



Alex Murshteyn, Site Acquisition Consultant  
c/o Cellco Partnership d/b/a Verizon Wireless  
Centerline Communications, LLC  
95 Ryan Drive, Suite 1  
Raynham, MA 02767  
Mobile: (508) 821-0159  
[AMurshteyn@centerlinecommunications.com](mailto:AMurshteyn@centerlinecommunications.com)

December 15, 2017

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

**RE: Notice of Exempt Modification // Site: Berlin 2 CT (ATC: 302483)  
260 Beckley Road (aka 268 aka 264 Beckley Rd), Berlin, CT 06037  
N 41.63166 // W 72.72986-**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless currently maintains fifteen (15) antennas at the 116-foot level on the existing 151.5-foot monopole tower, located at 260 Beckley Road, Berlin, CT. The tower is owned by American Tower Corporation (ATC). The property is owned by Elaine E. Matulis & John C. Matulis, Jr. The Council approved Verizon Wireless use of the existing tower in 2002. Verizon Wireless now intends remove six (6) of its antennas and replace with six (6) JAHH-65B-R3B models installed in pairs on side-by-side mounts (700/850/1900/2100 MHz) as replacements for its PCS/AWS/LTE upgrade, all at the same level on the tower. Additionally, Verizon Wireless will install six new (6) remote radio head units (RRHs) plus deploy one (1)

HYBRIFLEX fiber cable previously proposed and reserved, but not yet installed; altogether updating certain leased equipment rights, as reflected by the final configuration outlined in the structural analysis and proposed hereby. Note that additional cable and RRH equipment rights are reflected in the structural analysis. These reflect what was last approved under EM-VER-007-151013 but never installed due to the need for de-stacking structural upgrades to this tower; and miscellaneous leased rights acquired since then. Structural upgrades previously required by ATC Project #11912109 have since been completed pursuant to the modification drawings last dated October 3, 2017 and stamped October 6, 2017, which are enclosed herewith for reference.

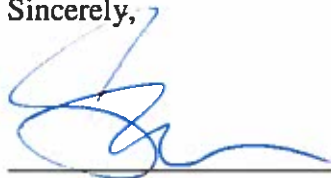
Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Mark H. Kaczynski, Mayor for the Town of Berlin, its Zoning Enforcement Officer Maureen Giusti, including for Planning and Zoning, to American Tower, the tower owner, and to the ground owners, Elaine E. Matulis & John C. Matulis, Jr.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2). Enclosed to accommodate this filing are specifications for all new and replacement Verizon Wireless equipment, a structural analysis dated October 4, 2017 by A.T. Engineering Service, PLLC and radio frequency (RF) analysis table showing worst-case RF emission calculation by Verizon Wireless RF Design Engineering.

1. The proposed modifications will not result in an increase in the height of the existing structure. Verizon Wireless replacement antennas and all RRHs will be installed on its existing antenna platform at the 116-foot level on the tower.
2. The proposed modifications 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 new antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading, as shown in the attached structural analysis by A.T. Engineering Service, PLLC, dated October 4, 2017 and completion of ATC structural modifications project as evidenced by the attached A.T. Engineering Service, PLLC modification drawings dated October 3, 2017.

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

Sincerely,

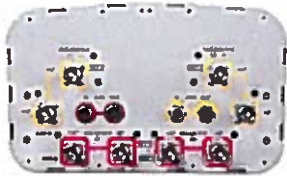


---

Alex Murshteyn, Site Acquisition Consultant  
c/o Cellco Partnership d/b/a Verizon Wireless  
Centerline Communications, LLC  
95 Ryan Drive, Suite 1  
Raynham, MA 02767  
Mobile: (508) 821-0159  
[AMurshteyn@centerlinecommunications.com](mailto:AMurshteyn@centerlinecommunications.com)

Attachments

cc: Mark Kaczynski, Mayor - as elected official - 1Z9Y45030324368340  
Maureen Giusti, ZEO, Planning and Zoning - as P&Z official - 1Z9Y45030323229957  
American Tower Corporation - as tower owner - 1Z9Y45030322132179  
Elaine & John Matulis - as property owners - 1Z9Y45030322184560



## JAHH-65B-R3B

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

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

### Electrical Specifications

Frequency Band, MHz	698-787	824-894	1695-1880	1850-1990	1920-2200	2300-2360
Gain, dBi	14.5	15.8	18.0	18.4	18.5	18.8
Beamwidth, Horizontal, degrees	67	65	63	63	65	68
Beamwidth, Vertical, degrees	12.4	10.5	5.7	5.2	4.9	4.4
Beam Tilt, degrees	2-14	2-14	0-10	0-10	0-10	0-10
USLS (First Lobe), dB	18	18	20	20	21	23
Front-to-Back Ratio at 180°, dB	32	34	31	35	36	38
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR   Return Loss, dB	1.5   14.0	1.5   14.0	1.5   14.0	1.5   14.0	1.5   14.0	1.5   14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, 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\*

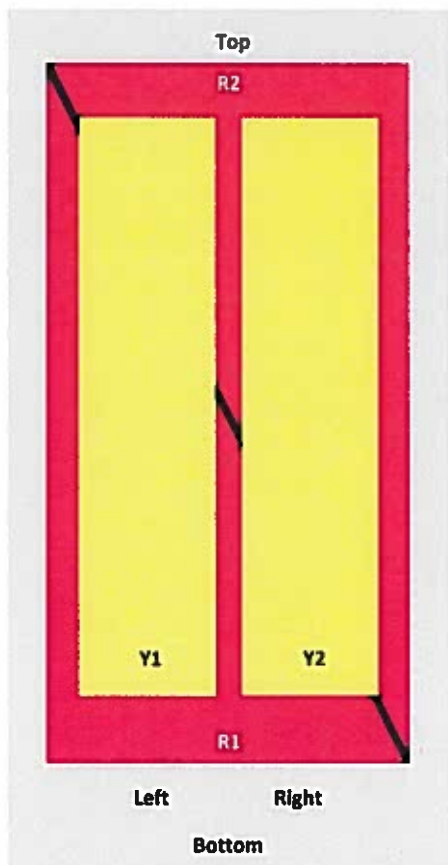
Frequency Band, MHz	698-787	824-894	1695-1880	1850-1990	1920-2200	2300-2360
Gain by all Beam Tilts, average, dBi	14.3	14.9	17.6	18.1	18.2	18.5
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.5	±0.6	±0.4	±0.5	±0.6
Gain by Beam Tilt, average, dBi	2 °   14.3	2 °   15.0	0 °   17.2	0 °   17.6	0 °   17.7	0 °   17.9
Gain by Beam Tilt, average, dBi	8 °   14.3	8 °   14.9	5 °   17.6	5 °   18.2	5 °   18.3	5 °   18.7
Gain by Beam Tilt, average, dBi	14 °   14.3	14 °   15.4	10 °   17.6	10 °   18.2	10 °   18.3	10 °   18.7
Beamwidth, Horizontal Tolerance, degrees	±1.2	±1.4	±4	±2.4	±2.9	±2.7
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.5	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	18	17	17	18	19	18
Front-to-Back Total Power at 180° ± 30°, dB	25	24	26	29	27	29
CPR at Boresight, dB	22	23	20	21	21	24
CPR at Sector, dB	11	12	11	11	11	8

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

### Array Layout

JAHH-65B-R3B

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



Array	Freq (MHz)	Cones	RET (SRET)	AISG RET CID
R1	698-787	1-2	1	ANXXXXXXXXXXXXX1
R2	824-894	3-4	2	ANXXXXXXXXXXXXX2
Y1	1695-2360	5-6	3	ANXXXXXXXXXXXXX3
Y2	1695-2360	7-8		

View from the front of the antenna

(Sizes of colored boxes are not true depictions of array sizes)

## General Specifications

Operating Frequency Band	1695 – 2360 MHz   698 – 787 MHz   824 – 894 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage

## Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Color	Light gray

JAHH65BR3B

Grounding Type	RF connector 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	746.0 N @ 150 km/h 167.7 lbf @ 150 km/h
Wind Loading, lateral	243.0 N @ 150 km/h 54.6 lbf @ 150 km/h
Wind Loading, rear	776.0 N @ 150 km/h 174.5 lbf @ 150 km/h
Wind Speed, maximum	241 km/h   150 mph

## Dimensions

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

## Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1   Port 5
Internal RET	High band (1)   Low band (2)
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female   8-pin DIN Male
RET Interface, quantity	2 female   2 male

## Packed Dimensions

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

## Regulatory Compliance/Certifications

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



JAHH-65BR3B

---

## 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



## 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.**

### General Specifications

Application	Outdoor
Includes	Brackets   Hardware
Package Quantity	1

### Mechanical Specifications

Color	Silver
Material Type	Galvanized steel

### Dimensions

Compatible Diameter, maximum	115.0 mm   4.5 in
Compatible Diameter, minimum	60.0 mm   2.4 in
Net Weight	6.0 kg   13.3 lb

### Regulatory Compliance/Certifications

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







## BSAMNT-SBS-2-2

**Side-by-Side Mounting Kit for these antennas: JAHH-65A/B/C, JAHH-45A, NHH-45A, SBNHH-1D45A/B**

- 4x4 MIMO capability at both UMTS and LTE band for faster data throughput
- Ensures consistent distance between the antennas for each site (2 inches / 50mm)
- Forces both antennas to point to the same boresight direction
- Designed to be attached to 2.4 - 4.5 in (60 - 115mm) OD pipes

### General Specifications

Application	Outdoor
Includes	Brackets   Hardware
Package Quantity	1

### Mechanical Specifications

Color	Silver
Material Type	Galvanized steel

### Dimensions

Compatible Diameter, maximum	115.0 mm   4.5 in
Compatible Diameter, minimum	60.0 mm   2.4 in
Net Weight	30.6 kg   67.4 lb

### Regulatory Compliance/Certifications

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



# 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.

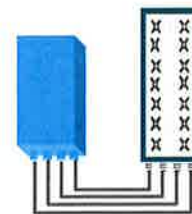


## FEATURES

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

## AirScale RRH 4T4R B5 160W AHCA

Capacity, performance, low total cost of ownership and investment protection

Nokia AirScale Remote Radio Head (RRH) AHCA supports band 5 - full band - along with 4x4 MIMO and 256QAM modulation to deliver higher data rates. It offers Nokia's unique book mounting for faster roll out and radio-integrated Passive Intermodulation (PIM) cancellation for enhanced network performance.

Furthermore, 4TX and 4RX paths in a single radio unit gives the flexibility to support 2T2R-2 sectors or 4T4R-single sector from a single unit, for cost-effective scaling of both coverage and capacity.

### Capacity and performance

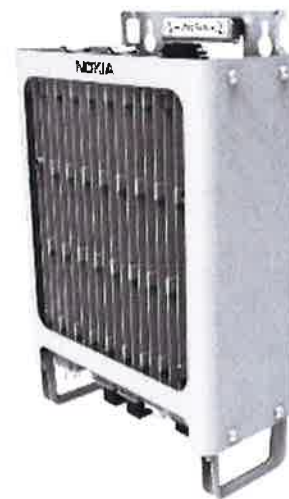
AirScale RRH 4T4R delivers 160 W (4x40 W) transmit power and can support 2x2 MIMO, 4x2 MIMO and 4x4 MIMO. The radio supports 256 QAM modulation in the downlink (DL) for up to 30 percent higher throughput. The Virtual Spectrum Analyzer feature enables both uplink and downlink spectrum to be analyzed.

### Low total cost of ownership

With up to two sectors in a single radio, light weight and zero-bolt book mounting, AirScale RRH 4T4R allows operators to achieve faster roll outs and more cost-effective installation and maintenance of radios and tower space.

### Investment protection

AirScale RRH 4T4R complements the AirScale System Module, offering a complete base station solution that is software upgradeable to 5G. AirScale System



Module offers 28 Gbps capacity that can be further enhanced by chaining more modules or through Cloud RAN. AirScale RRH is part of the AirScale Base Station portfolio, the next generation Nokia base station platform, and is backwards-compatible with the Nokia Flexi Multiradio 10 Base Station to best use an operator's existing investments.

Product name	AirScale RRH 4T4R B5 160W AHCA - 473966A
Supported frequency bands	3GPP band 5
Frequencies	DL 869-894MHz, UL 824-849MHz
Number of TX/RX ports	4/4
Instantaneous Bandwidth IBW	25MHz
Occupied Bandwidth OBW	25MHz
Output power	4T4R 40 W/ 2T4R 60W
Dimensions (mm) height x width x depth	337 x 295 x 165
Volume (liters)	16.4
Weight (kg)	16
Supply Voltage / Voltage Range	DC-48V / -36V to -60V
Typical Power Consumption	207 W (ETSI 24h Avg – 4x20W mode)
Antenna ports	4TX/4RX, 4.3-10+
Optical ports	2 x CPRI 9.8 Gbps
ALD control interfaces	AISG3.0 from ANT1, 2, 3, 4 and RET (Power supply ANT1 and ANT3)
Other interfaces	External alarm MDR-26 serial connector (4 inputs, 1 output) DC circular power connector
Operational temperature range	-40°C to 55°C (with no solar load)
Ingress protection class	IP65
Installation options	Pole or wall, RAS, vertical or horizontal book mount
Surge protection	Class II 5kA

Nokia is a registered trademark of Nokia Corporation. Other product and company names mentioned herein may be trademarks or trade names of their respective owners.

Nokia Oyj  
 Karaportti 3  
 FI-02610 Espoo  
 Finland  
 Tel. +358 (0) 10 44 88 000

Product code: SR1611002341EN (April)



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

**Product Description**

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

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

**Features/Benefits**

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



Figure 1: HYBRIFLEX Series

**Technical Specifications**

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

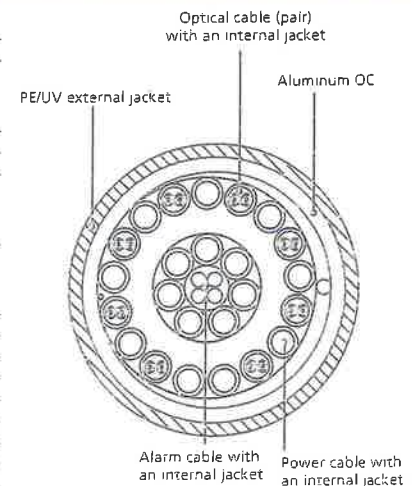


Figure 2: Construction Detail

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



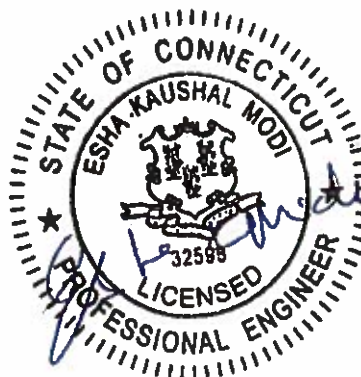
**AMERICAN TOWER®**  
CORPORATION

---

## Structural Analysis Report

**Structure** : 151.5 ft Monopole (De-stacked from 174.5')  
**ATC Site Name** : Brln - Berlin, CT  
**ATC Site Number** : 302483  
**Engineering Number** : OAA712549\_C3\_01  
**Proposed Carriers** : Verizon Wireless  
**Carrier Site Name** : Berlin 2 CT  
**Carrier Site Number** : 2552218  
**Site Location** : 260 Beckley Road  
Kensington, CT 06037-2419  
41.631722,-72.729900  
**County** : Hartford  
**Date** : October 4, 2017  
**Max Usage** : 100%  
**Result** : Pass\*

Prepared By:  
John D. Bigham, E.I.  
Structural Engineer III



Oct 4 2017 3:34 PM **cosign**

COA: D94317



**Table of Contents**

Introduction ..... 1

Supporting Documents ..... 1

Analysis ..... 1

Conclusion ..... 1

Existing and Reserved Equipment ..... 2

Structure Usages ..... 3

Foundations ..... 3

Deflection, Twist, and Sway ..... 3

Standard Conditions ..... 4

Calculations ..... Attached





**Introduction**

The purpose of this report is to summarize results of a structural analysis performed on the 151.5 ft monopole to reflect the changes proposed by Verizon Wireless.

**Supporting Documents**

<b>Tower Drawings</b>	ITT Meyer Type "B", dated July 21, 2001 Mapping by Smith Cullum Acq. #CT-0019, dated July 21, 2001 Mapping by ATC Report #0682, dated January 7, 2016
<b>Foundation Drawing</b>	SpectraSite Project #CT-0019, dated May 29, 2003
<b>Geotechnical Report</b>	Daniel G. Loucks Project #CT-0019, dated December 21, 2001
<b>Modifications</b>	Scientel Project #Berlin-CT0019, dated July 30, 2002 ATC Project #11912109, dated November 9, 2016*

\* The changes outlined by ATC Project # 11912109 must be completed in order for this analysis to be valid.

**Analysis**

The tower was analyzed using tnxTower version 7.0.7.0 analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/TIA-222.

<b>Basic Wind Speed:</b>	97 mph (3-Second Gust, Vasd) / 125 mph (3-second Gust, Vult)
<b>Basic Wind Speed w/ Ice:</b>	50 mph (3-Second Gust) w/ 1" radial ice concurrent
<b>Code:</b>	ANSI/TIA-222-G / 2012 IBC / 2016 Connecticut State Building Code
<b>Structure Class:</b>	II
<b>Exposure Category:</b>	B
<b>Topographic Category:</b>	1
<b>Crest Height:</b>	0 ft
<b>Spectral Response:</b>	Ss = 0.182, S1 = 0.063
<b>Site Class:</b>	D - Stiff Soil

**Conclusion**

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report. If the pending modifications cited in the Supporting Documents table are not completed prior to Verizon's installation, the results of this analysis are no longer valid, and Verizon should contact American Tower's Site Manager for further direction on how to proceed.

If you have any questions or require additional information, please contact American Tower via email at [Engineering@americantower.com](mailto:Engineering@americantower.com). Please include the American Tower site name, site number, and engineering number in the subject line for any questions.



**Existing and Reserved Equipment**

Elevation <sup>1</sup> (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
151.5	153.0	6	7" x 6" x 3" Diplexer	Platform w/ Handrails	(12) 1 1/4" Coax (4) 0.78" 8 AWG 6 (2) 0.39" Fiber Trunk (1) 3" conduit	AT&T Mobility
		6	Powerwave LGP21401			
		2	Raycap DC6-48-60-18-8F			
		6	Ericsson RRUS 11 (Band 12) (55 lb)			
		3	Ericsson RRUS-32			
		3	Powerwave 7770.00			
		3	KMW AM-X-CD-16-65-00T-RET			
		3	CCI OPA-65R-LCUU-H6			
142.0	142.0	3	Ericsson KRY 112 144/1	T-Arms	(6) 1 5/8" Coax	T-Mobile
		3	Ericsson AIR 21, 1.3 M, B2A B4P			
		3	Ericsson AIR 21 B4A/B12P-B5P 6FT			
		3	Ericsson RRUS 11 B12			
134.0	134.0	3	Alcatel-Lucent 800MHz 2X50W RRH w/ Filter	Flush	(4) 1 1/4" Hybriflex	Sprint Nextel
		6	Alcatel-Lucent 4x40W RRH			
		3	Alcatel-Lucent TD-RRH8x20			
128.0	128.0	3	RFS APXVTM14-C-I20			
		2	RFS APXVSP18-C-A20			
		1	RFS APXV9ERR18-C-A20			
117.5	116.0	2	RFS DB-T1-6Z-8AB-OZ	Low Profile Platform	(18) 1 5/8" Coax (2) 1 5/8" Fiber	Verizon
		3	Commscope LNX-6514DS-A1M			
		6	Antel LPA-80063-6CF-EDIN-X			
		3	Alcatel-Lucent RRH2X60-AWS			

**Equipment to be Removed**

Elevation <sup>1</sup> (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
117.5	115.0	3	Alcatel-Lucent RRH2X60-1900	-	-	Verizon
		3	Alcatel-Lucent RRH2x60 700			
		6	Commscope SBNHH-1D65B			

**Proposed Equipment**

Elevation <sup>1</sup> (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
117.5	116.0	3	Nokia AirScale RRH 4T4R B5 160W AHCA	Low Profile Platform	-	Verizon
		3	Alcatel-Lucent B25 RRH4x30			
		6	Commscope JAHH-65B-R3B			

<sup>1</sup>Mount elevation is defined as height above bottom of steel structure to the bottom of mount, RAD elevation is defined as center of antenna above ground level (AGL).



**Structure Usages\***

Structural Component	Controlling Usage	Pass/Fail
Anchor Bolts	75%	Pass
Shaft	68%	Pass
Base Plate	24%	Pass

**Foundations\***

Reaction Component	Analysis Reactions	% Of Usage
Moment (Kips-Ft)	3,624.5	92%
Axial (Kips)	45.6	100%
Shear (Kips)	33.8	60%
Anchor Moment (Kips-Ft)	2,920.0	92%

The structure base reactions resulting from this analysis were found to be acceptable through analysis based on geotechnical and foundation information, therefore no modification or reinforcement of the foundation will be required.

**Deflection and Sway\***

Antenna Elevation (ft)	Antenna	Carrier	Deflection (in)	Sway (Rotation) (°)
116.0	Nokia AirScale RRH 4T4R B5 160W AHCA	Verizon Wireless	13.235	1.041
	Alcatel-Lucent B25 RRH4x30			
	Commscope JAHH-65B-R3B			

\*Deflection, Twist and Sway was evaluated considering a design wind speed of 60 mph (3-Second Gust) per ANSI/TIA-222-G



## **Standard Conditions**

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessary limited, to:

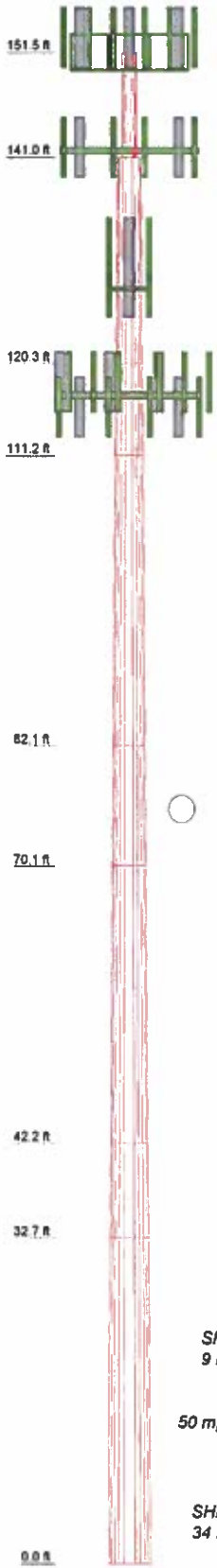
- Information supplied by the client regarding the structure itself, antenna, mounts and feed line loading on the structure and its components, or other relevant information.
- Information from drawings in the possession of American Tower Corporation, or generated by field inspections or measurements of the structure.

It is the responsibility of the client to ensure that the information provided to A.T. Engineering Service, PLLC and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and that their capacity has not significantly changed from the "as new" condition.

Unless explicitly agreed by both the client and American Tower Corporation, all services will be performed in accordance with the current revision of ANSI/TIA -222. The design basic wind speed will be determined based on the minimum basic wind speed as prescribed in ANSI/TIA-222. Although every effort is taken to ensure that the loading considered is adequate to meet the requirements of all applicable regulatory entities, we can provide no assurance to meet any other local and state codes or requirements. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement.

All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. A.T. Engineering Service, PLLC is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

Section	1	2	3	4	5	6	7	8
Length (ft)	10.50	20.67	8.14	28.11	12.02	27.82	9.53	32.71
Number of Sides	12	12	12	12	12	12	12	12
Thickness (in)	0.2400	0.3059	0.3063	0.3141	0.3804	0.4014	0.4706	0.4806
Top Dia (in)	17.1872	26.7630	31.5570	33.0280	36.3470	39.7110	43.9500	45.0640
Bot Dia (in)	17.7841	31.5570	33.0280	36.3470	39.7110	43.9500	45.0640	49.5520
Grade	A572-65							
Weight (K)	0.5	2.1	1.0	3.5	1.9	5.1	2.2	8.2



**DESIGNED APPURTENANCE LOADING**

TYPE	ELEVATION	TYPE	ELEVATION
(2) 7" x 6" x 3" Diplexer	151.5	800 MHz 2X50W RRH w/ Filter	128
(2) 7" x 6" x 3" Diplexer	151.5	4x40W RRH	128
(2) 7" x 6" x 3" Diplexer	151.5	4x40W RRH	128
(2) LGP21401	151.5	4x40W RRH	128
(2) LGP21401	151.5	4x40W RRH	128
(2) LGP21401	151.5	4x40W RRH	128
DC6-48-60-18-8F	151.5	4x40W RRH	128
DC6-48-60-18-8F	151.5	TD-RRHx20	128
(2) RRUS 11 (Band 12)	151.5	TD-RRHx20	128
(2) RRUS 11 (Band 12)	151.5	TD-RRHx20	128
(2) RRUS 11 (Band 12)	151.5	APXVTM14-C-I20	128
RRUS-32	151.5	APXVTM14-C-I20	128
RRUS-32	151.5	APXVTM14-C-I20	128
RRUS-32	151.5	APXVSP18-C-A20	128
7770.00	151.5	APXVSP18-C-A20	128
7770.00	151.5	APXV9ERR18-C-A20	128
7770.00	151.5	Flush Mount	128
AM-X-CD-16-65-00T-RET	151.5	RRH2X60-AWS	117.5
AM-X-CD-16-65-00T-RET	151.5	RRH2X60-AWS	117.5
AM-X-CD-16-65-00T-RET	151.5	RRH2X60-AWS	117.5
OPA-65R-LCUU-H6	151.5	DB-T1-62-8AB-0Z	117.5
OPA-65R-LCUU-H6	151.5	DB-T1-62-8AB-0Z	117.5
OPA-65R-LCUU-H6	151.5	LNx-6514DS-A1M	117.5
Flat Platform w/ Handrails	151.5	LNx-6514DS-A1M	117.5
KRY 112 144/1	142	LNx-6514DS-A1M	117.5
KRY 112 144/1	142	(2) LPA-80063-6CF-EDIN-X	117.5
KRY 112 144/1	142	(2) LPA-80063-6CF-EDIN-X	117.5
RRUS 11 B12	142	(2) LPA-80063-6CF-EDIN-X	117.5
RRUS 11 B12	142	AirScale RRH 4T4R B5 160W AHCA	117.5
RRUS 11 B12	142	AirScale RRH 4T4R B5 160W AHCA	117.5
AIR 21 1.3 M. B2A B4P	142	AirScale RRH 4T4R B5 160W AHCA	117.5
AIR 21 1.3 M. B2A B4P	142	B25 RRH4x30	117.5
AIR 21 1.3 M. B2A B4P	142	B25 RRH4x30	117.5
AIR 21 B4A/B12P-B5P 6R	142	B25 RRH4x30	117.5
AIR 21 B4A/B12P-B5P 6R	142	B25 RRH4x30	117.5
AIR 21 B4A/B12P-B5P 6R	142	(2) JAHH-65B-R3B	117.5
AIR 21 B4A/B12P-B5P 6R	142	(2) JAHH-65B-R3B	117.5
(3) T-Arms	142	(2) JAHH-65B-R3B	117.5
800 MHz 2X50W RRH w/ Filter	128	(2) JAHH-65B-R3B	117.5
800 MHz 2X50W RRH w/ Filter	128	Round Low Profile Platform	117.5

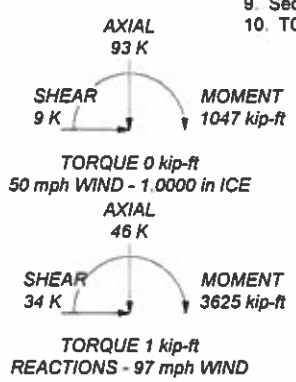
**MATERIAL STRENGTH**

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

**TOWER DESIGN NOTES**

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B 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 1.00 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. Combined pole and wrap structure.
9. Sections modeled to have equivalent inertia to pole and wrap combined.
10. TOWER RATING: 67.8%

ALL REACTIONS ARE FACTORED



<p><b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 468-5414</p>	Job: 302483 - Brln-Berlin
	Project: OAA712549
	Client: Verizon Wireless
	Code: TIA-222-G
	Path: C:\Users\john.berlin\Desktop\TIC\302483 - Brln-Berlin - Equipment.et
Drawn by: John Bigham	App'd:
Date: 10/04/17	Scale: NTS
Dwg No: E-1	



<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 2 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

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	151.50-141.00	10.50	0.00	12	17.1872	17.7841	0.2400	0.9600	A572-65 (65 ksi)
L2	141.00-120.33	20.67	0.00	12	28.7830	31.5570	0.3059	2.0000	A572-65 (65 ksi)
L3	120.33-111.19	9.14	0.00	12	31.5570	33.0280	0.3063	2.0000	A572-65 (65 ksi)
L4	111.19-82.08	29.11	0.00	12	33.0280	38.3470	0.3141	2.2000	A572-65 (65 ksi)
L5	82.08-70.06	12.02	0.00	12	38.3470	39.7110	0.3804	2.4000	A572-65 (65 ksi)
L6	70.06-42.24	27.82	0.00	12	39.7110	43.9500	0.4014	2.6000	A572-65 (65 ksi)
L7	42.24-32.71	9.53	0.00	12	43.9500	45.0640	0.4706	2.8000	A572-65 (65 ksi)
L8	32.71-0.00	32.71		12	45.0640	49.5520	0.4906	3.0000	A572-65 (65 ksi)

### Tapered Pole Properties

Section	Tip Dia. in	Area in <sup>2</sup>	I in <sup>4</sup>	r in	C in	I/C in <sup>3</sup>	J in <sup>4</sup>	I/Q in <sup>2</sup>	w in	w/t
L1	17.7935	13.0968	480.1168	6.0671	8.9030	53.9277	972.8469	6.4458	3.9630	16.512
	18.4115	13.5581	532.6554	6.2808	9.2122	57.8209	1079.3043	6.6729	4.1229	17.179
L2	29.7984	28.0499	2903.4114	10.1948	14.9096	194.7344	5883.0987	13.8053	6.8940	22.537
	32.6702	30.7823	3837.2246	11.1879	16.3465	234.7425	7775.2574	15.1501	7.6375	24.967
L3	32.6702	30.8221	3842.0947	11.1878	16.3465	235.0404	7785.1256	15.1697	7.6364	24.931
	34.1931	32.2730	4410.5870	11.7144	17.1085	257.8009	8937.0451	15.8838	8.0306	26.218
L4	34.1931	33.0869	4519.6700	11.7116	17.1085	264.1768	9158.0767	16.2844	8.0097	25.501
	39.6997	38.4666	7102.1213	13.6158	19.8637	357.5419	14390.8231	18.9321	9.4352	30.039
L5	39.6997	46.5048	8556.3285	13.5920	19.8637	430.7510	17337.4413	22.8883	9.2575	24.336
	41.1119	48.1756	9512.0483	14.0804	20.5703	462.4166	19273.9886	23.7106	9.6231	25.297
L6	41.1119	50.8080	10021.0923	14.0728	20.5703	487.1632	20305.4499	25.0061	9.5668	23.834
	45.5004	56.2869	13625.1654	15.5904	22.7661	598.4848	27608.2791	27.7027	10.7028	26.664
L7	45.5004	65.8857	15898.0688	15.5656	22.7661	698.3220	32213.7975	32.4270	10.5174	22.349
	46.6537	67.5738	17151.6341	15.9644	23.3432	734.7608	34753.8607	33.2578	10.8159	22.983
L8	46.6537	70.4140	17856.5130	15.9573	23.3432	764.9572	36182.1365	34.6556	10.7623	21.937
	51.3000	77.5039	23811.6328	17.5640	25.6679	927.6801	48248.8237	38.1450	11.9651	24.389

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 Multi.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 151.50-141.00				1	1	1			
L2 141.00-120.33				1	1	1			
L3 120.33-111.19				1	1	1			
L4 111.19-82.08				1	1	1			
L5 82.08-70.06				1	1	1			
L6 70.06-42.24				1	1	1			
L7 42.24-32.71				1	1	1			
L8 32.71-0.00				1	1	1			

<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 3 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

**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
***									
1 5/8" Coax	B	Surface Ar (CaAa)	117.50 - 5.00	18	6	-0.250 0.250	1.9800		1.04
1 5/8" Fiber	B	Surface Ar (CaAa)	117.50 - 5.00	2	2	0.250 0.300	1.9800		1.04
***									
4" Wrap Seams	A	Surface Af (CaAa)	141.00 - 0.00	1	1	0.000 0.000	4.0000	8.5000	0.00
4" Wrap Seams	B	Surface Af (CaAa)	141.00 - 0.00	1	1	0.000 0.000	4.0000	8.5000	0.00
4" Wrap Seams	C	Surface Af (CaAa)	141.00 - 0.00	1	1	0.000 0.000	4.0000	8.5000	0.00
***									

**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>1</sub> ft <sup>2</sup> /ft	Weight plf
***								
1 1/4" Coax	C	No	Inside Pole	151.50 - 5.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.66 0.66 0.66
0.78" 8 AWG 6	C	No	Inside Pole	151.50 - 5.00	4	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.54 0.54 0.54
0.39" Fiber Trunk	C	No	Inside Pole	151.50 - 5.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.25 0.25 0.25
3" Conduit	C	No	Inside Pole	151.50 - 5.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.78 1.78 1.78
1 5/8" Coax	C	No	Inside Pole	142.00 - 5.00	6	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	1.04 1.04 1.04
***								
1 1/4" Hybriflex	C	No	Inside Pole	128.00 - 5.00	4	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.66 0.66 0.66
***								
***								
***								
***								

**Feed Line/Linear Appurtenances Section Areas**



<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 4 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Tower Section	Tower Elevation ft	Face	$A_R$	$A_F$	$C_{A,1}$	$C_{A,1}$	Weight K
			ft <sup>2</sup>	ft <sup>2</sup>	In Face ft <sup>2</sup>	Out Face ft <sup>2</sup>	
L1	151.50-141.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.14
L2	141.00-120.33	A	0.000	0.000	13.780	0.000	0.00
		B	0.000	0.000	13.780	0.000	0.00
		C	0.000	0.000	13.780	0.000	0.40
L3	120.33-111.19	A	0.000	0.000	6.093	0.000	0.00
		B	0.000	0.000	16.088	0.000	0.13
		C	0.000	0.000	6.093	0.000	0.19
L4	111.19-82.08	A	0.000	0.000	19.407	0.000	0.00
		B	0.000	0.000	65.517	0.000	0.61
		C	0.000	0.000	19.407	0.000	0.62
L5	82.08-70.06	A	0.000	0.000	8.013	0.000	0.00
		B	0.000	0.000	27.053	0.000	0.25
		C	0.000	0.000	8.013	0.000	0.26
L6	70.06-42.24	A	0.000	0.000	18.547	0.000	0.00
		B	0.000	0.000	62.614	0.000	0.58
		C	0.000	0.000	18.547	0.000	0.59
L7	42.24-32.71	A	0.000	0.000	6.353	0.000	0.00
		B	0.000	0.000	21.449	0.000	0.20
		C	0.000	0.000	6.353	0.000	0.20
L8	32.71-0.00	A	0.000	0.000	21.807	0.000	0.00
		B	0.000	0.000	65.699	0.000	0.58
		C	0.000	0.000	21.807	0.000	0.59

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

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$	$A_F$	$C_{A,1}$	$C_{A,1}$	Weight K
				ft <sup>2</sup>	ft <sup>2</sup>	In Face ft <sup>2</sup>	Out Face ft <sup>2</sup>	
L1	151.50-141.00	A	2.321	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.14
L2	141.00-120.33	A	2.295	0.000	0.000	23.267	0.000	0.32
		B		0.000	0.000	23.267	0.000	0.32
		C		0.000	0.000	23.267	0.000	0.72
L3	120.33-111.19	A	2.267	0.000	0.000	10.238	0.000	0.14
		B		0.000	0.000	29.885	0.000	0.63
		C		0.000	0.000	10.238	0.000	0.33
L4	111.19-82.08	A	2.226	0.000	0.000	32.367	0.000	0.43
		B		0.000	0.000	122.404	0.000	2.67
		C		0.000	0.000	32.367	0.000	1.04
L5	82.08-70.06	A	2.174	0.000	0.000	13.240	0.000	0.17
		B		0.000	0.000	50.106	0.000	1.08
		C		0.000	0.000	13.240	0.000	0.43
L6	70.06-42.24	A	2.108	0.000	0.000	30.277	0.000	0.38
		B		0.000	0.000	114.687	0.000	2.43
		C		0.000	0.000	30.277	0.000	0.97
L7	42.24-32.71	A	2.025	0.000	0.000	10.214	0.000	0.12
		B		0.000	0.000	38.735	0.000	0.80
		C		0.000	0.000	10.214	0.000	0.32
L8	32.71-0.00	A	1.861	0.000	0.000	33.984	0.000	0.37
		B		0.000	0.000	114.640	0.000	2.23
		C		0.000	0.000	33.984	0.000	0.96

<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 5 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

**Feed Line Center of Pressure**

Section	Elevation <i>ft</i>	CP <sub>X</sub>	CP <sub>Z</sub>	CP <sub>X</sub>	CP <sub>Z</sub>
		<i>in</i>	<i>in</i>	<i>Ice</i> <i>in</i>	<i>Ice</i> <i>in</i>
L1	151.50-141.00	0.0000	0.0000	0.0000	0.0000
L2	141.00-120.33	0.0000	0.0000	0.0000	0.0000
L3	120.33-111.19	0.7810	-0.3248	0.9241	-0.3306
L4	111.19-82.08	1.0829	-0.4492	1.2313	-0.4398
L5	82.08-70.06	1.1236	-0.4651	1.3003	-0.4641
L6	70.06-42.24	1.1552	-0.4773	1.3545	-0.4839
L7	42.24-32.71	1.1835	-0.4883	1.4030	-0.5023
L8	32.71-0.00	1.0526	-0.4338	1.2907	-0.4653

**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
L2	25	4" Wrap Seams	120.33 - 141.00	1.0000	1.0000
L2	26	4" Wrap Seams	120.33 - 141.00	1.0000	1.0000
L2	27	4" Wrap Seams	120.33 - 141.00	1.0000	1.0000
L3	16	1 5/8" Coax	111.19 - 117.50	1.0000	1.0000
L3	17	1 5/8" Fiber	111.19 - 117.50	1.0000	1.0000
L3	25	4" Wrap Seams	111.19 - 120.33	1.0000	1.0000
L3	26	4" Wrap Seams	111.19 - 120.33	1.0000	1.0000
L3	27	4" Wrap Seams	111.19 - 120.33	1.0000	1.0000
L4	16	1 5/8" Coax	82.08 - 111.19	1.0000	1.0000
L4	17	1 5/8" Fiber	82.08 - 111.19	1.0000	1.0000
L4	25	4" Wrap Seams	82.08 - 111.19	1.0000	1.0000
L4	26	4" Wrap Seams	82.08 - 111.19	1.0000	1.0000
L4	27	4" Wrap Seams	82.08 - 111.19	1.0000	1.0000
L5	16	1 5/8" Coax	70.06 - 82.08	1.0000	1.0000
L5	17	1 5/8" Fiber	70.06 - 82.08	1.0000	1.0000
L5	25	4" Wrap Seams	70.06 - 82.08	1.0000	1.0000
L5	26	4" Wrap Seams	70.06 - 82.08	1.0000	1.0000
L5	27	4" Wrap Seams	70.06 - 82.08	1.0000	1.0000
L6	16	1 5/8" Coax	42.24 - 70.06	1.0000	1.0000
L6	17	1 5/8" Fiber	42.24 - 70.06	1.0000	1.0000
L6	25	4" Wrap Seams	42.24 - 70.06	1.0000	1.0000
L6	26	4" Wrap Seams	42.24 - 70.06	1.0000	1.0000
L6	27	4" Wrap Seams	42.24 - 70.06	1.0000	1.0000
L7	16	1 5/8" Coax	32.71 - 42.24	1.0000	1.0000
L7	17	1 5/8" Fiber	32.71 - 42.24	1.0000	1.0000
L7	25	4" Wrap Seams	32.71 - 42.24	1.0000	1.0000
L7	26	4" Wrap Seams	32.71 - 42.24	1.0000	1.0000
L7	27	4" Wrap Seams	32.71 - 42.24	1.0000	1.0000
L8	16	1 5/8" Coax	5.00 - 32.71	1.0000	1.0000
L8	17	1 5/8" Fiber	5.00 - 32.71	1.0000	1.0000
L8	25	4" Wrap Seams	0.00 - 32.71	1.0000	1.0000

<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 6 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Tower Section	Feed Line Record No	Description	Feed Line Segment Elev	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
L8	26	4" Wrap Seams	0.00 - 32.71	1.0000	1.0000
L8	27	4" Wrap Seams	0.00 - 32.71	1.0000	1.0000

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C <sub>d</sub> A <sub>1</sub> Front ft <sup>2</sup>	C <sub>d</sub> A <sub>1</sub> Side ft <sup>2</sup>	Weight K
***									
***AT&T OAA645075***									
(2) 7" x 6" x 3" Diplexer	A	From Leg	4.00	0.0000	151.50	No Ice	0.41	0.17	0.01
			0.00			1/2" Ice	0.43	0.23	0.01
			1.50			1" Ice	0.51	0.30	0.01
(2) 7" x 6" x 3" Diplexer	B	From Leg	4.00	0.0000	151.50	No Ice	0.41	0.17	0.01
			0.00			1/2" Ice	0.43	0.23	0.01
			1.50			1" Ice	0.51	0.30	0.01
(2) 7" x 6" x 3" Diplexer	C	From Leg	4.00	0.0000	151.50	No Ice	0.41	0.17	0.01
			0.00			1/2" Ice	0.43	0.23	0.01
			1.50			1" Ice	0.51	0.30	0.01
(2) LGP21401	A	From Leg	4.00	0.0000	151.50	No Ice	1.10	0.36	0.01
			0.00			1/2" Ice	1.45	0.48	0.02
			1.50			1" Ice	1.61	0.60	0.03
(2) LGP21401	B	From Leg	4.00	0.0000	151.50	No Ice	1.10	0.36	0.01
			0.00			1/2" Ice	1.45	0.48	0.02
			1.50			1" Ice	1.61	0.60	0.03
(2) LGP21401	C	From Leg	4.00	0.0000	151.50	No Ice	1.10	0.36	0.01
			0.00			1/2" Ice	1.45	0.48	0.02
			1.50			1" Ice	1.61	0.60	0.03
DC6-48-60-18-8F	B	From Leg	0.50	0.0000	151.50	No Ice	1.28	0.79	0.02
			0.00			1/2" Ice	1.27	1.27	0.04
			1.50			1" Ice	1.45	1.45	0.05
DC6-48-60-18-8F	C	From Leg	0.50	0.0000	151.50	No Ice	1.28	0.79	0.02
			0.00			1/2" Ice	1.27	1.27	0.04
			1.50			1" Ice	1.45	1.45	0.05
(2) RRUS 11 (Band 12)	A	From Leg	4.00	0.0000	151.50	No Ice	2.52	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			1.50			1" Ice	2.92	1.36	0.10
(2) RRUS 11 (Band 12)	B	From Leg	4.00	0.0000	151.50	No Ice	2.52	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			1.50			1" Ice	2.92	1.36	0.10
(2) RRUS 11 (Band 12)	C	From Leg	4.00	0.0000	151.50	No Ice	2.52	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			1.50			1" Ice	2.92	1.36	0.10
RRUS-32	A	From Leg	4.00	0.0000	151.50	No Ice	2.69	2.42	0.08
			0.00			1/2" Ice	3.56	2.64	0.10
			1.50			1" Ice	3.81	2.86	0.14
RRUS-32	B	From Leg	4.00	0.0000	151.50	No Ice	2.69	2.42	0.08
			0.00			1/2" Ice	3.56	2.64	0.10
			1.50			1" Ice	3.81	2.86	0.14
RRUS-32	C	From Leg	4.00	0.0000	151.50	No Ice	2.69	2.42	0.08
			0.00			1/2" Ice	3.56	2.64	0.10

<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	Job	302483 - Brln-Berlin	Page	7 of 31
	Project	OAA712549	Date	11:23:42 10/04/17
	Client	Verizon Wireless	Designed by	John.Bigham

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CMA Front ft²	CMA Side ft²	Weight K
7770.00	A	From Leg	1.50 4.00 0.00	0.0000	151.50	1" Ice 3.81 No Ice 5.51 1/2" Ice 6.31	2.86 2.93 3.27	0.14 0.04 0.07
7770.00	B	From Leg	1.50 4.00 0.00	0.0000	151.50	1" Ice 6.75 No Ice 5.51 1/2" Ice 6.31	3.63 2.93 3.27	0.11 0.04 0.07
7770.00	C	From Leg	1.50 4.00 0.00	0.0000	151.50	1" Ice 6.75 No Ice 5.51 1/2" Ice 6.31	3.63 2.93 3.27	0.11 0.04 0.07
AM-X-CD-16-65-00T-RET	A	From Leg	1.50 4.00 0.00	0.0000	151.50	1" Ice 6.75 No Ice 8.02 1/2" Ice 8.48	3.63 4.64 5.09	0.11 0.05 0.09
AM-X-CD-16-65-00T-RET	B	From Leg	1.50 4.00 0.00	0.0000	151.50	1" Ice 8.94 No Ice 8.02 1/2" Ice 8.48	5.54 4.64 5.09	0.15 0.05 0.09
AM-X-CD-16-65-00T-RET	C	From Leg	1.50 4.00 0.00	0.0000	151.50	1" Ice 8.94 No Ice 8.02 1/2" Ice 8.48	5.54 4.64 5.09	0.15 0.05 0.09
OPA-65R-LCUU-H6	A	From Leg	0.00 4.00 -3.00	0.0000	151.50	1" Ice 8.94 No Ice 9.66 1/2" Ice 10.13	5.54 5.52 5.97	0.15 0.07 0.13
OPA-65R-LCUU-H6	B	From Leg	1.50 4.00 -3.00	0.0000	151.50	1" Ice 10.61 No Ice 9.66 1/2" Ice 10.13	6.43 5.52 5.97	0.20 0.07 0.13
OPA-65R-LCUU-H6	C	From Leg	1.50 4.00 -3.00	0.0000	151.50	1" Ice 10.61 No Ice 9.66 1/2" Ice 10.13	6.43 5.52 5.97	0.20 0.07 0.13
Flat Platform w/ Handrails	C	None	1.50	0.0000	151.50	1" Ice 10.61 No Ice 42.40 1/2" Ice 48.40	6.43 42.40 48.40	0.20 2.00 2.45
***						1" Ice 54.40	54.40	2.90
KRY 112 144/1	A	From Leg	0.00 4.00 0.00	0.0000	142.00	No Ice 0.41 1/2" Ice 0.43 1" Ice 0.51	0.16 0.21 0.28	0.01 0.01 0.02
KRY 112 144/1	B	From Leg	0.00 4.00 0.00	0.0000	142.00	No Ice 0.41 1/2" Ice 0.43 1" Ice 0.51	0.16 0.21 0.28	0.01 0.01 0.02
KRY 112 144/1	C	From Leg	0.00 4.00 0.00	0.0000	142.00	No Ice 0.41 1/2" Ice 0.43 1" Ice 0.51	0.16 0.21 0.28	0.01 0.01 0.02
RRUS 11 B12	C	From Leg	0.00 4.00 0.00	0.0000	142.00	No Ice 2.79 1/2" Ice 3.00 1" Ice 3.21	1.19 1.34 1.50	0.05 0.07 0.10
RRUS 11 B12	B	From Leg	0.00 4.00 0.00	0.0000	142.00	No Ice 2.79 1/2" Ice 3.00 1" Ice 3.21	1.19 1.34 1.50	0.05 0.07 0.10
RRUS 11 B12	C	From Leg	0.00 4.00 0.00	0.0000	142.00	No Ice 2.79 1/2" Ice 3.00 1" Ice 3.21	1.19 1.34 1.50	0.05 0.07 0.10
AIR 21, 1.3 M, B2A B4P	A	From Leg	0.00 4.00 0.00	0.0000	142.00	No Ice 6.05 1/2" Ice 6.42 1" Ice 6.80	4.36 4.70 5.06	0.08 0.12 0.17
AIR 21, 1.3 M, B2A B4P	B	From Leg	0.00 4.00 0.00	0.0000	142.00	No Ice 6.05 1/2" Ice 6.42 1" Ice 6.80	4.36 4.70 5.06	0.08 0.12 0.17
AIR 21, 1.3 M, B2A B4P	C	From Leg	0.00 4.00	0.0000	142.00	No Ice 6.05	4.36	0.08

<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	Job	302483 - Brln-Berlin	Page	8 of 31
	Project	OAA712549	Date	11:23:42 10/04/17
	Client	Verizon Wireless	Designed by	John.Bigham

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	CMA		Weight	
			Horz	Lateral	Vert			Front	Side		
			ft	ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
			0.00				1/2" Ice	6.42	4.70	0.12	
			0.00				1" Ice	6.80	5.06	0.17	
AIR 21 B4A/B12P-B5P 6ft	A	From Leg	4.00			0.0000	142.00	No Ice	10.61	8.90	0.13
			2.00					1/2" Ice	12.16	9.50	0.20
			0.00					1" Ice	12.79	10.11	0.28
AIR 21 B4A/B12P-B5P 6ft	B	From Leg	4.00			0.0000	142.00	No Ice	10.61	8.90	0.13
			2.00					1/2" Ice	12.16	9.50	0.20
			0.00					1" Ice	12.79	10.11	0.28
AIR 21 B4A/B12P-B5P 6ft	C	From Leg	4.00			0.0000	142.00	No Ice	10.61	8.90	0.13
			2.00					1/2" Ice	12.16	9.50	0.20
			0.00					1" Ice	12.79	10.11	0.28
(3) T-Arms	C	None				0.0000	142.00	No Ice	17.20	17.20	0.33
								1/2" Ice	24.50	24.50	0.45
								1" Ice	31.80	31.80	0.57
***											
800 MHz 2X50W RRH w/ Filter	A	From Leg	1.00			0.0000	128.00	No Ice	2.06	1.93	0.06
			0.00					1/2" Ice	2.24	2.11	0.09
			-4.00					1" Ice	2.43	2.29	0.11
800 MHz 2X50W RRH w/ Filter	B	From Leg	1.00			0.0000	128.00	No Ice	2.06	1.93	0.06
			0.00					1/2" Ice	2.24	2.11	0.09
			-4.00					1" Ice	2.43	2.29	0.11
800 MHz 2X50W RRH w/ Filter	C	From Leg	1.00			0.0000	128.00	No Ice	2.06	1.93	0.06
			0.00					1/2" Ice	2.24	2.11	0.09
			-4.00					1" Ice	2.43	2.29	0.11
4x40W RRH	A	From Leg	1.00			0.0000	128.00	No Ice	3.26	3.80	0.09
			0.00					1/2" Ice	3.14	4.06	0.12
			4.00					1" Ice	3.39	4.34	0.15
4x40W RRH	C	From Leg	1.00			0.0000	128.00	No Ice	3.26	3.80	0.09
			0.00					1/2" Ice	3.14	4.06	0.12
			4.00					1" Ice	3.39	4.34	0.15
4x40W RRH	B	From Leg	1.00			0.0000	128.00	No Ice	3.26	3.80	0.09
			0.00					1/2" Ice	3.14	4.06	0.12
			4.00					1" Ice	3.39	4.34	0.15
4x40W RRH	A	From Face	1.00			0.0000	128.00	No Ice	3.26	3.80	0.09
			0.00					1/2" Ice	3.14	4.06	0.12
			4.00					1" Ice	3.39	4.34	0.15
4x40W RRH	B	From Face	1.00			0.0000	128.00	No Ice	3.26	3.80	0.09
			0.00					1/2" Ice	3.14	4.06	0.12
			4.00					1" Ice	3.39	4.34	0.15
4x40W RRH	C	From Face	1.00			0.0000	128.00	No Ice	3.26	3.80	0.09
			0.00					1/2" Ice	3.14	4.06	0.12
			4.00					1" Ice	3.39	4.34	0.15
TD-RRH8x20	A	From Face	1.00			0.0000	128.00	No Ice	3.69	1.40	0.07
			0.00					1/2" Ice	4.59	1.61	0.09
			-4.00					1" Ice	4.88	1.82	0.12
TD-RRH8x20	B	From Face	1.00			0.0000	128.00	No Ice	3.69	1.40	0.07
			0.00					1/2" Ice	4.59	1.61	0.09
			-4.00					1" Ice	4.88	1.82	0.12
TD-RRH8x20	C	From Face	1.00			0.0000	128.00	No Ice	3.69	1.40	0.07
			0.00					1/2" Ice	4.59	1.61	0.09
			-4.00					1" Ice	4.88	1.82	0.12
APXVTM14-C-120	A	From Leg	1.00			0.0000	128.00	No Ice	6.34	3.61	0.05
			0.00					1/2" Ice	6.72	3.97	0.09
			0.00					1" Ice	7.10	4.33	0.14
APXVTM14-C-120	B	From Leg	1.00			0.0000	128.00	No Ice	6.34	3.61	0.05
			0.00					1/2" Ice	6.72	3.97	0.09

<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b>	302483 - Brln-Berlin	<b>Page</b>	9 of 31
	<b>Project</b>	OAA712549	<b>Date</b>	11:23:42 10/04/17
	<b>Client</b>	Verizon Wireless	<b>Designed by</b>	John.Bigham

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A1</sub>		Weight	
			Horz	Lateral			Front	Side		
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
APXVTM14-C-I20	C	From Leg	0.00		0.0000	128.00	1" Ice	7.10	4.33	0.14
			1.00				No Ice	6.24	3.61	0.05
			0.00				1/2" Ice	6.72	3.97	0.09
APXVSPP18-C-A20	A	From Leg	0.00		0.0000	128.00	1" Ice	7.10	4.33	0.14
			1.00				No Ice	8.02	5.28	0.06
			0.00				1/2" Ice	8.48	5.74	0.11
APXVSPP18-C-A20	B	From Leg	4.00		0.0000	128.00	1" Ice	8.94	6.20	0.16
			1.00				No Ice	8.02	5.28	0.06
			0.00				1/2" Ice	8.48	5.74	0.11
APXV9ERR18-C-A20	C	From Leg	4.00		0.0000	128.00	1" Ice	8.94	6.20	0.16
			1.00				No Ice	8.02	5.81	0.06
			0.00				1/2" Ice	8.48	6.27	0.11
Flush Mount	C	None	4.00		0.0000	128.00	1" Ice	8.94	6.73	0.17
							No Ice	0.00	0.00	0.00
							1/2" Ice	0.00	0.00	0.00
***										
RRH2X60-AWS	A	From Leg	4.00		0.0000	117.50	No Ice	1.88	1.49	0.04
			0.00				1/2" Ice	2.40	1.67	0.06
			1.00				1" Ice	2.61	1.86	0.08
RRH2X60-AWS	B	From Leg	4.00		0.0000	117.50	No Ice	1.88	1.49	0.04
			0.00				1/2" Ice	2.40	1.67	0.06
			1.00				1" Ice	2.61	1.86	0.08
RRH2X60-AWS	C	From Leg	4.00		0.0000	117.50	No Ice	1.88	1.49	0.04
			0.00				1/2" Ice	2.40	1.67	0.06
			1.00				1" Ice	2.61	1.86	0.08
DB-T1-6Z-8AB-0Z	B	From Leg	0.50		0.0000	117.50	No Ice	4.80	2.00	0.04
			0.00				1/2" Ice	5.07	2.19	0.08
			1.00				1" Ice	5.35	2.39	0.12
DB-T1-6Z-8AB-0Z	C	From Leg	0.50		0.0000	117.50	No Ice	4.80	2.00	0.04
			0.00				1/2" Ice	5.07	2.19	0.08
			1.00				1" Ice	5.35	2.39	0.12
LNX-6514DS-A1M	A	From Leg	4.00		0.0000	117.50	No Ice	8.17	5.41	0.04
			0.00				1/2" Ice	8.63	5.86	0.09
			1.00				1" Ice	9.10	6.33	0.15
LNX-6514DS-A1M	B	From Leg	4.00		0.0000	117.50	No Ice	8.17	5.41	0.04
			0.00				1/2" Ice	8.63	5.86	0.09
			1.00				1" Ice	9.10	6.33	0.15
LNX-6514DS-A1M	C	From Leg	4.00		0.0000	117.50	No Ice	8.17	5.41	0.04
			0.00				1/2" Ice	8.63	5.86	0.09
			1.00				1" Ice	9.10	6.33	0.15
(2) LPA-80063-6CF-EDIN-X	A	From Leg	4.00		0.0000	117.50	No Ice	9.73	9.06	0.03
			-2.00				1/2" Ice	11.07	9.61	0.10
			1.00				1" Ice	11.64	10.16	0.18
(2) LPA-80063-6CF-EDIN-X	B	From Leg	4.00		0.0000	117.50	No Ice	9.73	9.06	0.03
			-2.00				1/2" Ice	11.07	9.61	0.10
			1.00				1" Ice	11.64	10.16	0.18
(2) LPA-80063-6CF-EDIN-X	C	From Leg	4.00		0.0000	117.50	No Ice	9.73	9.06	0.03
			-2.00				1/2" Ice	11.07	9.61	0.10
			1.00				1" Ice	11.64	10.16	0.18
AirScale RRH 4T4R B5 160W AHCA	A	From Leg	4.00		0.0000	117.50	No Ice	1.29	0.65	0.04
			0.00				1/2" Ice	1.75	0.88	0.05
			-1.50				1" Ice	2.21	1.11	0.06
AirScale RRH 4T4R B5 160W AHCA	B	From Leg	4.00		0.0000	117.50	No Ice	1.29	0.65	0.04
			0.00				1/2" Ice	1.75	0.88	0.05
			-1.50				1" Ice	2.21	1.11	0.06
AirScale RRH 4T4R B5	C	From Leg	4.00		0.0000	117.50	No Ice	1.29	0.65	0.04

<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	Job	302483 - Brln-Berlin	Page	10 of 31
	Project	OAA712549	Date	11:23:42 10/04/17
	Client	Verizon Wireless	Designed by	John.Bigham

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CMA Front ft <sup>2</sup>	CMA Side ft <sup>2</sup>	Weight K
160W AHCA			0 00		1/2" Ice	1.75	0.88	0.05
B25 RRH4x30	A	From Leg	-1.50	0.0000	117.50	1" Ice	2.21	1.11
			4.00		No Ice	2.12	1.29	0.05
			0.00		1/2" Ice	2.31	1.45	0.07
			-1.50		1" Ice	2.50	1.61	0.09
B25 RRH4x30	B	From Leg	4.00	0.0000	117.50	No Ice	2.12	1.29
			0.00		1/2" Ice	2.31	1.45	0.07
			-1.50		1" Ice	2.50	1.61	0.09
B25 RRH4x30	C	From Leg	4.00	0.0000	117.50	No Ice	2.12	1.29
			0.00		1/2" Ice	2.31	1.45	0.07
			-1.50		1" Ice	2.50	1.61	0.09
(2) JAHH-65B-R3B	A	From Leg	4.00	0.0000	117.50	No Ice	9.11	5.98
			0.00		1/2" Ice	9.58	6.44	0.12
			-1.50		1" Ice	10.05	6.91	0.18
(2) JAHH-65B-R3B	B	From Leg	4.00	0.0000	117.50	No Ice	9.11	5.98
			0.00		1/2" Ice	9.58	6.44	0.12
			-1.50		1" Ice	10.05	6.91	0.18
(2) JAHH-65B-R3B	C	From Leg	4.00	0.0000	117.50	No Ice	9.11	5.98
			0.00		1/2" Ice	9.58	6.44	0.12
			-1.50		1" Ice	10.05	6.91	0.18
Round Low Profile Platform	C	None		0.0000	117.50	No Ice	21.70	21.70
					1/2" Ice	27.20	27.20	1.70
					1" Ice	32.70	32.70	1.90
***								
***								

### Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M <sub>x</sub> kip-ft	Sum of Overturning Moments, M <sub>y</sub> kip-ft	Sum of Torques kip-ft
Leg Weight	24.47					
Bracing Weight	0.00					
Total Member Self-Weight	24.47					
Total Weight	38.02					
Wind 90 deg - No Ice		21.13	-0.01	-2.79	-2183.37	0.30
Member Ice	15.96					
Total Weight Ice	85.80			-4.21	-13.25	
Wind 90 deg - Ice		9.27	-0.00	-4.65	-947.83	0.13
Total Weight	38.02			-1.58	-3.77	
Wind 90 deg - Service		7.23	-0.00	0.04	-745.95	0.10

### Load Combinations

Comb. No.	Description
-----------	-------------

<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 11 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 90 deg - No Ice
3	0.9 Dead+1.6 Wind 90 deg - No Ice
4	1.2 Dead+1.0 Ice+1.0 Temp
5	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
6	Dead+Wind 90 deg - Service

### Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	151.5 - 141	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	4	-15.98	0.74	-1.49
			Max. Mx	2	-5.14	-68.29	-0.40
			Max. My	4	-15.98	0.74	-1.49
			Max. Vy	2	9.02	-68.29	-0.40
			Max. Vx	2	-0.02	-68.29	-0.40
			Max. Torque	2			-0.37
L2	141 - 120.33	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	4	-26.79	0.65	-1.51
			Max. Mx	2	-9.20	-309.13	-0.02
			Max. My	4	-24.72	0.71	-1.51
			Max. Vy	2	14.66	-309.13	-0.02
			Max. Vx	2	-0.02	-189.32	-0.10
			Max. Torque	2			-0.39
L3	120.33 - 111.19	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	4	-40.47	-0.17	-1.65
			Max. Mx	2	-13.39	-486.22	0.13
			Max. My	4	-38.30	0.38	-1.88
			Max. Vy	2	21.72	-486.22	0.13
			Max. Vx	2	-0.01	-486.22	0.13
			Max. Torque	2			-0.51
L4	111.19 - 82.08	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	4	-52.18	-4.13	-0.02
			Max. Mx	2	-19.32	-1171.31	1.09
			Max. My	4	-40.47	-0.17	-1.65
			Max. Vy	2	25.33	-1171.31	1.09
			Max. Vx	2	-0.01	-1171.31	1.09
			Max. Torque	2			-0.51
L5	82.08 - 70.06	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	4	-57.63	-5.86	0.70
			Max. Mx	2	-22.39	-1484.93	1.50
			Max. My	2	-22.39	-1484.93	1.50
			Max. Vy	2	26.80	-1484.93	1.50
			Max. Vx	2	-0.01	-1484.93	1.50
			Max. Torque	2			-0.51
L6	70.06 - 42.24	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	4	-70.94	-9.94	2.43
			Max. Mx	2	-30.34	-2274.74	2.50
			Max. My	5	-70.87	-663.87	2.81
			Max. Vy	2	29.92	-2274.74	2.50
			Max. Vx	2	-0.01	-2274.74	2.50
			Max. Torque	2			-0.51
L7	42.24 - 32.71	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	4	-75.99	-11.35	3.04
			Max. Mx	2	-33.60	-2564.76	2.85
			Max. My	5	-75.93	-747.68	3.45



<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 12 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L8	32.71 - 0	Pole	Max. Vy	2	30.88	-2564.76	2.85
			Max. Vx	2	-0.01	-2564.76	2.85
			Max. Torque	2			-0.51
			Max. Tension	1	0.00	0.00	0.00
			Max. Compression	4	-93.40	-15.16	4.73
			Max. Mx	2	-45.61	-3624.52	3.97
			Max. My	5	-93.40	-1046.87	5.29
			Max. Vy	2	33.84	-3624.52	3.97
			Max. Vx	2	-0.01	-2615.43	2.91
			Max. Torque	2			-0.51

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	4	93.40	0.00	-0.00
	Max. H <sub>x</sub>	4	93.40	0.00	-0.00
	Max. H <sub>z</sub>	2	45.63	-33.81	0.01
	Max. M <sub>x</sub>	5	5.29	-9.27	0.00
	Max. M <sub>z</sub>	2	3624.52	-33.81	0.01
	Max. Torsion	1	0.00	-0.00	0.00
	Min. Vert	3	34.22	-33.81	0.01
	Min. H <sub>x</sub>	2	45.63	-33.81	0.01
	Min. H <sub>z</sub>	4	93.40	0.00	-0.00
	Min. M <sub>x</sub>	1	1.58	-0.00	0.00
	Min. M <sub>z</sub>	1	3.77	-0.00	0.00
	Min. Torsion	2	-0.51	-33.81	0.01

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>y</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	38.02	0.00	-0.00	-1.58	-3.77	0.00
1.2 Dead+1.6 Wind 90 deg - No Ice	45.63	33.81	-0.01	-3.97	-3624.52	0.51
0.9 Dead+1.6 Wind 90 deg - No Ice	34.22	33.81	-0.01	-3.44	-3587.55	0.50
1.2 Dead+1.0 Ice+1.0 Temp	93.40	-0.00	0.00	-4.73	-15.16	0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	93.40	9.27	-0.00	-5.29	-1046.87	0.16
Dead+Wind 90 deg - Service	38.02	7.23	-0.00	-2.04	-774.27	0.11

### Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-38.02	0.00	-0.00	38.02	0.00	0.000%

<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 13 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Load Comb	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
2	33.81	-45.63	-0.01	-33.81	45.63	0.01	0.006%
3	33.81	-34.22	-0.01	-33.81	34.22	0.01	0.010%
4	0.00	-93.40	0.00	0.00	93.40	-0.00	0.001%
5	9.27	-93.40	-0.00	-9.27	93.40	0.00	0.000%
6	7.23	-38.02	-0.00	-7.23	38.02	0.00	0.003%

### Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	16	0.00006227	0.00008064
3	Yes	15	0.00008686	0.00013433
4	Yes	12	0.00000001	0.00004311
5	Yes	19	0.00000001	0.00008186
6	Yes	15	0.00010453	0.00003655

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	151.5 - 141	21.106	6	1.1609	0.0008
L2	141 - 120.33	18.586	6	1.1187	0.0007
L3	120.33 - 111.19	13.856	6	1.0550	0.0005
L4	111.19 - 82.08	11.884	6	1.0028	0.0004
L5	82.08 - 70.06	6.475	6	0.7549	0.0002
L6	70.06 - 42.24	4.706	6	0.6479	0.0002
L7	42.24 - 32.71	1.696	6	0.3800	0.0001
L8	32.71 - 0	1.021	6	0.2953	0.0001

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
151.50	(2) 7" x 6" x 3" Diplexer	6	21.106	1.1609	0.0008	31349
142.00	KRY 112 144/1	6	18.824	1.1221	0.0007	17273
128.00	800 MHz 2X50W RRH w/ Filter	6	15.571	1.0824	0.0006	14880
117.50	RRH2X60-AWS	6	13.235	1.0411	0.0005	11721

### Maximum Tower Deflections - Design Wind

<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	Job	302483 - Brln-Berlin	Page	14 of 31
	Project	OAA712549	Date	11:23:42 10/04/17
	Client	Verizon Wireless	Designed by	John.Bigham

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	151.5 - 141	98.886	2	5.4491	0.0037
L2	141 - 120.33	87.075	2	5.2500	0.0032
L3	120.33 - 111.19	64.908	2	4.9489	0.0024
L4	111.19 - 82.08	55.668	2	4.7031	0.0020
L5	82.08 - 70.06	30.329	2	3.5386	0.0011
L6	70.06 - 42.24	22.043	2	3.0366	0.0008
L7	42.24 - 32.71	7.943	2	1.7802	0.0004
L8	32.71 - 0	4.784	2	1.3832	0.0003

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
151.50	(2) 7" x 6" x 3" Diplexer	2	98.886	5.4491	0.0037	6744
142.00	KRY 112 144/I	2	88.188	5.2663	0.0032	3715
128.00	800 MHz 2X50W RRH w/ Filter	2	72.944	5.0783	0.0027	3199
117.50	RRH2X60-AWS	2	62.001	4.8836	0.0023	2522

### Compression Checks

### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	KI/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio P <sub>u</sub> / φP <sub>n</sub>							
L1	151.5 - 150.45	TP17 7841x17.1872x0.24	10.50	0.00	0.0	13.1429	-3.41	968.76	0.004							
	150.45 - 149.4						13.1891	-3.47	972.16	0.004						
	149.4 - 148.35						13.2352	-3.54	975.57	0.004						
	148.35 - 147.3						13.2813	-3.61	978.97	0.004						
	147.3 - 146.25						13.3274	-3.68	982.37	0.004						
	146.25 - 145.2						13.3736	-3.75	985.77	0.004						
	145.2 - 144.15						13.4197	-3.82	989.17	0.004						
	144.15 - 143.1						13.4658	-3.88	992.57	0.004						
	143.1 - 142.05						13.5120	-3.96	995.97	0.004						
	142.05 - 141						13.5581	-5.14	999.37	0.005						
	L2						141 - 139.967	TP31 557x28.783x0.3059	20.67	0.00	0.0	28.1865	-5.28	2029.49	0.003	
							139.967 - 138.933						28.3231	-5.41	2035.95	0.003
							138.933 - 137.899						28.4597	-5.55	2042.37	0.003
							137.899 - 136.866						28.5964	-5.68	2048.77	0.003
136.866 - 135.833		28.7330	-5.82	2055.13	0.003											
135.833 - 134.799		28.8696	-5.96	2061.46	0.003											
134.799 - 133.766		29.0062	-6.09	2067.75	0.003											
133.766 - 132.733		29.1428	-6.23	2074.01	0.003											
132.733 - 131.700																
131.700 - 130.667																

<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b>	302483 - Brln-Berlin	<b>Page</b>	15 of 31
	<b>Project</b>	OAA712549	<b>Date</b>	11:23:42 10/04/17
	<b>Client</b>	Verizon Wireless	<b>Designed by</b>	John.Bigham

Section No.	Elevation ft	Size	L ft	L <sub>n</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>v</sub> K	φP <sub>n</sub> K	Ratio P <sub>v</sub> / φP <sub>n</sub>
	132.732								
	132.732 -					29.2795	-6.37	2080.25	0.003
	131.699								
	131.699 -					29.4161	-6.51	2086.44	0.003
	130.665								
	130.665 -					29.5527	-6.65	2092.61	0.003
	129.631								
	129.631 -					29.6893	-6.79	2098.74	0.003
	128.598								
	128.598 -					29.8259	-8.17	2104.84	0.004
	127.565								
	127.565 -					29.9626	-8.32	2110.91	0.004
	126.531								
	126.531 -					30.0992	-8.46	2116.94	0.004
	125.498								
	125.498 -					30.2358	-8.61	2122.95	0.004
	124.464								
	124.464 -					30.3724	-8.75	2128.91	0.004
	123.43								
	123.43 -					30.5090	-8.90	2134.85	0.004
	122.397								
	122.397 -					30.6457	-9.05	2140.76	0.004
	121.364								
	121.364 -					30.7823	-9.20	2146.63	0.004
	120.33								
L3	120.33 -	TP33 028x31.557x0 3063	9.14	0.00	0.0	30.9833	-9.36	2157.40	0.004
	119.314								
	119.314 -					31.1445	-9.53	2164.25	0.004
	118.299								
	118.299 -					31.3057	-12.34	2171.06	0.006
	117.283								
	117.283 -					31.4669	-12.52	2177.82	0.006
	116.268								
	116.268 -					31.6281	-12.69	2184.54	0.006
	115.252								
	115.252 -					31.7893	-12.86	2191.21	0.006
	114.237								
	114.237 -					31.9505	-13.04	2197.84	0.006
	113.221								
	113.221 -					32.1118	-13.22	2204.42	0.006
	112.206								
	112.206 -					32.2730	-13.39	2210.95	0.006
	111.19								
L4	111.19 -	TP38 347x33.028x0 3141	29.11	0.00	0.0	33.3559	-13.67	2301.21	0.006
	109.735								
	109.735 -					33.6249	-13.94	2312.28	0.006
	108.279								
	108.279 -					33.8939	-14.22	2323.22	0.006
	106.824								
	106.824 -					34.1628	-14.50	2334.05	0.006
	105.368								
	105.368 -					34.4318	-14.78	2344.76	0.006
	103.912								
	103.912 -					34.7008	-15.07	2355.35	0.006
	102.457								
	102.457 -					34.9698	-15.36	2365.82	0.006
	101.001								
	101.001 -					35.2388	-15.65	2376.16	0.007
	99.546								
	99.546 -					35.5077	-15.94	2386.39	0.007



<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b>	302483 - Brln-Berlin	<b>Page</b>	17 of 31
	<b>Project</b>	OAA712549	<b>Date</b>	11:23:42 10/04/17
	<b>Client</b>	Verizon Wireless	<b>Designed by</b>	John.Bigham

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio P <sub>u</sub> / φP <sub>n</sub>
	60.323 - 58.932					52.9995	-25.47	3696.05	0.007
	58.932 - 57.541					53.2735	-25.86	3707.75	0.007
	57.541 - 56.15					53.5474	-26.26	3719.38	0.007
	56.15 - 54.759					53.8214	-26.66	3730.93	0.007
	54.759 - 53.368					54.0953	-27.06	3742.41	0.007
	53.368 - 51.977					54.3693	-27.46	3753.81	0.007
	51.977 - 50.586					54.6432	-27.87	3765.13	0.007
	50.586 - 49.195					54.9172	-28.28	3776.38	0.007
	49.195 - 47.804					55.1911	-28.68	3787.55	0.008
	47.804 - 46.413					55.4651	-29.10	3798.65	0.008
	46.413 - 45.022					55.7390	-29.51	3809.67	0.008
	45.022 - 43.631					56.0130	-29.92	3820.61	0.008
L7	43.631 - 42.24	TP45 064x43.95x0.4706	9.53	0.00	0.0	56.2869	-30.34	3831.48	0.008
	42.24 - 41.1811					66.0733	-30.71	4772.92	0.006
	41.1811 - 40.1222					66.2609	-31.06	4781.89	0.006
	40.1222 - 39.0633					66.4484	-31.42	4790.82	0.007
	39.0633 - 38.0044					66.6360	-31.78	4799.74	0.007
	38.0044 - 36.9456					66.8235	-32.15	4808.62	0.007
	36.9456 - 35.8867					67.0111	-32.51	4817.48	0.007
	35.8867 - 34.8278					67.1987	-32.87	4826.32	0.007
	34.8278 - 33.7689					67.3862	-33.24	4835.13	0.007
	33.7689 - 32.71					67.5738	-33.60	4843.91	0.007
L8	32.71 - 31.0745	TP49 552x45.064x0.4906	32.71	0.00	0.0	70.7685	-34.17	5137.08	0.007
	31.0745 - 29.439					71.1230	-34.75	5154.25	0.007
	29.439 - 27.8035					71.4775	-35.33	5171.34	0.007
	27.8035 - 26.168					71.8320	-35.91	5188.34	0.007
	26.168 - 24.5325					72.1865	-36.49	5205.26	0.007
	24.5325 - 22.897					72.5410	-37.08	5222.10	0.007
	22.897 - 21.2615					72.8955	-37.67	5238.84	0.007
	21.2615 - 19.626					73.2500	-38.26	5255.51	0.007
	19.626 - 17.9905					73.6045	-38.86	5272.08	0.007
	17.9905 - 17.9905					73.9589	-39.46	5288.58	0.007

<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	Job	302483 - Brln-Berlin	Page	18 of 31
	Project	OAA712549	Date	11:23:42 10/04/17
	Client	Verizon Wireless	Designed by	John.Bigham

Section No.	Elevation ft	Size	L ft	L <sub>n</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>u</sub> K	Ratio P <sub>u</sub> / φP <sub>u</sub>
	16 355								
	16 355 - 14 7195					74 3134	-40 06	5304.98	0.008
	14 7195 - 13 084					74 6679	-40 66	5321.30	0.008
	13 084 - 11 4485					75 0224	-41.27	5337.54	0.008
	11 4485 - 9 813					75 3769	-41.88	5353.69	0.008
	9 813 - 8 1775					75 7314	-42.50	5369.76	0.008
	8 1775 - 6 542					76 0859	-43 11	5385.74	0.008
	6 542 - 4 9065					76 4404	-43 73	5401.63	0.008
	4 9065 - 3 271					76 7949	-44 35	5417.44	0.008
	3 271 - 1 6355					77 1494	-44 98	5433.17	0.008
	1 6355 - 0					77 5039	-45.61	5448.80	0.008

### Pole Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>ux</sub> kip-ft	Ratio M <sub>ux</sub> / φM <sub>ux</sub>	M <sub>uy</sub> kip-ft	φM <sub>uy</sub> kip-ft	Ratio M <sub>uy</sub> / φM <sub>uy</sub>
L1	151.5 - 150.45	TP17 7841x17 1872x0.24	9 63	333.61	0 029	0 00	333.61	0 000
	150.45 - 149.4		15 55	335 97	0 046	0 00	335 97	0 000
	149.4 - 148.35		21 55	338 34	0 064	0 00	338 34	0 000
	148.35 - 147.3		27 64	340 72	0 081	0 00	340 72	0 000
	147.3 - 146.25		33 80	343 10	0 099	0 00	343 10	0 000
	146.25 - 145.2		40 04	345 50	0 116	0 00	345 50	0 000
	145.2 - 144.15		46 36	347 90	0 133	0 00	347 90	0 000
	144.15 - 143.1		52 76	350 32	0 151	0 00	350 32	0 000
	143.1 - 142.05		59 24	352 74	0 168	0 00	352 74	0 000
	142.05 - 141		68 29	355 17	0 192	0 00	355 17	0 000
L2	141 - 139 967	TP31 557x28 783x0 3059	77 67	1179 91	0 066	0 00	1179 91	0 000
	139 967 - 138 933		87 17	1189 47	0 073	0 00	1189 47	0 000
	138 933 - 137 899		96 81	1199 03	0 081	0 00	1199 03	0 000
	137 899 - 136 866		106 57	1208 63	0 088	0 00	1208 63	0 000
	136 866 - 135 833		116 46	1218 22	0 096	0 00	1218 22	0 000
	135 833 - 134 799		126 48	1227 85	0 103	0 00	1227 85	0 000
	134 799 - 133 766		136 63	1237 49	0 110	0 00	1237 49	0 000
	133 766 - 132 732		146 91	1247 14	0 118	0 00	1247 14	0 000
	132 732 - 131 699		157 32	1256 82	0 125	0 00	1256 82	0 000
	131 699 - 130 665		167 85	1266 50	0 133	0 00	1266 50	0 000
	130 665 - 129 631		178 52	1276 20	0 140	0 00	1276 20	0 000
	129 631 - 128 598		189 32	1285 92	0 147	0 00	1285 92	0 000
	128 598 - 127 565		206 39	1295 65	0 159	0 00	1295 65	0 000

<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 19 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Section No.	Elevation ft	Size	$M_{xx}$	$\phi M_{xx}$	Ratio	$M_{yy}$	$\phi M_{yy}$	Ratio
			kip-ft	kip-ft	$\frac{M_{xx}}{\phi M_{xx}}$	kip-ft	kip-ft	$\frac{M_{yy}}{\phi M_{yy}}$
	127.565 - 126.531		220.67	1305.39	0.169	0.00	1305.39	0.000
	126.531 - 125.498		235.08	1315.16	0.179	0.00	1315.16	0.000
	125.498 - 124.464		249.62	1324.93	0.188	0.00	1324.93	0.000
	124.464 - 123.43		264.30	1334.72	0.198	0.00	1334.72	0.000
	123.43 - 122.397		279.11	1344.53	0.208	0.00	1344.53	0.000
	122.397 - 121.364		294.05	1354.33	0.217	0.00	1354.33	0.000
	121.364 - 120.33		309.13	1364.17	0.227	0.00	1364.17	0.000
L3	120.33 - 119.314	TP33 028x31.557x0.3063	324.10	1378.22	0.235	0.00	1378.22	0.000
	119.314 - 118.299		339.20	1389.85	0.244	0.00	1389.85	0.000
	118.299 - 117.283		356.06	1401.51	0.254	0.00	1401.51	0.000
	117.283 - 116.268		377.43	1413.18	0.267	0.00	1413.18	0.000
	116.268 - 115.252		398.93	1424.88	0.280	0.00	1424.88	0.000
	115.252 - 114.237		420.56	1436.58	0.293	0.00	1436.58	0.000
	114.237 - 113.221		442.32	1448.30	0.305	0.00	1448.30	0.000
	113.221 - 112.206		464.20	1460.03	0.318	0.00	1460.03	0.000
	112.206 - 111.19		486.22	1471.78	0.330	0.00	1471.78	0.000
L4	111.19 - 109.735	TP38 347x33.028x0.3141	518.01	1543.70	0.336	0.00	1543.70	0.000
	109.735 - 108.279		550.05	1563.75	0.352	0.00	1563.75	0.000
	108.279 - 106.824		582.35	1583.84	0.368	0.00	1583.84	0.000
	106.824 - 105.368		614.90	1603.97	0.383	0.00	1603.97	0.000
	105.368 - 103.912		647.72	1624.13	0.399	0.00	1624.13	0.000
	103.912 - 102.457		680.79	1644.33	0.414	0.00	1644.33	0.000
	102.457 - 101.001		714.12	1664.55	0.429	0.00	1664.55	0.000
	101.001 - 99.546		747.71	1684.81	0.444	0.00	1684.81	0.000
	99.546 - 98.0905		781.56	1705.09	0.458	0.00	1705.09	0.000
	98.0905 - 96.635		815.67	1725.40	0.473	0.00	1725.40	0.000
	96.635 - 95.1795		850.04	1745.73	0.487	0.00	1745.73	0.000
	95.1795 - 93.724		884.67	1766.09	0.501	0.00	1766.09	0.000
	93.724 - 92.2685		919.58	1786.46	0.515	0.00	1786.46	0.000
	92.2685 - 90.813		954.74	1806.85	0.528	0.00	1806.85	0.000



<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 20 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Section No.	Elevation ft	Size	$M_{xx}$	$\phi M_{xx}$	Ratio	$M_{yy}$	$\phi M_{yy}$	Ratio		
			kip-ft	kip-ft	$\frac{M_{xx}}{\phi M_{xx}}$	kip-ft	kip-ft	$\frac{M_{yy}}{\phi M_{yy}}$		
L5	90.813 - 89.3575	TP39.711x38.347x0.3804	990.17	1827.26	0.542	0.00	1827.26	0.000		
	89.3575 - 87.902		1025.87	1847.68	0.555	0.00	1847.68	0.000		
	87.902 - 86.4465		1061.83	1868.12	0.568	0.00	1868.12	0.000		
	86.4465 - 84.991		1098.06	1888.56	0.581	0.00	1888.56	0.000		
	84.991 - 83.5355		1134.55	1909.01	0.594	0.00	1909.01	0.000		
	83.5355 - 82.08		1171.32	1929.46	0.607	0.00	1929.46	0.000		
	82.08 - 81.0783		1196.78	2537.84	0.472	0.00	2537.84	0.000		
	81.0783 - 80.0767		1222.35	2550.23	0.479	0.00	2550.23	0.000		
	80.0767 - 79.075		1248.06	2562.64	0.487	0.00	2562.64	0.000		
	79.075 - 78.0733		1273.88	2575.06	0.495	0.00	2575.06	0.000		
	78.0733 - 77.0717		1299.83	2587.48	0.502	0.00	2587.48	0.000		
	77.0717 - 76.07		1325.91	2599.92	0.510	0.00	2599.92	0.000		
	76.07 - 75.0683		1352.11	2612.37	0.518	0.00	2612.37	0.000		
	75.0683 - 74.0667		1378.43	2624.82	0.525	0.00	2624.82	0.000		
	74.0667 - 73.065		1404.88	2637.30	0.533	0.00	2637.30	0.000		
	73.065 - 72.0633		1431.43	2649.78	0.540	0.00	2649.78	0.000		
	72.0633 - 71.0617		1458.13	2662.27	0.548	0.00	2662.27	0.000		
	71.0617 - 70.06		1484.93	2674.77	0.555	0.00	2674.77	0.000		
	L6		70.06 - 68.669	TP43.95x39.711x0.4014	1522.36	2901.79	0.525	0.00	2901.79	0.000
			68.669 - 67.278		1560.01	2927.40	0.533	0.00	2927.40	0.000
67.278 - 65.887		1597.87	2953.04		0.541	0.00	2953.04	0.000		
65.887 - 64.496		1635.95	2978.73		0.549	0.00	2978.73	0.000		
64.496 - 63.105		1674.25	3004.47		0.557	0.00	3004.47	0.000		
63.105 - 61.714		1712.76	3030.24		0.565	0.00	3030.24	0.000		
61.714 - 60.323		1751.49	3056.06		0.573	0.00	3056.06	0.000		
60.323 - 58.932		1790.44	3081.92		0.581	0.00	3081.92	0.000		
58.932 - 57.541		1829.61	3107.81		0.589	0.00	3107.81	0.000		
57.541 - 56.15		1868.99	3133.74		0.596	0.00	3133.74	0.000		
56.15 - 54.759		1908.59	3159.72		0.604	0.00	3159.72	0.000		
54.759 - 53.368		1948.42	3185.72		0.612	0.00	3185.72	0.000		
53.368 - 51.977		1988.45	3211.76		0.619	0.00	3211.76	0.000		
51.977 -		2028.70	3237.83		0.627	0.00	3237.83	0.000		

<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 21 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Section No.	Elevation ft	Size	$M_{ux}$ kip-ft	$\phi M_{ux}$ kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	$M_{uy}$ kip-ft	$\phi M_{uy}$ kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
	50.586							
	50.586 - 49.195		2069.17	3263.94	0.634	0.00	3263.94	0.000
	49.195 - 47.804		2109.85	3290.07	0.641	0.00	3290.07	0.000
	47.804 - 46.413		2150.75	3316.25	0.649	0.00	3316.25	0.000
	46.413 - 45.022		2191.87	3342.45	0.656	0.00	3342.45	0.000
	45.022 - 43.631		2233.20	3368.68	0.663	0.00	3368.68	0.000
L7	43.631 - 42.24	TP45 064x43 95x0 4706	2274.75	3394.93	0.670	0.00	3394.93	0.000
	42.24 - 41.1811		2306.52	4227.81	0.546	0.00	4227.81	0.000
	41.1811 - 40.1222		2338.40	4247.90	0.550	0.00	4247.90	0.000
	40.1222 - 39.0633		2370.40	4268.02	0.555	0.00	4268.02	0.000
	39.0633 - 38.0044		2402.51	4288.15	0.560	0.00	4288.15	0.000
	38.0044 - 36.9456		2434.73	4308.32	0.565	0.00	4308.32	0.000
	36.9456 - 35.8867		2467.07	4328.49	0.570	0.00	4328.49	0.000
	35.8867 - 34.8278		2499.53	4348.70	0.575	0.00	4348.70	0.000
	34.8278 - 33.7689		2532.08	4368.93	0.580	0.00	4368.93	0.000
	33.7689 - 32.71		2564.77	4389.17	0.584	0.00	4389.17	0.000
L8	32.71 - 31.0745	TP49 552x45 064x0 4906	2615.43	4674.31	0.560	0.00	4674.31	0.000
	31.0745 - 29.439		2666.36	4713.68	0.566	0.00	4713.68	0.000
	29.439 - 27.8035		2717.53	4753.13	0.572	0.00	4753.13	0.000
	27.8035 - 26.168		2768.94	4792.67	0.578	0.00	4792.67	0.000
	26.168 - 24.5325		2820.61	4832.28	0.584	0.00	4832.28	0.000
	24.5325 - 22.897		2872.52	4871.97	0.590	0.00	4871.97	0.000
	22.897 - 21.2615		2924.68	4911.73	0.595	0.00	4911.73	0.000
	21.2615 - 19.626		2977.07	4951.57	0.601	0.00	4951.57	0.000
	19.626 - 17.9905		3029.72	4991.48	0.607	0.00	4991.48	0.000
	17.9905 - 16.355		3082.60	5031.46	0.613	0.00	5031.46	0.000
	16.355 - 14.7195		3135.72	5071.51	0.618	0.00	5071.51	0.000
	14.7195 - 13.084		3189.09	5111.63	0.624	0.00	5111.63	0.000
	13.084 - 11.4485		3242.70	5151.82	0.629	0.00	5151.82	0.000
	11.4485 - 9.813		3296.54	5192.07	0.635	0.00	5192.07	0.000
	9.813 - 8.1775		3350.62	5232.39	0.640	0.00	5232.39	0.000
	8.1775 - 6.542		3404.93	5272.77	0.646	0.00	5272.77	0.000

<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	Job	302483 - Brln-Berlin	Page	22 of 31
	Project	OAA712549	Date	11:23:42 10/04/17
	Client	Verizon Wireless	Designed by	John.Bigham

Section No.	Elevation ft	Size	$M_{ux}$ kip-ft	$\phi M_{ux}$ kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	$M_{uy}$ kip-ft	$\phi M_{uy}$ kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
	6.542 - 4.9065		3459.48	5313.23	0.651	0.00	5313.23	0.000
	4.9065 - 3.271		3514.26	5353.73	0.656	0.00	5353.73	0.000
	3.271 - 1.6355		3569.28	5394.31	0.662	0.00	5394.31	0.000
	1.6355 - 0		3624.53	5434.94	0.667	0.00	5434.94	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual $V_n$ K	$\phi V_n$ K	Ratio $\frac{V_n}{\phi V_n}$	Actual $T_n$ kip-ft	$\phi T_n$ kip-ft	Ratio $\frac{T_n}{\phi T_n}$
L1	151.5 - 150.45	TP17.7841x17.1872x0.24	5.60	484.38	0.012	0.04	676.45	0.000
	150.45 - 149.4		5.68	486.08	0.012	0.04	681.24	0.000
	149.4 - 148.35		5.76	487.78	0.012	0.04	686.04	0.000
	148.35 - 147.3		5.83	489.48	0.012	0.04	690.87	0.000
	147.3 - 146.25		5.91	491.18	0.012	0.04	695.71	0.000
	146.25 - 145.2		5.98	492.88	0.012	0.04	700.57	0.000
	145.2 - 144.15		6.06	494.58	0.012	0.04	705.44	0.000
	144.15 - 143.1		6.13	496.28	0.012	0.04	710.33	0.000
	143.1 - 142.05		6.21	497.98	0.012	0.04	715.24	0.000
	142.05 - 141		9.02	499.68	0.018	0.37	720.16	0.001
L2	141 - 139.967	TP31.557x28.783x0.3059	9.14	1014.74	0.009	0.37	2392.49	0.000
	139.967 - 138.933		9.26	1017.97	0.009	0.37	2411.87	0.000
	138.933 - 137.899		9.39	1021.19	0.009	0.37	2431.27	0.000
	137.899 - 136.866		9.51	1024.38	0.009	0.37	2450.71	0.000
	136.866 - 135.833		9.63	1027.56	0.009	0.37	2470.18	0.000
	135.833 - 134.799		9.76	1030.73	0.009	0.37	2489.70	0.000
	134.799 - 133.766		9.88	1033.88	0.010	0.37	2509.24	0.000
	133.766 - 132.732		10.01	1037.01	0.010	0.37	2528.82	0.000
	132.732 - 131.699		10.13	1040.12	0.010	0.37	2548.43	0.000
	131.699 - 130.665		10.26	1043.22	0.010	0.37	2568.07	0.000
	130.665 - 129.631		10.39	1046.30	0.010	0.37	2587.73	0.000
	129.631 - 128.598		10.52	1049.37	0.010	0.37	2607.44	0.000
	128.598 - 127.565		13.75	1052.42	0.013	0.39	2627.18	0.000
	127.565 - 126.531		13.88	1055.45	0.013	0.39	2646.93	0.000
	126.531 - 125.498		14.01	1058.47	0.013	0.39	2666.72	0.000
	125.498 - 124.464		14.14	1061.47	0.013	0.39	2686.55	0.000
	124.464 - 123.43		14.27	1064.46	0.013	0.39	2706.39	0.000
	123.43 - 122.397		14.40	1067.43	0.013	0.39	2726.27	0.000
	122.397 - 121.364		14.53	1070.38	0.014	0.39	2746.18	0.000



<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	Job	302483 - Brln-Berlin	Page	24 of 31
	Project	OAA712549	Date	11:23:42 10/04/17
	Client	Verizon Wireless	Designed by	John.Bigham

Section No.	Elevation ft	Size	Actual $V_n$ K	$\phi V_n$ K	Ratio $V_n$ $\phi V_n$	Actual $T_u$ kip-ft	$\phi T_u$ kip-ft	Ratio $T_u$ $\phi T_u$								
L5	82.08	TP39 711x38.347x0.3804	25.45	1638.99	0.016	0.51	5145.96	0.000								
	82.08 - 81.0783															
	81.0783 - 80.0767															
	80.0767 - 79.075															
	79.075 - 78.0733															
	78.0733 - 77.0717															
	77.0717 - 76.07															
	76.07 - 75.0683															
	75.0683 - 74.0667															
	74.0667 - 73.065															
	73.065 - 72.0633															
	72.0633 - 71.0617															
	71.0617 - 70.06															
	L6								70.06 - 68.669	TP43 95x39.711x0.4014	26.95	1805.99	0.015	0.51	5883.93	0.000
									68.669 - 67.278							
									67.278 - 65.887							
65.887 - 64.496																
64.496 - 63.105																
63.105 - 61.714																
61.714 - 60.323																
60.323 - 58.932																
58.932 - 57.541																
57.541 - 56.15																
56.15 - 54.759																
54.759 - 53.368																
53.368 - 51.977																
51.977 - 50.586																
50.586 - 49.195																
49.195 - 47.804																
47.804 - 46.413																
46.413 - 45.022																
45.022 - 43.631																

<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b>	302483 - Brln-Berlin	<b>Page</b>	25 of 31
	<b>Project</b>	OAA712549	<b>Date</b>	11:23:42 10/04/17
	<b>Client</b>	Verizon Wireless	<b>Designed by</b>	John.Bigham

Section No.	Elevation ft	Size	Actual $V_n$ K	$\phi V_n$ K	Ratio $V_n$ $\phi V_n$	Actual $T_n$ kip-ft	$\phi T_n$ kip-ft	Ratio $T_n$ $\phi T_n$		
L7	43.631 - 42.24	TP45 064x43.95x0.4706	29.92	1915.74	0.016	0.51	6883.86	0.000		
	42.24 - 41.1811		30.02	2386.46	0.013	0.51	8572.67	0.000		
	41.1811 - 40.1222		30.13	2390.94	0.013	0.51	8613.42	0.000		
	40.1222 - 39.0633		30.24	2395.41	0.013	0.51	8654.17	0.000		
	39.0633 - 38.0044		30.35	2399.87	0.013	0.51	8695.00	0.000		
	38.0044 - 36.9456		30.46	2404.31	0.013	0.51	8735.92	0.000		
	36.9456 - 35.8867		30.56	2408.74	0.013	0.51	8776.83	0.000		
	35.8867 - 34.8278		30.67	2413.16	0.013	0.51	8817.83	0.000		
	34.8278 - 33.7689		30.77	2417.56	0.013	0.51	8858.83	0.000		
	33.7689 - 32.71		30.88	2421.95	0.013	0.51	8899.83	0.000		
	L8		32.71 - 31.0745	TP49 552x45.064x0.4906	31.04	2568.54	0.012	0.51	9478.00	0.000
			31.0745 - 29.439		31.19	2577.13	0.012	0.51	9557.92	0.000
			29.439 - 27.8035		31.34	2585.67	0.012	0.51	9637.92	0.000
			27.8035 - 26.168		31.50	2594.17	0.012	0.51	9718.00	0.000
26.168 - 24.5325		31.65	2602.63		0.012	0.51	9798.33	0.000		
24.5325 - 22.897		31.80	2611.05		0.012	0.51	9878.83	0.000		
22.897 - 21.2615		31.95	2619.42		0.012	0.51	9959.42	0.000		
21.2615 - 19.626		32.10	2627.75		0.012	0.51	10040.25	0.000		
19.626 - 17.9905		32.24	2636.04		0.012	0.51	10121.17	0.000		
17.9905 - 16.355		32.39	2644.29		0.012	0.51	10202.25	0.000		
16.355 - 14.7195		32.54	2652.49		0.012	0.51	10283.42	0.000		
14.7195 - 13.084		32.69	2660.65		0.012	0.51	10364.75	0.000		
13.084 - 11.4485		32.83	2668.77		0.012	0.51	10446.25	0.000		
11.4485 - 9.813		32.98	2676.85		0.012	0.51	10527.92	0.000		
9.813 - 8.1775		33.12	2684.88		0.012	0.51	10609.67	0.000		
8.1775 - 6.542		33.27	2692.87		0.012	0.51	10691.58	0.000		
6.542 - 4.9065		33.41	2700.82		0.012	0.51	10773.58	0.000		
4.9065 - 3.271	33.55	2708.72	0.012	0.51	10855.67	0.000				
3.271 - 1.6355	33.70	2716.58	0.012	0.51	10938.00	0.000				
1.6355 - 0	33.84	2724.40	0.012	0.51	11020.33	0.000				

**Pole Interaction Design Data**

<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5114	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 26 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

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	151.5 - 150.45	0.004	0.029	0.000	0.012	0.000	0.033	1.000	4.8.2 ✓
	150.45 - 149.4	0.004	0.046	0.000	0.012	0.000	0.050	1.000	4.8.2 ✓
	149.4 - 148.35	0.004	0.064	0.000	0.012	0.000	0.067	1.000	4.8.2 ✓
	148.35 - 147.3	0.004	0.081	0.000	0.012	0.000	0.085	1.000	4.8.2 ✓
	147.3 - 146.25	0.004	0.099	0.000	0.012	0.000	0.102	1.000	4.8.2 ✓
	146.25 - 145.2	0.004	0.116	0.000	0.012	0.000	0.120	1.000	4.8.2 ✓
	145.2 - 144.15	0.004	0.133	0.000	0.012	0.000	0.137	1.000	4.8.2 ✓
	144.15 - 143.1	0.004	0.151	0.000	0.012	0.000	0.155	1.000	4.8.2 ✓
	143.1 - 142.05	0.004	0.168	0.000	0.012	0.000	0.172	1.000	4.8.2 ✓
	142.05 - 141	0.005	0.192	0.000	0.018	0.001	0.198	1.000	4.8.2 ✓
L2	141 - 139.967	0.003	0.066	0.000	0.009	0.000	0.069	1.000	4.8.2 ✓
	139.967 - 138.933	0.003	0.073	0.000	0.009	0.000	0.076	1.000	4.8.2 ✓
	138.933 - 137.899	0.003	0.081	0.000	0.009	0.000	0.084	1.000	4.8.2 ✓
	137.899 - 136.866	0.003	0.088	0.000	0.009	0.000	0.091	1.000	4.8.2 ✓
	136.866 - 135.833	0.003	0.096	0.000	0.009	0.000	0.099	1.000	4.8.2 ✓
	135.833 - 134.799	0.003	0.103	0.000	0.009	0.000	0.106	1.000	4.8.2 ✓
	134.799 - 133.766	0.003	0.110	0.000	0.010	0.000	0.113	1.000	4.8.2 ✓
	133.766 - 132.732	0.003	0.118	0.000	0.010	0.000	0.121	1.000	4.8.2 ✓
	132.732 - 131.699	0.003	0.125	0.000	0.010	0.000	0.128	1.000	4.8.2 ✓
	131.699 - 130.665	0.003	0.133	0.000	0.010	0.000	0.136	1.000	4.8.2 ✓
	130.665 - 129.631	0.003	0.140	0.000	0.010	0.000	0.143	1.000	4.8.2 ✓
	129.631 - 128.598	0.003	0.147	0.000	0.010	0.000	0.151	1.000	4.8.2 ✓
	128.598 - 127.565	0.004	0.159	0.000	0.013	0.000	0.163	1.000	4.8.2 ✓
	127.565 - 126.531	0.004	0.169	0.000	0.013	0.000	0.173	1.000	4.8.2 ✓
	126.531 - 125.498	0.004	0.179	0.000	0.013	0.000	0.183	1.000	4.8.2 ✓
	125.498 - 124.464	0.004	0.188	0.000	0.013	0.000	0.193	1.000	4.8.2 ✓

<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 27 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_n$	$M_{ux}$	$M_{uy}$	$V_x$	$T_x$			
	124 464 - 123.43	0.004	0.198	0.000	0.013	0.000	0.202	1.000	4.8.2 ✓
	123.43 - 122.397	0.004	0.208	0.000	0.013	0.000	0.212	1.000	4.8.2 ✓
	122.397 - 121.364	0.004	0.217	0.000	0.014	0.000	0.222	1.000	4.8.2 ✓
	121.364 - 120.33	0.004	0.227	0.000	0.014	0.000	0.231	1.000	4.8.2 ✓
L3	120.33 - 119.314	0.004	0.235	0.000	0.014	0.000	0.240	1.000	4.8.2 ✓
	119.314 - 118.299	0.004	0.244	0.000	0.014	0.000	0.249	1.000	4.8.2 ✓
	118.299 - 117.283	0.006	0.254	0.000	0.019	0.000	0.260	1.000	4.8.2 ✓
	117.283 - 116.268	0.006	0.267	0.000	0.019	0.000	0.273	1.000	4.8.2 ✓
	116.268 - 115.252	0.006	0.280	0.000	0.019	0.000	0.286	1.000	4.8.2 ✓
	115.252 - 114.237	0.006	0.293	0.000	0.019	0.000	0.299	1.000	4.8.2 ✓
	114.237 - 113.221	0.006	0.305	0.000	0.020	0.000	0.312	1.000	4.8.2 ✓
	113.221 - 112.206	0.006	0.318	0.000	0.020	0.000	0.324	1.000	4.8.2 ✓
	112.206 - 111.19	0.006	0.330	0.000	0.020	0.000	0.337	1.000	4.8.2 ✓
L4	111.19 - 109.735	0.006	0.336	0.000	0.019	0.000	0.342	1.000	4.8.2 ✓
	109.735 - 108.279	0.006	0.352	0.000	0.019	0.000	0.358	1.000	4.8.2 ✓
	108.279 - 106.824	0.006	0.368	0.000	0.019	0.000	0.374	1.000	4.8.2 ✓
	106.824 - 105.368	0.006	0.383	0.000	0.019	0.000	0.390	1.000	4.8.2 ✓
	105.368 - 103.912	0.006	0.399	0.000	0.019	0.000	0.405	1.000	4.8.2 ✓
	103.912 - 102.457	0.006	0.414	0.000	0.019	0.000	0.421	1.000	4.8.2 ✓
	102.457 - 101.001	0.006	0.429	0.000	0.019	0.000	0.436	1.000	4.8.2 ✓
	101.001 - 99.546	0.007	0.444	0.000	0.019	0.000	0.451	1.000	4.8.2 ✓
	99.546 - 98.0905	0.007	0.458	0.000	0.020	0.000	0.465	1.000	4.8.2 ✓
	98.0905 - 96.635	0.007	0.473	0.000	0.020	0.000	0.480	1.000	4.8.2 ✓
	96.635 - 95.1795	0.007	0.487	0.000	0.020	0.000	0.494	1.000	4.8.2 ✓
	95.1795 - 93.724	0.007	0.501	0.000	0.020	0.000	0.508	1.000	4.8.2 ✓
	93.724 -	0.007	0.515	0.000	0.020	0.000	0.522	1.000	4.8.2 ✓



<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 28 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_u$	$M_{ux}$	$M_{uy}$	$V_u$	$T_u$			
		$\phi P_n$	$\phi M_{ux}$	$\phi M_{uy}$	$\phi V_n$	$\phi T_n$			
	92.2685						✓		
	92.2685 - 90.813	0.007	0.528	0.000	0.020	0.000	0.536	1.000	4.8.2 ✓
	90.813 - 89.3575	0.007	0.542	0.000	0.020	0.000	0.550	1.000	4.8.2 ✓
	89.3575 - 87.902	0.007	0.555	0.000	0.020	0.000	0.563	1.000	4.8.2 ✓
	87.902 - 86.4465	0.007	0.568	0.000	0.020	0.000	0.576	1.000	4.8.2 ✓
	86.4465 - 84.991	0.008	0.581	0.000	0.020	0.000	0.589	1.000	4.8.2 ✓
	84.991 - 83.5355	0.008	0.594	0.000	0.020	0.000	0.602	1.000	4.8.2 ✓
	83.5355 - 82.08	0.008	0.607	0.000	0.020	0.000	0.615	1.000	4.8.2 ✓
L5	82.08 - 81.0783	0.006	0.472	0.000	0.016	0.000	0.478	1.000	4.8.2 ✓
	81.0783 - 80.0767	0.006	0.479	0.000	0.016	0.000	0.486	1.000	4.8.2 ✓
	80.0767 - 79.075	0.006	0.487	0.000	0.016	0.000	0.493	1.000	4.8.2 ✓
	79.075 - 78.0733	0.006	0.495	0.000	0.016	0.000	0.501	1.000	4.8.2 ✓
	78.0733 - 77.0717	0.006	0.502	0.000	0.016	0.000	0.509	1.000	4.8.2 ✓
	77.0717 - 76.07	0.006	0.510	0.000	0.016	0.000	0.517	1.000	4.8.2 ✓
	76.07 - 75.0683	0.006	0.518	0.000	0.016	0.000	0.524	1.000	4.8.2 ✓
	75.0683 - 74.0667	0.006	0.525	0.000	0.016	0.000	0.532	1.000	4.8.2 ✓
	74.0667 - 73.065	0.006	0.533	0.000	0.016	0.000	0.539	1.000	4.8.2 ✓
	73.065 - 72.0633	0.007	0.540	0.000	0.016	0.000	0.547	1.000	4.8.2 ✓
	72.0633 - 71.0617	0.007	0.548	0.000	0.016	0.000	0.555	1.000	4.8.2 ✓
	71.0617 - 70.06	0.007	0.555	0.000	0.016	0.000	0.562	1.000	4.8.2 ✓
L6	70.06 - 68.669	0.006	0.525	0.000	0.015	0.000	0.531	1.000	4.8.2 ✓
	68.669 - 67.278	0.006	0.533	0.000	0.015	0.000	0.540	1.000	4.8.2 ✓
	67.278 - 65.887	0.006	0.541	0.000	0.015	0.000	0.548	1.000	4.8.2 ✓
	65.887 - 64.496	0.007	0.549	0.000	0.015	0.000	0.556	1.000	4.8.2 ✓
	64.496 - 63.105	0.007	0.557	0.000	0.015	0.000	0.564	1.000	4.8.2 ✓
	63.105 - 61.714	0.007	0.565	0.000	0.015	0.000	0.572	1.000	4.8.2 ✓
	61.714 -	0.007	0.573	0.000	0.015	0.000	0.580	1.000	4.8.2 ✓

<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brin-Berlin	<b>Page</b> 29 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_u$	$M_{ux}$	$M_{uy}$	$V_u$	$T_u$			
	60 323						✓		
	60 323 - 58 932	0.007	0.581	0.000	0.015	0.000	0.588	1.000	4.82 ✓
	58 932 - 57.541	0.007	0.589	0.000	0.015	0.000	0.596	1.000	4.82 ✓
	57.541 - 56.15	0.007	0.596	0.000	0.015	0.000	0.604	1.000	4.82 ✓
	56.15 - 54.759	0.007	0.604	0.000	0.015	0.000	0.611	1.000	4.82 ✓
	54.759 - 53.368	0.007	0.612	0.000	0.015	0.000	0.619	1.000	4.82 ✓
	53.368 - 51.977	0.007	0.619	0.000	0.015	0.000	0.627	1.000	4.82 ✓
	51.977 - 50.586	0.007	0.627	0.000	0.015	0.000	0.634	1.000	4.82 ✓
	50.586 - 49.195	0.007	0.634	0.000	0.015	0.000	0.642	1.000	4.82 ✓
	49.195 - 47.804	0.008	0.641	0.000	0.015	0.000	0.649	1.000	4.82 ✓
	47.804 - 46.413	0.008	0.649	0.000	0.016	0.000	0.656	1.000	4.82 ✓
	46.413 - 45.022	0.008	0.656	0.000	0.016	0.000	0.664	1.000	4.82 ✓
	45.022 - 43.631	0.008	0.663	0.000	0.016	0.000	0.671	1.000	4.82 ✓
	43.631 - 42.24	0.008	0.670	0.000	0.016	0.000	0.678	1.000	4.82 ✓
L7	42.24 - 41.1811	0.006	0.546	0.000	0.013	0.000	0.552	1.000	4.82 ✓
	41.1811 - 40.1222	0.006	0.550	0.000	0.013	0.000	0.557	1.000	4.82 ✓
	40.1222 - 39.0633	0.007	0.555	0.000	0.013	0.000	0.562	1.000	4.82 ✓
	39.0633 - 38.0044	0.007	0.560	0.000	0.013	0.000	0.567	1.000	4.82 ✓
	38.0044 - 36.9456	0.007	0.565	0.000	0.013	0.000	0.572	1.000	4.82 ✓
	36.9456 - 35.8867	0.007	0.570	0.000	0.013	0.000	0.577	1.000	4.82 ✓
	35.8867 - 34.8278	0.007	0.575	0.000	0.013	0.000	0.582	1.000	4.82 ✓
	34.8278 - 33.7689	0.007	0.580	0.000	0.013	0.000	0.587	1.000	4.82 ✓
	33.7689 - 32.71	0.007	0.584	0.000	0.013	0.000	0.591	1.000	4.82 ✓
L8	32.71 - 31.0745	0.007	0.560	0.000	0.012	0.000	0.566	1.000	4.82 ✓
	31.0745 - 29.439	0.007	0.566	0.000	0.012	0.000	0.573	1.000	4.82 ✓
	29.439 - 27.8035	0.007	0.572	0.000	0.012	0.000	0.579	1.000	4.82 ✓
	27.8035 -	0.007	0.578	0.000	0.012	0.000	0.585	1.000	4.82 ✓

<b>inxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brin-Berlin	<b>Page</b> 30 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_n$	$M_{ux}$	$M_{uy}$	$V_u$	$T_u$			
	26.168						✓		
	26.168 - 24.5325	0.007	0.584	0.000	0.012	0.000	0.591	1.000	4.8.2 ✓
	24.5325 - 22.897	0.007	0.590	0.000	0.012	0.000	0.597	1.000	4.8.2 ✓
	22.897 - 21.2615	0.007	0.595	0.000	0.012	0.000	0.603	1.000	4.8.2 ✓
	21.2615 - 19.626	0.007	0.601	0.000	0.012	0.000	0.609	1.000	4.8.2 ✓
	19.626 - 17.9905	0.007	0.607	0.000	0.012	0.000	0.614	1.000	4.8.2 ✓
	17.9905 - 16.355	0.007	0.613	0.000	0.012	0.000	0.620	1.000	4.8.2 ✓
	16.355 - 14.7195	0.008	0.618	0.000	0.012	0.000	0.626	1.000	4.8.2 ✓
	14.7195 - 13.084	0.008	0.624	0.000	0.012	0.000	0.632	1.000	4.8.2 ✓
	13.084 - 11.4485	0.008	0.629	0.000	0.012	0.000	0.637	1.000	4.8.2 ✓
	11.4485 - 9.813	0.008	0.635	0.000	0.012	0.000	0.643	1.000	4.8.2 ✓
	9.813 - 8.1775	0.008	0.640	0.000	0.012	0.000	0.648	1.000	4.8.2 ✓
	8.1775 - 6.542	0.008	0.646	0.000	0.012	0.000	0.654	1.000	4.8.2 ✓
	6.542 - 4.9065	0.008	0.651	0.000	0.012	0.000	0.659	1.000	4.8.2 ✓
	4.9065 - 3.271	0.008	0.656	0.000	0.012	0.000	0.665	1.000	4.8.2 ✓
	3.271 - 1.6355	0.008	0.662	0.000	0.012	0.000	0.670	1.000	4.8.2 ✓
	1.6355 - 0	0.008	0.667	0.000	0.012	0.000	0.675	1.000	4.8.2 ✓

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\sigma P_{allow}$ K	% Capacity	Pass Fail
L1	151.5 - 141	Pole	TP17.7841x17.1872x0.24	1	-5.14	999.37	19.8	Pass
L2	141 - 120.33	Pole	TP31.557x28.783x0.3059	2	-9.20	2146.63	23.1	Pass
L3	120.33 - 111.19	Pole	TP33.028x31.557x0.3063	3	-13.39	2210.95	33.7	Pass
L4	111.19 - 82.08	Pole	TP38.347x33.028x0.3141	4	-19.32	2491.00	61.5	Pass
L5	82.08 - 70.06	Pole	TP39.711x38.347x0.3804	5	-22.39	3343.96	56.2	Pass
L6	70.06 - 42.24	Pole	TP43.95x39.711x0.4014	6	-30.34	3831.48	67.8	Pass
L7	42.24 - 32.71	Pole	TP45.064x43.95x0.4706	7	-33.60	4843.91	59.1	Pass
L8	32.71 - 0	Pole	TP49.552x45.064x0.4906	8	-45.61	5448.80	67.5	Pass
							Summary	
						Pole (L6)	67.8	Pass

<b>tnxTower</b>  <b>American Tower Engineering</b> 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 468-0112 FAX: (919) 466-5414	<b>Job</b> 302483 - Brln-Berlin	<b>Page</b> 31 of 31
	<b>Project</b> OAA712549	<b>Date</b> 11:23:42 10/04/17
	<b>Client</b> Verizon Wireless	<b>Designed by</b> John.Bigham

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\sigma P_{allow}$ K	% Capacity	Pass Fail
<b>RATING =</b>							<b>67.8</b>	<b>Pass</b>

Program Version 7.0.7.0 - 7/18/2016 File: C:/Users/john bigham/Desktop/TNX/302483 - Brln-Berlin - Equivalent eri

Base/Flange Plate	Plate Type	<b>Baseplate</b>
	Pole Diameter	51.3 in
	Pole Thickness	0.75 in
	Plate Diameter	62 in
	Plate Thickness	2 in
	Plate Fy	60 ksi
	Weld Length	0.25 in
	$\phi_s$ Resistance	299.30 k-in
	Applied	70.64 k-in
	Stiffeners	#

Code Rev. **G**

Moment **3624.5 k-ft**

Axial **45.6 k**

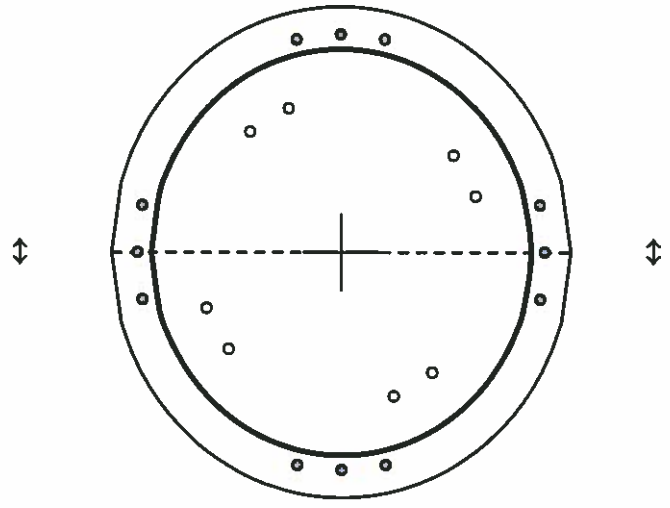
Date **10/4/2017**

Engineer **John. Bigham**

Site # **302483**

Carrier **VERIZON WIRELESS**

Bolts	#	<b>12</b>
	Bolt Circle (R)adial / (S)quare	55 in R
	Diameter	1.75 in
	Hole Diameter	2.375 in
	Type	R71 Williams
	Fy	127.7 ksi
	Fu	150 ksi
	$\phi_s$ Resistance	227.94 k
	Applied	171.24 k
	Reinforcement	#



Reinforcement	#	
---------------	---	--

Plate Stress Ratio: **0.24** (Pass)

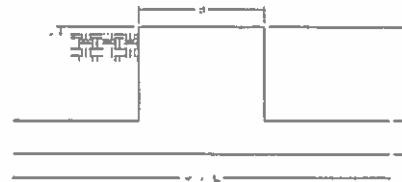
Bolt Stress Ratio: **0.75** (Pass)

Extra Bolt Stress Ratio: **0.63** (Pass)

Extra Bolts	#	<b>8</b>
	Bolt Circle (R)adial / (S)quare	39 in S
	Bolt Gap	6 in
	Offset Angle	30°
	Diameter	2.25 in
	Type	A325
	Fy	92 ksi
	Fu	120 ksi
	$\phi_s$ Resistance	311.78 k
	Applied	194.99 k

Site Name: Brln-Berlin  
 Site Number: 302483  
 Engineering Number: OAA712549  
 Engineer: JDB  
 Date: 10/04/17  
 Tower Type: MP

Program Last Updated: 5/13/2014



**Design Loads (Factored) - Analysis per TIA-222-G Standards**

Design / Analysis / Mapping:	Mapping
Compression/Leg:	45.6
Total Shear:	33.8 k
Moment:	3624.5 k-ft
Tower + Appurtenance Weight:	38.0 k
Depth to Base of Foundation (l + t - h):	8.00 ft
Diameter of Pier (d):	7.00 ft
Height of Pier above Ground (h):	0.50
Width of Pad (W):	11.00 ft
Length of Pad (L):	11.00 ft
Thickness of Pad (t):	2.58 ft
Tower Leg Center to Center:	0.00 ft
Number of Tower Legs:	1.0 (1 if MP or GT)
Tower Center from Mat Center:	0.00 ft
Depth Below Ground Surface to Water Table:	99.00 ft
Unit Weight of Concrete:	150.0 pcf
Unit Weight of Soil Above Water Table:	135.0 pcf
Unit Weight of Water:	62.4 pcf
Unit Weight of Soil Below Water Table:	72.6 pcf
Friction Angle of Uplift:	40.0 Degrees
Ultimate Coefficient of Shear Friction:	0.35
Ultimate Compressive Bearing Pressure:	52000.0 psf
Ultimate Passive Pressure on Pad Face:	500.0 psf
Factored Moment Applied to Rock Anchors	2920.0 k-ft
$\phi_{\text{Soil and Concrete Weight}}$ :	0.9
$\phi_{\text{Soil}}$ :	0.75

**Rock Anchor Usage**

Rock Anchor Resistance: 3360.0 k  
 Rock Anchor Tensile Resistance: 0.92 Result: OK

**Overturing Moment Usage**

Design OTM: 3912.2 k-ft  
 Weight of Soil and Concrete OTM Resistance: 141.4 k  
 OTM Resistance from Soil and Concrete: 777.6 k-ft  
 OTM Resistance from Tower: 174.3 k-ft  
 OTM Resistance from Soil Failure: 527.8 k-ft  
 OTM Resistance from Passive Pressure on Pad Face: 16.5 k-ft  
 OTM Resistance: 4266.5 k-ft  
 Design OTM / OTM Resistance: 0.92 Result: OK

**Soil Bearing Pressure Usage**

Total Weight (Foundation, Soil, Tower): 177.1 k  
 Factored Nominal Bearing Pressure: 39000 psf  
 Net Bearing Pressure/Factored Nominal Bearing Pressure: 1.00 Result: OK  
 Load Direction Controlling Design Bearing Pressure: Diagonal to Pad Edge

**Sliding Factor of Safety**

Total Factored Sliding Resistance: 56.1 k  
 Sliding Design / Sliding Resistance: 0.60 Result: OK

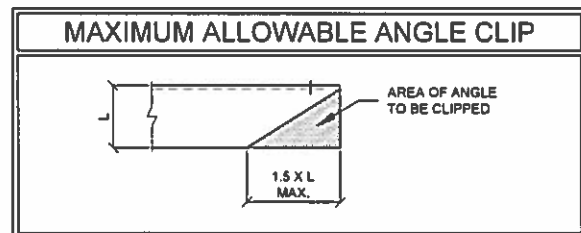


**GENERAL**

- ALL WORK TO BE COMPLETED PER APPLICABLE LOCAL, STATE, FEDERAL CODES AND ORDINANCES AND COMPLY WITH ATC MASTER SPECIFICATIONS FOR WIRELESS TOWER SITES. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND ABIDING BY ALL REQUIRED PERMITS.
- ALL WORK INDICATED ON THESE DRAWINGS SHALL BE PERFORMED BY QUALIFIED CONTRACTORS EXPERIENCED IN TOWER AND FOUNDATION CONSTRUCTION.
- THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF RECORD IMMEDIATELY OF ANY INSTALLATION INTERFERENCES. ALL NEW WORK SHALL ACCOMMODATE EXISTING CONDITIONS. DETAILS NOT SPECIFICALLY SHOWN ON THE DRAWINGS SHALL FOLLOW SIMILAR DETAILS FOR THIS JOB.
- ANY SUBSTITUTIONS SHALL CONFORM TO THE REQUIREMENTS OF THESE NOTES AND SPECIFICATIONS, AND SHOULD BE SIMILAR TO THOSE SHOWN. ALL SUBSTITUTIONS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.
- ANY MANUFACTURED DESIGN ELEMENTS SHALL CONFORM TO THE REQUIREMENTS OF THESE NOTES AND SPECIFICATIONS AND SHOULD BE SIMILAR TO THOSE SHOWN. THESE DESIGN ELEMENTS MUST BE STAMPED BY AN ENGINEER PROFESSIONALLY REGISTERED IN THE STATE OF THE PROJECT, AND SUBMITTED TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO FABRICATION.
- ALL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL CODES AND OSHA SAFETY REGULATIONS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND EXECUTION OF ALL MISCELLANEOUS SHORING, BRACING, TEMPORARY SUPPORTS, ETC. NECESSARY, PER ANSITIA-322 AND ANSIVASSE A10 48, TO PROVIDE A COMPLETE AND STABLE STRUCTURE AS SHOWN ON THESE DRAWINGS.
- CONTRACTOR'S PROPOSED INSTALLATION SHALL NOT INTERFERE, NOR DENY ACCESS TO, ANY EXISTING OPERATIONAL AND SAFETY EQUIPMENT.

**STRUCTURAL STEEL**

- ALL DETAILING, FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AISC SPECIFICATIONS, LATEST EDITION.
- ALL EXPOSED STRUCTURAL STEEL MEMBERS SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION PER ASTM A123. EXPOSED STEEL HARDWARE AND ANCHOR BOLTS SHALL BE GALVANIZED PER ASTM A153 OR B695.
- ALL U-BOLTS SHALL BE ASTM A36 OR EQUIVALENT, WITH LOCKING DEVICE, UNLESS NOTED OTHERWISE.
- FIELD CUT EDGES, EXCEPT DRILLED HOLES, SHALL BE GROUND SMOOTH.
- ALL FIELD CUT SURFACES, FIELD DRILLED HOLES & GROUND SURFACES WHERE EXISTING PAINT OR GALVANIZATION REMOVAL WAS REQUIRED SHALL BE REPAIRED WITH (2) BRUSHED COATS OF ZRC GALVILITE COLD GALVANIZING COMPOUND PER ASTM A780 AND MANUFACTURERS RECOMMENDATIONS.
- ALL STRUCTURAL STEEL EMBEDDED IN THE CONCRETE SHALL BE APPLIED WITH (2) BRUSHED COATS OF POLYGUARD CA-14 MASTIC OR EQUIVALENT. REFER TO THE MANUFACTURER SPECIFICATIONS FOR SURFACE PREPARATION AND APPLICATION. APPLICATION OF POLYGUARD 400 WRAP IS NOT ESSENTIAL.
- CONTRACTOR SHALL PERFORM WORK ON ONLY ONE (1) TOWER FACE AND REPLACE/REINFORCE ONE (1) BOLT/MEMBER AT A TIME.
- ALL FIELD DRILLED HOLES TO BE USED FOR FIELD BOLTING INSTALLATION SHALL BE STANDARD HOLES, AS DEFINED BY AISC, UNLESS NOTED OTHERWISE.



**PAINT**

- AS REQUIRED CLEAN AND PAINT PROPOSED STEEL ACCORDING TO FAA ADVISORY CIRCULAR AC 707480-1L.

**WELDING**

- ALL WELDING TO BE PERFORMED BY AWS CERTIFIED WELDERS AND CONDUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE AWS WELDING CODE D1.1.
- ALL WELDS SHALL BE INSPECTED VISUALLY. IF DIRECTED BY ENGINEER OF RECORD, 25% OF WELDS SHALL BE INSPECTED WITH DYE PENETRANT OR MAGNETIC PARTICLE (100% IF REJECTABLE DEFECTS ARE FOUND) TO MEET THE ACCEPTANCE CRITERIA OF AWS D1.1. REPAIR ALL WELDS AS NECESSARY.
- INSPECTION SHALL BE PERFORMED BY AN AWS CERTIFIED WELD INSPECTOR.
- ALL ELECTRODES TO BE LOW HYDROGEN, MATCHING FILLER METAL, PER AWS D1.1, UNLESS NOTED OTHERWISE.
- ALL WELDING ON LATTICE TOWERS SHALL BE DONE WITH E70XX ELECTRODES. ALL WELDING ON POLE STRUCTURES SHALL BE DONE WITH E80XX ELECTRODES UNLESS NOTED OTHERWISE.
- PRIOR TO FIELD WELDING GALVANIZED MATERIAL, CONTRACTOR SHALL GRIND OFF GALVANIZING 1/2" BEYOND ALL FIELD WELD SURFACES. AFTER WELD AND WELD INSPECTION IS COMPLETE, REPAIR ALL GROUND AND WELDED SURFACES WITH ZRC GALVILITE COLD GALVANIZING COMPOUND PER ASTM A780 AND MANUFACTURERS RECOMMENDATIONS.

**BOLT TIGHTENING PROCEDURE**

- STRUCTURAL CONNECTIONS TO BE ASSEMBLED AND INSPECTED IN ACCORDANCE WITH RCSC SPECIFICATIONS.
- FLANGE BOLTS SHALL BE INSTALLED AND TIGHTENED USING DIRECT TENSION INDICATING (DTI) SQUIRTER WASHERS. DTI SQUIRTER WASHERS ARE TO BE INSTALLED AND ORIENTED / TIGHTENED PER MANUFACTURER SPECIFICATIONS TO ACHIEVE DESIRED LEVEL OF BOLT PRE-TENSION.
- IN LIEU OF USING DTI SQUIRTER WASHERS, FLANGE BOLTS MAY BE TIGHTENED USING AISC / RCSC "TURN-OF-THE-NUT" METHOD, PENDING APPROVAL BY THE ENGINEER OF RECORD (EOR). TIGHTEN FLANGE BOLTS USING THE CHART BELOW:

BOLT LENGTHS UP TO AND INCLUDING FOUR DIAMETERS		
1/2"	BOLTS UP TO AND INCLUDING 2.0 INCH LENGTH	+1/3 TURN BEYOND SNUG TIGHT
5/8"	BOLTS UP TO AND INCLUDING 2.5 INCH LENGTH	+1/3 TURN BEYOND SNUG TIGHT
3/4"	BOLTS UP TO AND INCLUDING 3.0 INCH LENGTH	+1/3 TURN BEYOND SNUG TIGHT
7/8"	BOLTS UP TO AND INCLUDING 3.5 INCH LENGTH	+1/3 TURN BEYOND SNUG TIGHT
1"	BOLTS UP TO AND INCLUDING 4.0 INCH LENGTH	+1/3 TURN BEYOND SNUG TIGHT
1-1/8"	BOLTS UP TO AND INCLUDING 4.5 INCH LENGTH	+1/3 TURN BEYOND SNUG TIGHT
1-1/4"	BOLTS UP TO AND INCLUDING 5.0 INCH LENGTH	+1/3 TURN BEYOND SNUG TIGHT
1-3/8"	BOLTS UP TO AND INCLUDING 5.5 INCH LENGTH	+1/3 TURN BEYOND SNUG TIGHT
1-1/2"	BOLTS UP TO AND INCLUDING 6.0 INCH LENGTH	+1/3 TURN BEYOND SNUG TIGHT

BOLT LENGTHS OVER FOUR DIAMETERS BUT NOT EXCEEDING EIGHT DIAMETERS		
1/2"	BOLTS 2.25 TO 4.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
5/8"	BOLTS 2.75 TO 5.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
3/4"	BOLTS 3.25 TO 6.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
7/8"	BOLTS 3.75 TO 7.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
1"	BOLTS 4.25 TO 8.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
1-1/8"	BOLTS 4.75 TO 9.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
1-1/4"	BOLTS 5.25 TO 10.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
1-3/8"	BOLTS 5.75 TO 11.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT
1-1/2"	BOLTS 6.25 TO 12.0 INCH LENGTH	+1/2 TURN BEYOND SNUG TIGHT

- SPLICE BOLTS SUBJECT TO DIRECT TENSION SHALL BE INSTALLED AND TIGHTENED AS PER SECTION 8.2.1 OF THE AISC "SPECIFICATION FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS". LOCATED IN THE AISC MANUAL OF STEEL CONSTRUCTION. THE INSTALLATION PROCEDURE IS PARAPHRASED AS FOLLOWS:

FASTENERS SHALL BE INSTALLED IN PROPERLY ALIGNED HOLES AND TIGHTENED BY ONE OF THE METHODS DESCRIBED IN SUBSECTION 8.2.1 THROUGH 8.2.4.

**8.2.1 TURN-OF-NUT PRETENSIONING**  
 BOLTS SHALL BE INSTALLED IN ALL HOLES OF THE CONNECTION AND BROUGHT TO A SNUG TIGHT CONDITION AS DEFINED IN SECTION 8.1. UNTIL ALL THE BOLTS ARE SIMULTANEOUSLY SNUG TIGHT AND THE CONNECTION IS FULLY COMPACTED. FOLLOWING THIS INITIAL OPERATION ALL BOLTS IN THE CONNECTION SHALL BE TIGHTENED FURTHER BY THE APPLICABLE AMOUNT OF ROTATION SPECIFIED ABOVE. DURING THE TIGHTENING OPERATION THERE SHALL BE NO ROTATION OF THE PART NOT TURNED BY THE WRENCH. TIGHTENING SHALL PROGRESS SYSTEMATICALLY.

- ALL OTHER BOLTED CONNECTIONS SHALL BE BROUGHT TO A SNUG TIGHT CONDITION AS DEFINED IN SECTION 8.1 OF THE SPECIFICATION.

ALL BOLT HOLES SHALL BE ALIGNED TO PERMIT INSERTION OF THE BOLTS WITHOUT UNDUE DAMAGE TO THE THREADS. BOLTS SHALL BE PLACED IN ALL HOLES WITH WASHERS POSITIONED AS REQUIRED AND NUTS THREADED TO COMPLETE THE ASSEMBLY. COMPACTING THE JOINT TO THE SNUG-TIGHT CONDITION SHALL PROGRESS SYSTEMATICALLY FROM THE MOST RIGID PART OF THE JOINT. THE SNUG-TIGHTENED CONDITION IS THE TIGHTNESS THAT IS ATTAINED WITH A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL EFFORT OF AN IRONWORKER USING AN ORDINARY SPUD WRENCH TO BRING THE CONNECTED PLIES INTO FIRM CONTACT.

**APPLICABLE CODES AND STANDARDS**

- ANSITIA: STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES, 222-G EDITION.
- 2016 CONNECTICUT STATE BUILDING CODE.
- 2012 INTERNATIONAL BUILDING CODE.
- ACI 318: AMERICAN CONCRETE INSTITUTE, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, 318-02.
- CRSI: CONCRETE REINFORCING STEEL INSTITUTE, MANUAL OF STANDARD PRACTICE, LATEST EDITION.
- AISC: AMERICAN INSTITUTE OF STEEL CONSTRUCTION, MANUAL OF STEEL CONSTRUCTION, LATEST EDITION.
- AWS: AMERICAN WELDING SOCIETY D1.1, STRUCTURAL WELDING CODE, LATEST EDITION.

**SPECIAL INSPECTION**

- A QUALIFIED INDEPENDENT TESTING LABORATORY, EMPLOYED BY THE OWNER, SHALL PERFORM INSPECTION AND TESTING IN ACCORDANCE WITH IBC 2012, SECTION 1704 AS REQUIRED BY PROJECT SPECIFICATIONS FOR THE FOLLOWING CONSTRUCTION WORK:
  - a) STRUCTURAL WELDING (CONTINUOUS INSPECTION OF FIELD WELD ONLY)
  - b) HIGH STRENGTH BOLTS (PERIODIC INSPECTION OF A325 EXTENSION FLANGE BOLTS TO BE TIGHTENED PER "TURN-OF-THE-NUT" METHOD)
- THE INSPECTION AGENCY SHALL SUBMIT INSPECTION AND TEST REPORTS TO THE BUILDING DEPARTMENT, THE ENGINEER OF RECORD, AND THE OWNER IN ACCORDANCE WITH IBC 2012, SECTION 1704. UNLESS THE FABRICATOR IS APPROVED BY THE BUILDING OFFICIAL TO PERFORM SUCH WORK WITHOUT THE SPECIAL INSPECTIONS.

THESE DRAWINGS AND/OR THE ACCOMPANYING SPECIFICATION AS INSTRUMENTS OR SERVICE ARE THE EXCLUSIVE PROPERTY OF AMERICAN TOWER. THEIR USE AND PUBLICATION SHALL BE RESTRICTED TO THE ORIGINAL SITE FOR WHICH THEY ARE PREPARED. ANY USE OR DISCLOSURE OTHER THAN THAT WHICH RELATES TO AMERICAN TOWER OR THE SPECIFIED CARRIER IS STRICTLY PROHIBITED. TITLE TO THESE DOCUMENTS SHALL REMAIN THE PROPERTY OF AMERICAN TOWER WHETHER OR NOT THE PROJECT IS EXECUTED. NEITHER THE ARCHITECT NOR THE ENGINEER WILL BE PROVIDING ON-SITE CONSTRUCTION REVIEW OF THIS PROJECT. CONTRACTORS MUST VERIFY ALL DIMENSIONS AND ADVISE AMERICAN TOWER OF ANY DISCREPANCIES. ANY PRIOR ISSUANCE OF THIS DRAWING IS SUPERSEDED BY THE LATEST VERSION ON FILE WITH AMERICAN TOWER.

REV.	DESCRIPTION	BY	DATE
0	FIRST ISSUE	CWB	10/03/17

ATC SITE NUMBER:  
302483

ATC SITE NAME:  
BRLN - BERLIN

CONNECTICUT

SITE ADDRESS:  
260 BECKLEY ROAD  
KENSINGTON, CT 06037



Oct 6 2017 2:58 PM **cosign**

DRAWN BY:	CWB
APPROVED BY:	JDB
DATE DRAWN:	10/03/17
ATC JOB NO:	11912109_P5_02

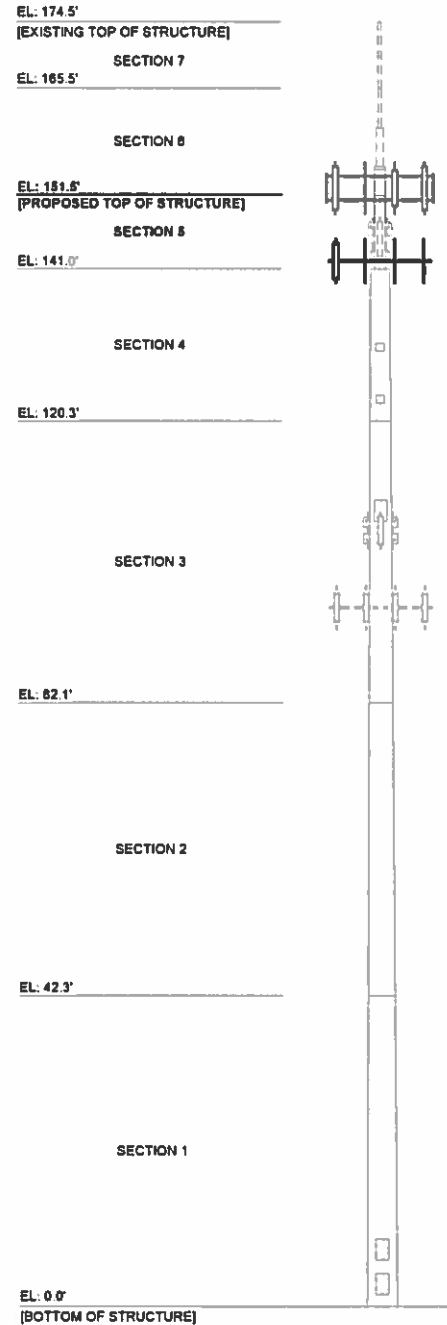
**IBC GENERAL NOTES**

SHEET NUMBER:	REVISION:
IGN	0

Copyright © 2017 ATC-IP, LLC. All Rights Reserved.



T-MOBILE  
EL: 142.0' [PROPOSED]



REMOVE EXISTING 20' TOWER SECTION FROM EL: 154.5'± TO 174.5'± & ALL ASSOCIATED MOUNTS, PLATFORMS, EQUIPMENT & COAX AT EXISTING TOP OF STRUCTURE. SEE CHART BELOW.

REMOVE EXISTING EQUIPMENT AT EL: 145.0' PRIOR TO RELOCATING T-MOBILE EQUIPMENT FROM EL: 171.0' TO EL: 142.0'. SEE CHART BELOW.

REMOVE EXISTING EQUIPMENT AT EL: 105.5'. SEE CHART BELOW.

REMOVE EXISTING EQUIPMENT AT EL: 95.0'. SEE CHART BELOW.

EQUIPMENT TO BE REMOVED				
ELEVATION	ANTENNA	MOUNT	COAX	ADDITIONAL NOTES
171.0'	(3) ERICSSON AIR 21, 1.3 M, B2A B4P	T-ARM	(6) 1 5/8" COAX (1) 1 5/8" FIBER	TO BE RELOCATED TO EL: 142.0'
145.0'	(3) ERICSSON KRY 112 144/1	FLUSH	(6) 1 5/8" COAX	---
105.5'	(3) 48" X 6" PANEL	FLUSH	(6) 1 1/4" COAX	---
95.0'	(12) DECIBEL 844G85VTZASX	LOW PROFILE PLATFORM	(12) 1 5/8" COAX	---

TOWER ELEVATION VIEW

NOTE:  
CONTACT AMERICAN TOWER FIELD OPERATIONS WHEN EXISTING EQUIPMENT INTERFERES WITH INSTALLATION OF MODIFICATIONS. ONCE APPROVED, EXISTING EQUIPMENT MAY BE TEMPORARILY MOVED DURING INSTALLATION & REINSTALLED TO THE ORIGINAL HEIGHT & LOCATION BY CONTRACTOR POST COMPLETION OF MODIFICATIONS.



**AMERICAN TOWER®**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 469-0112  
COA: PEC.0001553

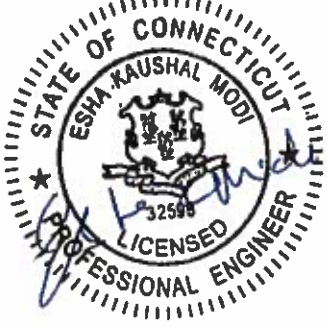
THESE DRAWINGS AND/OR THE ACCOMPANYING SPECIFICATION AS INSTRUMENTS OF SERVICE ARE THE EXCLUSIVE PROPERTY OF AMERICAN TOWER. THEIR USE AND PUBLICATION SHALL BE RESTRICTED TO THE ORIGINAL SITE FOR WHICH THEY ARE PREPARED. ANY USE OR DISCLOSURE OTHER THAN THAT WHICH RELATES TO AMERICAN TOWER OR THE SPECIFIED CARRIER IS STRICTLY PROHIBITED. TITLE TO THESE DOCUMENTS SHALL REMAIN THE PROPERTY OF AMERICAN TOWER WHETHER OR NOT THE PROJECT IS EXECUTED. NEITHER THE ARCHITECT NOR THE ENGINEER WILL BE PROVIDING ON-SITE CONSTRUCTION REVIEW OF THIS PROJECT. CONTRACTOR(S) MUST VERIFY ALL DIMENSIONS AND ADVISE AMERICAN TOWER OF ANY DISCREPANCIES. ANY PRIOR ISSUANCE OF THIS DRAWING IS SUPERSEDED BY THE LATEST VERSION ON FILE WITH AMERICAN TOWER.


REV.	DESCRIPTION	BY	DATE
0	FIRST ISSUE	CWB	10/03/17

ATC SITE NUMBER:  
302483

ATC SITE NAME:  
BRLN - BERLIN  
CONNECTICUT

SITE ADDRESS:  
260 BECKLEY ROAD  
KENSINGTON, CT 06037



Oct 6 2017 2:58 PM 

DRAWN BY: CWB  
APPROVED BY: JDB  
DATE DRAWN: 10/03/17  
ATC JOB NO: 11912109\_PS\_02

MODIFICATION PROFILE

SHEET NUMBER: A-1  
REVISION: 0

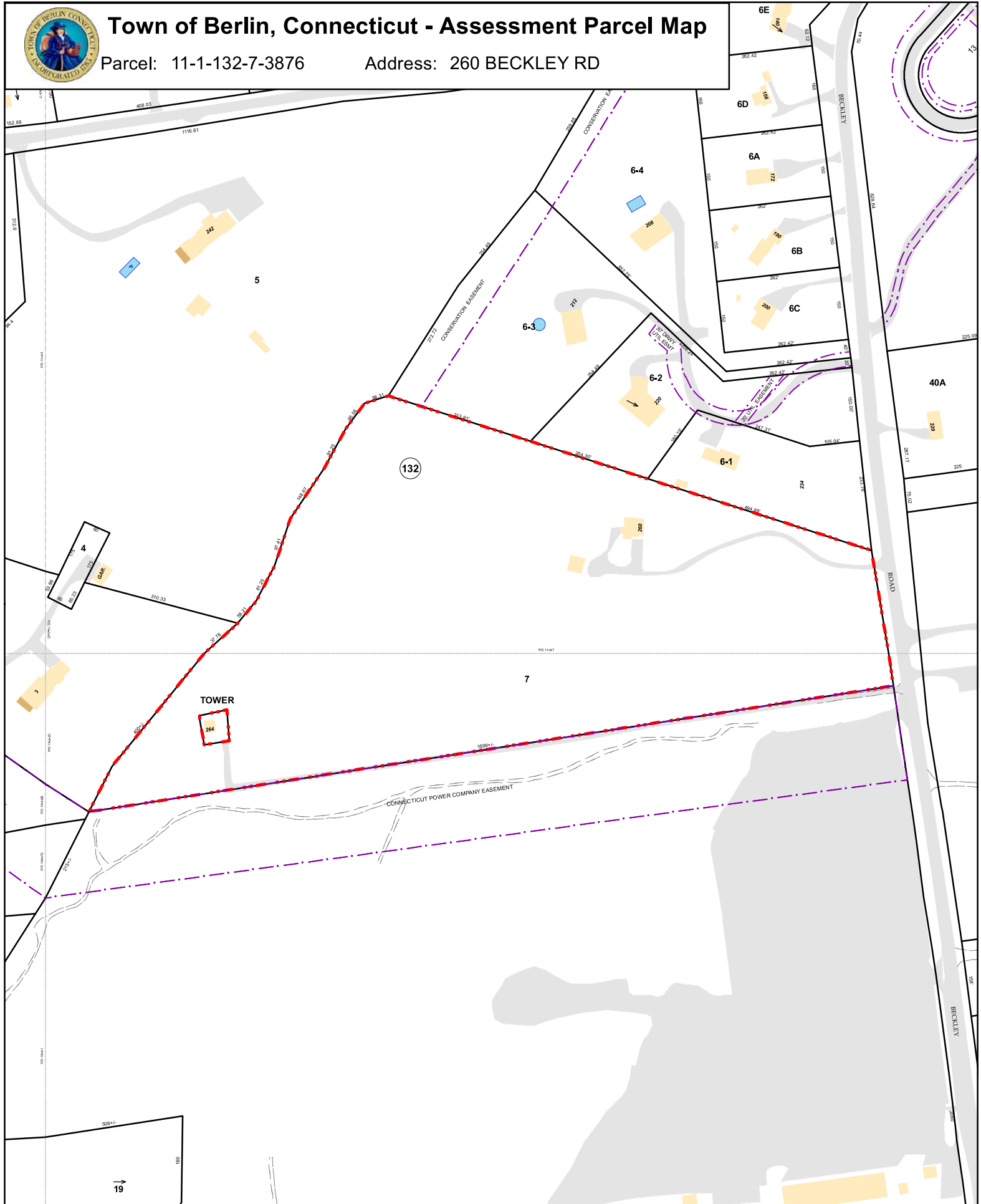
Copyright © 2017 ATC IP LLC. All Rights Reserved.



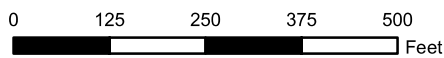
# Town of Berlin, Connecticut - Assessment Parcel Map

Parcel: 11-1-132-7-3876

Address: 260 BECKLEY RD



Approximate Scale: 1 inch = 250 feet



Map Produced: December 2017

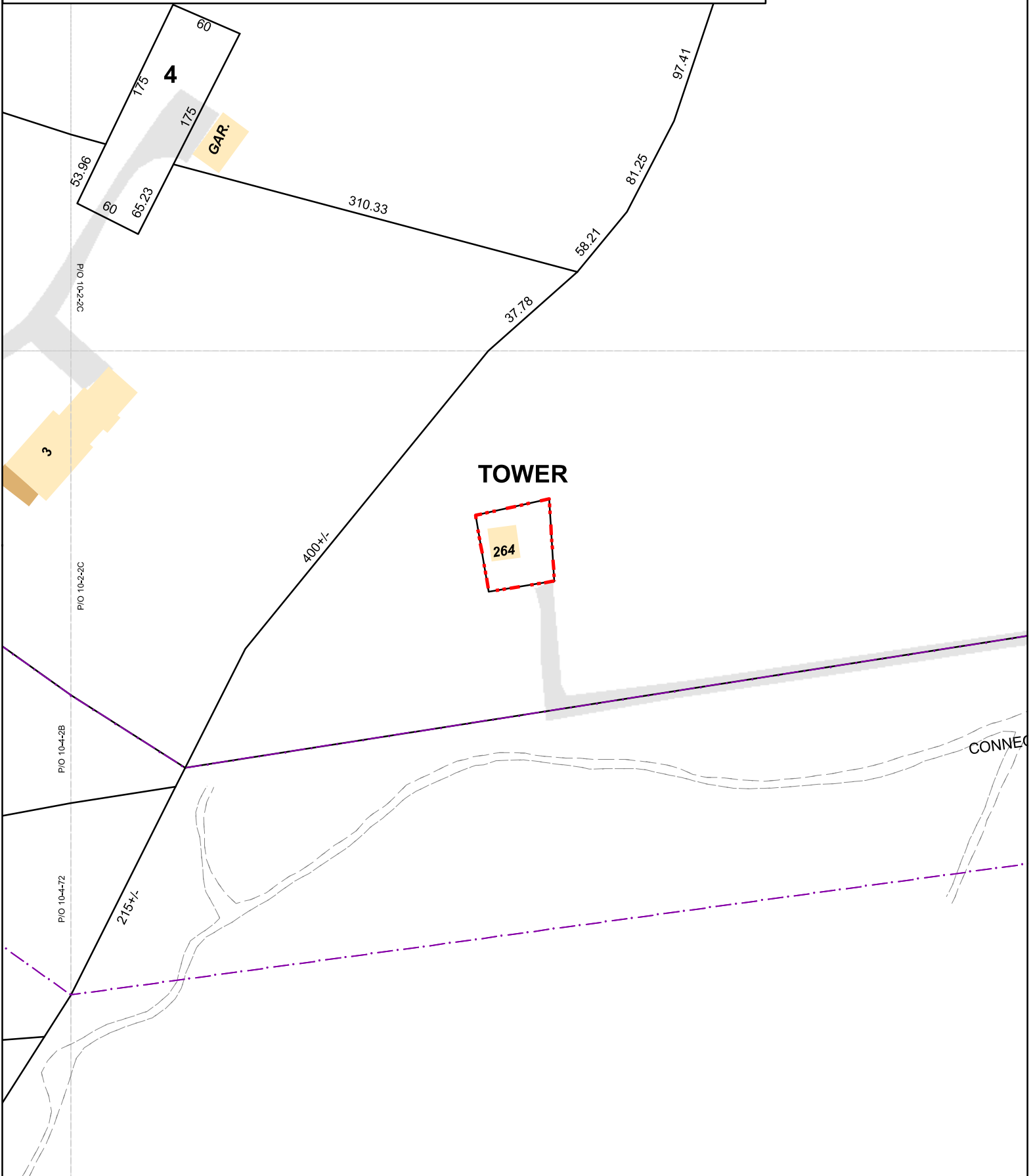
Disclaimer: This map is for informational purposes only All information is subject to verification by any user. The Town of Berlin and its mapping contractors assume no legal responsibility for the information contained herein.



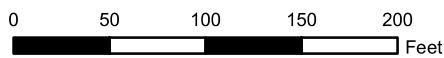
# Town of Berlin, Connecticut - Assessment Parcel Map

Parcel: 11-3-132-7-3877

Address: 286 BECKLEY RD



Approximate Scale: 1 inch = 100 feet



Map Produced: December 2017

Disclaimer: This map is for informational purposes only. All information is subject to verification by any user. The Town of Berlin and its mapping contractors assume no legal responsibility for the information contained herein.



Property Information

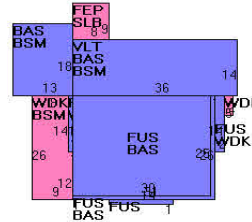
Property Location	<b>260 BECKLEY RD</b>
Owner	<b>MATULIS ELAINE E &amp; JOHN C JR</b>
Co-Owner	
Mailing Address	<b>260 BECKLEY RD BERLIN CT 06037</b>
Land Use	<b>1010 Single Family</b>
Land Class	<b>R</b>
Zoning Code	<b>R-43</b>
Census Tract	

Street Index	<b>2</b>
Acreage	<b>17.9</b>
Utilities	<b>All Public</b>
Lot Setting/ Desc	<b>Above</b>
Additional Info	

Photo



Sketch



Primary Construction Details

Year Built	<b>1981</b>
Stories	<b>2</b>
Building Style	<b>Contemp</b>
Building Use	<b>Residential</b>
Building Condition	<b>B-</b>
Floors	<b>Hardwood</b>
Total Rooms	<b>8</b>

Bedrooms	<b>4 Bedrooms</b>
Full Bathrooms	<b>2</b>
Half Bathrooms	<b>1</b>
Bath Style	<b>Average</b>
Kitchen Style	<b>Average</b>
Roof Style	<b>Gable</b>
Roof Cover	<b>Asph/F Gls/Cmp</b>

Exterior Walls	<b>Clapboard</b>
Interior Walls	<b>Drywall</b>
Heating Type	<b>Forced Air-Duc</b>
Heating Fuel	<b>Oil/Gas</b>
AC Type	<b>Central</b>
Gross Bldg Area	<b>4284</b>
Total Living Area	<b>2406</b>



# Town of Berlin, CT

## Property Listing Report

Map Block Lot

11-1-132-7-3876

Account

1040690

### Valuation Summary (Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	185600	129900
Extras	0	0
Improvements	201300	141000
Outbuildings	15700	11100
Land	453600	100511
<b>Total</b>	<b>654900</b>	<b>241511</b>

### Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
<b>Vaulted Ceiling</b>	<b>504</b>	<b>0</b>
<b>Porch, Enclosed, Finished</b>	<b>72</b>	<b>0</b>
<b>Slab</b>	<b>72</b>	<b>0</b>
<b>First Floor</b>	<b>1544</b>	<b>1544</b>
<b>Deck, Wood</b>	<b>272</b>	<b>0</b>
<b>Upper Story, Finished</b>	<b>862</b>	<b>862</b>
<b>Basement</b>	<b>958</b>	<b>0</b>
<b>Total Area</b>	<b>4284</b>	<b>2406</b>

### Outbuilding and Extra Items

Type	Description
<b>Barn 1 Story</b>	<b>1024 S.F.</b>
<b>Shed Wd Res</b>	<b>64 S.F.</b>
<b>SCREEN HOUSE</b>	<b>72 S.F.</b>
<b>Shed Wd Res</b>	<b>140 S.F.</b>

### Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
<b>MATULIS ELAINE E &amp; JOHN C JR</b>	<b>234/ 913</b>	<b>5/7/1984</b>	<b>0</b>



Property Information

Property Location	286 BECKLEY RD
Owner	MATULIS ELAINE E & JOHN C JR
Co-Owner	
Mailing Address	260 BECKLEY RD BERLIN CT 06037
Land Use	4330 Rad/TV Twr
Land Class	I
Zoning Code	R-43
Census Tract	

Street Index	2030
Acreage	0.01
Utilities	
Lot Setting/Desc	
Additional Info	

Photo

No Photo Available

Sketch

Primary Construction Details

Year Built	
Stories	
Building Style	
Building Use	
Building Condition	
Floors	
Total Rooms	

Bedrooms	
Full Bathrooms	
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	
Roof Cover	

Exterior Walls	
Interior Walls	
Heating Type	
Heating Fuel	
AC Type	
Gross Bldg Area	
Total Living Area	

