZAXY (E)	94	RRH2x60-700 (P)	94
(2) DB846F65ZAXY (E)	94	AWS4 (B66) 4x45 RRH (P)	94
742 213 (E)	94	AWS4 (B66) 4x45 RRH (P)	94
742 213 (E)	94	AWS4 (B66) 4x45 RRH (P)	94
742 213 (E)	94	DB-T1-6Z-8AB-0Z (P)	94
742 213 (E)	94	16' x 2" Pipe Mount (E)	94
GPS_A (E)	94	16' x 2" Pipe Mount (E)	94
DB-T1-6Z-8AB-0Z (E-Hor.Off./Photo)	94	16' x 2" Pipe Mount (E)	94
SBNHH-1D65B (P)	94	16' x 2" Pipe Mount (E)	94
SBNHH-1D65B (P)	94	5' horizontal x 2" Pipe Mount (E)	94
SBNHH-1D65B (P)	94	5' horizontal x 2" Pipe Mount (E)	94
SBNHH-1D65B (P)	94	5' horizontal x 2" Pipe Mount (E)	94
SBNHH-1D65B w/ Mount Pipe (P)	94	Platform Mount [LP 712-1] (E)	94
SBNHH-1D65B w/ Mount Pipe (P)	94	(2) DB846F65ZAXY (E)	94
SBNHH-1D65B w/ Mount Pipe (P)	94	DB225-A (AB)	83
RRH2X60-PCS (P)	94	Pipe Mount [PM 602-1] (AB)	83
RRH2X60-PCS (P)	94	DB225-A (AB)	64
RRH2X60-PCS (P)	94	Pipe Mount [PM 602-1] (AB)	64

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

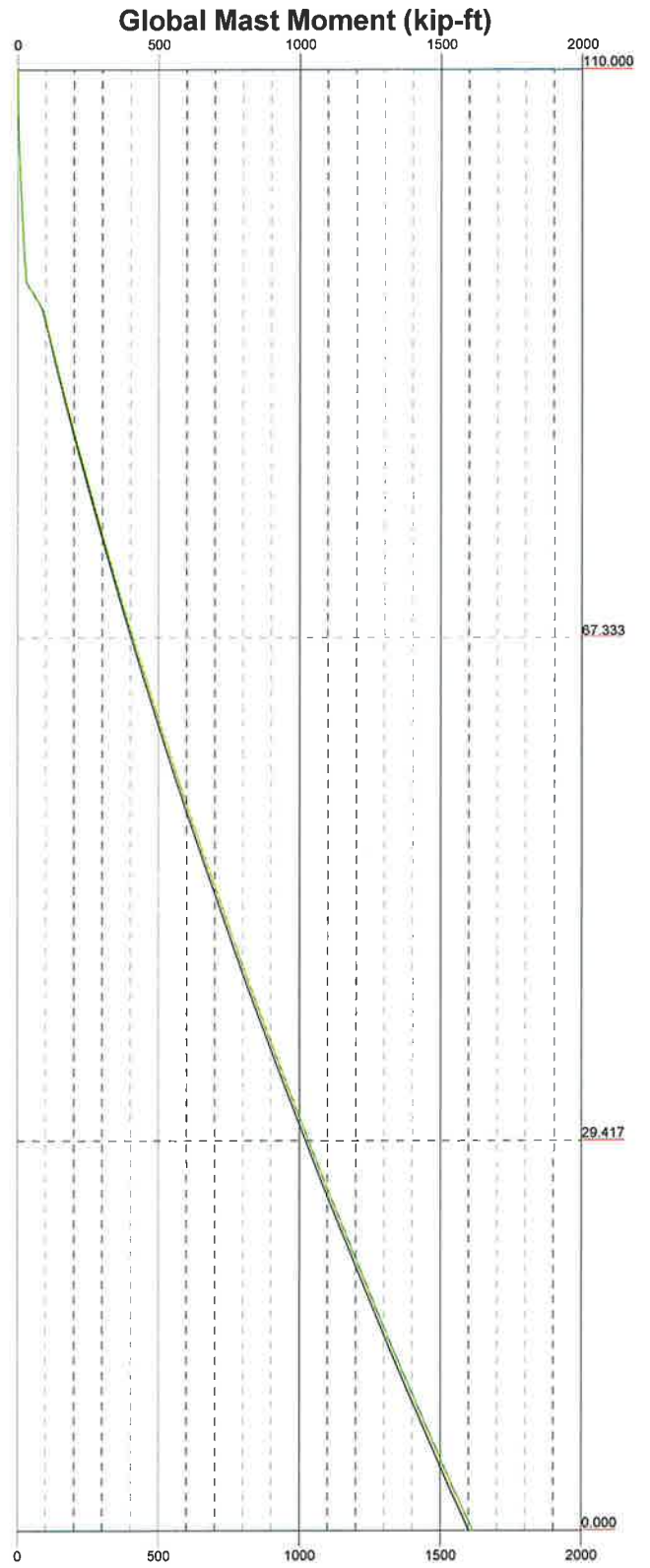
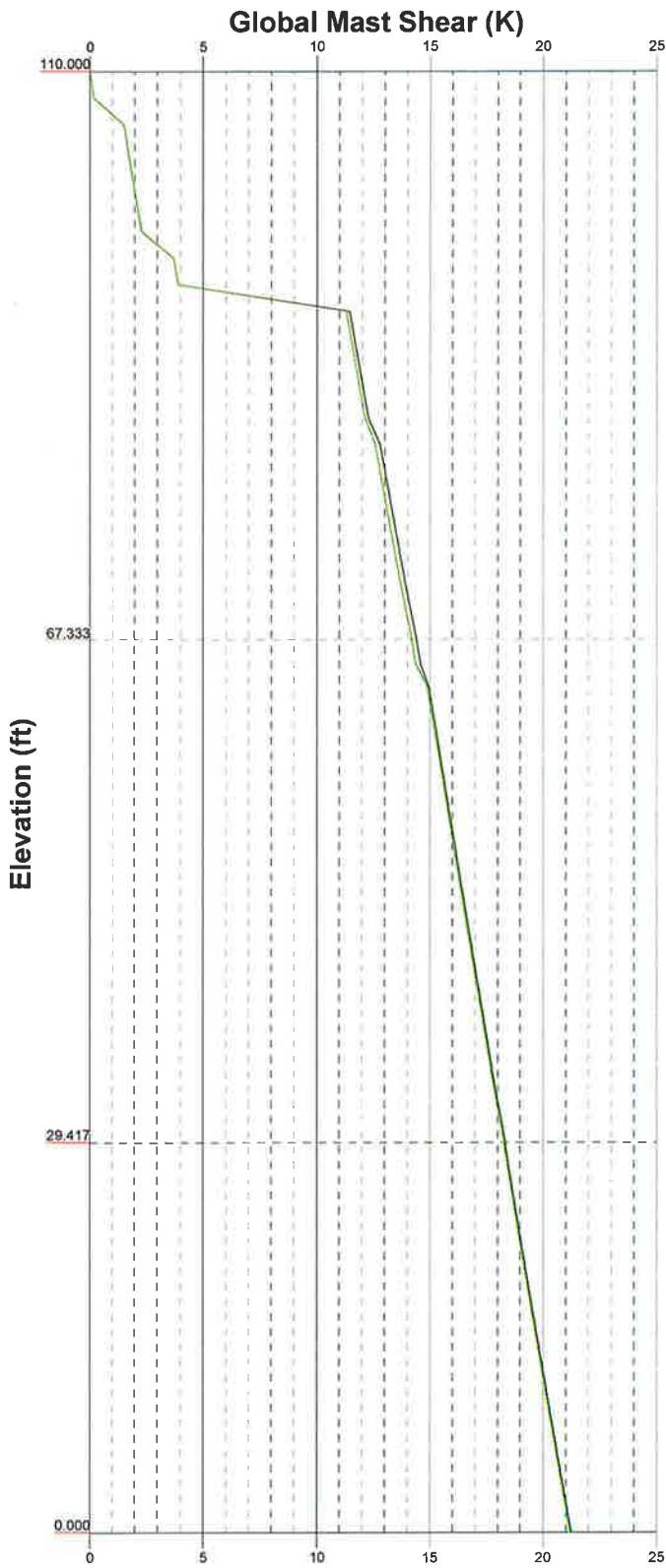
1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 67.6%



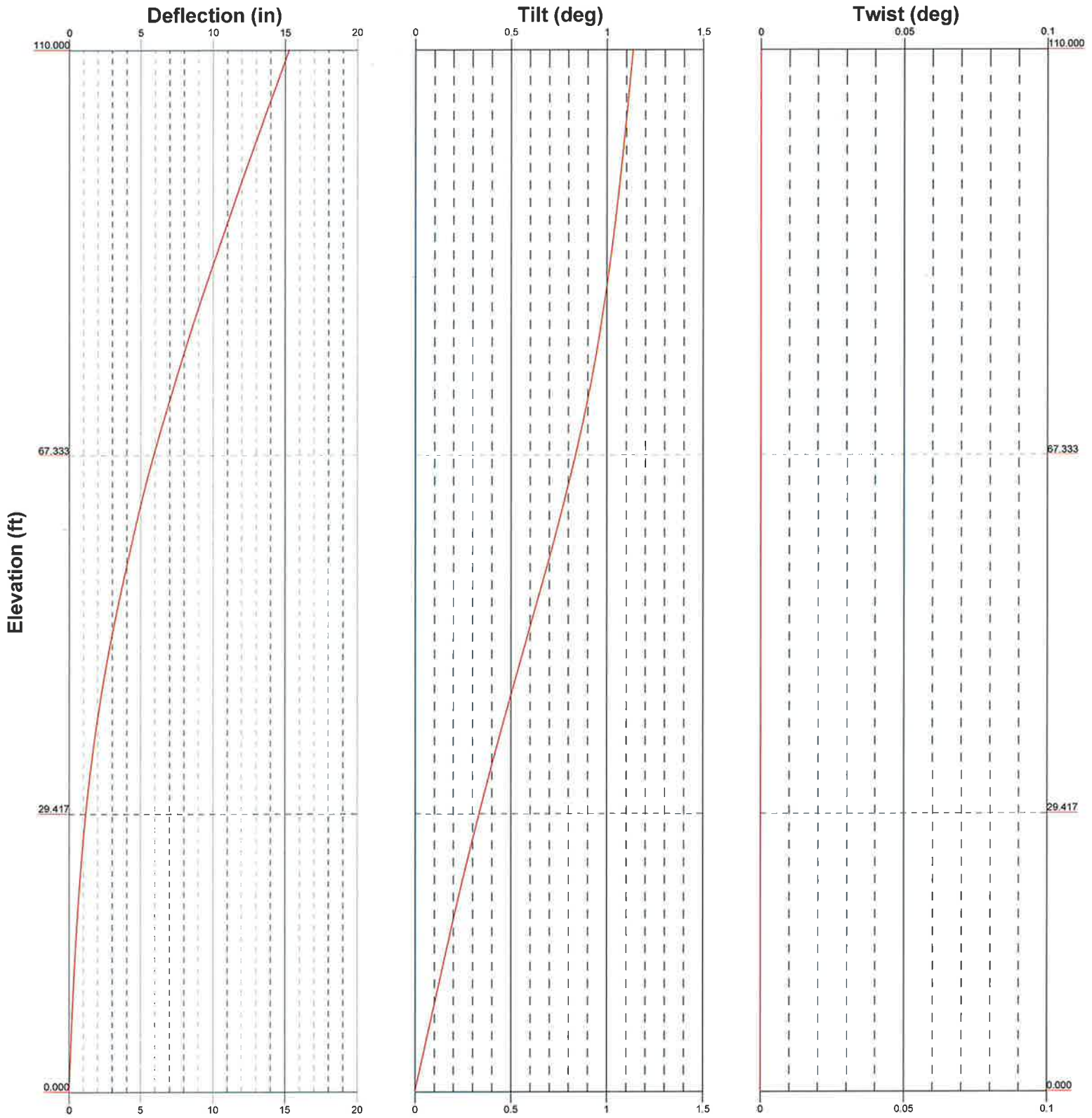
<p>B+T Group 1717 S Boulder Ave, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265</p>	Job: 87395.003.01 - NHV113 943126, CT (BU# 806:		
	Project:	Client: Crown Castle	Drawn by: jbrock
	Code: TIA/EIA-222-F	Date: 07/18/16	Scale: NTS
	Path:		Dwg No. E-1
	<small>© 2016 Crown Castle. All rights reserved. 07/18/16 11:11:11 AM</small>		

Vx Vz

Mx Mz



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	Project:		
	Client: Crown Castle	Drawn by: Bhushan	App'd:
	Code: TIA/EIA-222-F	Date: 07/15/16	Scale: NTS
	Path:		Dwg No. E-4

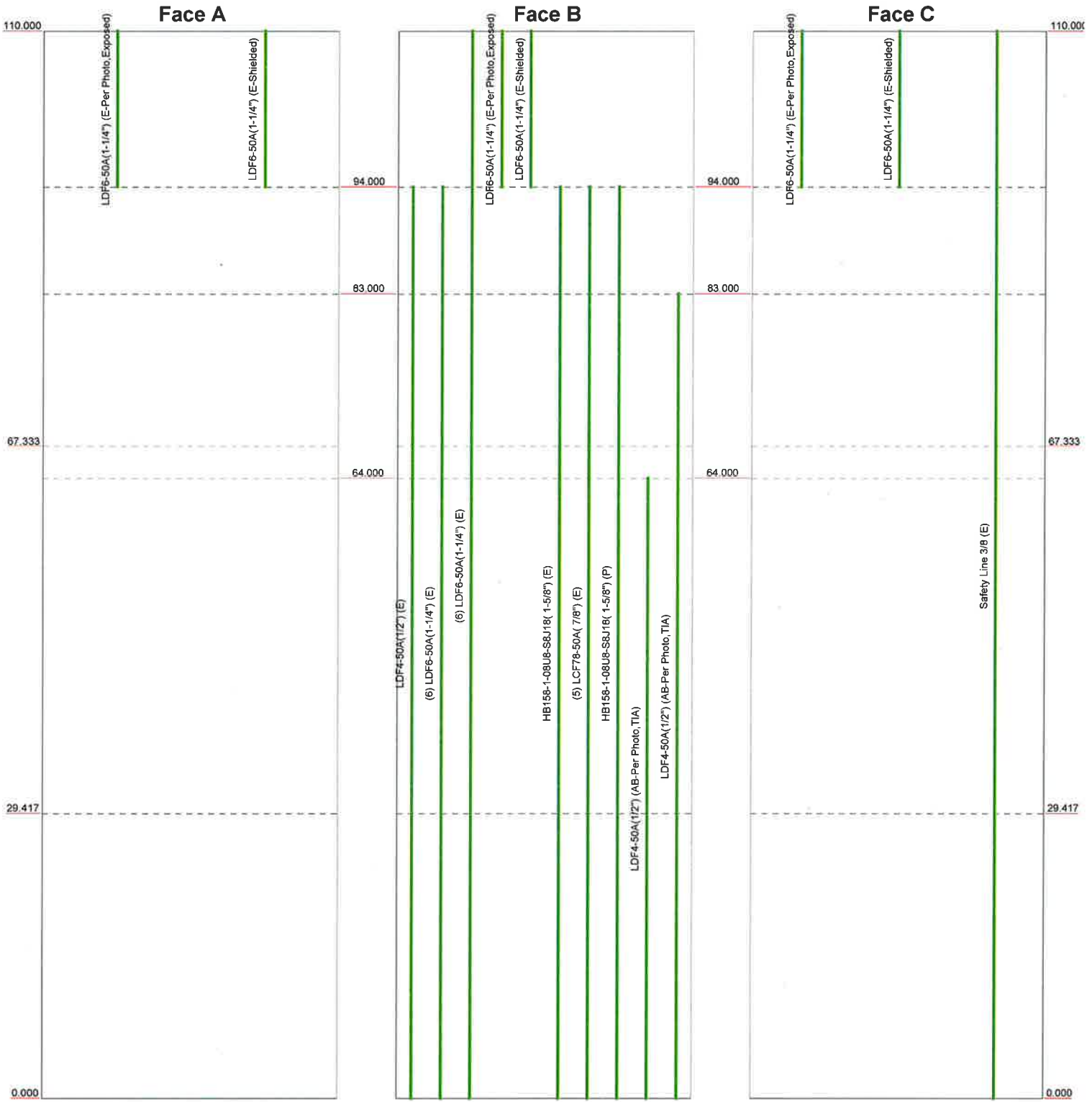


 <p>B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265</p>	Job: 87395.003.01 - NHV113 943126, CT (BU# 806:		
	Project:		App'd:
	Client: Crown Castle	Drawn by: Bhushan	Scale: NTS
	Code: TIA/EIA-222-F	Date: 07/15/16	Dwg No: E-5
	Path:		

0' - 110'

Round Flat App In Face App Out Face Truss Leg

Elevation (ft)



 <p>B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265</p>	Job: 87395.003.01 - NHV113 943126, CT (BU# 806)		
	Project:		
	Client: Crown Castle	Drawn by: Bhushan	App'd:
	Code: TIA/EIA-222-F	Date: 07/15/16	Scale: NTS
	Path:	Dwg No. E-7	

tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 87395.003.01 - NHV113 943126, CT (BU# 806360)	Page 1 of 14
	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in New Haven County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.750 in.

Ice thickness is considered to increase with height.

Ice density of 56.000 pcf.

A wind speed of 38 mph is used in combination with ice.

Temperature drop of 50.000 °F.

Deflections calculated using a wind speed of 50 mph.

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

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

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

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	110.000-67.333	42.667	4.667	12	21.910	30.450	0.219	0.875	A572-65 (65 ksi)
L2	67.333-29.417	42.583	5.583	12	29.078	37.600	0.313	1.250	A572-65 (65 ksi)
L3	29.417-0.000	35.000		12	35.858	42.850	0.406	1.625	A572-65 (65 ksi)

tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 87395.003.01 - NHV113 943126, CT (BU# 806360)	Page 2 of 14
	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	22.683	15.279	917.579	7.765	11.349	80.848	1859.264	7.520	5.286	24.163
	31.524	21.294	2484.038	10.823	15.773	157.486	5033.334	10.480	7.574	34.626
L2	31.071	28.946	3057.206	10.298	15.063	202.967	6194.729	14.246	6.956	22.258
	38.926	37.521	6658.580	13.349	19.477	341.872	13492.089	18.466	9.239	29.566
L3	38.277	46.375	7439.381	12.692	18.574	400.520	15074.203	22.824	8.521	20.975
	44.362	55.522	12766.635	15.195	22.196	575.170	25868.664	27.326	10.395	25.588

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
L1 110.000-67.33				1	1	1			
3 L2 67.333-29.417				1	1	1			
L3 29.417-0.000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	Number Per Row	Clear Spacing	Width or Diameter	Perimeter	Weight
				ft			in	in	in	klf
B										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Face Offset	Lateral Offset (Frac FW)	#	C _{AA}	Weight
				ft	in			ft ² /ft	klf
LDF4-50A(1/2") (E)	B	No	Inside Pole	94.000 - 0.000	0.000	0	1	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.000 0.000 0.000
LDF6-50A(1-1/4") (E)	B	No	Inside Pole	94.000 - 0.000	0.000	0	6	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.001 0.001 0.001
LDF6-50A(1-1/4") (E)	B	No	Inside Pole	110.000 - 0.000	0.000	0	6	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.000 0.000 0.001 0.001 0.001
LDF6-50A(1-1/4") (E-Per)	A	No	CaAa (Out Of Face)	94.000 - 110.000	36.000	0	1	No Ice 1/2" Ice 1" Ice	0.155 0.255 0.355

tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 87395.003.01 - NHV113 943126, CT (BU# 806360)	Page 4 of 14
	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	110.000-67.333	A	0.000	0.000	0.000	2.480	0.021
		B	0.000	0.000	0.000	2.480	0.417
		C	0.000	0.000	0.000	4.080	0.031
L2	67.333-29.417	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.480
		C	0.000	0.000	0.000	1.422	0.008
L3	29.417-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.373
		C	0.000	0.000	0.000	1.103	0.006

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	110.000-67.333	A	0.844	0.000	0.000	0.000	5.179	0.102
		B		0.000	0.000	0.000	5.179	0.498
		C		0.000	0.000	0.000	13.978	0.150
L2	67.333-29.417	A	0.785	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.480
		C		0.000	0.000	0.000	7.819	0.042
L3	29.417-0.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.373
		C		0.000	0.000	0.000	5.721	0.031

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	110.000-67.333	-0.044	0.026	-0.202	0.117
L2	67.333-29.417	-0.048	0.028	-0.239	0.138
L3	29.417-0.000	-0.048	0.028	-0.230	0.133

tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 87395.003.01 - NHV113 943126, CT (BU# 806360)	Page 5 of 14
	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz Lateral	Vert					
			ft	ft	°	ft	ft ²	ft ²	K

Platform Mount [LP 712-1] (E-Empty)	C	None			0.000	107.000	No Ice 24.530 1/2" Ice 29.940 1" Ice 35.350 2" Ice 46.170 4" Ice 67.810	24.530 29.940 35.350 46.170 67.810	1.335 1.646 1.956 2.577 3.820
B									
(2) DB846F65ZAXY (E)	A	From Leg	4.000 0.000 3.000		0.000	94.000	No Ice 7.033 1/2" Ice 7.536 1" Ice 8.080 2" Ice 9.195 4" Ice 11.528	6.158 6.619 7.087 8.106 10.401	0.021 0.070 0.125 0.254 0.593
(2) DB846F65ZAXY (E)	B	From Leg	4.000 0.000 3.000		0.000	94.000	No Ice 7.033 1/2" Ice 7.536 1" Ice 8.080 2" Ice 9.195 4" Ice 11.528	6.158 6.619 7.087 8.106 10.401	0.021 0.070 0.125 0.254 0.593
(2) DB846F65ZAXY (E)	C	From Leg	4.000 0.000 3.000		0.000	94.000	No Ice 7.033 1/2" Ice 7.536 1" Ice 8.080 2" Ice 9.195 4" Ice 11.528	6.158 6.619 7.087 8.106 10.401	0.021 0.070 0.125 0.254 0.593
742 213 (E)	A	From Leg	4.000 0.000 9.000		0.000	94.000	No Ice 5.135 1/2" Ice 5.609 1" Ice 6.090 2" Ice 7.074 4" Ice 9.130	2.869 3.483 3.946 4.893 6.876	0.022 0.047 0.078 0.158 0.394
742 213 (E)	B	From Leg	4.000 0.000 9.000		0.000	94.000	No Ice 5.135 1/2" Ice 5.609 1" Ice 6.090 2" Ice 7.074 4" Ice 9.130	2.869 3.483 3.946 4.893 6.876	0.022 0.047 0.078 0.158 0.394
742 213 (E)	C	From Leg	4.000 0.000 9.000		0.000	94.000	No Ice 5.135 1/2" Ice 5.609 1" Ice 6.090 2" Ice 7.074 4" Ice 9.130	2.869 3.483 3.946 4.893 6.876	0.022 0.047 0.078 0.158 0.394
GPS_A (E)	A	From Leg	4.000 0.000 14.000		0.000	94.000	No Ice 0.297 1/2" Ice 0.374 1" Ice 0.459 2" Ice 0.655 4" Ice 1.151	0.297 0.374 0.459 0.655 1.151	0.001 0.005 0.010 0.025 0.079
DB-T1-6Z-8AB-0Z (E-Hor.Off./Photo)	C	From Leg	0.500 0.000 9.000		0.000	94.000	No Ice 5.600 1/2" Ice 5.915 1" Ice 6.240 2" Ice 6.914 4" Ice 8.365	2.333 2.558 2.791 3.284 4.373	0.044 0.080 0.120 0.213 0.455
SBNHH-1D65B (P)	A	From Leg	4.000 0.000 3.000		0.000	94.000	No Ice 8.399 1/2" Ice 8.951 1" Ice 9.512 2" Ice 10.659 4" Ice 13.057	5.396 5.853 6.317 7.267 9.421	0.041 0.091 0.148 0.280 0.627
SBNHH-1D65B (P)	B	From Leg	4.000 0.000		0.000	94.000	No Ice 8.399 1/2" Ice 8.951	5.396 5.853	0.041 0.091

tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 87395.003.01 - NHV113 943126, CT (BU# 806360)	Page 6 of 14
	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
			ft	ft					
			3.000						
						1" Ice	9.512	6.317	0.148
						2" Ice	10.659	7.267	0.280
						4" Ice	13.057	9.421	0.627
SBNHH-1D65B (P)	C	From Leg	4.000	0.000	94.000	No Ice	8.399	5.396	0.041
			0.000			1/2" Ice	8.951	5.853	0.091
			3.000			1" Ice	9.512	6.317	0.148
						2" Ice	10.659	7.267	0.280
						4" Ice	13.057	9.421	0.627
SBNHH-1D65B w/ Mount Pipe (P)	A	From Leg	4.000	0.000	94.000	No Ice	8.637	7.071	0.066
			0.000			1/2" Ice	9.293	8.260	0.135
			9.000			1" Ice	9.917	9.170	0.212
						2" Ice	11.190	11.006	0.394
						4" Ice	13.855	15.043	0.903
SBNHH-1D65B w/ Mount Pipe (P)	B	From Leg	4.000	0.000	94.000	No Ice	8.637	7.071	0.066
			0.000			1/2" Ice	9.293	8.260	0.135
			9.000			1" Ice	9.917	9.170	0.212
						2" Ice	11.190	11.006	0.394
						4" Ice	13.855	15.043	0.903
SBNHH-1D65B w/ Mount Pipe (P)	C	From Leg	4.000	0.000	94.000	No Ice	8.637	7.071	0.066
			0.000			1/2" Ice	9.293	8.260	0.135
			9.000			1" Ice	9.917	9.170	0.212
						2" Ice	11.190	11.006	0.394
						4" Ice	13.855	15.043	0.903
RRH2X60-PCS (P)	A	From Leg	4.000	0.000	94.000	No Ice	2.567	2.011	0.055
			0.000			1/2" Ice	2.791	2.218	0.075
			9.000			1" Ice	3.025	2.435	0.099
						2" Ice	3.517	2.894	0.155
						4" Ice	4.606	3.915	0.313
RRH2X60-PCS (P)	B	From Leg	4.000	0.000	94.000	No Ice	2.567	2.011	0.055
			0.000			1/2" Ice	2.791	2.218	0.075
			9.000			1" Ice	3.025	2.435	0.099
						2" Ice	3.517	2.894	0.155
						4" Ice	4.606	3.915	0.313
RRH2X60-PCS (P)	C	From Leg	4.000	0.000	94.000	No Ice	2.567	2.011	0.055
			0.000			1/2" Ice	2.791	2.218	0.075
			9.000			1" Ice	3.025	2.435	0.099
						2" Ice	3.517	2.894	0.155
						4" Ice	4.606	3.915	0.313
RRH2x60-700 (P)	A	From Leg	4.000	0.000	94.000	No Ice	3.957	1.816	0.060
			0.000			1/2" Ice	4.272	2.075	0.083
			3.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2x60-700 (P)	B	From Leg	4.000	0.000	94.000	No Ice	3.957	1.816	0.060
			0.000			1/2" Ice	4.272	2.075	0.083
			3.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
RRH2x60-700 (P)	C	From Leg	4.000	0.000	94.000	No Ice	3.957	1.816	0.060
			0.000			1/2" Ice	4.272	2.075	0.083
			3.000			1" Ice	4.596	2.360	0.109
						2" Ice	5.271	2.957	0.173
						4" Ice	6.722	4.253	0.354
AWS4 (B66) 4x45 RRH (P)	A	From Leg	4.000	0.000	94.000	No Ice	3.010	1.831	0.067
			0.000			1/2" Ice	3.259	2.050	0.087
			9.000			1" Ice	3.517	2.277	0.111
						2" Ice	4.059	2.758	0.168

tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 87395.003.01 - NHV113 943126, CT (BU# 806360)	Page 7 of 14
	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement		C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert						
							ft ²	ft ²	K	
AWS4 (B66) 4x45 RRH (P)	B	From Leg	4.000	0.000	94.000	4" Ice	5.247	3.824	0.329	
						No Ice	3.010	1.831	0.067	
						1/2" Ice	3.259	2.050	0.087	
						1" Ice	3.517	2.277	0.111	
						2" Ice	4.059	2.758	0.168	
AWS4 (B66) 4x45 RRH (P)	C	From Leg	4.000	0.000	94.000	4" Ice	5.247	3.824	0.329	
						No Ice	3.010	1.831	0.067	
						1/2" Ice	3.259	2.050	0.087	
						1" Ice	3.517	2.277	0.111	
						2" Ice	4.059	2.758	0.168	
DB-T1-6Z-8AB-0Z (P)	B	From Leg	4.000	0.000	94.000	No Ice	5.600	2.333	0.044	
						1/2" Ice	5.915	2.558	0.080	
						1" Ice	6.240	2.791	0.120	
						2" Ice	6.914	3.284	0.213	
						4" Ice	8.365	4.373	0.455	
16' x 2" Pipe Mount (E)	A	From Leg	4.000	0.000	94.000	No Ice	3.800	3.800	0.059	
						1/2" Ice	5.428	5.428	0.087	
						1" Ice	7.073	7.073	0.125	
						2" Ice	10.413	10.413	0.234	
						4" Ice	15.459	15.459	0.579	
16' x 2" Pipe Mount (E)	B	From Leg	4.000	0.000	94.000	No Ice	3.800	3.800	0.059	
						1/2" Ice	5.428	5.428	0.087	
						1" Ice	7.073	7.073	0.125	
						2" Ice	10.413	10.413	0.234	
						4" Ice	15.459	15.459	0.579	
16' x 2" Pipe Mount (E)	C	From Leg	4.000	0.000	94.000	No Ice	3.800	3.800	0.059	
						1/2" Ice	5.428	5.428	0.087	
						1" Ice	7.073	7.073	0.125	
						2" Ice	10.413	10.413	0.234	
						4" Ice	15.459	15.459	0.579	
5' horizontal x 2" Pipe Mount (E)	A	From Leg	4.000	0.000	94.000	No Ice	1.167	1.167	0.100	
						1/2" Ice	1.573	1.573	0.228	
						1" Ice	1.988	1.988	0.365	
						2" Ice	2.843	2.843	0.663	
						4" Ice	4.658	4.658	1.365	
5' horizontal x 2" Pipe Mount (E)	B	From Leg	4.000	0.000	94.000	No Ice	1.167	1.167	0.100	
						1/2" Ice	1.573	1.573	0.228	
						1" Ice	1.988	1.988	0.365	
						2" Ice	2.843	2.843	0.663	
						4" Ice	4.658	4.658	1.365	
5' horizontal x 2" Pipe Mount (E)	C	From Leg	4.000	0.000	94.000	No Ice	1.167	1.167	0.100	
						1/2" Ice	1.573	1.573	0.228	
						1" Ice	1.988	1.988	0.365	
						2" Ice	2.843	2.843	0.663	
						4" Ice	4.658	4.658	1.365	
Platform Mount [LP 712-1] (E)	C	None		0.000	94.000	No Ice	24.530	24.530	1.335	
						1/2" Ice	29.940	29.940	1.646	
						1" Ice	35.350	35.350	1.956	
						2" Ice	46.170	46.170	2.577	
						4" Ice	67.810	67.810	3.820	
Sector Mount [SM 201-3] (E-4 M.P./Sector)	C	None		0.000	97.000	No Ice	26.690	26.690	1.083	
						1/2" Ice	37.600	37.600	1.490	
						1" Ice	48.510	48.510	1.896	
						2" Ice	70.330	70.330	2.709	
						4" Ice	113.970	113.970	4.336	

B

tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 87395.003.01 - NHV113 943126, CT (BU# 806360)	Page 8 of 14
	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
			Horz Lateral ft	Vert ft						
DB225-A (AB)	B	From Leg	1.000	0.000	0.000	83.000	No Ice	3.210	3.210	0.037
			0.000	0.000			1/2" Ice	5.778	5.778	0.048
			0.000	0.000			1" Ice	8.346	8.346	0.059
							2" Ice	13.482	13.482	0.081
							4" Ice	23.754	23.754	0.126
Pipe Mount [PM 602-1] (AB)	B	From Leg	0.500	0.000	0.000	83.000	No Ice	5.250	1.580	0.093
			0.000	0.000			1/2" Ice	6.500	1.950	0.118
			0.000	0.000			1" Ice	7.750	2.320	0.142
							2" Ice	10.250	3.060	0.192
							4" Ice	15.250	4.540	0.291
B DB225-A (AB)	A	From Leg	1.000	0.000	0.000	64.000	No Ice	3.210	3.210	0.037
			0.000	0.000			1/2" Ice	5.778	5.778	0.048
			0.000	0.000			1" Ice	8.346	8.346	0.059
							2" Ice	13.482	13.482	0.081
							4" Ice	23.754	23.754	0.126
Pipe Mount [PM 602-1] (AB)	A	From Leg	0.500	0.000	0.000	64.000	No Ice	5.250	1.580	0.093
			0.000	0.000			1/2" Ice	6.500	1.950	0.118
			0.000	0.000			1" Ice	7.750	2.320	0.142
							2" Ice	10.250	3.060	0.192
							4" Ice	15.250	4.540	0.291
B										

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp

tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 87395.003.01 - NHV113 943126, CT (BU# 806360)	Page 9 of 14
	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Comb. No.	Description
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	110 - 67.333	Pole	Max Tension	18	0.000	0.000	0.000
			Max. Compression	14	-14.023	-0.582	-0.508
			Max. Mx	5	-7.624	-343.178	-0.585
			Max. My	8	-7.641	-0.657	-338.270
			Max. Vy	5	13.866	-343.178	-0.585
			Max. Vx	8	13.648	-0.657	-338.270
			Max. Torque	3			-0.794
L2	67.333 - 29.4167	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-20.576	-0.533	-0.174
			Max. Mx	5	-12.918	-931.493	-2.748
			Max. My	8	-12.923	-3.053	-922.306
			Max. Vy	5	17.757	-931.493	-2.748
			Max. Vx	8	17.678	-3.053	-922.306
			Max. Torque	3			-0.790
L3	29.4167 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-29.353	-0.481	-0.204
			Max. Mx	5	-20.502	-1613.712	-5.000
			Max. My	8	-20.502	-5.289	-1601.828
			Max. Vy	5	21.254	-1613.712	-5.000
			Max. Vx	8	21.178	-5.289	-1601.828
			Max. Torque	2			-0.624

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	19	29.353	-4.434	-2.564
	Max. H _x	11	20.512	21.244	0.064
	Max. H _z	2	20.512	0.064	21.168
	Max. M _x	2	1601.777	0.064	21.168
	Max. M _z	5	1613.712	-21.244	-0.064
	Max. Torsion	8	0.562	-0.064	-21.168
	Min. Vert	1	20.512	0.000	0.000

tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 87395.003.01 - NHV113 943126, CT (BU# 806360)	Page 10 of 14
	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. H _x	5	20.512	-21.244	-0.064
	Min. H _z	8	20.512	-0.064	-21.168
	Min. M _x	8	-1601.828	-0.064	-21.168
	Min. M _z	11	-1613.081	21.244	0.064
	Min. Torsion	2	-0.611	0.064	21.168

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturing Moment, M _x kip-ft	Overturing Moment, M _z kip-ft	Torque kip-ft
Dead Only	20.512	0.000	0.000	0.023	-0.305	0.000
Dead+Wind 0 deg - No Ice	20.512	-0.064	-21.168	-1601.777	4.660	0.611
Dead+Wind 30 deg - No Ice	20.512	10.567	-18.300	-1384.689	-802.713	0.580
Dead+Wind 60 deg - No Ice	20.512	18.366	-10.529	-796.564	-1395.077	0.377
Dead+Wind 90 deg - No Ice	20.512	21.244	0.064	5.000	-1613.712	0.074
Dead+Wind 120 deg - No Ice	20.512	18.430	10.639	805.227	-1400.046	-0.230
Dead+Wind 150 deg - No Ice	20.512	10.677	18.364	1389.708	-811.326	-0.457
Dead+Wind 180 deg - No Ice	20.512	0.064	21.168	1601.828	-5.289	-0.562
Dead+Wind 210 deg - No Ice	20.512	-10.567	18.300	1384.739	802.083	-0.534
Dead+Wind 240 deg - No Ice	20.512	-18.366	10.529	796.614	1394.447	-0.381
Dead+Wind 270 deg - No Ice	20.512	-21.244	-0.064	-4.950	1613.081	-0.124
Dead+Wind 300 deg - No Ice	20.512	-18.430	-10.639	-805.177	1399.415	0.184
Dead+Wind 330 deg - No Ice	20.512	-10.677	-18.364	-1389.657	810.696	0.460
Dead+Ice+Temp	29.353	0.000	0.000	0.204	-0.481	0.000
Dead+Wind 0 deg+Ice+Temp	29.353	-0.018	-5.099	-401.965	0.902	0.161
Dead+Wind 30 deg+Ice+Temp	29.353	2.540	-4.407	-347.376	-201.506	0.144
Dead+Wind 60 deg+Ice+Temp	29.353	4.417	-2.534	-199.650	-350.057	0.089
Dead+Wind 90 deg+Ice+Temp	29.353	5.110	0.018	1.632	-404.948	0.009
Dead+Wind 120 deg+Ice+Temp	29.353	4.434	2.564	202.534	-351.470	-0.072
Dead+Wind 150 deg+Ice+Temp	29.353	2.570	4.424	349.227	-203.954	-0.132
Dead+Wind 180 deg+Ice+Temp	29.353	0.018	5.099	402.403	-1.925	-0.158
Dead+Wind 210 deg+Ice+Temp	29.353	-2.540	4.407	347.813	200.483	-0.142
Dead+Wind 240 deg+Ice+Temp	29.353	-4.417	2.534	200.087	349.034	-0.089
Dead+Wind 270 deg+Ice+Temp	29.353	-5.110	-0.018	-1.195	403.924	-0.012
Dead+Wind 300 deg+Ice+Temp	29.353	-4.434	-2.564	-202.097	350.447	0.069
Dead+Wind 330 deg+Ice+Temp	29.353	-2.570	-4.424	-348.789	202.930	0.133
Dead+Wind 0 deg - Service	20.512	-0.022	-7.325	-554.472	1.406	0.206
Dead+Wind 30 deg - Service	20.512	3.656	-6.332	-479.322	-278.083	0.196
Dead+Wind 60 deg - Service	20.512	6.355	-3.643	-275.732	-483.145	0.131
Dead+Wind 90 deg - Service	20.512	7.351	0.022	1.748	-558.833	0.032
Dead+Wind 120 deg - Service	20.512	6.377	3.681	278.765	-484.867	-0.075
Dead+Wind 150 deg - Service	20.512	3.695	6.354	481.095	-281.066	-0.159
Dead+Wind 180 deg - Service	20.512	0.022	7.325	554.523	-2.038	-0.201
Dead+Wind 210 deg - Service	20.512	-3.656	6.332	479.373	277.451	-0.191
Dead+Wind 240 deg - Service	20.512	-6.355	3.643	275.782	482.512	-0.132
Dead+Wind 270 deg - Service	20.512	-7.351	-0.022	-1.697	558.200	-0.037
Dead+Wind 300 deg - Service	20.512	-6.377	-3.681	-278.714	484.234	0.069
Dead+Wind 330 deg - Service	20.512	-3.695	-6.354	-481.044	280.434	0.159

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	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-20.512	0.000	0.000	20.512	0.000	0.000%
2	-0.064	-20.512	-21.168	0.064	20.512	21.168	0.000%
3	10.567	-20.512	-18.300	-10.567	20.512	18.300	0.000%
4	18.366	-20.512	-10.529	-18.366	20.512	10.529	0.000%
5	21.244	-20.512	0.064	-21.244	20.512	-0.064	0.000%
6	18.430	-20.512	10.639	-18.430	20.512	-10.639	0.000%
7	10.677	-20.512	18.364	-10.677	20.512	-18.364	0.000%
8	0.064	-20.512	21.168	-0.064	20.512	-21.168	0.000%
9	-10.567	-20.512	18.300	10.567	20.512	-18.300	0.000%
10	-18.366	-20.512	10.529	18.366	20.512	-10.529	0.000%
11	-21.244	-20.512	-0.064	21.244	20.512	0.064	0.000%
12	-18.430	-20.512	-10.639	18.430	20.512	10.639	0.000%
13	-10.677	-20.512	-18.364	10.677	20.512	18.364	0.000%
14	0.000	-29.353	0.000	0.000	29.353	0.000	0.000%
15	-0.018	-29.353	-5.099	0.018	29.353	5.099	0.000%
16	2.540	-29.353	-4.407	-2.540	29.353	4.407	0.000%
17	4.417	-29.353	-2.534	-4.417	29.353	2.534	0.000%
18	5.110	-29.353	0.018	-5.110	29.353	-0.018	0.000%
19	4.434	-29.353	2.564	-4.434	29.353	-2.564	0.000%
20	2.570	-29.353	4.424	-2.570	29.353	-4.424	0.000%
21	0.018	-29.353	5.099	-0.018	29.353	-5.099	0.000%
22	-2.540	-29.353	4.407	2.540	29.353	-4.407	0.000%
23	-4.417	-29.353	2.534	4.417	29.353	-2.534	0.000%
24	-5.110	-29.353	-0.018	5.110	29.353	0.018	0.000%
25	-4.434	-29.353	-2.564	4.434	29.353	2.564	0.000%
26	-2.570	-29.353	-4.424	2.570	29.353	4.424	0.000%
27	-0.022	-20.512	-7.325	0.022	20.512	7.325	0.000%
28	3.656	-20.512	-6.332	-3.656	20.512	6.332	0.000%
29	6.355	-20.512	-3.643	-6.355	20.512	3.643	0.000%
30	7.351	-20.512	0.022	-7.351	20.512	-0.022	0.000%
31	6.377	-20.512	3.681	-6.377	20.512	-3.681	0.000%
32	3.695	-20.512	6.354	-3.695	20.512	-6.354	0.000%
33	0.022	-20.512	7.325	-0.022	20.512	-7.325	0.000%
34	-3.656	-20.512	6.332	3.656	20.512	-6.332	0.000%
35	-6.355	-20.512	3.643	6.355	20.512	-3.643	0.000%
36	-7.351	-20.512	-0.022	7.351	20.512	0.022	0.000%
37	-6.377	-20.512	-3.681	6.377	20.512	3.681	0.000%
38	-3.695	-20.512	-6.354	3.695	20.512	6.354	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00006476
3	Yes	5	0.00000001	0.00002660
4	Yes	5	0.00000001	0.00002518
5	Yes	4	0.00000001	0.00003442
6	Yes	5	0.00000001	0.00002587
7	Yes	5	0.00000001	0.00002655
8	Yes	4	0.00000001	0.00007489
9	Yes	5	0.00000001	0.00002492
10	Yes	5	0.00000001	0.00002644

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	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

11	Yes	4	0.00000001	0.00002713
12	Yes	5	0.00000001	0.00002617
13	Yes	5	0.00000001	0.00002539
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00050358
16	Yes	4	0.00000001	0.00054417
17	Yes	4	0.00000001	0.00054526
18	Yes	4	0.00000001	0.00050967
19	Yes	4	0.00000001	0.00054996
20	Yes	4	0.00000001	0.00054877
21	Yes	4	0.00000001	0.00050511
22	Yes	4	0.00000001	0.00054197
23	Yes	4	0.00000001	0.00054448
24	Yes	4	0.00000001	0.00050668
25	Yes	4	0.00000001	0.00054633
26	Yes	4	0.00000001	0.00054395
27	Yes	4	0.00000001	0.00001541
28	Yes	4	0.00000001	0.00009017
29	Yes	4	0.00000001	0.00007964
30	Yes	4	0.00000001	0.00001067
31	Yes	4	0.00000001	0.00008390
32	Yes	4	0.00000001	0.00008916
33	Yes	4	0.00000001	0.00001597
34	Yes	4	0.00000001	0.00007808
35	Yes	4	0.00000001	0.00008865
36	Yes	4	0.00000001	0.00001038
37	Yes	4	0.00000001	0.00008588
38	Yes	4	0.00000001	0.00008056

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	110 - 67.333	15.279	30	1.134	0.002
L2	72 - 29.4167	6.778	31	0.888	0.001
L3	35 - 0	1.590	31	0.407	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
107.000	Platform Mount [LP 712-1]	30	14.560	1.120	0.002	36132
97.000	Sector Mount [SM 201-3]	30	12.187	1.071	0.001	13896
94.000	(2) DB846F65ZAXY	30	11.489	1.055	0.001	11291
83.000	DB225-A	31	9.024	0.984	0.001	6690
64.000	DB225-A	31	5.327	0.798	0.001	4456

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	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	110 - 67.333	44.074	5	3.271	0.005
L2	72 - 29.4167	19.561	6	2.563	0.003
L3	35 - 0	4.589	6	1.175	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
107.000	Platform Mount [LP 712-1]	5	42.001	3.231	0.005	12609
97.000	Sector Mount [SM 201-3]	5	35.159	3.091	0.004	4849
94.000	(2) DB846F65ZAXY	5	33.146	3.044	0.004	3939
83.000	DB225-A	5	26.040	2.840	0.003	2333
64.000	DB225-A	6	15.376	2.303	0.002	1551

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _n ft	KI/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P/P _a
L1	110 - 67.333 (1)	TP30.45x21.91x0.219	42.667	0.000	0.0	36.858	20.636	-7.624	760.617	0.010
L2	67.333 - 29.4167 (2)	TP37.6x29.078x0.313	42.583	0.000	0.0	39.000	36.396	-12.917	1419.450	0.009
L3	29.4167 - 0 (3)	TP42.85x35.858x0.406	35.000	0.000	0.0	39.000	55.522	-20.502	2165.350	0.009

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} /F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} /F _{by}
L1	110 - 67.333 (1)	TP30.45x21.91x0.219	343.179	27.850	36.858	0.756	0.000	0.000	36.858	0.000
L2	67.333 - 29.4167 (2)	TP37.6x29.078x0.313	931.600	34.760	39.000	0.891	0.000	0.000	39.000	0.000
L3	29.4167 - 0 (3)	TP42.85x35.858x0.406	1615.09	33.696	39.000	0.864	0.000	0.000	39.000	0.000

tnxTower B+T Group 1717 S. Boulder, Suite 300 Tulsa, OK 74119 Phone: (918) 587-4630 FAX: (918) 295-0265	Job 87395.003.01 - NHV113 943126, CT (BU# 806360)	Page 14 of 14
	Project	Date 16:47:16 07/15/16
	Client Crown Castle	Designed by Bhushan

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f _v ksi	Allow. F _v ksi	Ratio f _v / F _v	Actual T kip-ft	Actual f _{vt} ksi	Allow. F _{vt} ksi	Ratio f _{vt} / F _{vt}
L1	110 - 67.333 (1)	TP30.45x21.91x0.219	13.866	0.672	26.000	0.053	0.442	0.017	26.000	0.001
L2	67.333 - 29.4167 (2)	TP37.6x29.078x0.313	17.793	0.489	26.000	0.038	0.246	0.004	26.000	0.000
L3	29.4167 - 0 (3)	TP42.85x35.858x0.406	21.291	0.383	26.000	0.030	0.231	0.002	26.000	0.000

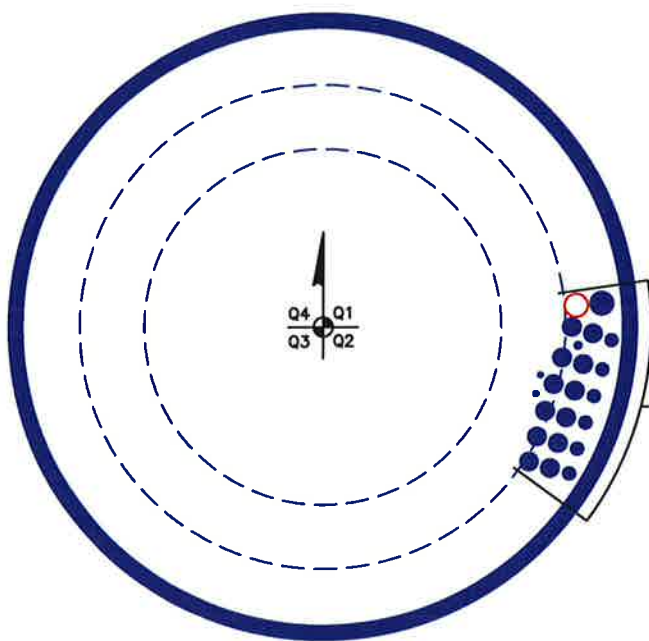
Pole Interaction Design Data

Section No.	Elevation ft	Ratio P P _a	Ratio f _{bx} F _{bx}	Ratio f _{by} F _{by}	Ratio f _v F _v	Ratio f _{vt} F _{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	110 - 67.333 (1)	0.010	0.756	0.000	0.053	0.001	0.766	1.333	H1-3+VT ✓
L2	67.333 - 29.4167 (2)	0.009	0.891	0.000	0.038	0.000	0.901	1.333	H1-3+VT ✓
L3	29.4167 - 0 (3)	0.009	0.864	0.000	0.030	0.000	0.874	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
L1	110 - 67.333	Pole	TP30.45x21.91x0.219	1	-7.624	1013.902	57.5	Pass
L2	67.333 - 29.4167	Pole	TP37.6x29.078x0.313	2	-12.917	1892.127	67.6	Pass
L3	29.4167 - 0	Pole	TP42.85x35.858x0.406	3	-20.502	2886.411	65.5	Pass
Summary								
Pole (L2)							67.6	Pass
RATING =							67.6	Pass

APPENDIX B
BASE LEVEL DRAWING



- (PROPOSED)
 (1) 1-5/8" TO 94 FT LEVEL
 (INSTALLED--TO BE REMOVED)
 (1) 7/8" TO 94 FT LEVEL
- (INSTALLED)
 (1) 1/2" TO 94 FT LEVEL
 (5) 7/8" TO 94 FT LEVEL
 (12) 1-1/4" TO 94 FT LEVEL
 (1) 1-5/8" TO 94 FT LEVEL
- (ABANDONED)
 (1) 1/2" TO 83 FT LEVEL
 (1) 1/2" TO 64 FT LEVEL

BUSINESS UNIT: 806360

APPENDIX C
ADDITIONAL CALCULATIONS

Stiffened or Unstiffened, UngROUTed, Circular Base Plate - Any Rod Material

TIA Rev F

Site Data

BU#: 806360
 Site Name: NHV 113 943126, CT
 App #: 354819 Rev# 1

Pole Manufacturer: Other

Anchor Rod Data

Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	50.86	in

Plate Data

Diam:	56.86	in
Thick:	2.75	in
Grade:	60	ksi
Single-Rod B-eff:	11.48	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:	42.85	in
Thick:	0.40625	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor

ASIF:	1.333
-------	-------

Reactions

Moment:	1615	ft-kips
Axial:	21	kips
Shear:	21	kips

If No stiffeners, Criteria: AISC ASD <-Only Applicable to Unstiffened Cases

Anchor Rod Results

Maximum Rod Tension: 125.3 Kips
 Allowable Tension: 195.0 Kips
 Anchor Rod Stress Ratio: 64.3% Pass

Rigid
Service, ASD
Fty*ASIF

Base Plate Results

Base Plate Stress: 22.6 ksi
 Allowable Plate Stress: 60.0 ksi
 Base Plate Stress Ratio: 37.7% Pass

Flexural Check

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length:
27.40

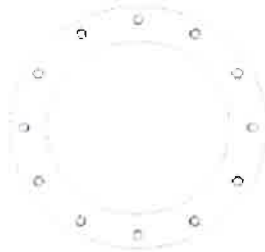
n/a

Stiffener Results

Horizontal Weld : n/a
 Vertical Weld: n/a
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: n/a
 Plate Tension+Shear, ft/Ft+(fv/Fv)^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

BU: 806360
 Site Name: NHV 113 943126,CT
 App Number: 354819 Rev# 1
 Work Order: 1268898



Monopole Drilled Pier

Input

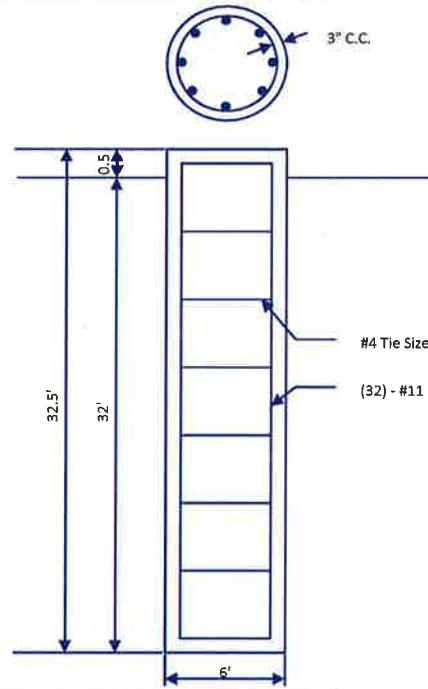
Criteria
 TIA Revision: F
 ACI 318 Revision: 2002
 Seismic Category: B

Forces
 Compression: 21 kips
 Shear: 21 kips
 Moment: 1615 k-ft
 Swelling Force: 0 kips

Foundation Dimensions
 Pier Diameter: 6 ft
 Ext. above grade: 0.5 ft
 Depth below grade: 32 ft

Material Properties
 Number of Rebar: 32
 Rebar Size: 11
 Tie Size: 4
 Rebar tensile strength: 60 ksi
 Concrete Strength: 3000 psi
 Ultimate Concrete Strain: 0.003 in/in
 Clear Cover to Ties: 3 in

Soil Profile: Soil



Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3.33	0	3.33	155	0	0	0	0	0	
2	3.67	3.33	7	155	1300	0			0	
3	25	7	32	92.6	1300	0				50

Analysis Results

Soil Lateral Capacity
 Depth to Zero Shear: 5.48 ft
 Max Moment, Mu: 1713.84 k-ft
 Soil Safety Factor: 6.40
 Safety Factor Req'd: 2
RATING: 31.2%

Soil Axial Capacity
 Skin Friction (k): 200.76 kips
 End Bearing (k): 165.40 kips
 Comp. Capacity (k), φCn: 366.17 kips
 Comp. (k), Cu: 27.30 kips
RATING: 7.5%

Concrete/Steel Check

Mu (from soil analysis) 2227.99 k-ft
 φMn 6182.96 k-ft
RATING: 36.0%

rho provided 1.23
 rho required 0.33 OK

Rebar Spacing 4.83
 Spacing required 22.56 OK

Dev. Length required 26.27
 Dev. Length provided 61.78 OK

Overall Foundation Rating: 36.0%

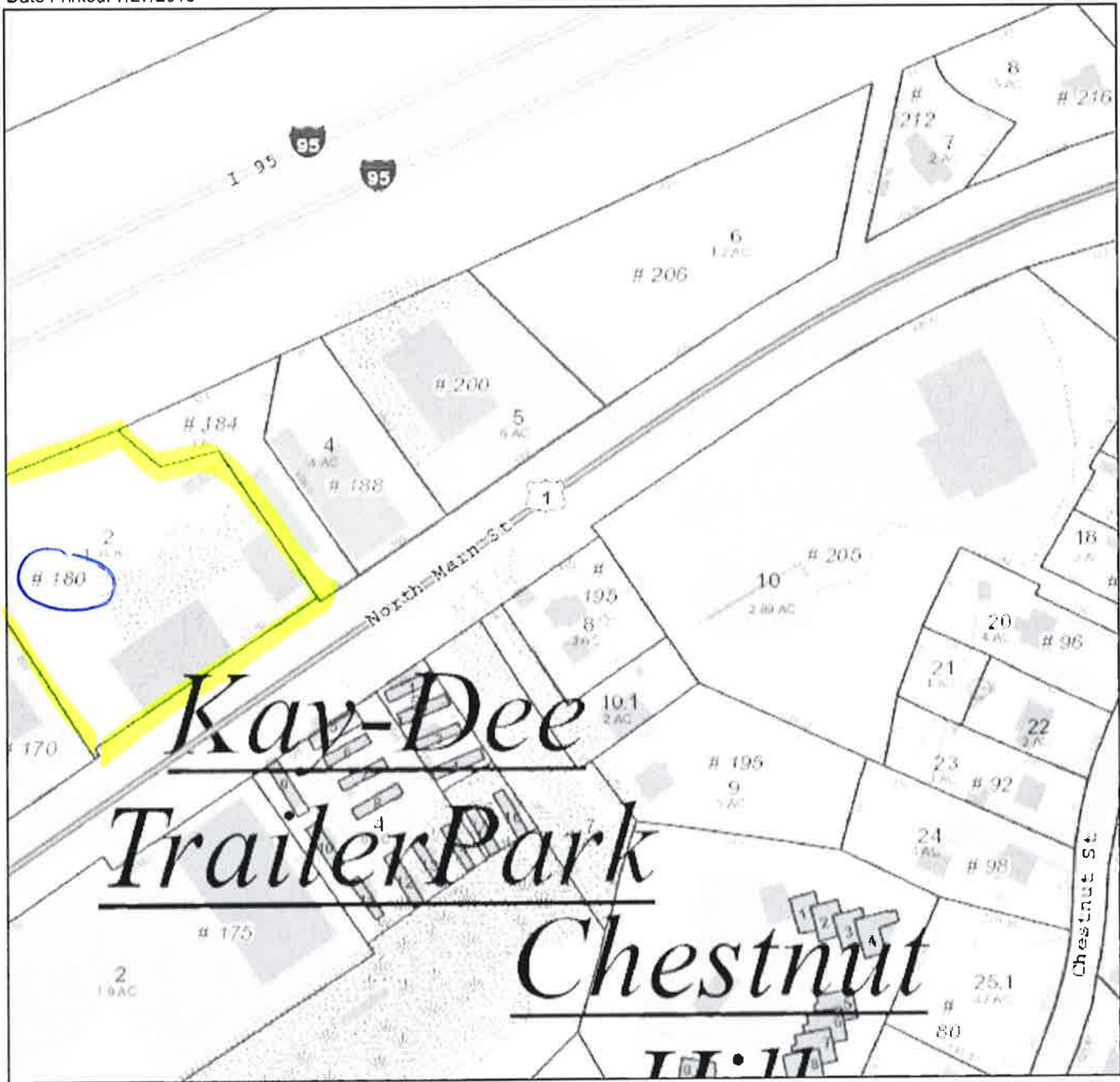
ATTACHMENT 4

Town of Branford

Geographic Information System (GIS)

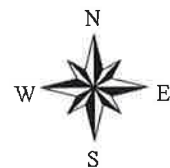


Date Printed: 7/27/2016



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180-182 NO MAIN ST

Location 180-182 NO MAIN ST

Mblu E06/000 001/ 00002/ /

Acct# 005970

Owner THREE M + M LTD PART

Assessment \$510,300

Appraisal \$729,000

PID 837

Building Count 2

Current Value

Appraisal			
Valuation Year	Improvements	Land	Total
2016	\$34,300	\$694,700	\$729,000
Assessment			
Valuation Year	Improvements	Land	Total
2016	\$24,000	\$486,300	\$510,300

Owner of Record

Owner THREE M + M LTD PART
Co-Owner
Address 2040 FOAL LA IVY FARM
 CHARLOTTESVILLE, VA 22901

Sale Price \$0
Certificate
Book & Page 0468/0305
Sale Date 04/04/1989

Ownership History

Ownership History				
Owner	Sale Price	Certificate	Book & Page	Sale Date
THREE M + M LTD PART			0468/0305	04/04/1989

Building Information

Building 1 : Section 1

Year Built: 1920
Living Area: 3120
Replacement Cost: \$159,515
Building Percent 5
Good:
Replacement Cost
Less Depreciation: \$8,000

Building Attributes	
Field	Description
STYLE	Service Shop

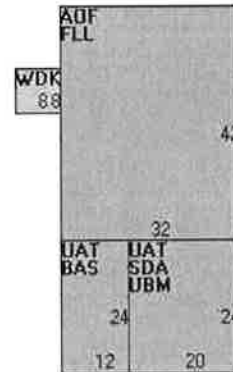
MODEL	Ind/Comm
Grade	C -
Stories:	1
Occupancy	1
Exterior Wall 1	Wood Shingle
Exterior Wall 2	
Roof Structure	Gable/Hip
Roof Cover	Asphalt
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Hot Air-no Duc
AC Type	None
Bldg Use	AUTO REPR MDL96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	332I
Heat/AC	NONE
Frame Type	WOOD FRAME
Baths/Plumbing	AVERAGE
Ceiling/Wall	CEIL & MIN WL
Rooms/Prtns	AVERAGE
Wall Height	9
% Comn Wall	0

Building Photo



(<http://images.vgsi.com/photos/BranfordCTPhotos//\00\01\20/>)

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
AOF	Office	1344	1344
FLL	Finished Lower Level	1344	1008
SDA	Store Display Area	480	480
BAS	First Floor	288	288
UAT	Attic, Unfinished	768	0
UBM	Basement, Unfinished	480	0
WDK	Deck, Wood	64	0
		4768	3120

Building 1 : Section 1

Year Built:	1920
Living Area:	0
Replacement Cost:	\$159,515
Building Percent Good:	5
Replacement Cost Less Depreciation:	\$8,000

Building Attributes

Field	Description
Style	Outbuildings
Model	
Grade:	
Stories:	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure:	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Total Xtra Fixtrs:	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Cottage Cmplx	
Cottage Adj	

Building Photo



(<http://images.vgsi.com/photos/BranfordCTPhotos//default.jpg>)

Building Layout

Building Layout

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Building 2 : Section 1

Year Built: 1920
Living Area: 6120
Replacement Cost: \$255,886
Building Percent Good: 5
Replacement Cost Less Depreciation: \$12,800

Building Attributes : Bldg 2 of 2

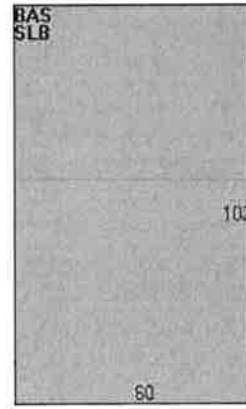
Field	Description
STYLE	Service Shop
MODEL	Ind/Comm
Grade	C -
Stories:	1
Occupancy	1

Building Photo



(<http://images.vgsi.com/photos/BranfordCTPhotos//\00\01\20/>)

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	6120	6120
SLB	Slab	6120	0
		12240	6120

Exterior Wall 1	Clapboard
Exterior Wall 2	Pre-Fab Wood
Roof Structure	Gable/Hip
Roof Cover	Asphalt
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Oil
Heating Type	Forced Air-Duc
AC Type	None
Bldg Use	AUTO REPR MDL96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	332I
Heat/AC	NONE
Frame Type	WOOD FRAME
Baths/Plumbing	AVERAGE
Ceiling/Wall	CEILING ONLY
Rooms/Prtns	AVERAGE
Wall Height	14
% Corn Wall	0

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	332I
Description	AUTO REPR MDL96
Zone	IG-1
Neighborhood	450
Alt Land Appr Category	No

Land Line Valuation

Size (Acres)	1.34
Frontage	
Depth	
Assessed Value	\$486,300
Appraised Value	\$694,700

Outbuildings

Outbuildings	Legend

Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
FN9	W/O TOP RL-8'			200 L.F.	\$1,200	1
PAV1	PAVING-ASPHALT			1500 S.F.	\$1,000	1
SHD6	SHED COM MAS			640 S.F.	\$11,300	1

Valuation History

Appraisal			
Valuation Year	Improvements	Land	Total
2015	\$34,300	\$694,700	\$729,000
2014	\$34,300	\$694,700	\$729,000
2013	\$34,300	\$694,700	\$729,000

Assessment			
Valuation Year	Improvements	Land	Total
2015	\$24,000	\$486,300	\$510,300
2014	\$24,000	\$486,300	\$510,300
2013	\$24,000	\$486,300	\$510,300

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