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Also admitted in Massachusetts

January 10, 2014

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

Re: **Notice of Exempt Modification – Antenna Swap
4 Volunteer Drive, Windsor Locks, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 150-foot level on the existing 195-foot tower at the above-referenced address. The tower is owned by the Town of Windsor Locks. Cellco’s shared use of this tower was approved in 2008. Cellco now intends to replace six (6) of its existing antennas with three (3) model BXA-70063-6CF 850 MHz antennas and three (3) model BXA-171063-12CF 2100 MHz antennas, at the same 150-foot level. Cellco also intends to install three (3) remote radio heads (“RRHs”) behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for the replacement antennas, RRHs and HYBRIFLEX™ cable.



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Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Steven N. Wawruck, Jr., First Selectman for the Town of Windsor Locks.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco’s proposed antennas and RRHs will be located at the 150-foot level on the 195-foot tower.

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ROBINSON & COLE^{LLP}

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

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

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Attachment 2.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed modifications. (See Structural Analysis included in Attachment 3).

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

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Steven N. Wawruck, Jr., Windsor Locks First Selectman
Sandy M. Carter



ATTACHMENT 1

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

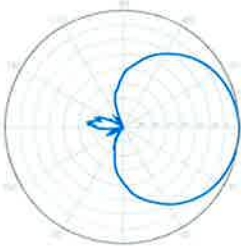
Replace 'X' with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace 'EDIN' with 'NE' in the model number when ordering.

| Electrical Characteristics | 696-900 MHz | | |
|---|---|--|-----------------|
| Frequency bands | 696-806 MHz | 806-900 MHz | |
| Polarization | ±45° | | |
| Horizontal beamwidth | 65° | 63° | |
| Vertical beamwidth | 13° | 11° | |
| Gain | 14.0 dBd (16.1 dBi) | 14.5 dBd (16.6 dBi) | |
| Electrical downtilt (X) | 0, 2, 3, 4, 5, 6, 8, 10 | | |
| Impedance | 50Ω | | |
| VSWR | ≤1.35:1 | | |
| Upper sidelobe suppression (0°) | -18.3 dB | -18.2 dB | |
| Front-to-back ratio (+/-30°) | -33.4 dB | -36.3 dB | |
| Null fill | 5% (-26.02 dB) | | |
| Isolation between ports | < -25 dB | | |
| Input power with EDIN connectors | 500 W | | |
| Input power with NE connectors | 300 W | | |
| IM3 (2x20W carriers) | < -153 dBc | | |
| Lightning protection | Direct Ground | | |
| Connector(s) | 2 Ports / EDIN or NE / Female / Center (Back) | | |
| Mechanical Characteristics | | | |
| Dimensions Length x Width x Depth | 1804 x 285 x 132 mm | 71.0 x 11.2 x 5.2 in | |
| Depth with z-brackets | 172 mm | 6.8 in | |
| Weight without mounting brackets | 7.9 kg | 17 lbs | |
| Survival wind speed | > 201 km/hr | > 125 mph | |
| Wind area | Front: 0.51 m ² Side: 0.24 m ² | Front: 5.5 ft ² Side: 2.6 ft ² | |
| Wind load @ 161 km/hr (100 mph) | Front: 759 N Side: 391 N | Front: 169 lbf Side: 89 lbf | |
| Mounting Options | Part Number | Fits Pipe Diameter | Weight |
| 3-Point Mounting & Downtilt Bracket Kit | 36210008 | 40-115 mm 1.57-4.5 in | 6.9 kg 15.2 lbs |
| Concealment Configurations | For concealment configurations, order BXA-70063-6CF-EDIN-X-FP | | |

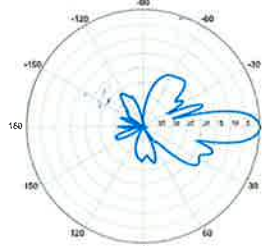


BXA-70063-6CF-EDIN-X



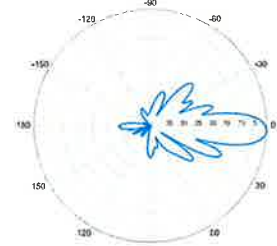
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

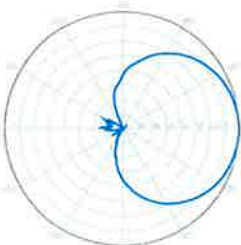


0° | Vertical | 750 MHz

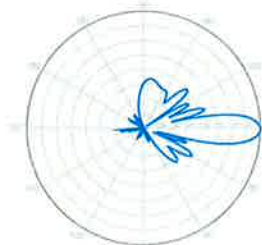
BXA-70063-6CF-EDIN-2



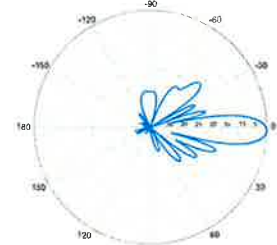
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



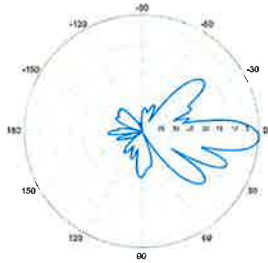
2° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

BXA-70063-6CF-EDIN-X

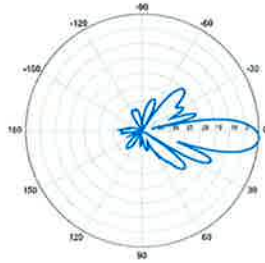
X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3



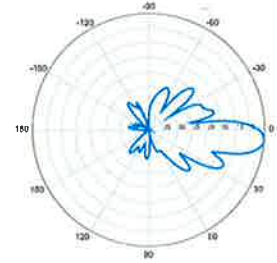
3° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-4

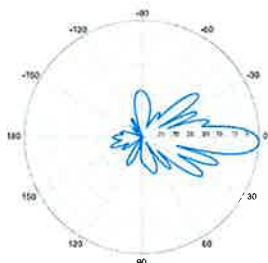


4° | Vertical | 750 MHz

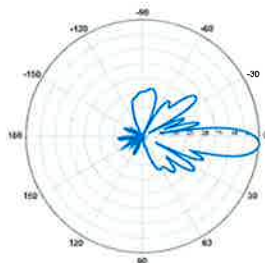
BXA-70063-6CF-EDIN-5



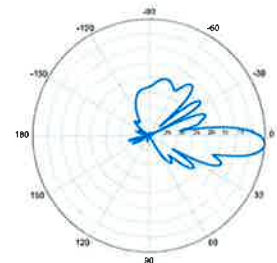
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

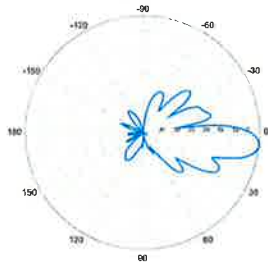


4° | Vertical | 850 MHz



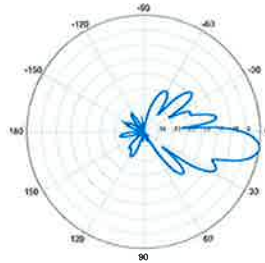
5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6



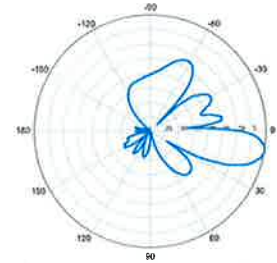
6° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-8

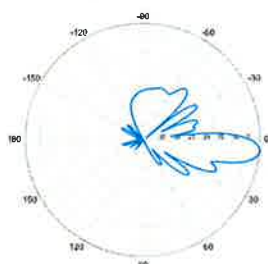


8° | Vertical | 750 MHz

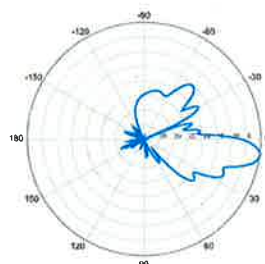
BXA-70063-6CF-EDIN-10



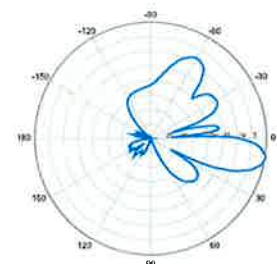
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz

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BXA-171063-12CF-EDIN-X

X-Pol | FET Panel | 63° | 19.0 dBi

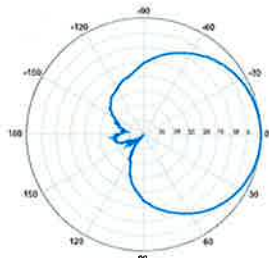
Replace "X" with desired electrical downtilt

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

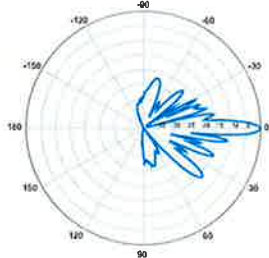


| Electrical Characteristics | 1710-2170 MHz | | | |
|---|---|----------------------------|---------------------------|--------------|
| Frequency bands | 1710-1880 MHz | 1850-1990 MHz | 1920-2170 MHz | |
| Polarization | ±45° | ±45° | ±45° | |
| Horizontal beamwidth | 68° | 65° | 60° | |
| Vertical beamwidth | 4.5° | 4.5° | 4.5° | |
| Gain | 16.1 dBd / 18.2 dBi | 16.5 dBd / 18.6 dBi | 16.9 dBd / 19.0 dBi | |
| Electrical downtilt (X) | 0, 2, 5 | | | |
| Impedance | 50Ω | | | |
| VSWR | ≤1.5:1 | | | |
| First upper sidelobe | < -17 dB | | | |
| Front-to-back ratio | > 30 dB | | | |
| In-band isolation | < -25 dB | | | |
| IM3 (20W carrier) | < -150 dBc | | | |
| Input power | 300 W | | | |
| Lightning protection | Direct Ground | | | |
| Connector(s) | 2 Ports / EDIN or NE / Female / Center (Back) | | | |
| Operating temperature | -40° to +60° C / -40° to +140° F | | | |
| Mechanical Characteristics | | | | |
| Dimensions Length x Width x Depth | 1842 x 154 x 105 mm | 72.5 x 6.1 x 4.1 in | | |
| Depth with z-brackets | 133 mm | 5.2 in | | |
| Weight without mounting brackets | 5.8 kg | 12.8 lbs | | |
| Survival wind speed | > 201 km/hr | | > 125 mph | |
| Wind area | Front: 0.28 m ² Side: 0.19 m ² | Front: 3.1 ft ² | Side: 2.1 ft ² | |
| Wind load @ 161 km/hr (100 mph) | Front: 460 N Side: 304 N | Front: 103 lbf | Side: 68 lbf | |
| Mounting Options | Part Number | Fits Pipe Diameter | | Weight |
| 2-Point Mounting Bracket Kit | 26799997 | 50-102 mm | 2.0-4.0 in | 2.3 kg 5 lbs |
| 2-Point Mounting & Downtilt Bracket Kit | 26799999 | 50-102 mm | 2.0-4.0 in | 3.6 kg 8 lbs |
| Concealment Configurations | For concealment configurations, order BXA-171063-12CF-EDIN-X-FP | | | |

BXA-171063-12CF-EDIN-X

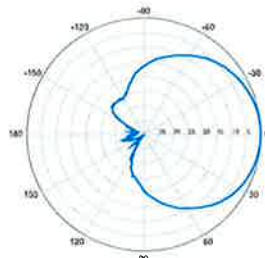


Horizontal | 1710-1880 MHz
BXA-171063-12CF-EDIN-0

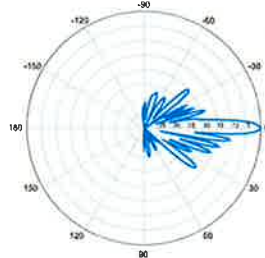


0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-X

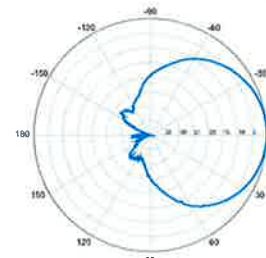


Horizontal | 1850-1990 MHz
BXA-171063-12CF-EDIN-0

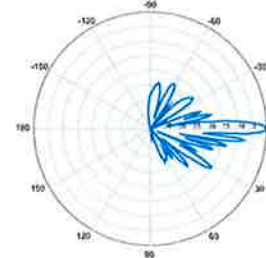


0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



Horizontal | 1920-2170 MHz
BXA-171063-12CF-EDIN-0



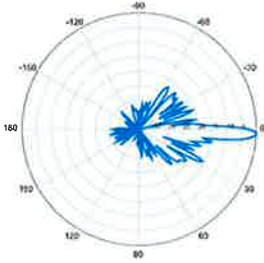
0° | Vertical | 1920-2170 MHz

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BXA-171063-12CF-EDIN-X

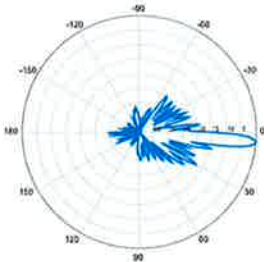
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12CF-EDIN-2



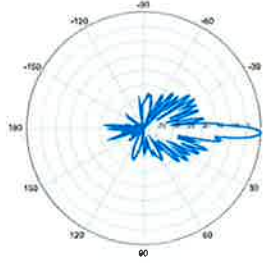
2° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-5



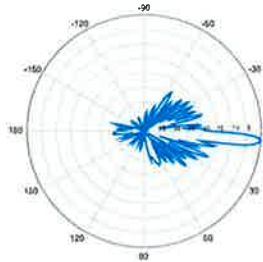
5° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-2



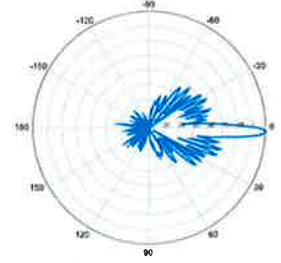
2° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-5



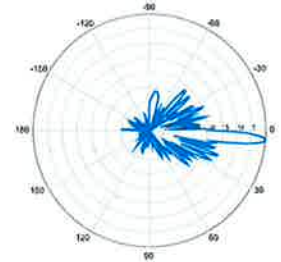
5° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-2



2° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-5



5° | Vertical | 1920-2170 MHz

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Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



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

The Alcatel-Lucent RRH2x40-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-AWS is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low

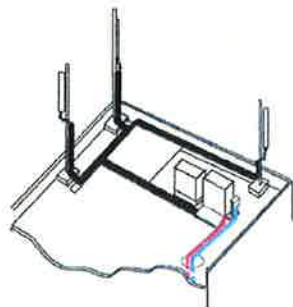
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-AWS is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-AWS is compact and weighs less than 20 kg (44 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

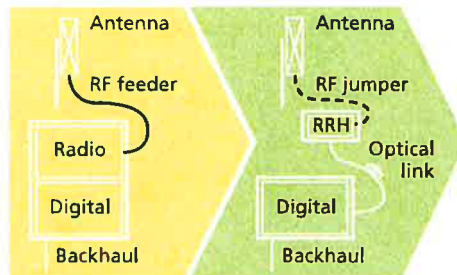
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-AWS provides more RF power while at the same time consuming less electricity.



Macro

Features

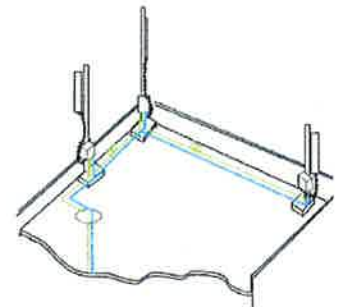
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption



RRH for space-constrained cell sites

Benefits

- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170 mm (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
 - With solar load: -40°C to +50°C (-40°F to +122°F)
 - Without solar load: -40°C to +55°C (-40°F to +131°F)

- Passive convection cooling (no fans)
- Enclosure protection
 - IP65 (International Protection rating)

RF characteristics

- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
 - TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
 - One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
 - Single mode dual fiber (SM/DF)
- Multi-mode variant
 - Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Digital Ports and Alarms

- Two optical ports to support daisy-chaining
- Six external alarms

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

Product Description

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

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

Features/Benefits

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



Figure 1: HYBRIFLEX Series

Technical Specifications

| | | | |
|--|--------------------------------|-------------------|---|
| 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 |
| Physical Properties | | | |
| Weight, Approximate | | [kg/m (lb/ft)] | 1.9 (1.30) |
| Minimum Bending Radius, Single Bending | | [mm (in)] | 200 (8) |
| Minimum Bending Radius, Repeated Bending | | [mm (in)] | 500 (20) |
| Recommended/Maximum Clamp Spacing | | [m (ft)] | 1.0 / 1.2 (3.25 / 4.0) |
| Electrical Properties | | | |
| DC-Resistance Outer Conductor Armor | | [Ω/km (Ω/1000ft)] | 068 (0.205) |
| DC-Resistance Power Cable: 8.4mm ² (8AWG) | | [Ω/km (Ω/1000ft)] | 2.1 (0.307) |
| Optical Properties | | | |
| Version | | | Single-mode OM3 |
| Quantity, Fiber Count | | | 16 (8 pairs) |
| Core/Clad | | [μm] | 50/125 |
| Primary Coating (Acrylate) | | [μm] | 245 |
| Buffer Diameter, Nominal | | [μm] | 900 |
| Secondary Protection, Jacket, Nominal | | [mm (in)] | 2.0 (0.08) |
| Minimum Bending Radius | | [mm (in)] | 104 (4.1) |
| Insertion Loss @ wavelength 850nm | | dB/km | 3.0 |
| Insertion Loss @ wavelength 1310nm | | dB/km | 1.0 |
| Standards (Meets or exceeds) | | | UL94-V0, UL1666 RoHS Compliant |
| Power Cable Properties | | | |
| Size (Power) | | [mm (AWG)] | 8.4 (8) |
| Quantity, Wire Count (Power) | | | 16 (8 pairs) |
| Size (Alarm) | | [mm (AWG)] | 0.8 (18) |
| Quantity, Wire Count (Alarm) | | | 4 (2 pairs) |
| Type | | | UV protected |
| Strands | | | 19 |
| Primary Jacket Diameter, Nominal | | [mm (in)] | 6.8 (0.27) |
| Standards (Meets or exceeds) | | | NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant |
| Temperature Properties | | | |
| Installation Temperature | | [°C (°F)] | -40 to +65 (-40 to 149) |
| Operation Temperature | | [°C (°F)] | -40 to +65 (-40 to 149) |

* This data is provisional and subject to change

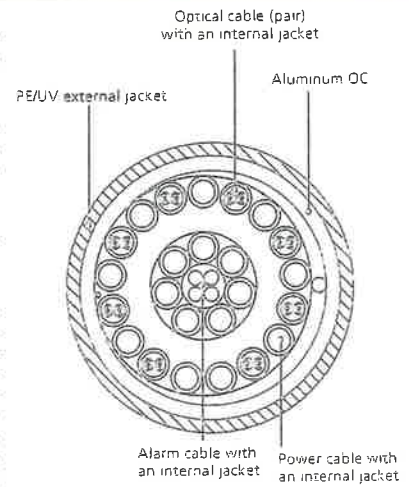


Figure 2: Construction Detail

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

ATTACHMENT 2

| CARRIER | General | | Power | | Density | | CALC. POWER DENS | FREQ. | MAX. PERMISS. EXP. | FRACTION MPE | Total |
|-----------------------------|------------|-------------|------------|---------|---------------|-------------|------------------|--------------|--------------------|--------------|-------|
| | # OF CHAN. | WATTS ERP | HEIGHT | Density | | | | | | | |
| *AT&T UMTS | 2 | 565 | 170 | | 0.0141 | 880 | 0.5867 | 2.40% | | | |
| *AT&T UMTS | 2 | 1077 | 170 | | 0.0268 | 1900 | 1.0000 | 2.68% | | | |
| *AT&T GSM | 1 | 283 | 170 | | 0.0035 | 880 | 0.5867 | 0.60% | | | |
| *AT&T LTE | 1 | 1375 | 170 | | 0.0171 | 734 | 0.4893 | 3.50% | | | |
| *T-Mobile GSM | 8 | 126 | 146 | | 0.0170 | 1945 | 1.0000 | 1.70% | | | |
| *T-Mobile UMTS | 2 | 711 | 146 | | 0.0240 | 2100 | 1.0000 | 2.40% | | | |
| *MetroPCS CDMA | 3 | 727 | 130 | | 0.0464 | 2135 | 1.0000 | 4.64% | | | |
| *MetroPCS LTE | 1 | 1200 | 130 | | 0.0255 | 2130 | 1.0000 | 2.55% | | | |
| *Clearwire antennas | 2 | 153 | 109 | | 0.0093 | 2496 | 1.0000 | 0.93% | | | |
| *Clearwire microwave dishes | 1 | 211 | 109 | | 0.0064 | 11 GHz | 1.0000 | 0.64% | | | |
| *Clearwire microwave dishes | 1 | 211 | 109 | | 0.0064 | 11 GHz | 1.0000 | 0.64% | | | |
| *Clearwire microwave dishes | 1 | 211 | 109 | | 0.0064 | 11 GHz | 1.0000 | 0.64% | | | |
| *Sprint CDMA/LTE | 3 | 693 | 120 | | 0.0519 | 1900 | 1.0000 | 5.19% | | | |
| *Sprint CDMA/LTE | 1 | 390 | 120 | | 0.0097 | 850 | 0.5667 | 1.72% | | | |
| *Windsor Fire Dept | | | 180 | | 0.0033 | 170.15 | 0.2000 | 1.67% | | | |
| *Windsor Fire Dept | | | 180 | | 0.0044 | 155.61 | 0.2000 | 2.22% | | | |
| *Windsor Fire Dept | | | 180 | | 0.0044 | 155.085 | 0.2000 | 2.22% | | | |
| *Windsor Fire Dept | | | 180 | | 0.0011 | 153.935 | 0.2000 | 0.56% | | | |
| *Windsor Fire Dept | | | 180 | | 0.0027 | 154.115 | 0.2000 | 1.33% | | | |
| *Windsor Fire Dept | | | 180 | | 0.0027 | 155.205 | 0.2000 | 1.33% | | | |
| *Windsor Fire Dept | | | 180 | | 0.0012 | 33.94 | 0.2000 | 0.61% | | | |
| *Windsor Fire Dept | | | 180 | | 0.0089 | 154.265 | 0.2000 | 4.44% | | | |
| Verizon | 11 | 408 | 150 | | 0.0717 | 1970 | 1.0000 | 7.17% | | | |
| Verizon | 9 | 386 | 150 | | 0.0555 | 869 | 0.5793 | 9.58% | | | |
| Verizon | 1 | 1750 | 150 | | 0.0280 | 2145 | 1.0000 | 2.80% | | | |
| Verizon | 1 | 1050 | 150 | | 0.0168 | 746 | 0.4973 | 3.37% | | | |
| 67.5% | | | | | | | | | | | |
| * Source: Siting Council | | | | | | | | | | | |

ATTACHMENT 3

Structural Analysis Report

195' Existing Valmont Lattice Tower

*Proposed Verizon Wireless
Antenna Upgrade*

Verizon Site Ref: Windsor Locks NE

*4 Volunteer Drive
Windsor Locks, CT*

Centek Project No. 13001.072

Date: November 19, 2013



Prepared for:
Verizon Wireless
99 East River Road, 9th Floor
East Hartford, CT 06108

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Introduction

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna installation/modification proposed by Verizon Wireless on the existing lattice tower located in Windsor Locks, Connecticut.

The host tower is a 195-ft, three legged, lattice tower originally manufactured by PiROD Inc.; Eng. file no. A-115761, drawing no(s). 204960B 1-8 dated June 11, 1999 (Rev. C). The tower geometry, structure member sizes and foundation information were taken from a previous structural report prepared by Centek engineering job no. 10001.CO10 dated June 30, 2010.

Antenna and appurtenance inventory were taken from the aforementioned Centek structural report, a tower inventory sheet dated October 31, 2013 provided by MCM, visual verification from grade conducted by Centek personnel on November 6, 2013 and a Verizon RF data sheet.

The tower is made of eleven (11) tapered vertical sections consisting of PiROD truss and solid round steel pipe legs. Diagonal and horizontal lateral support bracing consists of solid round and steel angle shapes. All connections were bolted connections. The width of the tower face is 4.0-ft at the top and 20.0-ft at the base.

Verizon Wireless proposes the removal of six (6) panel antennas and the installation of six (6) panel antennas, three (3) remote radio heads and one (1) main distribution box mounted on three (3) existing T-Frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing tower supports several communication antennas. The existing and proposed loads considered in the analysis consist of the following:

- MESSAGE CENTER MANAGEMENT (Existing):
Antenna: One (1) flash beacon light and one (1) lightning rod mounted with an elevation of ± 200 -ft above grade level.
Coax Cable: One (1) 1" rigid conduit on a leg/face of the existing tower as specified in Section 3 of this report.
- TOWN (Existing):
Antenna: One (1) 20-ft (4)-Bay dipole leg mounted with an elevation of ± 199 -ft above grade level.
Coax Cable: One (1) 7/8" \varnothing coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- TOWN (Existing):
Antenna: Four (4) 20-ft (4)-Bay dipoles, two (2) 20-ft Omni-directional whip antennas, one (1) 12-ft Omni-directional whip antenna and one (1) 10-ft Omni-directional whip antenna mounted on three (3) 15' T-Frames with an elevation of ± 176 -ft above grade level.
Coax Cable: Eight (8) 7/8" \varnothing coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- **AT&T (Existing):**
Antennas: Three (3) Kathrein 800-10121 panel antennas, three (3) Andrew SBNH-1D6565C panel antennas, six (6) Powerwave LGP21401 TMA's, six (6) Ericsson RRUS-11 remote radio heads and one (1) Raycap DC6-48-60-18-8F surge arrester mounted on three (3) 15' T-Frames with a RAD center elevation of ±165-ft above grade level.
Coax Cables: Nine (9) 1-5/8" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report. Two (2) DC trunks and one (1) fiber trunk running within a 3" flex conduit on a leg/face of the existing tower as specified in Section 3 of this report.
- **T-MOBILE (Existing):**
Antennas: Three (3) EMS RR90-17-02DP panel antennas, three (3) RFS APX16DWV-16DWVS-A20 panel antennas, three (3) RFS APXV18-206516S panel antennas, six (6) Ericsson KRY 112 TMA's and three (3) RFS ATMAA1412D-1A29 TMA's mounted on three (3) 15' T-Frames with a RAD center elevation of ±140-ft above grade level.
Coax Cables: Eighteen (18) 1-5/8" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **METROPCS (Existing):**
Antennas: Three (3) RFS APXV18-206517-C panel antennas flush mounted to the tower legs with a RAD center elevation of ±130-ft above grade level.
Coax Cables: Six (6) 1-5/8" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **SPRINT (Existing/Reserved):**
Antennas: Six (6) DB980F65T2E-M panel antennas, three (3) RFS APXVSP18-C-A20 panel antennas, three (3) ALU 1900 MHz RRH's and three (3) ALU 800 MHz RRH's mounted on three (3) 15' boom gates with a RAD center elevation of ±119-ft above grade level.
Coax Cables: Six (6) 1-5/8" Ø coax cables and three (3) 1-5/8" Ø fiber cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **CLEARWIRE (Existing):**
Antennas: Three (3) Argus LLPX310R panel antennas, three (3) Samsung RRU and three (3) Andrew VHLP2-23 dishes mounted on three (3) dual standoff mounts with a RAD center elevation of ±109-ft above grade level.
Coax Cables: Two (2) 1/2" Ø coax cables running on a leg/face of the existing tower as specified in Section 3 of this report. Six (6) 5/8" Ø and six (6) 5/16" Ø cables running within two (2) 3" flex conduits on a leg/face of the existing tower as specified in Section 3 of this report.
- **MESSAGE CENTER MANAGEMENT (Existing):**
Antenna: Three (3) beacons mounted with an elevation of ±99-ft above grade level.
Coax Cable: Three (3) 1/2" Ø electrical cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- **SPRINT (Existing):**
Antennas: One (1) GPS antenna mounted on a one (1) 1' Standoff with a RAD center elevation of ± 78 -ft above grade level.
Coax Cables: One (1) 1/2" \varnothing coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **VERIZON (Existing to Remain):**
Antennas: One (1) Andrew LNX-6514DS-T4M panel antenna, two (2) Antel BXA-70063-6CF panel antennas, three (3) Antel BXA-185060-12CF panel antennas and six (6) RFS FD9R6004/2C-3L diplexers mounted on three (3) 15' T-Frames with a RAD center elevation of ± 150 -ft above grade level.
Coax Cables: Twelve (12) 1-5/8" \varnothing coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **VERIZON (Existing to Remove):**
Antennas: Six (6) Antel LPA-80063/6CF panel antennas mounted on three (3) 15' T-Frames with a RAD center elevation of ± 150 -ft above grade level.
- **VERIZON (Proposed):**
Antennas: **Three (3) BXA-171063-12CF panel antennas, three (3) Antel BXA-70063-6CF panel antennas, three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on three (3) 15' T-Frames with a RAD center elevation of ± 150 -ft above grade level.**
Coax Cables: One (1) 1-5/8" \varnothing fiber cable running on a leg/face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables should be routed as specified in section 3 of this report.

A n a l y s i s

The existing tower was analyzed using a comprehensive computer program entitled *tnxTower*. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled “Structural Standards for Steel Antenna Towers and Antenna Supporting Structures”, the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC¹ and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation of the tower analysis.

T o w e r L o a d i n g

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½” radial ice on the tower structure and its components.

| | | |
|-------------------|---|---|
| Basic Wind Speed: | Hartford; v = 80 mph (fastest mile) | [Section 16 of TIA/EIA-222-F-96] |
| | Windsor Locks; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile) <i>TIA/EIA-222-F wind speed controls.</i> | [Appendix K of the 2005 CT Building Code Supplement] |
| Load Cases: | <u>Load Case 1</u> ; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. | [Section 2.3.16 of TIA/EIA-222-F-96] |
| | <u>Load Case 2</u> ; 69 mph wind speed w/ ½” radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed. | [Section 2.3.16 of TIA/EIA-222-F-96] |
| | <u>Load Case 3</u> ; Seismic – not checked | [Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type |

¹ The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- Calculated stresses were found to be within allowable limits. In Load Case 2, per tnxTower "Section Capacity Table", this tower was found to be at **80.9%** of its total capacity.

| Tower Section | Elevation | Stress Ratio (percentage of capacity) | Result |
|----------------|--------------|--|-------------|
| Diagonal (T11) | 4'-0"-24'-0" | 80.9% | PASS |
| Leg (T11) | 4'-0"-24'-0" | 71.7% | PASS |

Foundation and Anchors

The existing foundation consists of three (3) 5-ft \varnothing x 11.5-ft long reinforced concrete piers on a 29.5-ft square x 3.5-ft thick reinforced concrete pad bearing directly on existing sub grade. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned structural report prepared by Centek. Tower legs are connected to the foundation by means of (6) 1.25" \varnothing , ASTM A687 anchor bolts per leg, embedded into the concrete foundation structure.

- The tower reactions developed from the governing Load Case 2 were used in the verification of the foundation:

| Reactions | Vector | Proposed Base Reactions |
|-----------|-------------|-------------------------|
| Base | Shear | 49 kips |
| | Compression | 86 kips |
| | Moment | 5074 kip-ft |
| Leg | Shear | 34 kips |
| | Uplift | 258 kips |
| | Compression | 321 kips |

- The anchor bolts were found to be within allowable limits.

| Tower Component | Design Limit | Stress Ratio (percentage of capacity) | Result |
|-----------------|--------------|---------------------------------------|--------|
| Anchor Bolts | Tension | 51.2% | PASS |

- The foundation was found to be within allowable limits.

| Foundation | Design Limit | IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS) ⁽¹⁾ | Proposed Loading (FS) ⁽¹⁾ | Result |
|-------------------------|-------------------|---|--------------------------------------|--------|
| Reinforced Concrete Mat | OM ⁽²⁾ | 2.0 | 3.32 | PASS |

Note 1: FS denotes Factor of Safety

Note 2: OM denotes Overturning Moment.

Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by Verizon Wireless. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Carlo F. Centore, PE
Principal ~ Structural Engineer



Prepared by:



Timothy J. Lynn, PE
Structural Engineer

CEN TEK Engineering, Inc.
Structural Analysis - 195-ft Valmont Lattice Tower
Verizon Wireless Antenna Upgrade – Windsor Locks NE
Windsor Locks, CT
November 19, 2013

Standard Conditions for Furnishing of
Professional Engineering Services on
Existing Structures

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

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. 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 are in an uncorroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. 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. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

CENTEK Engineering, Inc.
Structural Analysis - 195-ft Valmont Lattice Tower
Verizon Wireless Antenna Upgrade – Windsor Locks NE
Windsor Locks, CT
November 19, 2013

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

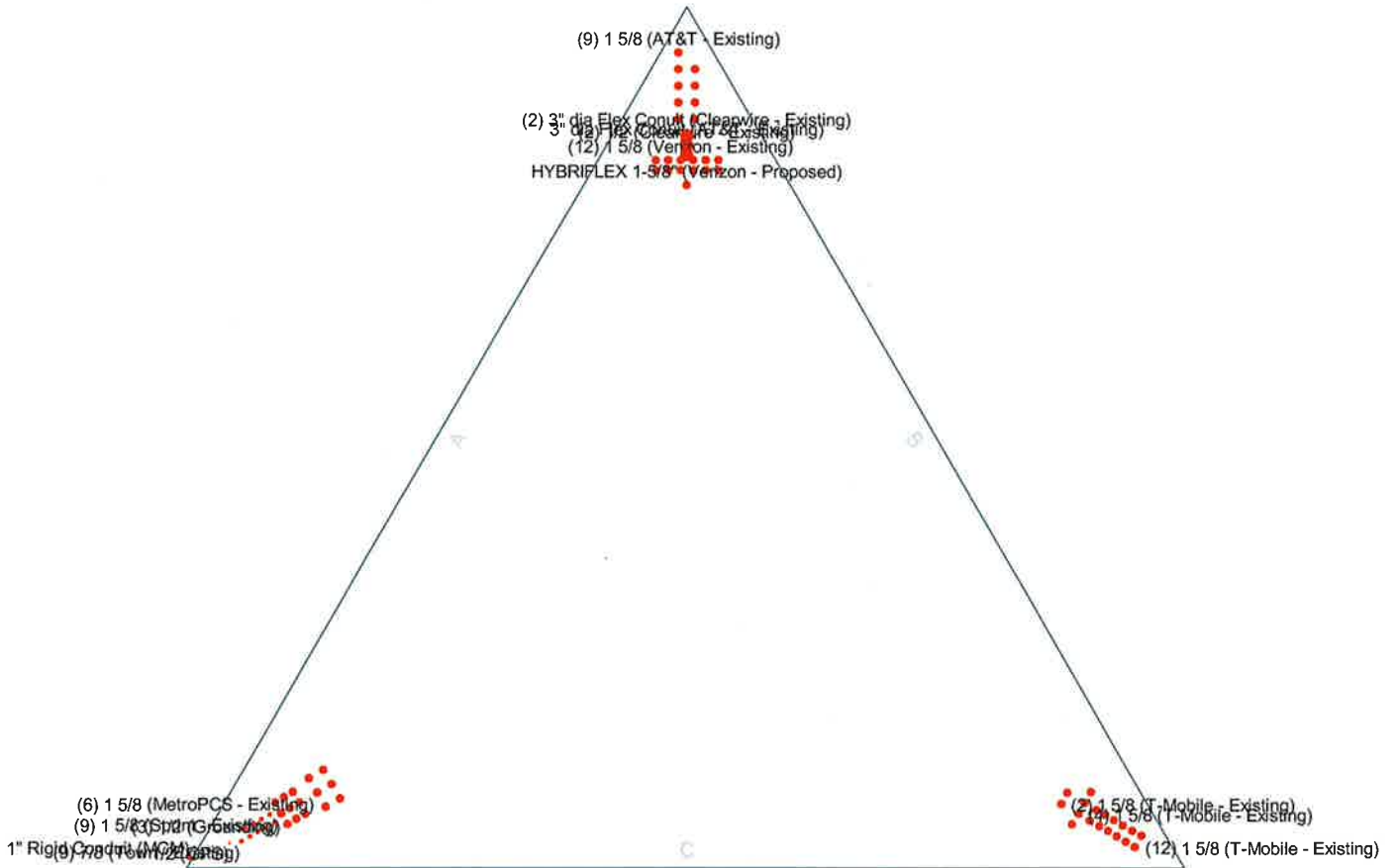
tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Feedline Plan

— Round
 — Flat
 — App In Face
 — App Out Face
 — Truss-Leg

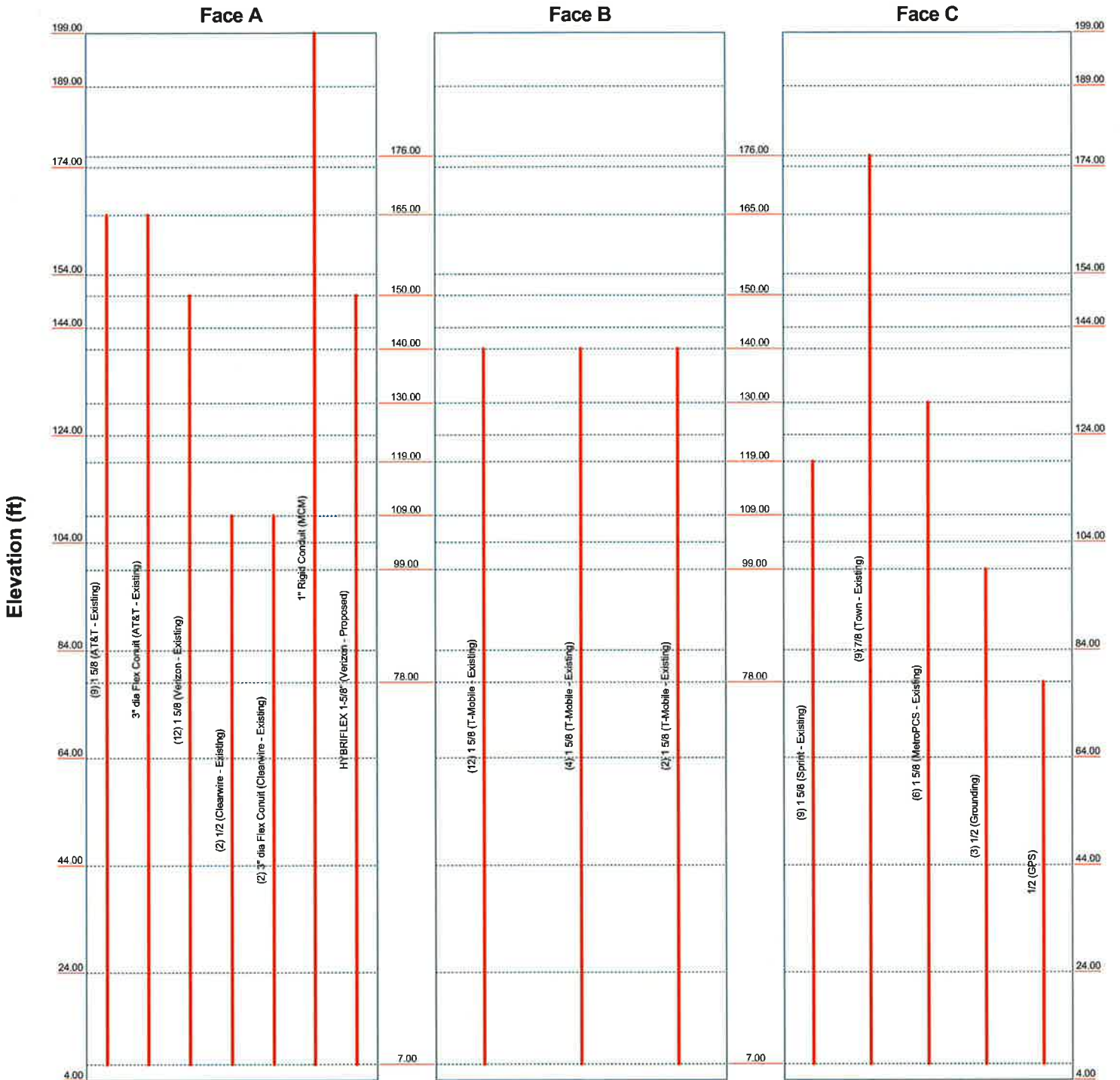


| | | | |
|---|---|----------------|------------|
| Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job: 13001.072 - Windsor Locks NE | | |
| | Project: 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | | |
| | Client: Verizon Wireless | Drawn by: T.JL | App'd: |
| | Code: TIA/EIA-222-F | Date: 11/19/13 | Scale: NTS |
| | Path: | Dwg No. E-7 | |

Feedline Distribution Chart

4' - 199'

— Round
 — Flat
 — App In Face
 — App Out Face
 — Truss Leg



| | | | |
|---|---|--------------------|------------|
| Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job: 13001.072 - Windsor Locks NE | | |
| | Project: 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | | |
| | Client: Verizon Wireless | Drawn by: TJL | App'd: |
| | Code: TIA/EIA-222-F | Date: 11/19/13 | Scale: NTS |
| | Path: | Dwg No. E-7 | |

| | | |
|--|---|----------------------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 1 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 199.00 ft above the ground line.

The base of the tower is set at an elevation of 4.00 ft above the ground line.

The face width of the tower is 4.00 ft at the top and 20.00 ft at the base.

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

The following design criteria apply:

Basic wind speed of 80 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

A wind speed of 69 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

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

Pressures are calculated at each section.

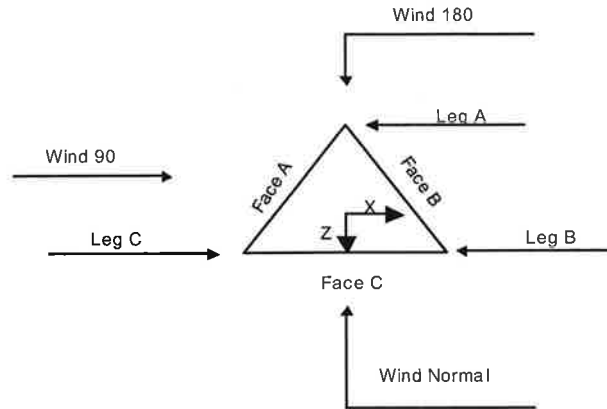
Stress ratio used in tower member design is 1.333.

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

Options

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

| | | |
|--|---|----------------------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 2 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |



Triangular Tower

Tower Section Geometry

| Tower Section | Tower Elevation | Assembly Database | Description | Section Width | Number of Sections | Section Length |
|---------------|-----------------|-------------------|--------------------------|---------------|--------------------|----------------|
| | ft | | | ft | | ft |
| T1 | 199.00-189.00 | | V4 106778 | 4.00 | 1 | 10.00 |
| T2 | 189.00-174.00 | | V4 106778 | 4.00 | 1 | 15.00 |
| T3 | 174.00-154.00 | | H5.0 114529 | 4.00 | 1 | 20.00 |
| T4 | 154.00-144.00 | | U6.0 105245 | 5.00 | 1 | 10.00 |
| T5 | 144.00-124.00 | | U8.0 105216 | 6.00 | 1 | 20.00 |
| T6 | 124.00-104.00 | | U10.0 105217 L2 1/2x3/16 | 8.00 | 1 | 20.00 |
| T7 | 104.00-84.00 | | U12.0 105218 | 10.00 | 1 | 20.00 |
| T8 | 84.00-64.00 | | U14.0 105218 | 12.00 | 1 | 20.00 |
| T9 | 64.00-44.00 | | U16.0 105219 | 14.00 | 1 | 20.00 |
| T10 | 44.00-24.00 | | U18.0 105219 | 16.00 | 1 | 20.00 |
| T11 | 24.00-4.00 | | U20.0 105219 L3.5x5/16 | 18.00 | 1 | 20.00 |

Tower Section Geometry (cont'd)

| Tower Section | Tower Elevation | Diagonal Spacing | Bracing Type | Has K Brace End Panels | Has Horizontals | Top Girt Offset | Bottom Girt Offset |
|---------------|-----------------|------------------|--------------|------------------------|-----------------|-----------------|--------------------|
| | ft | ft | | | | in | in |
| T1 | 199.00-189.00 | 2.25 | X Brace | No | Steps | 6.0000 | 6.0000 |
| T2 | 189.00-174.00 | 2.33 | X Brace | No | Steps | 6.0000 | 6.0000 |
| T3 | 174.00-154.00 | 2.38 | X Brace | No | Steps | 6.0000 | 6.0000 |
| T4 | 154.00-144.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |

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| Tower Section | Tower Elevation ft | Diagonal Spacing ft | Bracing Type | Has K Brace End Panels | Has Horizontals | Top Girt Offset in | Bottom Girt Offset in |
|---------------|-----------------------|------------------------|--------------|------------------------|-----------------|-----------------------|--------------------------|
| T5 | 144.00-124.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T6 | 124.00-104.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T7 | 104.00-84.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T8 | 84.00-64.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T9 | 64.00-44.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T10 | 44.00-24.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T11 | 24.00-4.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |

Tower Section Geometry (cont'd)

| Tower Elevation ft | Leg Type | Leg Size | Leg Grade | Diagonal Type | Diagonal Size | Diagonal Grade |
|-----------------------|-------------|--------------|---------------------|---------------|-------------------|---------------------|
| T1 199.00-189.00 | Solid Round | 1 1/2 | A572-50 (50 ksi) | Solid Round | 3/4 | A572-50 (50 ksi) |
| T2 189.00-174.00 | Solid Round | 1 1/2 | A572-50 (50 ksi) | Solid Round | 3/4 | A572-50 (50 ksi) |
| T3 174.00-154.00 | Solid Round | 2 | A572-50 (50 ksi) | Solid Round | 1 | A572-50 (50 ksi) |
| T4 154.00-144.00 | Truss Leg | Pirod 105244 | A572-50 (50 ksi) | Single Angle | L2 1/2x2 1/2x3/16 | A36 (36 ksi) |
| T5 144.00-124.00 | Truss Leg | Pirod 105217 | A572-50 (50 ksi) | Single Angle | L2 1/2x2 1/2x3/16 | A36 (36 ksi) |
| T6 124.00-104.00 | Truss Leg | Pirod 105218 | A572-50 (50 ksi) | Single Angle | L3x3x3/16 | A36 (36 ksi) |
| T7 104.00-84.00 | Truss Leg | Pirod 105218 | A572-50 (50 ksi) | Single Angle | L3x3x3/16 | A36 (36 ksi) |
| T8 84.00-64.00 | Truss Leg | Pirod 105219 | A572-50 (50 ksi) | Single Angle | L3x3x5/16 | A36 (36 ksi) |
| T9 64.00-44.00 | Truss Leg | Pirod 105219 | A572-50 (50 ksi) | Single Angle | L3x3x5/16 | A36 (36 ksi) |
| T10 44.00-24.00 | Truss Leg | Pirod 105220 | A572-50 (50 ksi) | Single Angle | L3 1/2x3 1/2x5/16 | A36 (36 ksi) |
| T11 24.00-4.00 | Truss Leg | Pirod 105220 | A572-50 (50 ksi) | Single Angle | L3 1/2x3 1/2x5/16 | A36 (36 ksi) |

Tower Section Geometry (cont'd)

| Tower Elevation ft | Top Girt Type | Top Girt Size | Top Girt Grade | Bottom Girt Type | Bottom Girt Size | Bottom Girt Grade |
|-----------------------|---------------|---------------|---------------------|------------------|------------------|---------------------|
| T1 199.00-189.00 | Solid Round | 7/8 | A572-50 (50 ksi) | Solid Round | 7/8 | A572-50 (50 ksi) |
| T2 189.00-174.00 | Solid Round | 7/8 | A572-50 (50 ksi) | Solid Round | 7/8 | A572-50 (50 ksi) |
| T3 174.00-154.00 | Solid Round | 1 | A572-50 (50 ksi) | Solid Round | 1 | A572-50 (50 ksi) |

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| Tower Elevation ft | Calc K Single Angles | Calc K Solid Rounds | K Factors ¹ | | | | | | | | |
|-----------------------|----------------------------|---------------------------|------------------------|---------------------|---------------------|-----------------|--------|--------|----------------|----------------|---|
| | | | Legs | X Brace Diags | K Brace Diags | Single Diags | Girts | Horiz. | Sec. Horiz. | Inner Brace | |
| | | | | X Y | X Y | X Y | X Y | X Y | X Y | X Y | |
| 189.00-174.00 | | | | | | | | | | | |
| T3 | Yes | Yes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 174.00-154.00 | | | | | | | | | | | |
| T4 | Yes | Yes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 154.00-144.00 | | | | | | | | | | | |
| T5 | Yes | Yes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 144.00-124.00 | | | | | | | | | | | |
| T6 | Yes | Yes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 124.00-104.00 | | | | | | | | | | | |
| T7 | Yes | Yes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 104.00-84.00 | | | | | | | | | | | |
| T8 | Yes | Yes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 84.00-64.00 | | | | | | | | | | | |
| T9 | Yes | Yes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 64.00-44.00 | | | | | | | | | | | |
| T10 | Yes | Yes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 44.00-24.00 | | | | | | | | | | | |
| T11 | Yes | Yes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 24.00-4.00 | | | | | | | | | | | |

¹Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.

Tower Section Geometry (cont'd)

| Tower Elevation ft | Truss-Leg K Factors | | | | | |
|-----------------------|--------------------------------|-------------------------|-------------------------|----------------------------------|-------------------------|-------------------------|
| | Truss-Legs Used As Leg Members | | | Truss-Legs Used As Inner Members | | |
| | Leg Panels | X Brace Diagonals | Z Brace Diagonals | Leg Panels | X Brace Diagonals | Z Brace Diagonals |
| T4 | 1 | 0.5 | 0.85 | 1 | 0.5 | 0.85 |
| 154.00-144.00 | | | | | | |
| T5 | 1 | 0.5 | 0.85 | 1 | 0.5 | 0.85 |
| 144.00-124.00 | | | | | | |
| T6 | 1 | 0.5 | 0.85 | 1 | 0.5 | 0.85 |
| 124.00-104.00 | | | | | | |
| T7 | 1 | 0.5 | 0.85 | 1 | 0.5 | 0.85 |
| 104.00-84.00 | | | | | | |
| T8 | 1 | 0.5 | 0.85 | 1 | 0.5 | 0.85 |
| 84.00-64.00 | | | | | | |
| T9 | 1 | 0.5 | 0.85 | 1 | 0.5 | 0.85 |
| 64.00-44.00 | | | | | | |
| T10 | 1 | 0.5 | 0.85 | 1 | 0.5 | 0.85 |
| 44.00-24.00 | | | | | | |
| T11 | 1 | 0.5 | 0.85 | 1 | 0.5 | 0.85 |
| 24.00-4.00 | | | | | | |

Tower Section Geometry (cont'd)

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

| Description | Face or Leg | Allow Shield | Component Type | Placement ft | Face Offset in | Lateral Offset (Frac FW) | # | # Per Row | Clear Spacing in | Width or Diameter in | Perimeter in | Weight plf |
|--|-------------|--------------|----------------|-----------------|-------------------|-----------------------------|----|-----------|---------------------|-------------------------|-----------------|---------------|
| 1 5/8 (T-Mobile - Existing) | B | No | Ar (Leg) | 140.00 - 7.00 | 0.0000 | 0.08 | 12 | 6 | 0.5000 1.0000 | 1.9800 | | 1.04 |
| 1 5/8 (T-Mobile - Existing) | B | No | Ar (Leg) | 140.00 - 7.00 | 0.0000 | 0.12 | 4 | 1 | 0.5000 1.0000 | 1.9800 | | 1.04 |
| 1 5/8 (T-Mobile - Existing) | B | No | Ar (Leg) | 140.00 - 7.00 | 0.0000 | 0.14 | 2 | 1 | 0.5000 1.0000 | 1.9800 | | 1.04 |
| 1 5/8 (AT&T - Existing) | A | No | Ar (Leg) | 165.00 - 7.00 | 0.0000 | 0.08 | 9 | 5 | 1.9800 | 1.9800 | | 1.04 |
| 3" dia Flex Conduit (AT&T - Existing) | A | No | Ar (Leg) | 165.00 - 7.00 | 0.0000 | 0.14 | 1 | 1 | 3.0000 | 3.0000 | | 5.00 |
| 1 5/8 (Verizon - Existing) | A | No | Ar (Leg) | 150.00 - 7.00 | 0.0000 | 0.16 | 12 | 2 | 0.5000 1.0000 | 1.9800 | | 1.04 |
| 1/2 (Clearwire - Existing) | A | No | Ar (Leg) | 109.00 - 7.00 | 0.0000 | 0.14 | 2 | 2 | 0.5800 | 0.5800 | | 0.25 |
| 3" dia Flex Conduit (Clearwire - Existing) | A | No | Ar (Leg) | 109.00 - 7.00 | 0.0000 | 0.14 | 2 | 2 | 1.5000 | 3.0000 | | 5.00 |
| 1 5/8 (Sprint - Existing) | C | No | Ar (Leg) | 119.00 - 7.00 | 0.0000 | 0.12 | 9 | 3 | 0.5000 1.0000 | 1.9800 | | 1.04 |
| 7/8 (Town - Existing) | C | No | Ar (Leg) | 176.00 - 7.00 | 0.0000 | 0.08 | 9 | 5 | 1.1100 | 1.1100 | | 0.54 |
| 1 5/8 (MetroPCS - Existing) | C | No | Ar (Leg) | 130.00 - 7.00 | 0.0000 | 0.16 | 6 | 2 | 1.9800 | 1.9800 | | 1.04 |
| 1/2 (Grounding) | C | No | Ar (Leg) | 99.00 - 7.00 | 0.0000 | 0.11 | 3 | 2 | 0.5000 0.5800 | 0.5800 | | 0.25 |
| 1/2 (GPS) | C | No | Ar (Leg) | 78.00 - 7.00 | 0.0000 | 0.05 | 1 | 1 | 0.5000 0.5800 | 0.5800 | | 0.25 |
| 1" Rigid Conduit (MCM) | A | No | Ar (CfAe) | 199.00 - 7.00 | 0.0000 | -0.49 | 1 | 1 | 1.0000 | 1.0000 | | 0.70 |
| HYBRIFLEX 1-5/8" (Verizon - Proposed) | A | No | Ar (Leg) | 150.00 - 7.00 | 0.0000 | 0.18 | 1 | 1 | 1.9800 | 1.9800 | | 1.90 |

Feed Line/Linear Appurtenances Section Areas

| Tower Section | Tower Elevation ft | Face | A _R ft ² | A _F ft ² | C _{AFA} In Face ft ² | C _{AFA} Out Face ft ² | Weight K |
|---------------|-----------------------|------|-----------------------------------|-----------------------------------|--|---|-------------|
|---------------|-----------------------|------|-----------------------------------|-----------------------------------|--|---|-------------|

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| Tower Section | Tower Elevation ft | Face | A _R ft ² | A _F ft ² | C _{AA} In Face ft ² | C _{AA} Out Face ft ² | Weight K |
|---------------|-----------------------|------|-----------------------------------|-----------------------------------|---|--|-------------|
| T1 | 199.00-189.00 | A | 0.833 | 0.000 | 0.000 | 0.000 | 0.01 |
| | | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T2 | 189.00-174.00 | A | 2.175 | 0.000 | 0.000 | 0.000 | 0.01 |
| | | B | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | C | 0.925 | 0.000 | 0.000 | 0.000 | 0.01 |
| T3 | 174.00-154.00 | A | 22.742 | 0.000 | 0.000 | 0.000 | 0.17 |
| | | B | 11.825 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | C | 9.250 | 0.000 | 0.000 | 0.000 | 0.10 |
| T4 | 154.00-144.00 | A | 19.178 | 0.000 | 0.000 | 0.000 | 0.24 |
| | | B | 13.720 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | C | 4.625 | 0.000 | 0.000 | 0.000 | 0.05 |
| T5 | 144.00-124.00 | A | 44.297 | 0.000 | 0.000 | 0.000 | 0.59 |
| | | B | 52.520 | 0.000 | 0.000 | 0.000 | 0.30 |
| | | C | 32.350 | 0.000 | 0.000 | 0.000 | 0.13 |
| T6 | 124.00-104.00 | A | 59.325 | 0.000 | 0.000 | 0.000 | 0.64 |
| | | B | 60.783 | 0.000 | 0.000 | 0.000 | 0.37 |
| | | C | 49.675 | 0.000 | 0.000 | 0.000 | 0.36 |
| T7 | 104.00-84.00 | A | 72.200 | 0.000 | 0.000 | 0.000 | 0.80 |
| | | B | 69.733 | 0.000 | 0.000 | 0.000 | 0.37 |
| | | C | 53.600 | 0.000 | 0.000 | 0.000 | 0.42 |
| T8 | 84.00-64.00 | A | 73.360 | 0.000 | 0.000 | 0.000 | 0.80 |
| | | B | 69.733 | 0.000 | 0.000 | 0.000 | 0.37 |
| | | C | 54.760 | 0.000 | 0.000 | 0.000 | 0.43 |
| T9 | 64.00-44.00 | A | 73.650 | 0.000 | 0.000 | 0.000 | 0.80 |
| | | B | 69.733 | 0.000 | 0.000 | 0.000 | 0.37 |
| | | C | 55.050 | 0.000 | 0.000 | 0.000 | 0.43 |
| T10 | 44.00-24.00 | A | 73.650 | 0.000 | 0.000 | 0.000 | 0.80 |
| | | B | 69.733 | 0.000 | 0.000 | 0.000 | 0.37 |
| | | C | 55.050 | 0.000 | 0.000 | 0.000 | 0.43 |
| T11 | 24.00-4.00 | A | 62.602 | 0.000 | 0.000 | 0.000 | 0.68 |
| | | B | 59.273 | 0.000 | 0.000 | 0.000 | 0.32 |
| | | C | 46.792 | 0.000 | 0.000 | 0.000 | 0.36 |

Feed Line/Linear Appurtenances Section Areas - With Ice

| Tower Section | Tower Elevation ft | Face or Leg | Ice Thickness in | A _R ft ² | A _F ft ² | C _{AA} In Face ft ² | C _{AA} Out Face ft ² | Weight K |
|---------------|-----------------------|-------------|---------------------|-----------------------------------|-----------------------------------|---|--|-------------|
| T1 | 199.00-189.00 | A | 0.500 | 1.667 | 0.000 | 0.000 | 0.000 | 0.02 |
| | | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T2 | 189.00-174.00 | A | 0.500 | 4.258 | 0.000 | 0.000 | 0.000 | 0.02 |
| | | B | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | C | | 1.758 | 0.000 | 0.000 | 0.000 | 0.03 |
| T3 | 174.00-154.00 | A | 0.500 | 38.242 | 0.000 | 0.000 | 0.000 | 0.36 |
| | | B | | 17.325 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | C | | 17.583 | 0.000 | 0.000 | 0.000 | 0.27 |
| T4 | 154.00-144.00 | A | 0.500 | 29.188 | 1.240 | 0.000 | 0.000 | 0.53 |
| | | B | | 18.730 | 1.240 | 0.000 | 0.000 | 0.00 |
| | | C | | 8.792 | 0.000 | 0.000 | 0.000 | 0.14 |
| T5 | 144.00-124.00 | A | 0.500 | 65.330 | 4.133 | 0.000 | 0.000 | 1.34 |
| | | B | | 53.353 | 20.667 | 0.000 | 0.000 | 0.76 |
| | | C | | 32.483 | 16.533 | 0.000 | 0.000 | 0.37 |
| T6 | 124.00-104.00 | A | 0.500 | 80.000 | 10.817 | 0.000 | 0.000 | 1.42 |
| | | B | | 60.325 | 25.283 | 0.000 | 0.000 | 0.95 |
| | | C | | 46.142 | 26.867 | 0.000 | 0.000 | 0.94 |
| T7 | 104.00-84.00 | A | 0.500 | 95.192 | 15.683 | 0.000 | 0.000 | 1.66 |

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| Tower Section | Tower Elevation ft | Face or Leg | Ice Thickness in | A_R ft ² | A_F ft ² | C_{AA} In Face ft ² | C_{AA} Out Face ft ² | Weight K |
|---------------|-----------------------|-------------|---------------------|--------------------------|--------------------------|--|---|-------------|
| T8 | 84.00-64.00 | B | 0.500 | 72.300 | 26.733 | 0.000 | 0.000 | 0.95 |
| | | C | | 49.358 | 30.283 | 0.000 | 0.000 | 1.10 |
| | | A | | 97.693 | 16.133 | 0.000 | 0.000 | 1.66 |
| T9 | 64.00-44.00 | B | 0.500 | 72.300 | 26.733 | 0.000 | 0.000 | 0.95 |
| | | C | | 51.860 | 30.733 | 0.000 | 0.000 | 1.12 |
| | | A | | 98.483 | 16.133 | 0.000 | 0.000 | 1.66 |
| T10 | 44.00-24.00 | B | 0.500 | 72.300 | 26.733 | 0.000 | 0.000 | 0.95 |
| | | C | | 52.650 | 30.733 | 0.000 | 0.000 | 1.13 |
| | | A | | 98.483 | 16.133 | 0.000 | 0.000 | 1.66 |
| T11 | 24.00-4.00 | B | 0.500 | 72.300 | 26.733 | 0.000 | 0.000 | 0.95 |
| | | C | | 52.650 | 30.733 | 0.000 | 0.000 | 1.13 |
| | | A | | 83.711 | 13.713 | 0.000 | 0.000 | 1.41 |
| | | B | | 61.455 | 22.723 | 0.000 | 0.000 | 0.81 |
| | | C | | 44.752 | 26.123 | 0.000 | 0.000 | 0.96 |

Feed Line Center of Pressure

| Section | Elevation ft | CP_X in | CP_Z in | CP_X Ice in | CP_Z Ice in |
|---------|-----------------|--------------|--------------|---------------------|---------------------|
| T1 | 199.00-189.00 | -1.1571 | 0.6309 | -1.1502 | 0.6271 |
| T2 | 189.00-174.00 | -1.8049 | 1.0066 | -1.7678 | 0.9852 |
| T3 | 174.00-154.00 | -2.9657 | -1.9942 | -3.2983 | -1.2572 |
| T4 | 154.00-144.00 | -1.8496 | -3.8990 | -2.2245 | -2.9530 |
| T5 | 144.00-124.00 | 1.2559 | -2.1343 | 0.0156 | -1.6425 |
| T6 | 124.00-104.00 | 0.3207 | -1.3357 | -0.6553 | -1.1548 |
| T7 | 104.00-84.00 | -0.2621 | -2.6884 | -1.0859 | -2.4162 |
| T8 | 84.00-64.00 | -0.5302 | -2.9167 | -1.5512 | -2.5447 |
| T9 | 64.00-44.00 | -0.6677 | -3.2710 | -1.8817 | -2.8173 |
| T10 | 44.00-24.00 | -0.7158 | -3.5078 | -2.0383 | -3.0522 |
| T11 | 24.00-4.00 | -0.7219 | -3.5383 | -2.0637 | -3.0905 |

Discrete Tower Loads

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert ft ft ft | Azimuth Adjustment ° | Placement ft | C_{AA} Front ft ² | C_{AA} Side ft ² | Weight K |
|-------------------------------|-------------|-------------|--|-------------------------|-----------------|--------------------------------------|-------------------------------------|-------------|
| 4-ft Lightning Rod (MCM) | B | From Leg | 0.00 | 0.0000 | 200.00 | No Ice | 0.40 | 0.01 |
| | | | 0.00 | | | 1/2" Ice | 0.81 | 0.01 |
| Flash Beacon Lighting (MCM) | C | None | 0.00 | 0.0000 | 200.00 | No Ice | 2.70 | 0.05 |
| | | | 0.00 | | | 1/2" Ice | 3.10 | 0.07 |
| DB224 (Town - Existing) | C | From Leg | 0.00 | 0.0000 | 199.00 | No Ice | 3.15 | 0.03 |
| | | | 0.00 | | | 1/2" Ice | 5.67 | 0.04 |
| 15' T-Frame (Town - Existing) | A | From Face | 0.00 | 0.0000 | 176.00 | No Ice | 15.00 | 0.50 |
| | | | 0.00 | | | 1/2" Ice | 20.60 | 0.65 |
| | | | 0.00 | | | | | |

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| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert ft ft ft | Azimuth Adjustment ° | Placement ft | C _{AA} Front ft ² | C _{AA} Side ft ² | Weight K | |
|-------------------------------------|-------------|-------------|--|-------------------------|-----------------|--|---|----------------|--------------|
| 15' T-Frame (Town - Existing) | B | From Face | 2.00 0.00 0.00 | 0.0000 | 176.00 | No Ice 1/2" Ice | 15.00 20.60 | 15.00 20.60 | 0.50 0.65 |
| 15' T-Frame (Town - Existing) | C | From Face | 2.00 0.00 0.00 | 0.0000 | 176.00 | No Ice 1/2" Ice | 15.00 20.60 | 15.00 20.60 | 0.50 0.65 |
| DB224 (Town - Existing) | A | From Face | 4.00 -6.00 10.00 | 0.0000 | 176.00 | No Ice 1/2" Ice | 3.15 5.67 | 3.15 5.67 | 0.03 0.04 |
| 20' x 2" Dia Omni (Town - Existing) | A | From Face | 4.00 0.00 10.00 | 0.0000 | 176.00 | No Ice 1/2" Ice | 4.00 6.03 | 4.00 6.03 | 0.02 0.05 |
| DB224 (Town - Existing) | A | From Face | 4.00 6.00 10.00 | 0.0000 | 176.00 | No Ice 1/2" Ice | 3.15 5.67 | 3.15 5.67 | 0.03 0.04 |
| 10' x 3" Dia Omni (Town - Existing) | B | From Face | 4.00 0.00 5.00 | 0.0000 | 176.00 | No Ice 1/2" Ice | 3.00 4.03 | 3.00 4.03 | 0.03 0.05 |
| 12' x 3" Dia Omni (Town - Existing) | B | From Face | 4.00 6.00 6.00 | 0.0000 | 176.00 | No Ice 1/2" Ice | 3.60 4.83 | 3.60 4.83 | 0.04 0.06 |
| DB224 (Town - Existing) | C | From Face | 4.00 -6.00 10.00 | 0.0000 | 176.00 | No Ice 1/2" Ice | 3.15 5.67 | 3.15 5.67 | 0.03 0.04 |
| 20' x 2" Dia Omni (Town - Existing) | C | From Face | 4.00 0.00 10.00 | 0.0000 | 176.00 | No Ice 1/2" Ice | 4.00 6.03 | 4.00 6.03 | 0.02 0.05 |
| DB224 (Town - Existing) | C | From Face | 4.00 6.00 10.00 | 0.0000 | 176.00 | No Ice 1/2" Ice | 3.15 5.67 | 3.15 5.67 | 0.03 0.04 |
| 15' T-Frame (AT&T - Existing) | A | From Face | 2.00 0.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 15.00 20.60 | 15.00 20.60 | 0.50 0.65 |
| 15' T-Frame (AT&T - Existing) | B | From Face | 2.00 0.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 15.00 20.60 | 15.00 20.60 | 0.50 0.65 |
| 15' T-Frame (AT&T - Existing) | C | From Face | 2.00 0.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 15.00 20.60 | 15.00 20.60 | 0.50 0.65 |
| 800-10121 (AT&T - Existing) | A | From Face | 4.00 -3.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 5.46 5.88 | 3.29 3.64 | 0.05 0.08 |
| (2) LGP21401 TMA (AT&T - Existing) | A | From Face | 4.00 -3.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 0.95 1.09 | 0.37 0.48 | 0.02 0.02 |
| SBNH-1D6565C (AT&T - Existing) | A | From Face | 4.00 1.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 11.41 12.03 | 7.70 8.29 | 0.06 0.13 |
| (2) RRUS-11 (AT&T - Existing) | A | From Face | 4.00 0.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 2.99 3.23 | 1.25 1.41 | 0.05 0.07 |
| 800-10121 (AT&T - Existing) | B | From Face | 4.00 -3.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 5.46 5.88 | 3.29 3.64 | 0.05 0.08 |
| (2) LGP21401 TMA (AT&T - Existing) | B | From Face | 4.00 -3.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 0.95 1.09 | 0.37 0.48 | 0.02 0.02 |

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| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 11 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert ft ft ft | Azimuth Adjustment ° | Placement ft | C _{AA} Front ft ² | C _{AA} Side ft ² | Weight K | |
|--|-------------|-------------|--|-------------------------|-----------------|--|---|----------------|--------------|
| SBNH-1D6565C (AT&T - Existing) | B | From Face | 4.00 1.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 11.41 12.03 | 7.70 8.29 | 0.06 0.13 |
| (2) RRUS-11 (AT&T - Existing) | B | From Face | 4.00 0.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 2.99 3.23 | 1.25 1.41 | 0.05 0.07 |
| 800-10121 (AT&T - Existing) | C | From Face | 4.00 -3.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 5.46 5.88 | 3.29 3.64 | 0.05 0.08 |
| (2) LGP21401 TMA (AT&T - Existing) | C | From Face | 4.00 -3.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 0.95 1.09 | 0.37 0.48 | 0.02 0.02 |
| SBNH-1D6565C (AT&T - Existing) | C | From Face | 4.00 1.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 11.41 12.03 | 7.70 8.29 | 0.06 0.13 |
| (2) RRUS-11 (AT&T - Existing) | C | From Face | 4.00 0.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 2.99 3.23 | 1.25 1.41 | 0.05 0.07 |
| DC6-48-60-18-8F Surge Arrestor (AT&T - Existing) | C | From Face | 4.00 0.00 0.00 | 0.0000 | 165.00 | No Ice 1/2" Ice | 2.23 2.45 | 2.23 2.45 | 0.02 0.04 |
| 15' T-Frame (Verizon - Existing) | A | From Leg | 2.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 15.00 20.60 | 15.00 20.60 | 0.50 0.65 |
| 15' T-Frame (Verizon - Existing) | B | From Leg | 2.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 15.00 20.60 | 15.00 20.60 | 0.50 0.65 |
| 15' T-Frame (Verizon - Existing) | C | From Leg | 2.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 15.00 20.60 | 15.00 20.60 | 0.50 0.65 |
| BXA-171063-12CF (Verizon - Proposed) | A | From Leg | 4.00 -4.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 4.79 5.24 | 3.62 4.06 | 0.02 0.04 |
| LNx-6514DS-T4M (Verizon - Existing) | A | From Leg | 4.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 8.41 8.96 | 5.41 5.86 | 0.04 0.09 |
| BXA-185060/12CF (Verizon - Existing) | A | From Leg | 4.00 4.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 4.79 5.24 | 3.62 4.06 | 0.02 0.04 |
| BXA-70063/6CF (Verizon - Proposed) | A | From Leg | 4.00 6.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 7.73 8.27 | 4.16 4.60 | 0.02 0.06 |
| BXA-171063-12CF (Verizon - Proposed) | B | From Leg | 4.00 -4.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 4.79 5.24 | 3.62 4.06 | 0.02 0.04 |
| BXA-70063/6CF (Verizon - Existing) | B | From Leg | 4.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 7.73 8.27 | 4.16 4.60 | 0.02 0.06 |
| BXA-185060/12CF (Verizon - Existing) | B | From Leg | 4.00 4.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 4.79 5.24 | 3.62 4.06 | 0.02 0.04 |
| BXA-70063/6CF (Verizon - Proposed) | B | From Leg | 4.00 6.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 7.73 8.27 | 4.16 4.60 | 0.02 0.06 |
| BXA-171063-12CF (Verizon - Proposed) | C | From Leg | 4.00 -4.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 4.79 5.24 | 3.62 4.06 | 0.02 0.04 |

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| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 12 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert ft ft ft | Azimuth Adjustment ° | Placement ft | C _{AA} Front ft ² | C _{AA} Side ft ² | Weight K | |
|--|-------------|-------------|--|-------------------------|-----------------|--|---|----------------|--------------|
| BXA-70063/6CF (Verizon - Existing) | C | From Leg | 4.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 7.73 8.27 | 4.16 4.60 | 0.02 0.06 |
| BXA-185060/12CF (Verizon - Existing) | C | From Leg | 4.00 4.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 4.79 5.24 | 3.62 4.06 | 0.02 0.04 |
| BXA-70063/6CF (Verizon - Proposed) | C | From Leg | 4.00 6.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 7.73 8.27 | 4.16 4.60 | 0.02 0.06 |
| (2) FD9R6004/2C-3L Diplexer (Verizon - Existing) | A | From Leg | 4.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 0.37 0.45 | 0.08 0.14 | 0.00 0.01 |
| (2) FD9R6004/2C-3L Diplexer (Verizon - Existing) | B | From Leg | 4.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 0.37 0.45 | 0.08 0.14 | 0.00 0.01 |
| (2) FD9R6004/2C-3L Diplexer (Verizon - Existing) | C | From Leg | 4.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 0.37 0.45 | 0.08 0.14 | 0.00 0.01 |
| RRH2x40-AWS (Verizon - Proposed) | A | From Leg | 4.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 2.52 2.75 | 1.59 1.80 | 0.04 0.06 |
| RRH2x40-AWS (Verizon - Proposed) | B | From Leg | 4.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 2.52 2.75 | 1.59 1.80 | 0.04 0.06 |
| RRH2x40-AWS (Verizon - Proposed) | C | From Leg | 4.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 2.52 2.75 | 1.59 1.80 | 0.04 0.06 |
| DB-T1-6Z-8AB-0Z (Verizon - Proposed) | A | From Leg | 4.00 0.00 0.00 | 0.0000 | 150.00 | No Ice 1/2" Ice | 5.60 5.92 | 2.33 2.56 | 0.04 0.08 |
| 15' T-Frame (T-Mobile - Existing) | A | From Leg | 2.00 0.00 0.00 | 0.0000 | 140.00 | No Ice 1/2" Ice | 15.00 20.60 | 15.00 20.60 | 0.50 0.65 |
| 15' T-Frame (T-Mobile - Existing) | B | From Leg | 2.00 0.00 0.00 | 0.0000 | 140.00 | No Ice 1/2" Ice | 15.00 20.60 | 15.00 20.60 | 0.50 0.65 |
| 15' T-Frame (T-Mobile - Existing) | C | From Leg | 2.00 0.00 0.00 | 0.0000 | 140.00 | No Ice 1/2" Ice | 15.00 20.60 | 15.00 20.60 | 0.50 0.65 |
| RR90-17-02DP (T-Mobile - Existing) | A | From Leg | 4.00 4.00 0.00 | 0.0000 | 140.00 | No Ice 1/2" Ice | 4.36 4.77 | 1.97 2.31 | 0.02 0.04 |
| RR90-17-02DP (T-Mobile - Existing) | B | From Leg | 4.00 4.00 0.00 | 0.0000 | 140.00 | No Ice 1/2" Ice | 4.36 4.77 | 1.97 2.31 | 0.02 0.04 |
| RR90-17-02DP (T-Mobile - Existing) | C | From Leg | 4.00 4.00 0.00 | 0.0000 | 140.00 | No Ice 1/2" Ice | 4.36 4.77 | 1.97 2.31 | 0.02 0.04 |
| (2) KRY 112 TMA (T-Mobile - Existing) | A | From Leg | 4.00 0.00 0.00 | 0.0000 | 140.00 | No Ice 1/2" Ice | 0.78 0.90 | 0.49 0.59 | 0.03 0.03 |
| (2) KRY 112 TMA (T-Mobile - Existing) | B | From Leg | 4.00 0.00 0.00 | 0.0000 | 140.00 | No Ice 1/2" Ice | 0.78 0.90 | 0.49 0.59 | 0.03 0.03 |
| (2) KRY 112 TMA (T-Mobile - Existing) | C | From Leg | 4.00 0.00 0.00 | 0.0000 | 140.00 | No Ice 1/2" Ice | 0.78 0.90 | 0.49 0.59 | 0.03 0.03 |

| | | | | | | | | |
|--|----------------|--|---|--|--------------------|--|-------------------|--|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job | | 13001.072 - Windsor Locks NE | | Page | | 13 of 40 | |
| | Project | | 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | | Date | | 16:17:18 11/19/13 | |
| | Client | | Verizon Wireless | | Designed by | | TJL | |

| Description | Face or Leg | Offset Type | Offsets: | | Azimuth Adjustment | Placement | C _{AA} | | Weight | |
|--|-------------|-------------|-----------------------|------|--------------------|-----------|--------------------|-----------------|----------------|--------------|
| | | | Horz Lateral | Vert | | | Front | Side | | |
| | | | ft | ft | ° | ft | ft ² | ft ² | K | |
| APXV18-206516S-C-A20 (T-Mobile - Existing) | A | From Leg | 4.00 -6.00 0.00 | | 0.0000 | 140.00 | No Ice 1/2" Ice | 3.62 3.97 | 2.01 2.33 | 0.03 0.05 |
| APXV18-206516S-C-A20 (T-Mobile - Existing) | B | From Leg | 4.00 -6.00 0.00 | | 0.0000 | 140.00 | No Ice 1/2" Ice | 3.62 3.97 | 2.01 2.33 | 0.03 0.05 |
| APXV18-206516S-C-A20 (T-Mobile - Existing) | C | From Leg | 4.00 -6.00 0.00 | | 0.0000 | 140.00 | No Ice 1/2" Ice | 3.62 3.97 | 2.01 2.33 | 0.03 0.05 |
| APX16DWV-16DWVS-E-A 20 (T-Mobile - Existing) | A | From Leg | 4.00 0.00 0.00 | | 0.0000 | 140.00 | No Ice 1/2" Ice | 7.07 7.52 | 2.15 2.49 | 0.04 0.07 |
| APX16DWV-16DWVS-E-A 20 (T-Mobile - Existing) | B | From Leg | 4.00 0.00 0.00 | | 0.0000 | 140.00 | No Ice 1/2" Ice | 7.07 7.52 | 2.15 2.49 | 0.04 0.07 |
| APX16DWV-16DWVS-E-A 20 (T-Mobile - Existing) | C | From Leg | 4.00 0.00 0.00 | | 0.0000 | 140.00 | No Ice 1/2" Ice | 7.07 7.52 | 2.15 2.49 | 0.04 0.07 |
| ATMAA1412D-1A29 TMA (T-Mobile - Existing) | A | From Leg | 4.00 0.00 0.00 | | 0.0000 | 140.00 | No Ice 1/2" Ice | 1.17 1.31 | 0.47 0.57 | 0.01 0.02 |
| ATMAA1412D-1A29 TMA (T-Mobile - Existing) | B | From Leg | 4.00 0.00 0.00 | | 0.0000 | 140.00 | No Ice 1/2" Ice | 1.17 1.31 | 0.47 0.57 | 0.01 0.02 |
| ATMAA1412D-1A29 TMA (T-Mobile - Existing) | C | From Leg | 4.00 0.00 0.00 | | 0.0000 | 140.00 | No Ice 1/2" Ice | 1.17 1.31 | 0.47 0.57 | 0.01 0.02 |
| APXV18-206517-C (MetroPCS - Existing) | A | From Leg | 0.50 0.00 0.00 | | 0.0000 | 130.00 | No Ice 1/2" Ice | 5.51 5.98 | 3.93 4.39 | 0.02 0.05 |
| APXV18-206517-C (MetroPCS - Existing) | B | From Leg | 0.50 0.00 0.00 | | 0.0000 | 130.00 | No Ice 1/2" Ice | 5.51 5.98 | 3.93 4.39 | 0.02 0.05 |
| APXV18-206517-C (MetroPCS - Existing) | C | From Leg | 0.50 0.00 0.00 | | 0.0000 | 130.00 | No Ice 1/2" Ice | 5.51 5.98 | 3.93 4.39 | 0.02 0.05 |
| ROHN 6'x15' Boom Gate (1) (Sprint - Existing) | A | From Leg | 2.00 0.00 0.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 17.75 21.10 | 17.75 21.10 | 0.60 0.07 |
| ROHN 6'x15' Boom Gate (1) (Sprint - Existing) | B | From Leg | 2.00 0.00 0.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 17.75 21.10 | 17.75 21.10 | 0.60 0.07 |
| ROHN 6'x15' Boom Gate (1) (Sprint - Existing) | C | From Leg | 2.00 0.00 0.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 17.75 21.10 | 17.75 21.10 | 0.60 0.07 |
| (2) DB980F65T2E-M (Sprint - Existing) | A | From Leg | 4.00 0.00 0.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 3.90 4.28 | 2.29 2.65 | 0.01 0.03 |
| (2) DB980F65T2E-M (Sprint - Existing) | B | From Leg | 4.00 0.00 0.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 3.90 4.28 | 2.29 2.65 | 0.01 0.03 |
| (2) DB980F65T2E-M (Sprint - Existing) | C | From Leg | 4.00 0.00 0.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 3.90 4.28 | 2.29 2.65 | 0.01 0.03 |
| APXVSP18-C-A20 (Sprint - Reserved) | A | From Leg | 4.00 0.00 0.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 8.26 8.81 | 5.28 5.74 | 0.06 0.11 |

| | | | | |
|--|----------------|---|--------------------|-------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job | 13001.072 - Windsor Locks NE | Page | 14 of 40 |
| | Project | 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date | 16:17:18 11/19/13 |
| | Client | Verizon Wireless | Designed by | TJL |

| Description | Face or Leg | Offset Type | Offsets: | | Azimuth Adjustment | Placement | C _{AA} | | Weight | |
|--|-------------|-------------|-----------------------|---------|--------------------|-----------|--------------------|-----------------|--------------|--------------|
| | | | Horz | Lateral | | | Front | Side | | |
| | | | ft | ft | ° | ft | ft ² | ft ² | K | |
| APXVSPPI8-C-A20 (Sprint - Reserved) | B | From Leg | 4.00 0.00 0.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 8.26 8.81 | 5.28 5.74 | 0.06 0.11 |
| APXVSPPI8-C-A20 (Sprint - Reserved) | C | From Leg | 4.00 0.00 0.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 8.26 8.81 | 5.28 5.74 | 0.06 0.11 |
| FD-RRH 2x50 800 (Sprint - Reserved) | A | From Leg | 4.00 3.00 1.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 2.40 2.61 | 2.25 2.46 | 0.06 0.09 |
| FD-RRH 2x50 800 (Sprint - Reserved) | B | From Leg | 4.00 3.00 1.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 2.40 2.61 | 2.25 2.46 | 0.06 0.09 |
| FD-RRH 2x50 800 (Sprint - Reserved) | C | From Leg | 4.00 3.00 1.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 2.40 2.61 | 2.25 2.46 | 0.06 0.09 |
| FD-RRH 4x45 1900 (Sprint - Reserved) | A | From Leg | 4.00 3.00 -1.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 2.71 2.94 | 2.78 3.02 | 0.06 0.08 |
| FD-RRH 4x45 1900 (Sprint - Reserved) | B | From Leg | 4.00 3.00 -1.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 2.71 2.94 | 2.78 3.02 | 0.06 0.08 |
| FD-RRH 4x45 1900 (Sprint - Reserved) | C | From Leg | 4.00 3.00 -1.00 | | 0.0000 | 119.00 | No Ice 1/2" Ice | 2.71 2.94 | 2.78 3.02 | 0.06 0.08 |
| 4-ft Dual Mount Standoff (Clearwire - Existing) | A | From Leg | 2.00 0.00 0.00 | | 0.0000 | 109.00 | No Ice 1/2" Ice | 5.20 6.30 | 5.20 6.30 | 0.05 0.06 |
| 4-ft Dual Mount Standoff (Clearwire - Existing) | B | From Leg | 2.00 0.00 0.00 | | 0.0000 | 109.00 | No Ice 1/2" Ice | 5.20 6.30 | 5.20 6.30 | 0.05 0.06 |
| 4-ft Dual Mount Standoff (Clearwire - Existing) | C | From Leg | 2.00 0.00 0.00 | | 0.0000 | 109.00 | No Ice 1/2" Ice | 5.20 6.30 | 5.20 6.30 | 0.05 0.06 |
| LLPX310R (Clearwire - Existing) | A | From Leg | 4.00 0.00 0.00 | | 0.0000 | 109.00 | No Ice 1/2" Ice | 4.83 5.18 | 1.95 2.21 | 0.03 0.05 |
| LLPX310R (Clearwire - Existing) | B | From Leg | 4.00 0.00 0.00 | | 0.0000 | 109.00 | No Ice 1/2" Ice | 4.83 5.18 | 1.95 2.21 | 0.03 0.05 |
| LLPX310R (Clearwire - Existing) | C | From Leg | 4.00 0.00 0.00 | | 0.0000 | 109.00 | No Ice 1/2" Ice | 4.83 5.18 | 1.95 2.21 | 0.03 0.05 |
| RRU (Clearwire - Existing) | A | From Leg | 4.00 0.00 0.00 | | 0.0000 | 109.00 | No Ice 1/2" Ice | 1.80 2.00 | 0.78 0.92 | 0.03 0.04 |
| RRU (Clearwire - Existing) | B | From Leg | 4.00 0.00 0.00 | | 0.0000 | 109.00 | No Ice 1/2" Ice | 1.80 2.00 | 0.78 0.92 | 0.03 0.04 |
| RRU (Clearwire - Existing) | C | From Leg | 4.00 0.00 0.00 | | 0.0000 | 109.00 | No Ice 1/2" Ice | 1.80 2.00 | 0.78 0.92 | 0.03 0.04 |
| Beacon (MCM) | A | From Leg | 0.50 0.00 0.00 | | 0.0000 | 99.00 | No Ice 1/2" Ice | 1.40 1.56 | 0.35 0.45 | 0.02 0.03 |
| Beacon (MCM) | B | From Leg | 0.50 0.00 0.00 | | 0.0000 | 99.00 | No Ice 1/2" Ice | 1.40 1.56 | 0.35 0.45 | 0.02 0.03 |

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| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 15 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| Description | Face or Leg | Offset Type | Offsets: | | Azimuth Adjustment | Placement | C _{AA} Front | C _{AA} Side | Weight |
|---------------------------------|-------------|-------------|--------------|--------|--------------------|-----------|-----------------------|----------------------|--------|
| | | | Horz Lateral | Vert | | | | | |
| | | | ft | ft | ° | ft | ft ² | ft ² | K |
| Beacon (MCM) | C | From Leg | 0.50 | 0.0000 | 99.00 | No Ice | 1.40 | 0.35 | 0.02 |
| | | | 0.00 | 0.00 | | 1/2" Ice | 1.56 | 0.45 | 0.03 |
| GPS (Sprint - Existing) | C | From Leg | 1.00 | 0.0000 | 78.00 | No Ice | 1.00 | 1.00 | 0.01 |
| | | | 0.00 | 0.00 | | 1/2" Ice | 1.50 | 1.50 | 0.01 |
| 1' Standoff (Sprint - Existing) | C | From Leg | 0.50 | 0.0000 | 78.00 | No Ice | 1.32 | 1.32 | 0.04 |
| | | | 0.00 | 0.00 | | 1/2" Ice | 1.58 | 1.58 | 0.06 |
| | | | 0.00 | | | | | | |

Dishes

| Description | Face or Leg | Dish Type | Offset Type | Offsets: | | Azimuth Adjustment | 3 dB Beam Width | Elevation | Outside Diameter | Aperture Area | Weight |
|---------------------------------|-------------|--------------------------|-------------|--------------|--------|--------------------|-----------------|-----------|------------------|---------------|----------|
| | | | | Horz Lateral | Vert | | | | | | |
| | | | ft | ft | ° | ° | ft | ft | ft ² | K | |
| VHLP2-23 (Clearwire - Existing) | A | Paraboloid w/Shroud (HP) | From Leg | 4.00 | 0.0000 | 109.00 | 2.17 | No Ice | 3.72 | 0.03 | |
| | | | | 0.00 | 0.00 | | | | | | 1/2" Ice |
| VHLP2-23 (Clearwire - Existing) | B | Paraboloid w/Shroud (HP) | From Leg | 4.00 | 0.0000 | 109.00 | 2.17 | No Ice | 3.72 | 0.03 | |
| | | | | 0.00 | 0.00 | | | | | | 1/2" Ice |
| VHLP2-23 (Clearwire - Reserved) | C | Paraboloid w/Shroud (HP) | From Leg | 4.00 | 0.0000 | 109.00 | 2.17 | No Ice | 3.72 | 0.03 | |
| | | | | 0.00 | 0.00 | | | | | | 1/2" Ice |

Truss-Leg Properties

| Section Designation | Area | Area Ice | Self Weight | Ice Weight | Equiv. Diameter | Equiv. Diameter Ice | Leg Area |
|---------------------|-----------|-----------------|-----------------|------------|-----------------|---------------------|-----------------|
| | | in ² | in ² | K | K | in | in ² |
| Pirod 105244 | 1026.8606 | 1727.9786 | 0.56 | 0.21 | 7.1310 | 11.9999 | 3.6816 |
| Pirod 105217 | 2296.2363 | 3598.8066 | 0.59 | 0.43 | 7.9730 | 12.4959 | 5.3014 |
| Pirod 105218 | 2425.3141 | 3778.2146 | 0.72 | 0.45 | 8.4212 | 13.1188 | 7.2158 |
| Pirod 105218 | 2425.3141 | 3778.2146 | 0.72 | 0.45 | 8.4212 | 13.1188 | 7.2158 |
| Pirod 105219 | 2597.9095 | 4038.9458 | 1.09 | 0.48 | 9.0205 | 14.0241 | 9.4248 |
| Pirod 105219 | 2597.9095 | 4038.9458 | 1.09 | 0.48 | 9.0205 | 14.0241 | 9.4248 |
| Pirod 105220 | 2735.0688 | 4240.4956 | 1.26 | 0.50 | 9.4968 | 14.7239 | 11.9282 |
| Pirod 105220 | 2735.0688 | 4240.4956 | 1.26 | 0.50 | 9.4968 | 14.7239 | 11.9282 |

Tower Pressures - No Ice

$$G_H = 1.116$$

| | | | | |
|--|----------------|---|--------------------|-------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job | 13001.072 - Windsor Locks NE | Page | 16 of 40 |
| | Project | 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date | 16:17:18 11/19/13 |
| | Client | Verizon Wireless | Designed by | TJL |

| Section Elevation ft | z ft | K _Z | q _z psf | A _G ft ² | F a c e | A _F ft ² | A _R ft ² | A _{leg} ft ² | Leg % | C _A A _A In Face ft ² | C _A A _A Out Face ft ² |
|-------------------------|---------|----------------|-----------------------|-----------------------------------|------------------|-----------------------------------|-----------------------------------|-------------------------------------|----------|--|---|
| T1 199.00-189.00 | 194.00 | 1.659 | 27 | 41.250 | A | 0.000 | 6.121 | 2.500 | 40.84 | 0.000 | 0.000 |
| | | | | | B | 0.000 | 5.288 | 47.28 | 0.000 | 0.000 | |
| | | | | | C | 0.000 | 6.015 | 41.57 | 0.000 | 0.000 | |
| T2 189.00-174.00 | 181.50 | 1.628 | 27 | 61.875 | A | 0.000 | 9.855 | 3.750 | 38.05 | 0.000 | 0.000 |
| | | | | | B | 0.000 | 7.680 | 48.83 | 0.000 | 0.000 | |
| | | | | | C | 0.000 | 9.816 | 38.20 | 0.000 | 0.000 | |
| T3 174.00-154.00 | 164.00 | 1.581 | 26 | 93.334 | A | 0.000 | 36.668 | 6.669 | 18.19 | 0.000 | 0.000 |
| | | | | | B | 0.000 | 25.752 | 25.90 | 0.000 | 0.000 | |
| | | | | | C | 0.000 | 25.389 | 26.27 | 0.000 | 0.000 | |
| T4 154.00-144.00 | 149.00 | 1.538 | 25 | 66.055 | A | 4.253 | 31.083 | 11.905 | 33.69 | 0.000 | 0.000 |
| | | | | | B | 4.253 | 25.625 | 39.84 | 0.000 | 0.000 | |
| | | | | | C | 4.253 | 16.530 | 57.28 | 0.000 | 0.000 | |
| T5 144.00-124.00 | 134.00 | 1.492 | 24 | 162.528 | A | 8.723 | 70.918 | 26.621 | 33.43 | 0.000 | 0.000 |
| | | | | | B | 8.723 | 79.141 | 30.30 | 0.000 | 0.000 | |
| | | | | | C | 8.723 | 58.971 | 39.33 | 0.000 | 0.000 | |
| T6 124.00-104.00 | 114.00 | 1.425 | 23 | 202.945 | A | 11.964 | 87.443 | 28.118 | 28.29 | 0.000 | 0.000 |
| | | | | | B | 11.964 | 88.901 | 27.88 | 0.000 | 0.000 | |
| | | | | | C | 11.964 | 77.793 | 31.33 | 0.000 | 0.000 | |
| T7 104.00-84.00 | 94.00 | 1.349 | 22 | 242.945 | A | 13.520 | 100.318 | 28.118 | 24.70 | 0.000 | 0.000 |
| | | | | | B | 13.520 | 97.851 | 25.25 | 0.000 | 0.000 | |
| | | | | | C | 13.520 | 81.718 | 29.52 | 0.000 | 0.000 | |
| T8 84.00-64.00 | 74.00 | 1.26 | 21 | 283.362 | A | 15.144 | 103.478 | 30.118 | 25.39 | 0.000 | 0.000 |
| | | | | | B | 15.144 | 99.852 | 26.19 | 0.000 | 0.000 | |
| | | | | | C | 15.144 | 84.878 | 30.11 | 0.000 | 0.000 | |
| T9 64.00-44.00 | 54.00 | 1.151 | 19 | 323.362 | A | 16.830 | 103.768 | 30.118 | 24.97 | 0.000 | 0.000 |
| | | | | | B | 16.830 | 99.852 | 25.81 | 0.000 | 0.000 | |
| | | | | | C | 16.830 | 85.168 | 29.53 | 0.000 | 0.000 | |
| T10 44.00-24.00 | 34.00 | 1.009 | 17 | 363.780 | A | 21.661 | 105.359 | 31.709 | 24.96 | 0.000 | 0.000 |
| | | | | | B | 21.661 | 101.442 | 25.76 | 0.000 | 0.000 | |
| | | | | | C | 21.661 | 86.759 | 29.25 | 0.000 | 0.000 | |
| T11 24.00-4.00 | 14.00 | 1 | 16 | 403.780 | A | 23.735 | 94.311 | 31.709 | 26.86 | 0.000 | 0.000 |
| | | | | | B | 23.735 | 90.982 | 27.64 | 0.000 | 0.000 | |
| | | | | | C | 23.735 | 78.501 | 31.02 | 0.000 | 0.000 | |

Tower Pressure - With Ice

$$G_H = 1.116$$

| Section Elevation ft | z ft | K _Z | q _z psf | t _z in | A _G ft ² | F a c e | A _F ft ² | A _R ft ² | A _{leg} ft ² | Leg % | C _A A _A In Face ft ² | C _A A _A Out Face ft ² |
|-------------------------|---------|----------------|-----------------------|----------------------|-----------------------------------|------------------|-----------------------------------|-----------------------------------|-------------------------------------|----------|--|---|
| T1 199.00-189.00 | 194.00 | 1.659 | 20 | 0.5000 | 42.083 | A | 0.000 | 12.231 | 4.167 | 34.07 | 0.000 | 0.000 |
| | | | | | | B | 0.000 | 10.565 | 39.44 | 0.000 | 0.000 | |
| | | | | | | C | 0.000 | 12.260 | 33.99 | 0.000 | 0.000 | |
| T2 189.00-174.00 | 181.50 | 1.628 | 20 | 0.5000 | 63.125 | A | 0.000 | 19.570 | 6.250 | 31.94 | 0.000 | 0.000 |
| | | | | | | B | 0.000 | 15.312 | 40.82 | 0.000 | 0.000 | |
| | | | | | | C | 0.000 | 19.895 | 31.41 | 0.000 | 0.000 | |
| T3 174.00-154.00 | 164.00 | 1.581 | 19 | 0.5000 | 95.002 | A | 0.000 | 62.760 | 10.004 | 15.94 | 0.000 | 0.000 |
| | | | | | | B | 0.000 | 41.844 | 23.91 | 0.000 | 0.000 | |
| | | | | | | C | 0.000 | 46.842 | 21.36 | 0.000 | 0.000 | |
| T4 154.00-144.00 | 149.00 | 1.538 | 19 | 0.5000 | 66.890 | A | 5.493 | 50.923 | 20.033 | 35.51 | 0.000 | 0.000 |
| | | | | | | B | 5.493 | 40.464 | 43.59 | 0.000 | 0.000 | |
| | | | | | | C | 4.253 | 30.526 | 57.60 | 0.000 | 0.000 | |
| T5 | 134.00 | 1.492 | 18 | 0.5000 | 164.197 | A | 12.856 | 110.541 | 41.722 | 33.81 | 0.000 | 0.000 |

| | | |
|--|---|----------------------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 17 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| Section Elevation | z | K _Z | q _z | l _z | A _G | F a c e | A _F | A _R | A _{leg} | Leg % | C _A A _A In Face ft ² | C _A A _A Out Face ft ² |
|-------------------|--------------|----------------|----------------|----------------|-----------------|------------------|-----------------|-----------------|------------------|-------|--|---|
| ft | ft | | psf | in | ft ² | | ft ² | ft ² | ft ² | | | |
| 144.00-124.00 | | | | | | B | 29.389 | 98.565 | | 32.61 | 0.000 | 0.000 |
| | | | | | | C | 25.256 | 77.695 | | 40.53 | 0.000 | 0.000 |
| T6 | 114.00 | 1.425 | 18 | 0.5000 | 204.614 | A | 22.781 | 127.790 | 43.802 | 29.09 | 0.000 | 0.000 |
| 124.00-104.00 | | | | | | B | 37.248 | 108.115 | | 30.13 | 0.000 | 0.000 |
| | | | | | | C | 38.831 | 93.932 | | 32.99 | 0.000 | 0.000 |
| T7 | 104.00-84.00 | 1.349 | 17 | 0.5000 | 244.614 | A | 29.203 | 143.500 | 43.802 | 25.36 | 0.000 | 0.000 |
| | | | | | | B | 40.253 | 120.609 | | 27.23 | 0.000 | 0.000 |
| | | | | | | C | 43.803 | 97.667 | | 30.96 | 0.000 | 0.000 |
| T8 | 84.00-64.00 | 1.26 | 15 | 0.5000 | 285.031 | A | 31.278 | 149.566 | 46.825 | 25.89 | 0.000 | 0.000 |
| | | | | | | B | 41.877 | 124.173 | | 28.20 | 0.000 | 0.000 |
| | | | | | | C | 45.877 | 103.733 | | 31.30 | 0.000 | 0.000 |
| T9 | 64.00-44.00 | 1.151 | 14 | 0.5000 | 325.031 | A | 32.963 | 150.918 | 46.825 | 25.46 | 0.000 | 0.000 |
| | | | | | | B | 43.563 | 124.735 | | 27.82 | 0.000 | 0.000 |
| | | | | | | C | 47.563 | 105.085 | | 30.68 | 0.000 | 0.000 |
| T10 | 44.00-24.00 | 1.009 | 12 | 0.5000 | 365.448 | A | 37.794 | 153.834 | 49.162 | 25.65 | 0.000 | 0.000 |
| | | | | | | B | 48.394 | 127.650 | | 27.93 | 0.000 | 0.000 |
| | | | | | | C | 52.394 | 108.000 | | 30.65 | 0.000 | 0.000 |
| T11 | 24.00-4.00 | 1 | 12 | 0.5000 | 405.448 | A | 37.448 | 139.654 | 49.162 | 27.76 | 0.000 | 0.000 |
| | | | | | | B | 46.458 | 117.398 | | 30.00 | 0.000 | 0.000 |
| | | | | | | C | 49.858 | 100.695 | | 32.65 | 0.000 | 0.000 |

Tower Pressure - Service

$$G_H = 1.116$$

| Section Elevation | z | K _Z | q _z | A _G | F a c e | A _F | A _R | A _{leg} | Leg % | C _A A _A In Face ft ² | C _A A _A Out Face ft ² |
|-------------------|-------------|----------------|----------------|-----------------|------------------|-----------------|-----------------|------------------|-------|--|---|
| ft | ft | | psf | ft ² | | ft ² | ft ² | ft ² | | | |
| T1 | 194.00 | 1.659 | 11 | 41.250 | A | 0.000 | 6.121 | 2.500 | 40.84 | 0.000 | 0.000 |
| 199.00-189.00 | | | | | B | 0.000 | 5.288 | | 47.28 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 6.015 | | 41.57 | 0.000 | 0.000 |
| T2 | 181.50 | 1.628 | 10 | 61.875 | A | 0.000 | 9.855 | 3.750 | 38.05 | 0.000 | 0.000 |
| 189.00-174.00 | | | | | B | 0.000 | 7.680 | | 48.83 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 9.816 | | 38.20 | 0.000 | 0.000 |
| T3 | 164.00 | 1.581 | 10 | 93.334 | A | 0.000 | 36.668 | 6.669 | 18.19 | 0.000 | 0.000 |
| 174.00-154.00 | | | | | B | 0.000 | 25.752 | | 25.90 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 25.389 | | 26.27 | 0.000 | 0.000 |
| T4 | 149.00 | 1.538 | 10 | 66.055 | A | 4.253 | 31.083 | 11.905 | 33.69 | 0.000 | 0.000 |
| 154.00-144.00 | | | | | B | 4.253 | 25.625 | | 39.84 | 0.000 | 0.000 |
| | | | | | C | 4.253 | 16.530 | | 57.28 | 0.000 | 0.000 |
| T5 | 134.00 | 1.492 | 10 | 162.528 | A | 8.723 | 70.918 | 26.621 | 33.43 | 0.000 | 0.000 |
| 144.00-124.00 | | | | | B | 8.723 | 79.141 | | 30.30 | 0.000 | 0.000 |
| | | | | | C | 8.723 | 58.971 | | 39.33 | 0.000 | 0.000 |
| T6 | 114.00 | 1.425 | 9 | 202.945 | A | 11.964 | 87.443 | 28.118 | 28.29 | 0.000 | 0.000 |
| 124.00-104.00 | | | | | B | 11.964 | 88.901 | | 27.88 | 0.000 | 0.000 |
| | | | | | C | 11.964 | 77.793 | | 31.33 | 0.000 | 0.000 |
| T7 | 94.00 | 1.349 | 9 | 242.945 | A | 13.520 | 100.318 | 28.118 | 24.70 | 0.000 | 0.000 |
| 104.00-84.00 | | | | | B | 13.520 | 97.851 | | 25.25 | 0.000 | 0.000 |
| | | | | | C | 13.520 | 81.718 | | 29.52 | 0.000 | 0.000 |
| T8 | 84.00-64.00 | 1.26 | 8 | 283.362 | A | 15.144 | 103.478 | 30.118 | 25.39 | 0.000 | 0.000 |
| | | | | | B | 15.144 | 99.852 | | 26.19 | 0.000 | 0.000 |
| | | | | | C | 15.144 | 84.878 | | 30.11 | 0.000 | 0.000 |
| T9 | 64.00-44.00 | 1.151 | 7 | 323.362 | A | 16.830 | 103.768 | 30.118 | 24.97 | 0.000 | 0.000 |
| | | | | | B | 16.830 | 99.852 | | 25.81 | 0.000 | 0.000 |

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|--|---|----------------------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 18 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| Section Elevation | z | K _Z | q _z | A _G | F _{a c e} | A _F | A _R | A _{leg} | Leg % | C _{MAA} In Face | C _{MAA} Out Face |
|--------------------|-------|----------------|----------------|-----------------|--------------------|-----------------|-----------------|------------------|-------|--------------------------|---------------------------|
| ft | ft | | psf | ft ² | | ft ² | ft ² | ft ² | | ft ² | ft ² |
| T10 44.00-24.00 | 34.00 | 1.009 | 6 | 363.780 | C | 16.830 | 85.168 | | 29.53 | 0.000 | 0.000 |
| | | | | | A | 21.661 | 105.359 | 31.709 | 24.96 | 0.000 | 0.000 |
| | | | | | B | 21.661 | 101.442 | | 25.76 | 0.000 | 0.000 |
| | | | | | C | 21.661 | 86.759 | | 29.25 | 0.000 | 0.000 |
| T11 24.00-4.00 | 14.00 | 1 | 6 | 403.780 | A | 23.735 | 94.311 | 31.709 | 26.86 | 0.000 | 0.000 |
| | | | | | B | 23.735 | 90.982 | | 27.64 | 0.000 | 0.000 |
| | | | | | C | 23.735 | 78.501 | | 31.02 | 0.000 | 0.000 |

Tower Forces - No Ice - Wind Normal To Face

| Section Elevation | Add Weight | Self Weight | F _{a c e} | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|---------------------|------------|-------------|--------------------|-------|----------------|----------------|----------------|----------------|-------------------|-------|--------|------------|
| ft | K | K | | | | | | | ft ² | K | plf | |
| T1 199.00-189.00 | 0.01 | 0.42 | A | 0.148 | 2.777 | 0.581 | 1 | 1 | 3.558 | 0.30 | 29.96 | A |
| | | | B | 0.128 | 2.853 | 0.578 | 1 | 1 | 3.059 | | | |
| | | | C | 0.146 | 2.787 | 0.581 | 1 | 1 | 3.494 | | | |
| T2 189.00-174.00 | 0.02 | 0.61 | A | 0.159 | 2.738 | 0.583 | 1 | 1 | 5.745 | 0.47 | 31.19 | A |
| | | | B | 0.124 | 2.869 | 0.578 | 1 | 1 | 4.438 | | | |
| | | | C | 0.159 | 2.74 | 0.583 | 1 | 1 | 5.721 | | | |
| T3 174.00-154.00 | 0.27 | 1.46 | A | 0.393 | 2.078 | 0.649 | 1 | 1 | 23.787 | 1.43 | 71.43 | A |
| | | | B | 0.276 | 2.362 | 0.609 | 1 | 1 | 15.678 | | | |
| | | | C | 0.272 | 2.373 | 0.608 | 1 | 1 | 15.430 | | | |
| T4 154.00-144.00 | 0.29 | 1.07 | A | 0.535 | 1.859 | 0.716 | 1 | 1 | 26.507 | 1.39 | 138.52 | A |
| | | | B | 0.452 | 1.97 | 0.674 | 1 | 1 | 21.533 | | | |
| | | | C | 0.315 | 2.258 | 0.62 | 1 | 1 | 14.509 | | | |
| T5 144.00-124.00 | 1.02 | 2.24 | A | 0.49 | 1.913 | 0.692 | 1 | 1 | 57.830 | 3.32 | 165.84 | B |
| | | | B | 0.541 | 1.853 | 0.719 | 1 | 1 | 65.629 | | | |
| | | | C | 0.417 | 2.032 | 0.658 | 1 | 1 | 47.553 | | | |
| T6 124.00-104.00 | 1.38 | 2.80 | A | 0.49 | 1.914 | 0.692 | 1 | 1 | 72.506 | 3.66 | 183.07 | B |
| | | | B | 0.497 | 1.904 | 0.696 | 1 | 1 | 73.837 | | | |
| | | | C | 0.442 | 1.986 | 0.67 | 1 | 1 | 64.066 | | | |
| T7 104.00-84.00 | 1.59 | 2.87 | A | 0.469 | 1.944 | 0.682 | 1 | 1 | 81.934 | 3.93 | 196.32 | A |
| | | | B | 0.458 | 1.96 | 0.677 | 1 | 1 | 79.782 | | | |
| | | | C | 0.392 | 2.08 | 0.648 | 1 | 1 | 66.503 | | | |
| T8 84.00-64.00 | 1.60 | 4.51 | A | 0.419 | 2.028 | 0.659 | 1 | 1 | 83.375 | 3.89 | 194.64 | A |
| | | | B | 0.406 | 2.053 | 0.654 | 1 | 1 | 80.447 | | | |
| | | | C | 0.353 | 2.165 | 0.634 | 1 | 1 | 68.919 | | | |
| T9 64.00-44.00 | 1.60 | 4.64 | A | 0.373 | 2.12 | 0.641 | 1 | 1 | 83.339 | 3.72 | 185.85 | A |
| | | | B | 0.361 | 2.147 | 0.636 | 1 | 1 | 80.376 | | | |
| | | | C | 0.315 | 2.256 | 0.621 | 1 | 1 | 69.698 | | | |
| T10 44.00-24.00 | 1.60 | 5.56 | A | 0.349 | 2.173 | 0.632 | 1 | 1 | 88.266 | 3.54 | 176.81 | A |
| | | | B | 0.338 | 2.199 | 0.628 | 1 | 1 | 85.407 | | | |
| | | | C | 0.298 | 2.301 | 0.615 | 1 | 1 | 75.043 | | | |
| T11 24.00-4.00 | 1.36 | 5.72 | A | 0.292 | 2.317 | 0.614 | 1 | 1 | 81.603 | 3.45 | 172.75 | A |
| | | | B | 0.284 | 2.339 | 0.611 | 1 | 1 | 79.340 | | | |
| | | | C | 0.253 | 2.428 | 0.603 | 1 | 1 | 71.047 | | | |
| Sum Weight: | 10.74 | 31.89 | | | | | | OTM | 2355.68 kip-ft | 29.09 | | |

Tower Forces - No Ice - Wind 60 To Face

| | | |
|--|---|----------------------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 19 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|---------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-------------------|-------|--------|------------|
| ft | K | K | | | | | | | ft ² | K | plf | |
| T1 199.00-189.00 | 0.01 | 0.42 | A | 0.148 | 2.777 | 0.581 | 0.8 | 1 | 3.558 | 0.30 | 29.96 | A |
| | | | B | 0.128 | 2.853 | 0.578 | 0.8 | 1 | 3.059 | | | |
| | | | C | 0.146 | 2.787 | 0.581 | 0.8 | 1 | 3.494 | | | |
| T2 189.00-174.00 | 0.02 | 0.61 | A | 0.159 | 2.738 | 0.583 | 0.8 | 1 | 5.745 | 0.47 | 31.19 | A |
| | | | B | 0.124 | 2.869 | 0.578 | 0.8 | 1 | 4.438 | | | |
| | | | C | 0.159 | 2.74 | 0.583 | 0.8 | 1 | 5.721 | | | |
| T3 174.00-154.00 | 0.27 | 1.46 | A | 0.393 | 2.078 | 0.649 | 0.8 | 1 | 23.787 | 1.43 | 71.43 | A |
| | | | B | 0.276 | 2.362 | 0.609 | 0.8 | 1 | 15.678 | | | |
| | | | C | 0.272 | 2.373 | 0.608 | 0.8 | 1 | 15.430 | | | |
| T4 154.00-144.00 | 0.29 | 1.07 | A | 0.535 | 1.859 | 0.716 | 0.8 | 1 | 25.656 | 1.34 | 134.08 | A |
| | | | B | 0.452 | 1.97 | 0.674 | 0.8 | 1 | 20.682 | | | |
| | | | C | 0.315 | 2.258 | 0.62 | 0.8 | 1 | 13.659 | | | |
| T5 144.00-124.00 | 1.02 | 2.24 | A | 0.49 | 1.913 | 0.692 | 0.8 | 1 | 56.085 | 3.23 | 161.43 | B |
| | | | B | 0.541 | 1.853 | 0.719 | 0.8 | 1 | 63.884 | | | |
| | | | C | 0.417 | 2.032 | 0.658 | 0.8 | 1 | 45.809 | | | |
| T6 124.00-104.00 | 1.38 | 2.80 | A | 0.49 | 1.914 | 0.692 | 0.8 | 1 | 70.113 | 3.54 | 177.14 | B |
| | | | B | 0.497 | 1.904 | 0.696 | 0.8 | 1 | 71.444 | | | |
| | | | C | 0.442 | 1.986 | 0.67 | 0.8 | 1 | 61.674 | | | |
| T7 104.00-84.00 | 1.59 | 2.87 | A | 0.469 | 1.944 | 0.682 | 0.8 | 1 | 79.230 | 3.80 | 189.84 | A |
| | | | B | 0.458 | 1.96 | 0.677 | 0.8 | 1 | 77.078 | | | |
| | | | C | 0.392 | 2.08 | 0.648 | 0.8 | 1 | 63.799 | | | |
| T8 84.00-64.00 | 1.60 | 4.51 | A | 0.419 | 2.028 | 0.659 | 0.8 | 1 | 80.347 | 3.75 | 187.57 | A |
| | | | B | 0.406 | 2.053 | 0.654 | 0.8 | 1 | 77.418 | | | |
| | | | C | 0.353 | 2.165 | 0.634 | 0.8 | 1 | 65.890 | | | |
| T9 64.00-44.00 | 1.60 | 4.64 | A | 0.373 | 2.12 | 0.641 | 0.8 | 1 | 79.973 | 3.57 | 178.35 | A |
| | | | B | 0.361 | 2.147 | 0.636 | 0.8 | 1 | 77.010 | | | |
| | | | C | 0.315 | 2.256 | 0.621 | 0.8 | 1 | 66.332 | | | |
| T10 44.00-24.00 | 1.60 | 5.56 | A | 0.349 | 2.173 | 0.632 | 0.8 | 1 | 83.934 | 3.36 | 168.13 | A |
| | | | B | 0.338 | 2.199 | 0.628 | 0.8 | 1 | 81.075 | | | |
| | | | C | 0.298 | 2.301 | 0.615 | 0.8 | 1 | 70.711 | | | |
| T11 24.00-4.00 | 1.36 | 5.72 | A | 0.292 | 2.317 | 0.614 | 0.8 | 1 | 76.856 | 3.25 | 162.70 | A |
| | | | B | 0.284 | 2.339 | 0.611 | 0.8 | 1 | 74.593 | | | |
| | | | C | 0.253 | 2.428 | 0.603 | 0.8 | 1 | 66.300 | | | |
| Sum Weight: | 10.74 | 31.89 | | | | | | OTM | 2288.43 kip-ft | 28.04 | | |

Tower Forces - No Ice - Wind 90 To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|---------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-----------------|------|--------|------------|
| ft | K | K | | | | | | | ft ² | K | plf | |
| T1 199.00-189.00 | 0.01 | 0.42 | A | 0.148 | 2.777 | 0.581 | 0.85 | 1 | 3.558 | 0.30 | 29.96 | A |
| | | | B | 0.128 | 2.853 | 0.578 | 0.85 | 1 | 3.059 | | | |
| | | | C | 0.146 | 2.787 | 0.581 | 0.85 | 1 | 3.494 | | | |
| T2 189.00-174.00 | 0.02 | 0.61 | A | 0.159 | 2.738 | 0.583 | 0.85 | 1 | 5.745 | 0.47 | 31.19 | A |
| | | | B | 0.124 | 2.869 | 0.578 | 0.85 | 1 | 4.438 | | | |
| | | | C | 0.159 | 2.74 | 0.583 | 0.85 | 1 | 5.721 | | | |
| T3 174.00-154.00 | 0.27 | 1.46 | A | 0.393 | 2.078 | 0.649 | 0.85 | 1 | 23.787 | 1.43 | 71.43 | A |
| | | | B | 0.276 | 2.362 | 0.609 | 0.85 | 1 | 15.678 | | | |
| | | | C | 0.272 | 2.373 | 0.608 | 0.85 | 1 | 15.430 | | | |
| T4 154.00-144.00 | 0.29 | 1.07 | A | 0.535 | 1.859 | 0.716 | 0.85 | 1 | 25.869 | 1.35 | 135.19 | A |
| | | | B | 0.452 | 1.97 | 0.674 | 0.85 | 1 | 20.895 | | | |
| | | | C | 0.315 | 2.258 | 0.62 | 0.85 | 1 | 13.872 | | | |
| T5 144.00-124.00 | 1.02 | 2.24 | A | 0.49 | 1.913 | 0.692 | 0.85 | 1 | 56.522 | 3.25 | 162.53 | B |
| | | | B | 0.541 | 1.853 | 0.719 | 0.85 | 1 | 64.321 | | | |

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|--|------------------------------|-------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job | Page |
| | 13001.072 - Windsor Locks NE | 20 of 40 |
| | Project | Date |
| 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | 16:17:18 11/19/13 | |
| Client | Designed by | |
| Verizon Wireless | TJL | |

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|---------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-------------------|-------|--------|------------|
| ft | K | K | | | | | | | ft ² | K | plf | |
| T6 124.00-104.00 | 1.38 | 2.80 | C | 0.417 | 2.032 | 0.658 | 0.85 | | 46.245 | 3.57 | 178.62 | B |
| | | | A | 0.49 | 1.914 | 0.692 | 0.85 | | 70.711 | | | |
| | | | B | 0.497 | 1.904 | 0.696 | 0.85 | | 72.043 | | | |
| T7 104.00-84.00 | 1.59 | 2.87 | C | 0.442 | 1.986 | 0.67 | 0.85 | | 62.272 | 3.83 | 191.46 | A |
| | | | A | 0.469 | 1.944 | 0.682 | 0.85 | | 79.906 | | | |
| | | | B | 0.458 | 1.96 | 0.677 | 0.85 | | 77.754 | | | |
| T8 84.00-64.00 | 1.60 | 4.51 | C | 0.392 | 2.08 | 0.648 | 0.85 | | 64.475 | 3.79 | 189.34 | A |
| | | | A | 0.419 | 2.028 | 0.659 | 0.85 | | 81.104 | | | |
| | | | B | 0.406 | 2.053 | 0.654 | 0.85 | | 78.175 | | | |
| T9 64.00-44.00 | 1.60 | 4.64 | C | 0.353 | 2.165 | 0.634 | 0.85 | | 66.647 | 3.60 | 180.22 | A |
| | | | A | 0.373 | 2.12 | 0.641 | 0.85 | | 80.814 | | | |
| | | | B | 0.361 | 2.147 | 0.636 | 0.85 | | 77.852 | | | |
| T10 44.00-24.00 | 1.60 | 5.56 | C | 0.315 | 2.256 | 0.621 | 0.85 | | 67.173 | 3.41 | 170.30 | A |
| | | | A | 0.349 | 2.173 | 0.632 | 0.85 | | 85.017 | | | |
| | | | B | 0.338 | 2.199 | 0.628 | 0.85 | | 82.158 | | | |
| T11 24.00-4.00 | 1.36 | 5.72 | C | 0.298 | 2.301 | 0.615 | 0.85 | | 71.794 | 3.30 | 165.21 | A |
| | | | A | 0.292 | 2.317 | 0.614 | 0.85 | | 78.043 | | | |
| | | | B | 0.284 | 2.339 | 0.611 | 0.85 | | 75.779 | | | |
| Sum Weight: | 10.74 | 31.89 | C | 0.253 | 2.428 | 0.603 | 0.85 | OTM | 2305.24 kip-ft | 28.30 | | |

Tower Forces - With Ice - Wind Normal To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|---------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-----------------|------|--------|------------|
| ft | K | K | | | | | | | ft ² | K | plf | |
| T1 199.00-189.00 | 0.02 | 0.57 | A | 0.291 | 2.321 | 0.613 | | | 7.499 | 0.40 | 39.65 | C |
| | | | B | 0.251 | 2.434 | 0.602 | | | 6.361 | | | |
| | | | C | 0.291 | 2.319 | 0.613 | | | 7.519 | | | |
| T2 189.00-174.00 | 0.05 | 0.83 | A | 0.31 | 2.27 | 0.619 | | | 12.114 | 0.62 | 41.44 | C |
| | | | B | 0.243 | 2.46 | 0.6 | | | 9.187 | | | |
| | | | C | 0.315 | 2.256 | 0.621 | | | 12.348 | | | |
| T3 174.00-154.00 | 0.64 | 1.83 | A | 0.661 | 1.779 | 0.793 | | | 49.743 | 1.92 | 95.89 | A |
| | | | B | 0.44 | 1.989 | 0.669 | | | 27.991 | | | |
| | | | C | 0.493 | 1.909 | 0.694 | | | 32.508 | | | |
| T4 154.00-144.00 | 0.66 | 1.54 | A | 0.843 | 1.855 | 0.933 | | | 52.993 | 2.07 | 207.23 | A |
| | | | B | 0.687 | 1.776 | 0.811 | | | 38.299 | | | |
| | | | C | 0.52 | 1.875 | 0.708 | | | 25.862 | | | |
| T5 144.00-124.00 | 2.46 | 3.88 | A | 0.752 | 1.788 | 0.858 | | | 107.705 | 4.28 | 214.00 | B |
| | | | B | 0.779 | 1.802 | 0.88 | | | 116.097 | | | |
| | | | C | 0.627 | 1.79 | 0.77 | | | 85.119 | | | |
| T6 124.00-104.00 | 3.31 | 4.59 | A | 0.736 | 1.783 | 0.846 | | | 130.914 | 4.56 | 227.92 | A |
| | | | B | 0.71 | 1.777 | 0.827 | | | 126.702 | | | |
| | | | C | 0.649 | 1.782 | 0.785 | | | 112.540 | | | |
| T7 104.00-84.00 | 3.71 | 4.70 | A | 0.706 | 1.776 | 0.824 | | | 147.479 | 4.84 | 242.16 | A |
| | | | B | 0.658 | 1.78 | 0.791 | | | 135.601 | | | |
| | | | C | 0.578 | 1.819 | 0.741 | | | 116.134 | | | |
| T8 84.00-64.00 | 3.73 | 6.50 | A | 0.634 | 1.787 | 0.775 | | | 147.236 | 4.54 | 227.09 | A |
| | | | B | 0.583 | 1.816 | 0.743 | | | 134.149 | | | |
| | | | C | 0.525 | 1.87 | 0.711 | | | 119.581 | | | |
| T9 64.00-44.00 | 3.74 | 6.68 | A | 0.566 | 1.829 | 0.733 | | | 143.621 | 4.15 | 207.26 | A |
| | | | B | 0.518 | 1.878 | 0.707 | | | 131.718 | | | |
| | | | C | 0.47 | 1.943 | 0.682 | | | 119.282 | | | |
| T10 | 3.74 | 7.80 | A | 0.524 | 1.87 | 0.71 | | | 147.051 | 3.80 | 190.12 | A |

| | | |
|--|---|----------------------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 21 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|-------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-----------------|-------|--------|------------|
| ft | K | K | | | | | | | ft ² | K | plf | |
| 44.00-24.00 | | | B | 0.482 | 1.925 | 0.688 | 1 | 1 | 136.262 | | | |
| | | | C | 0.439 | 1.992 | 0.668 | 1 | 1 | 124.564 | | | |
| T11 | 3.18 | 8.02 | A | 0.437 | 1.996 | 0.667 | 1 | 1 | 130.640 | 3.57 | 178.69 | A |
| 24.00-4.00 | | | B | 0.404 | 2.056 | 0.653 | 1 | 1 | 123.153 | | | |
| | | | C | 0.371 | 2.124 | 0.64 | 1 | 1 | 114.335 | | | |
| Sum Weight: | 25.23 | 46.95 | | | | | | OTM | 2961.70 kip-ft | 34.75 | | |

Tower Forces - With Ice - Wind 60 To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|-------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-----------------|-------|--------|------------|
| ft | K | K | | | | | | | ft ² | K | plf | |
| T1 | 0.02 | 0.57 | A | 0.291 | 2.321 | 0.613 | 0.8 | 1 | 7.499 | 0.40 | 39.65 | C |
| 199.00-189.00 | | | B | 0.251 | 2.434 | 0.602 | 0.8 | 1 | 6.361 | | | |
| | | | C | 0.291 | 2.319 | 0.613 | 0.8 | 1 | 7.519 | | | |
| T2 | 0.05 | 0.83 | A | 0.31 | 2.27 | 0.619 | 0.8 | 1 | 12.114 | 0.62 | 41.44 | C |
| 189.00-174.00 | | | B | 0.243 | 2.46 | 0.6 | 0.8 | 1 | 9.187 | | | |
| | | | C | 0.315 | 2.256 | 0.621 | 0.8 | 1 | 12.348 | | | |
| T3 | 0.64 | 1.83 | A | 0.661 | 1.779 | 0.793 | 0.8 | 1 | 49.743 | 1.92 | 95.89 | A |
| 174.00-154.00 | | | B | 0.44 | 1.989 | 0.669 | 0.8 | 1 | 27.991 | | | |
| | | | C | 0.493 | 1.909 | 0.694 | 0.8 | 1 | 32.508 | | | |
| T4 | 0.66 | 1.54 | A | 0.843 | 1.855 | 0.933 | 0.8 | 1 | 51.894 | 2.03 | 202.94 | A |
| 154.00-144.00 | | | B | 0.687 | 1.776 | 0.811 | 0.8 | 1 | 37.201 | | | |
| | | | C | 0.52 | 1.875 | 0.708 | 0.8 | 1 | 25.011 | | | |
| T5 | 2.46 | 3.88 | A | 0.752 | 1.788 | 0.858 | 0.8 | 1 | 105.133 | 4.06 | 203.17 | B |
| 144.00-124.00 | | | B | 0.779 | 1.802 | 0.88 | 0.8 | 1 | 110.219 | | | |
| | | | C | 0.627 | 1.79 | 0.77 | 0.8 | 1 | 80.068 | | | |
| T6 | 3.31 | 4.59 | A | 0.736 | 1.783 | 0.846 | 0.8 | 1 | 126.358 | 4.40 | 219.98 | A |
| 124.00-104.00 | | | B | 0.71 | 1.777 | 0.827 | 0.8 | 1 | 119.253 | | | |
| | | | C | 0.649 | 1.782 | 0.785 | 0.8 | 1 | 104.774 | | | |
| T7 | 3.71 | 4.70 | A | 0.706 | 1.776 | 0.824 | 0.8 | 1 | 141.638 | 4.65 | 232.57 | A |
| 104.00-84.00 | | | B | 0.658 | 1.78 | 0.791 | 0.8 | 1 | 127.550 | | | |
| | | | C | 0.578 | 1.819 | 0.741 | 0.8 | 1 | 107.373 | | | |
| T8 | 3.73 | 6.50 | A | 0.634 | 1.787 | 0.775 | 0.8 | 1 | 140.981 | 4.35 | 217.44 | A |
| 84.00-64.00 | | | B | 0.583 | 1.816 | 0.743 | 0.8 | 1 | 125.773 | | | |
| | | | C | 0.525 | 1.87 | 0.711 | 0.8 | 1 | 110.405 | | | |
| T9 | 3.74 | 6.68 | A | 0.566 | 1.829 | 0.733 | 0.8 | 1 | 137.028 | 3.95 | 197.75 | A |
| 64.00-44.00 | | | B | 0.518 | 1.878 | 0.707 | 0.8 | 1 | 123.005 | | | |
| | | | C | 0.47 | 1.943 | 0.682 | 0.8 | 1 | 109.770 | | | |
| T10 | 3.74 | 7.80 | A | 0.524 | 1.87 | 0.71 | 0.8 | 1 | 139.492 | 3.61 | 180.34 | A |
| 44.00-24.00 | | | B | 0.482 | 1.925 | 0.688 | 0.8 | 1 | 126.583 | | | |
| | | | C | 0.439 | 1.992 | 0.668 | 0.8 | 1 | 114.086 | | | |
| T11 | 3.18 | 8.02 | A | 0.437 | 1.996 | 0.667 | 0.8 | 1 | 123.150 | 3.37 | 168.45 | A |
| 24.00-4.00 | | | B | 0.404 | 2.056 | 0.653 | 0.8 | 1 | 113.862 | | | |
| | | | C | 0.371 | 2.124 | 0.64 | 0.8 | 1 | 104.363 | | | |
| Sum Weight: | 25.23 | 46.95 | | | | | | OTM | 2861.65 kip-ft | 33.36 | | |

Tower Forces - With Ice - Wind 90 To Face

| | | |
|--|---|----------------------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 22 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|---------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-------------------|-------|--------|------------|
| ft | K | K | e | | | | | | ft ² | K | plf | |
| T1 199.00-189.00 | 0.02 | 0.57 | A | 0.291 | 2.321 | 0.613 | 0.85 | 1 | 7.499 | 0.40 | 39.65 | C |
| | | | B | 0.251 | 2.434 | 0.602 | 0.85 | 1 | 6.361 | | | |
| | | | C | 0.291 | 2.319 | 0.613 | 0.85 | 1 | 7.519 | | | |
| T2 189.00-174.00 | 0.05 | 0.83 | A | 0.31 | 2.27 | 0.619 | 0.85 | 1 | 12.114 | 0.62 | 41.44 | C |
| | | | B | 0.243 | 2.46 | 0.6 | 0.85 | 1 | 9.187 | | | |
| | | | C | 0.315 | 2.256 | 0.621 | 0.85 | 1 | 12.348 | | | |
| T3 174.00-154.00 | 0.64 | 1.83 | A | 0.661 | 1.779 | 0.793 | 0.85 | 1 | 49.743 | 1.92 | 95.89 | A |
| | | | B | 0.44 | 1.989 | 0.669 | 0.85 | 1 | 27.991 | | | |
| | | | C | 0.493 | 1.909 | 0.694 | 0.85 | 1 | 32.508 | | | |
| T4 154.00-144.00 | 0.66 | 1.54 | A | 0.843 | 1.855 | 0.933 | 0.85 | 1 | 52.169 | 2.04 | 204.01 | A |
| | | | B | 0.687 | 1.776 | 0.811 | 0.85 | 1 | 37.475 | | | |
| | | | C | 0.52 | 1.875 | 0.708 | 0.85 | 1 | 25.224 | | | |
| T5 144.00-124.00 | 2.46 | 3.88 | A | 0.752 | 1.788 | 0.858 | 0.85 | 1 | 105.776 | 4.12 | 205.87 | B |
| | | | B | 0.779 | 1.802 | 0.88 | 0.85 | 1 | 111.689 | | | |
| | | | C | 0.627 | 1.79 | 0.77 | 0.85 | 1 | 81.331 | | | |
| T6 124.00-104.00 | 3.31 | 4.59 | A | 0.736 | 1.783 | 0.846 | 0.85 | 1 | 127.497 | 4.44 | 221.97 | A |
| | | | B | 0.71 | 1.777 | 0.827 | 0.85 | 1 | 121.115 | | | |
| | | | C | 0.649 | 1.782 | 0.785 | 0.85 | 1 | 106.716 | | | |
| T7 104.00-84.00 | 3.71 | 4.70 | A | 0.706 | 1.776 | 0.824 | 0.85 | 1 | 143.099 | 4.70 | 234.97 | A |
| | | | B | 0.658 | 1.78 | 0.791 | 0.85 | 1 | 129.563 | | | |
| | | | C | 0.578 | 1.819 | 0.741 | 0.85 | 1 | 109.563 | | | |
| T8 84.00-64.00 | 3.73 | 6.50 | A | 0.634 | 1.787 | 0.775 | 0.85 | 1 | 142.545 | 4.40 | 219.85 | A |
| | | | B | 0.583 | 1.816 | 0.743 | 0.85 | 1 | 127.867 | | | |
| | | | C | 0.525 | 1.87 | 0.711 | 0.85 | 1 | 112.699 | | | |
| T9 64.00-44.00 | 3.74 | 6.68 | A | 0.566 | 1.829 | 0.733 | 0.85 | 1 | 138.676 | 4.00 | 200.13 | A |
| | | | B | 0.518 | 1.878 | 0.707 | 0.85 | 1 | 125.183 | | | |
| | | | C | 0.47 | 1.943 | 0.682 | 0.85 | 1 | 112.148 | | | |
| T10 44.00-24.00 | 3.74 | 7.80 | A | 0.524 | 1.87 | 0.71 | 0.85 | 1 | 141.382 | 3.66 | 182.79 | A |
| | | | B | 0.482 | 1.925 | 0.688 | 0.85 | 1 | 129.003 | | | |
| | | | C | 0.439 | 1.992 | 0.668 | 0.85 | 1 | 116.705 | | | |
| T11 24.00-4.00 | 3.18 | 8.02 | A | 0.437 | 1.996 | 0.667 | 0.85 | 1 | 125.023 | 3.42 | 171.01 | A |
| | | | B | 0.404 | 2.056 | 0.653 | 0.85 | 1 | 116.185 | | | |
| | | | C | 0.371 | 2.124 | 0.64 | 0.85 | 1 | 106.856 | | | |
| Sum Weight: | 25.23 | 46.95 | | | | | | OTM | 2886.66 kip-ft | 33.71 | | |

Tower Forces - Service - Wind Normal To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|---------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-----------------|------|-------|------------|
| ft | K | K | e | | | | | | ft ² | K | plf | |
| T1 199.00-189.00 | 0.01 | 0.42 | A | 0.148 | 2.777 | 0.581 | 1 | 1 | 3.558 | 0.12 | 11.70 | A |
| | | | B | 0.128 | 2.853 | 0.578 | 1 | 1 | 3.059 | | | |
| | | | C | 0.146 | 2.787 | 0.581 | 1 | 1 | 3.494 | | | |
| T2 189.00-174.00 | 0.02 | 0.61 | A | 0.159 | 2.738 | 0.583 | 1 | 1 | 5.745 | 0.18 | 12.18 | A |
| | | | B | 0.124 | 2.869 | 0.578 | 1 | 1 | 4.438 | | | |
| | | | C | 0.159 | 2.74 | 0.583 | 1 | 1 | 5.721 | | | |
| T3 174.00-154.00 | 0.27 | 1.46 | A | 0.393 | 2.078 | 0.649 | 1 | 1 | 23.787 | 0.56 | 27.90 | A |
| | | | B | 0.276 | 2.362 | 0.609 | 1 | 1 | 15.678 | | | |
| | | | C | 0.272 | 2.373 | 0.608 | 1 | 1 | 15.430 | | | |
| T4 154.00-144.00 | 0.29 | 1.07 | A | 0.535 | 1.859 | 0.716 | 1 | 1 | 26.507 | 0.54 | 54.11 | A |
| | | | B | 0.452 | 1.97 | 0.674 | 1 | 1 | 21.533 | | | |
| | | | C | 0.315 | 2.258 | 0.62 | 1 | 1 | 14.509 | | | |
| T5 144.00-124.00 | 1.02 | 2.24 | A | 0.49 | 1.913 | 0.692 | 1 | 1 | 57.830 | 1.30 | 64.78 | B |
| | | | B | 0.541 | 1.853 | 0.719 | 1 | 1 | 65.629 | | | |

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|--|---|----------------------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 23 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|---------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-----------------|-------|-------|------------|
| ft | K | K | | | | | | | ft ² | K | plf | |
| T6 124.00-104.00 | 1.38 | 2.80 | C | 0.417 | 2.032 | 0.658 | 1 | 1 | 47.553 | 1.43 | 71.51 | B |
| | | | A | 0.49 | 1.914 | 0.692 | 1 | 1 | 72.506 | | | |
| | | | B | 0.497 | 1.904 | 0.696 | 1 | 1 | 73.837 | | | |
| T7 104.00-84.00 | 1.59 | 2.87 | C | 0.442 | 1.986 | 0.67 | 1 | 1 | 64.066 | 1.53 | 76.69 | A |
| | | | A | 0.469 | 1.944 | 0.682 | 1 | 1 | 81.934 | | | |
| | | | B | 0.458 | 1.96 | 0.677 | 1 | 1 | 79.782 | | | |
| T8 84.00-64.00 | 1.60 | 4.51 | C | 0.392 | 2.08 | 0.648 | 1 | 1 | 66.503 | 1.52 | 76.03 | A |
| | | | A | 0.419 | 2.028 | 0.659 | 1 | 1 | 83.375 | | | |
| | | | B | 0.406 | 2.053 | 0.654 | 1 | 1 | 80.447 | | | |
| T9 64.00-44.00 | 1.60 | 4.64 | C | 0.353 | 2.165 | 0.634 | 1 | 1 | 68.919 | 1.45 | 72.60 | A |
| | | | A | 0.373 | 2.12 | 0.641 | 1 | 1 | 83.339 | | | |
| | | | B | 0.361 | 2.147 | 0.636 | 1 | 1 | 80.376 | | | |
| T10 44.00-24.00 | 1.60 | 5.56 | C | 0.315 | 2.256 | 0.621 | 1 | 1 | 69.698 | 1.38 | 69.07 | A |
| | | | A | 0.349 | 2.173 | 0.632 | 1 | 1 | 88.266 | | | |
| | | | B | 0.338 | 2.199 | 0.628 | 1 | 1 | 85.407 | | | |
| T11 24.00-4.00 | 1.36 | 5.72 | C | 0.298 | 2.301 | 0.615 | 1 | 1 | 75.043 | 1.35 | 67.48 | A |
| | | | A | 0.292 | 2.317 | 0.614 | 1 | 1 | 81.603 | | | |
| | | | B | 0.284 | 2.339 | 0.611 | 1 | 1 | 79.340 | | | |
| Sum Weight: | 10.74 | 31.89 | C | 0.253 | 2.428 | 0.603 | 1 | 1 | 71.047 | 11.36 | | |
| | | | | | | | | OTM | 920.19 | | | |
| | | | | | | | | | kip-ft | | | |

Tower Forces - Service - Wind 60 To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|---------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|-----------------|------|-------|------------|
| ft | K | K | | | | | | | ft ² | K | plf | |
| T1 199.00-189.00 | 0.01 | 0.42 | A | 0.148 | 2.777 | 0.581 | 0.8 | 1 | 3.558 | 0.12 | 11.70 | A |
| | | | B | 0.128 | 2.853 | 0.578 | 0.8 | 1 | 3.059 | | | |
| | | | C | 0.146 | 2.787 | 0.581 | 0.8 | 1 | 3.494 | | | |
| T2 189.00-174.00 | 0.02 | 0.61 | A | 0.159 | 2.738 | 0.583 | 0.8 | 1 | 5.745 | 0.18 | 12.18 | A |
| | | | B | 0.124 | 2.869 | 0.578 | 0.8 | 1 | 4.438 | | | |
| | | | C | 0.159 | 2.74 | 0.583 | 0.8 | 1 | 5.721 | | | |
| T3 174.00-154.00 | 0.27 | 1.46 | A | 0.393 | 2.078 | 0.649 | 0.8 | 1 | 23.787 | 0.56 | 27.90 | A |
| | | | B | 0.276 | 2.362 | 0.609 | 0.8 | 1 | 15.678 | | | |
| | | | C | 0.272 | 2.373 | 0.608 | 0.8 | 1 | 15.430 | | | |
| T4 154.00-144.00 | 0.29 | 1.07 | A | 0.535 | 1.859 | 0.716 | 0.8 | 1 | 25.656 | 0.52 | 52.37 | A |
| | | | B | 0.452 | 1.97 | 0.674 | 0.8 | 1 | 20.682 | | | |
| | | | C | 0.315 | 2.258 | 0.62 | 0.8 | 1 | 13.659 | | | |
| T5 144.00-124.00 | 1.02 | 2.24 | A | 0.49 | 1.913 | 0.692 | 0.8 | 1 | 56.085 | 1.26 | 63.06 | B |
| | | | B | 0.541 | 1.853 | 0.719 | 0.8 | 1 | 63.884 | | | |
| | | | C | 0.417 | 2.032 | 0.658 | 0.8 | 1 | 45.809 | | | |
| T6 124.00-104.00 | 1.38 | 2.80 | A | 0.49 | 1.914 | 0.692 | 0.8 | 1 | 70.113 | 1.38 | 69.19 | B |
| | | | B | 0.497 | 1.904 | 0.696 | 0.8 | 1 | 71.444 | | | |
| | | | C | 0.442 | 1.986 | 0.67 | 0.8 | 1 | 61.674 | | | |
| T7 104.00-84.00 | 1.59 | 2.87 | A | 0.469 | 1.944 | 0.682 | 0.8 | 1 | 79.230 | 1.48 | 74.16 | A |
| | | | B | 0.458 | 1.96 | 0.677 | 0.8 | 1 | 77.078 | | | |
| | | | C | 0.392 | 2.08 | 0.648 | 0.8 | 1 | 63.799 | | | |
| T8 84.00-64.00 | 1.60 | 4.51 | A | 0.419 | 2.028 | 0.659 | 0.8 | 1 | 80.347 | 1.47 | 73.27 | A |
| | | | B | 0.406 | 2.053 | 0.654 | 0.8 | 1 | 77.418 | | | |
| | | | C | 0.353 | 2.165 | 0.634 | 0.8 | 1 | 65.890 | | | |
| T9 64.00-44.00 | 1.60 | 4.64 | A | 0.373 | 2.12 | 0.641 | 0.8 | 1 | 79.973 | 1.39 | 69.67 | A |
| | | | B | 0.361 | 2.147 | 0.636 | 0.8 | 1 | 77.010 | | | |
| | | | C | 0.315 | 2.256 | 0.621 | 0.8 | 1 | 66.332 | | | |
| T10 | 1.60 | 5.56 | A | 0.349 | 2.173 | 0.632 | 0.8 | 1 | 83.934 | 1.31 | 65.68 | A |

| | | |
|--|---|----------------------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 24 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|-------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|------------------|-------|-------|------------|
| ft | K | K | e | | | | | | ft ² | K | plf | |
| 44.00-24.00 | | | B | 0.338 | 2.199 | 0.628 | 0.8 | 1 | 81.075 | | | |
| | | | C | 0.298 | 2.301 | 0.615 | 0.8 | 1 | 70.711 | | | |
| T11 | 1.36 | 5.72 | A | 0.292 | 2.317 | 0.614 | 0.8 | 1 | 76.856 | 1.27 | 63.55 | A |
| 24.00-4.00 | | | B | 0.284 | 2.339 | 0.611 | 0.8 | 1 | 74.593 | | | |
| | | | C | 0.253 | 2.428 | 0.603 | 0.8 | 1 | 66.300 | | | |
| Sum Weight: | 10.74 | 31.89 | | | | | | OTM | 893.92 kip-ft | 10.95 | | |

Tower Forces - Service - Wind 90 To Face

| Section Elevation | Add Weight | Self Weight | F a c e | e | C _F | R _R | D _F | D _R | A _E | F | w | Ctrl. Face |
|-------------------|------------|-------------|---------|-------|----------------|----------------|----------------|----------------|------------------|-------|-------|------------|
| ft | K | K | e | | | | | | ft ² | K | plf | |
| T1 | 0.01 | 0.42 | A | 0.148 | 2.777 | 0.581 | 0.85 | 1 | 3.558 | 0.12 | 11.70 | A |
| 199.00-189.00 | | | B | 0.128 | 2.853 | 0.578 | 0.85 | 1 | 3.059 | | | |
| | | | C | 0.146 | 2.787 | 0.581 | 0.85 | 1 | 3.494 | | | |
| T2 | 0.02 | 0.61 | A | 0.159 | 2.738 | 0.583 | 0.85 | 1 | 5.745 | 0.18 | 12.18 | A |
| 189.00-174.00 | | | B | 0.124 | 2.869 | 0.578 | 0.85 | 1 | 4.438 | | | |
| | | | C | 0.159 | 2.74 | 0.583 | 0.85 | 1 | 5.721 | | | |
| T3 | 0.27 | 1.46 | A | 0.393 | 2.078 | 0.649 | 0.85 | 1 | 23.787 | 0.56 | 27.90 | A |
| 174.00-154.00 | | | B | 0.276 | 2.362 | 0.609 | 0.85 | 1 | 15.678 | | | |
| | | | C | 0.272 | 2.373 | 0.608 | 0.85 | 1 | 15.430 | | | |
| T4 | 0.29 | 1.07 | A | 0.535 | 1.859 | 0.716 | 0.85 | 1 | 25.869 | 0.53 | 52.81 | A |
| 154.00-144.00 | | | B | 0.452 | 1.97 | 0.674 | 0.85 | 1 | 20.895 | | | |
| | | | C | 0.315 | 2.258 | 0.62 | 0.85 | 1 | 13.872 | | | |
| T5 | 1.02 | 2.24 | A | 0.49 | 1.913 | 0.692 | 0.85 | 1 | 56.522 | 1.27 | 63.49 | B |
| 144.00-124.00 | | | B | 0.541 | 1.853 | 0.719 | 0.85 | 1 | 64.321 | | | |
| | | | C | 0.417 | 2.032 | 0.658 | 0.85 | 1 | 46.245 | | | |
| T6 | 1.38 | 2.80 | A | 0.49 | 1.914 | 0.692 | 0.85 | 1 | 70.711 | 1.40 | 69.77 | B |
| 124.00-104.00 | | | B | 0.497 | 1.904 | 0.696 | 0.85 | 1 | 72.043 | | | |
| | | | C | 0.442 | 1.986 | 0.67 | 0.85 | 1 | 62.272 | | | |
| T7 | 1.59 | 2.87 | A | 0.469 | 1.944 | 0.682 | 0.85 | 1 | 79.906 | 1.50 | 74.79 | A |
| 104.00-84.00 | | | B | 0.458 | 1.96 | 0.677 | 0.85 | 1 | 77.754 | | | |
| | | | C | 0.392 | 2.08 | 0.648 | 0.85 | 1 | 64.475 | | | |
| T8 | 1.60 | 4.51 | A | 0.419 | 2.028 | 0.659 | 0.85 | 1 | 81.104 | 1.48 | 73.96 | A |
| 84.00-64.00 | | | B | 0.406 | 2.053 | 0.654 | 0.85 | 1 | 78.175 | | | |
| | | | C | 0.353 | 2.165 | 0.634 | 0.85 | 1 | 66.647 | | | |
| T9 | 1.60 | 4.64 | A | 0.373 | 2.12 | 0.641 | 0.85 | 1 | 80.814 | 1.41 | 70.40 | A |
| 64.00-44.00 | | | B | 0.361 | 2.147 | 0.636 | 0.85 | 1 | 77.852 | | | |
| | | | C | 0.315 | 2.256 | 0.621 | 0.85 | 1 | 67.173 | | | |
| T10 | 1.60 | 5.56 | A | 0.349 | 2.173 | 0.632 | 0.85 | 1 | 85.017 | 1.33 | 66.52 | A |
| 44.00-24.00 | | | B | 0.338 | 2.199 | 0.628 | 0.85 | 1 | 82.158 | | | |
| | | | C | 0.298 | 2.301 | 0.615 | 0.85 | 1 | 71.794 | | | |
| T11 | 1.36 | 5.72 | A | 0.292 | 2.317 | 0.614 | 0.85 | 1 | 78.043 | 1.29 | 64.54 | A |
| 24.00-4.00 | | | B | 0.284 | 2.339 | 0.611 | 0.85 | 1 | 75.779 | | | |
| | | | C | 0.253 | 2.428 | 0.603 | 0.85 | 1 | 67.487 | | | |
| Sum Weight: | 10.74 | 31.89 | | | | | | OTM | 900.49 kip-ft | 11.06 | | |

Force Totals

| | | |
|--|---|----------------------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 25 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| Load Case | Vertical Forces K | Sum of Forces X K | Sum of Forces Z K | Sum of Overturning Moments, M_x kip-ft | Sum of Overturning Moments, M_z kip-ft | Sum of Torques kip-ft |
|--------------------------|----------------------|-------------------------|-------------------------|---|---|--------------------------|
| Leg Weight | 22.18 | | | | | |
| Bracing Weight | 9.72 | | | | | |
| Total Member Self-Weight | 31.89 | | | -13.74 | 1.67 | |
| Total Weight | 53.64 | | | -13.74 | 1.67 | |
| Wind 0 deg - No Ice | | 0.00 | -44.49 | -4570.09 | 1.67 | -1.83 |
| Wind 30 deg - No Ice | | 21.83 | -37.85 | -3916.01 | -2247.91 | -4.11 |
| Wind 60 deg - No Ice | | 37.57 | -21.73 | -2258.96 | -3877.56 | -5.62 |
| Wind 90 deg - No Ice | | 43.64 | -0.02 | -15.60 | -4494.26 | -5.73 |
| Wind 120 deg - No Ice | | 38.46 | 22.24 | 2264.44 | -3934.63 | -4.03 |
| Wind 150 deg - No Ice | | 21.80 | 37.86 | 3890.40 | -2244.68 | -0.98 |
| Wind 180 deg - No Ice | | 0.00 | 43.45 | 4476.71 | 1.67 | 1.80 |
| Wind 210 deg - No Ice | | -21.80 | 37.86 | 3890.40 | 2248.02 | 4.11 |
| Wind 240 deg - No Ice | | -38.46 | 22.24 | 2264.44 | 3937.97 | 5.86 |
| Wind 270 deg - No Ice | | -43.64 | -0.02 | -15.60 | 4497.60 | 5.73 |
| Wind 300 deg - No Ice | | -37.57 | -21.73 | -2258.96 | 3880.90 | 3.82 |
| Wind 330 deg - No Ice | | -21.83 | -37.85 | -3916.01 | 2251.25 | 0.98 |
| Member Ice | 15.06 | | | | | |
| Total Weight Ice | 85.53 | | | -21.18 | 4.98 | |
| Wind 0 deg - Ice | | 0.00 | -48.99 | -5040.18 | 4.98 | -5.36 |
| Wind 30 deg - Ice | | 23.96 | -41.52 | -4302.81 | -2464.46 | -6.91 |
| Wind 60 deg - Ice | | 41.18 | -23.80 | -2481.20 | -4248.46 | -6.95 |
| Wind 90 deg - Ice | | 47.90 | -0.01 | -22.69 | -4931.29 | -5.27 |
| Wind 120 deg - Ice | | 42.38 | 24.50 | 2488.32 | -4334.16 | -1.92 |
| Wind 150 deg - Ice | | 23.94 | 41.54 | 4261.96 | -2461.85 | 2.16 |
| Wind 180 deg - Ice | | 0.00 | 47.61 | 4898.86 | 4.98 | 5.20 |
| Wind 210 deg - Ice | | -23.94 | 41.54 | 4261.96 | 2471.81 | 6.91 |
| Wind 240 deg - Ice | | -42.38 | 24.50 | 2488.32 | 4344.13 | 7.28 |
| Wind 270 deg - Ice | | -47.90 | -0.01 | -22.69 | 4941.26 | 5.27 |
| Wind 300 deg - Ice | | -41.18 | -23.80 | -2481.20 | 4258.42 | 1.76 |
| Wind 330 deg - Ice | | -23.96 | -41.52 | -4302.81 | 2474.42 | -2.16 |
| Total Weight | 53.64 | | | -13.74 | 1.67 | |
| Wind 0 deg - Service | | 0.00 | -17.38 | -1779.64 | 0.35 | -0.71 |
| Wind 30 deg - Service | | 8.53 | -14.78 | -1524.14 | -878.39 | -1.60 |
| Wind 60 deg - Service | | 14.67 | -8.49 | -876.86 | -1514.97 | -2.19 |
| Wind 90 deg - Service | | 17.05 | -0.01 | -0.54 | -1755.87 | -2.24 |
| Wind 120 deg - Service | | 15.02 | 8.69 | 890.10 | -1537.26 | -1.57 |
| Wind 150 deg - Service | | 8.52 | 14.79 | 1525.24 | -877.13 | -0.38 |
| Wind 180 deg - Service | | 0.00 | 16.97 | 1754.26 | 0.35 | 0.70 |
| Wind 210 deg - Service | | -8.52 | 14.79 | 1525.24 | 877.83 | 1.60 |
| Wind 240 deg - Service | | -15.02 | 8.69 | 890.10 | 1537.97 | 2.29 |
| Wind 270 deg - Service | | -17.05 | -0.01 | -0.54 | 1756.58 | 2.24 |
| Wind 300 deg - Service | | -14.67 | -8.49 | -876.86 | 1515.68 | 1.49 |
| Wind 330 deg - Service | | -8.53 | -14.78 | -1524.14 | 879.10 | 0.38 |

Load Combinations

| Comb. No. | Description |
|-----------|----------------------------|
| 1 | Dead Only |
| 2 | Dead+Wind 0 deg - No Ice |
| 3 | Dead+Wind 30 deg - No Ice |
| 4 | Dead+Wind 60 deg - No Ice |
| 5 | Dead+Wind 90 deg - No Ice |
| 6 | Dead+Wind 120 deg - No Ice |
| 7 | Dead+Wind 150 deg - No Ice |
| 8 | Dead+Wind 180 deg - No Ice |

| | | | | |
|--|----------------|---|--------------------|-------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job | 13001.072 - Windsor Locks NE | Page | 26 of 40 |
| | Project | 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date | 16:17:18 11/19/13 |
| | Client | Verizon Wireless | Designed by | TJL |

| Comb. No. | Description |
|-----------|-----------------------------|
| 9 | Dead+Wind 210 deg - No Ice |
| 10 | Dead+Wind 240 deg - No Ice |
| 11 | Dead+Wind 270 deg - No Ice |
| 12 | Dead+Wind 300 deg - No Ice |
| 13 | Dead+Wind 330 deg - No Ice |
| 14 | Dead+Ice+Temp |
| 15 | Dead+Wind 0 deg+Ice+Temp |
| 16 | Dead+Wind 30 deg+Ice+Temp |
| 17 | Dead+Wind 60 deg+Ice+Temp |
| 18 | Dead+Wind 90 deg+Ice+Temp |
| 19 | Dead+Wind 120 deg+Ice+Temp |
| 20 | Dead+Wind 150 deg+Ice+Temp |
| 21 | Dead+Wind 180 deg+Ice+Temp |
| 22 | Dead+Wind 210 deg+Ice+Temp |
| 23 | Dead+Wind 240 deg+Ice+Temp |
| 24 | Dead+Wind 270 deg+Ice+Temp |
| 25 | Dead+Wind 300 deg+Ice+Temp |
| 26 | Dead+Wind 330 deg+Ice+Temp |
| 27 | Dead+Wind 0 deg - Service |
| 28 | Dead+Wind 30 deg - Service |
| 29 | Dead+Wind 60 deg - Service |
| 30 | Dead+Wind 90 deg - Service |
| 31 | Dead+Wind 120 deg - Service |
| 32 | Dead+Wind 150 deg - Service |
| 33 | Dead+Wind 180 deg - Service |
| 34 | Dead+Wind 210 deg - Service |
| 35 | Dead+Wind 240 deg - Service |
| 36 | Dead+Wind 270 deg - Service |
| 37 | Dead+Wind 300 deg - Service |
| 38 | Dead+Wind 330 deg - Service |

Maximum Member Forces

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Force K | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|-------------|--------------|----------------|------------------|-----------------|---------|--------------------------|--------------------------|
| T1 | 199 - 189 | Leg | Max Tension | 21 | 1.45 | -0.02 | 0.11 |
| | | | Max. Compression | 23 | -1.92 | 0.00 | -0.00 |
| | | | Max. Mx | 18 | -1.66 | 0.11 | -0.01 |
| | | | Max. My | 15 | 0.56 | -0.01 | -0.12 |
| | | | Max. Vy | 24 | -0.23 | 0.00 | 0.00 |
| | | | Max. Vx | 21 | 0.24 | 0.00 | -0.00 |
| | | Diagonal | Max Tension | 24 | 0.33 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -0.34 | 0.00 | 0.00 |
| | | | Max. Mx | 23 | 0.03 | -0.00 | 0.00 |
| | | | Max. My | 26 | -0.21 | -0.00 | -0.00 |
| | | | Max. Vy | 23 | -0.00 | -0.00 | 0.00 |
| | | | Max. Vx | 26 | -0.00 | 0.00 | 0.00 |
| | | Horizontal | Max Tension | 15 | 0.03 | 0.00 | 0.00 |
| | | | Max. Compression | 15 | -0.01 | 0.00 | 0.00 |
| | | | Max. Mx | 14 | 0.01 | 0.00 | 0.00 |
| | | | Max. My | 19 | 0.01 | 0.00 | 0.00 |
| | | | Max. Vy | 14 | 0.00 | 0.00 | 0.00 |
| | | | Max. Vx | 19 | 0.00 | 0.00 | 0.00 |
| | | Top Girt | Max Tension | 15 | 0.04 | 0.00 | 0.00 |
| | | | Max. Compression | 25 | -0.05 | 0.00 | 0.00 |
| | | | Max. Mx | 14 | -0.01 | 0.01 | 0.00 |
| Max. My | 26 | | 0.00 | 0.00 | -0.00 | | |
| Max. Vy | 14 | | 0.01 | 0.00 | 0.00 | | |

| | | | | |
|--|----------------|---|--------------------|-------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job | 13001.072 - Windsor Locks NE | Page | 27 of 40 |
| | Project | 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date | 16:17:18 11/19/13 |
| | Client | Verizon Wireless | Designed by | TJL |

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Force K | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|-------------|------------------|----------------|------------------|-----------------|---------|--------------------------|--------------------------|
| T2 | 189 - 174 | Bottom Girt | Max. Vx | 26 | -0.00 | 0.00 | 0.00 |
| | | | Max Tension | 25 | 0.17 | 0.00 | 0.00 |
| | | | Max. Compression | 23 | -0.16 | 0.00 | 0.00 |
| | | | Max. Mx | 14 | 0.01 | 0.01 | 0.00 |
| | | | Max. My | 26 | 0.01 | 0.00 | -0.00 |
| | | | Max. Vy | 14 | 0.01 | 0.00 | 0.00 |
| | | Leg | Max. Vx | 26 | -0.00 | 0.00 | 0.00 |
| | | | Max Tension | 21 | 8.28 | -0.03 | 0.28 |
| | | | Max. Compression | 23 | -10.77 | 0.38 | -0.18 |
| | | | Max. Mx | 24 | -9.51 | 0.43 | 0.01 |
| | | | Max. My | 15 | -10.49 | -0.04 | 0.42 |
| | | | Max. Vy | 24 | -1.42 | 0.43 | 0.01 |
| | | Diagonal | Max. Vx | 15 | -1.40 | -0.04 | 0.42 |
| | | | Max Tension | 21 | 1.51 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -1.53 | 0.00 | 0.00 |
| | | | Max. Mx | 23 | -0.16 | -0.00 | -0.00 |
| | | | Max. My | 25 | -1.32 | -0.00 | -0.00 |
| | | | Max. Vy | 23 | -0.00 | -0.00 | -0.00 |
| | | Horizontal | Max. Vx | 25 | -0.00 | 0.00 | 0.00 |
| | | | Max Tension | 15 | 0.27 | 0.00 | 0.00 |
| | | | Max. Compression | 21 | -0.19 | 0.00 | 0.00 |
| | | | Max. Mx | 14 | 0.04 | 0.00 | 0.00 |
| | | | Max. My | 19 | 0.06 | 0.00 | 0.00 |
| | | | Max. Vy | 14 | 0.00 | 0.00 | 0.00 |
| Top Girt | Max. Vx | 19 | 0.00 | 0.00 | 0.00 | | |
| | Max Tension | 15 | 0.11 | 0.00 | 0.00 | | |
| | Max. Compression | 21 | -0.10 | 0.00 | 0.00 | | |
| | Max. Mx | 14 | -0.01 | 0.01 | 0.00 | | |
| | Max. My | 26 | -0.00 | 0.00 | -0.00 | | |
| | Max. Vy | 14 | 0.01 | 0.00 | 0.00 | | |
| Bottom Girt | Max. Vx | 26 | -0.00 | 0.00 | 0.00 | | |
| | Max Tension | 17 | 0.81 | 0.00 | 0.00 | | |
| | Max. Compression | 19 | -0.82 | 0.00 | 0.00 | | |
| | Max. Mx | 14 | 0.00 | 0.01 | 0.00 | | |
| | Max. My | 26 | 0.05 | 0.00 | -0.00 | | |
| | Max. Vy | 14 | 0.01 | 0.00 | 0.00 | | |
| T3 | 174 - 154 | Leg | Max. Vx | 26 | 0.00 | 0.00 | 0.00 |
| | | | Max Tension | 21 | 32.65 | 0.23 | 0.02 |
| | | | Max. Compression | 23 | -39.02 | 1.17 | 0.02 |
| | | | Max. Mx | 21 | 32.64 | -1.23 | -0.06 |
| | | | Max. My | 20 | -1.40 | -0.02 | -1.03 |
| | | | Max. Vy | 17 | 2.92 | -1.23 | -0.01 |
| | | Diagonal | Max. Vx | 26 | -1.97 | -0.04 | 0.82 |
| | | | Max Tension | 18 | 2.81 | 0.00 | 0.00 |
| | | | Max. Compression | 18 | -2.92 | 0.00 | 0.00 |
| | | | Max. Mx | 15 | 2.10 | -0.01 | -0.00 |
| | | | Max. My | 25 | -1.85 | -0.00 | -0.00 |
| | | | Max. Vy | 25 | -0.01 | -0.01 | 0.00 |
| | | Horizontal | Max. Vx | 25 | 0.00 | 0.00 | 0.00 |
| | | | Max Tension | 21 | 0.60 | 0.00 | 0.00 |
| | | | Max. Compression | 15 | -0.47 | 0.00 | 0.00 |
| | | | Max. Mx | 14 | 0.09 | 0.01 | 0.00 |
| | | | Max. My | 19 | 0.16 | 0.00 | 0.00 |
| | | | Max. Vy | 14 | -0.01 | 0.00 | 0.00 |
| | | Top Girt | Max. Vx | 19 | -0.00 | 0.00 | 0.00 |
| | | | Max Tension | 19 | 0.89 | 0.00 | 0.00 |
| | | | Max. Compression | 17 | -0.88 | 0.00 | 0.00 |
| | | | Max. Mx | 14 | -0.01 | 0.01 | 0.00 |
| | | | Max. My | 26 | -0.07 | 0.00 | -0.00 |
| | | | Max. Vy | 14 | -0.01 | 0.00 | 0.00 |
| | Max. Vx | 26 | 0.00 | 0.00 | 0.00 | | |

| | | | | |
|--|----------------|---|--------------------|-------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job | 13001.072 - Windsor Locks NE | Page | 28 of 40 |
| | Project | 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date | 16:17:18 11/19/13 |
| | Client | Verizon Wireless | Designed by | TJL |

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Force K | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|-------------|--------------|----------------|------------------|-----------------|---------|--------------------------|--------------------------|
| T4 | 154 - 144 | Bottom Girt | Max Tension | 21 | 1.02 | 0.00 | 0.00 |
| | | | Max. Compression | 15 | -0.77 | 0.00 | 0.00 |
| | | Leg | Max. Mx | 14 | 0.09 | 0.01 | 0.00 |
| | | | Max. My | 21 | -0.27 | 0.00 | -0.00 |
| | | | Max. Vy | 14 | -0.01 | 0.00 | 0.00 |
| | | | Max. Vx | 21 | 0.00 | 0.00 | 0.00 |
| | | | Max Tension | 21 | 37.78 | -1.23 | -0.06 |
| | | | Max. Compression | 15 | -44.94 | 3.23 | 0.01 |
| | | | Max. Mx | 21 | 36.13 | -3.76 | -0.04 |
| | | | Max. My | 24 | -4.45 | -0.26 | -4.32 |
| Max. Vy | 21 | | 0.83 | -3.76 | -0.04 | | |
| Max. Vx | 24 | | 0.94 | -0.26 | -4.32 | | |
| T5 | 144 - 124 | Diagonal | Max Tension | 21 | 5.34 | 0.00 | 0.00 |
| | | | Max. Compression | 15 | -5.97 | 0.00 | 0.00 |
| | | Leg | Max. Mx | 25 | 4.61 | 0.05 | 0.00 |
| | | | Max. My | 15 | -5.94 | -0.03 | 0.01 |
| | | | Max. Vy | 25 | 0.02 | 0.05 | 0.00 |
| | | | Max. Vx | 25 | -0.00 | 0.00 | 0.00 |
| | | | Max Tension | 25 | 71.14 | -3.10 | -0.01 |
| | | | Max. Compression | 15 | -86.07 | 3.96 | 0.03 |
| | | | Max. Mx | 25 | 70.61 | -4.04 | -0.01 |
| | | | Max. My | 24 | -5.47 | -0.26 | -4.32 |
| Max. Vy | 21 | | -0.67 | -3.76 | -0.04 | | |
| Max. Vx | 24 | | -0.66 | -0.26 | -4.32 | | |
| T6 | 124 - 104 | Diagonal | Max Tension | 22 | 6.98 | 0.00 | 0.00 |
| | | | Max. Compression | 22 | -7.11 | 0.00 | 0.00 |
| | | Leg | Max. Mx | 15 | 5.13 | 0.05 | 0.00 |
| | | | Max. My | 21 | -6.00 | -0.00 | -0.01 |
| | | | Max. Vy | 15 | -0.02 | 0.05 | 0.00 |
| | | | Max. Vx | 21 | 0.00 | 0.00 | 0.00 |
| | | | Max Tension | 17 | 106.42 | -4.20 | 0.02 |
| | | | Max. Compression | 15 | -128.34 | 3.90 | 0.01 |
| | | | Max. Mx | 17 | 106.42 | -4.20 | 0.02 |
| | | | Max. My | 26 | -10.28 | -0.03 | 3.87 |
| Max. Vy | 8 | | 0.62 | -4.03 | -0.00 | | |
| Max. Vx | 5 | | 0.57 | -0.05 | 3.57 | | |
| T7 | 104 - 84 | Diagonal | Max Tension | 22 | 8.02 | 0.00 | 0.00 |
| | | | Max. Compression | 22 | -8.28 | 0.00 | 0.00 |
| | | Leg | Max. Mx | 15 | 6.35 | 0.08 | 0.00 |
| | | | Max. My | 21 | -6.85 | 0.00 | -0.01 |
| | | | Max. Vy | 17 | 0.03 | 0.07 | 0.01 |
| | | | Max. Vx | 21 | 0.00 | 0.00 | 0.00 |
| | | | Max Tension | 25 | 141.46 | -3.50 | -0.02 |
| | | | Max. Compression | 15 | -169.99 | 5.38 | 0.05 |
| | | | Max. Mx | 15 | -169.99 | 5.38 | 0.05 |
| | | | Max. My | 26 | -13.06 | 0.02 | 4.78 |
| Max. Vy | 21 | | 0.29 | -5.21 | -0.05 | | |
| Max. Vx | 24 | | 0.18 | 0.04 | -4.76 | | |
| T8 | 84 - 64 | Diagonal | Max Tension | 22 | 8.15 | 0.00 | 0.00 |
| | | | Max. Compression | 22 | -8.36 | 0.00 | 0.00 |
| | | Leg | Max. Mx | 15 | 6.38 | 0.09 | 0.01 |
| | | | Max. My | 21 | -7.11 | 0.01 | -0.01 |
| | | | Max. Vy | 15 | -0.03 | 0.09 | 0.01 |
| | | | Max. Vx | 21 | 0.00 | 0.00 | 0.00 |
| | | | Max Tension | 25 | 173.34 | -3.93 | -0.01 |
| | | | Max. Compression | 15 | -209.39 | 4.33 | 0.00 |
| | | | Max. Mx | 15 | -189.25 | 5.38 | 0.05 |
| | | | Max. My | 26 | -14.03 | 0.02 | 4.78 |
| Max. Vy | 21 | | -0.26 | -5.21 | -0.05 | | |
| Max. Vx | 20 | | -0.21 | 0.03 | -4.75 | | |
| Diagonal | Max Tension | 22 | 8.39 | 0.00 | 0.00 | | |

| | | | | |
|--|----------------|---|--------------------|-------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job | 13001.072 - Windsor Locks NE | Page | 29 of 40 |
| | Project | 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date | 16:17:18 11/19/13 |
| | Client | Verizon Wireless | Designed by | TJL |

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Force K | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|-------------|--------------|----------------|------------------|-----------------|---------|--------------------------|--------------------------|
| T9 | 64 - 44 | Leg | Max. Compression | 22 | -8.64 | 0.00 | 0.00 |
| | | | Max. Mx | 15 | 6.69 | 0.12 | 0.01 |
| | | | Max. My | 17 | -7.14 | 0.04 | 0.01 |
| | | | Max. Vy | 25 | 0.05 | 0.12 | 0.01 |
| | | | Max. Vx | 17 | -0.00 | 0.00 | 0.00 |
| | | | Max Tension | 25 | 201.93 | -3.90 | -0.02 |
| | | | Max. Compression | 15 | -246.02 | 3.93 | 0.02 |
| | | Diagonal | Max. Mx | 25 | 201.25 | -5.19 | -0.02 |
| | | | Max. My | 26 | -20.00 | -0.68 | 4.50 |
| | | | Max. Vy | 21 | 0.24 | -5.18 | -0.02 |
| | | | Max. Vx | 18 | -0.14 | 0.05 | 4.44 |
| | | | Max Tension | 22 | 8.47 | 0.00 | 0.00 |
| | | | Max. Compression | 22 | -8.72 | 0.00 | 0.00 |
| | | | Max. Mx | 15 | 6.87 | 0.13 | 0.01 |
| T10 | 44 - 24 | Leg | Max. My | 17 | -7.31 | 0.05 | 0.01 |
| | | | Max. Vy | 25 | 0.05 | 0.13 | 0.01 |
| | | | Max. Vx | 17 | -0.00 | 0.00 | 0.00 |
| | | | Max Tension | 25 | 227.32 | -1.90 | -0.02 |
| | | | Max. Compression | 15 | -281.78 | -0.92 | -0.00 |
| | | | Max. Mx | 25 | 226.54 | -9.72 | -0.02 |
| | | | Max. My | 26 | -20.73 | -0.68 | 4.50 |
| | | Diagonal | Max. Vy | 21 | 0.89 | -9.70 | -0.01 |
| | | | Max. Vx | 24 | -0.16 | 2.30 | -3.93 |
| | | | Max Tension | 22 | 9.67 | 0.00 | 0.00 |
| | | | Max. Compression | 22 | -9.21 | 0.00 | 0.00 |
| | | | Max. Mx | 15 | 6.92 | 0.17 | 0.01 |
| | | | Max. My | 16 | -7.92 | 0.05 | 0.02 |
| | | | Max. Vy | 25 | 0.06 | 0.17 | -0.01 |
| T11 | 24 - 4 | Leg | Max. Vx | 16 | -0.00 | 0.00 | 0.00 |
| | | | Max Tension | 25 | 248.67 | 3.85 | -0.03 |
| | | | Max. Compression | 15 | -316.16 | -0.00 | -0.00 |
| | | | Max. Mx | 15 | -295.70 | 12.14 | -0.01 |
| | | | Max. My | 26 | -29.78 | 7.92 | 7.54 |
| | | | Max. Vy | 21 | -1.46 | -9.70 | -0.01 |
| | | | Max. Vx | 24 | -0.84 | 7.94 | -7.51 |
| | | Diagonal | Max Tension | 22 | 12.88 | 0.00 | 0.00 |
| | | | Max. Compression | 22 | -11.11 | 0.00 | 0.00 |
| | | | Max. Mx | 25 | 4.36 | 0.22 | -0.02 |
| | | | Max. My | 17 | -10.03 | 0.13 | 0.03 |
| | | | Max. Vy | 25 | 0.07 | 0.22 | -0.02 |
| | | | Max. Vx | 17 | -0.00 | 0.00 | 0.00 |

Maximum Reactions

| Location | Condition | Gov. Load Comb. | Vertical K | Horizontal, X K | Horizontal, Z K |
|----------|---------------------|-----------------|------------|-----------------|-----------------|
| Leg C | Max. Vert | 23 | 319.49 | 22.66 | -13.35 |
| | Max. H _x | 10 | 281.36 | 24.98 | -14.63 |
| | Max. H _z | 17 | -257.45 | -29.23 | 17.09 |
| | Min. Vert | 17 | -257.45 | -29.23 | 17.09 |
| | Min. H _x | 17 | -257.45 | -29.23 | 17.09 |
| | Min. H _z | 10 | 281.36 | 24.98 | -14.63 |
| Leg B | Max. Vert | 19 | 318.99 | -22.73 | -13.21 |
| | Max. H _x | 25 | -257.95 | 29.31 | 16.96 |
| | Max. H _z | 25 | -257.95 | 29.31 | 16.96 |
| | Min. Vert | 25 | -257.95 | 29.31 | 16.96 |

| | | | | |
|--|----------------|---|--------------------|-------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job | 13001.072 - Windsor Locks NE | Page | 30 of 40 |
| | Project | 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date | 16:17:18 11/19/13 |
| | Client | Verizon Wireless | Designed by | TJL |

| Location | Condition | Gov. Load Comb. | Vertical K | Horizontal, X K | Horizontal, Z K |
|----------|---------------------|-----------------|------------|-----------------|-----------------|
| Leg A | Min. H _x | 6 | 281.20 | -25.00 | -14.58 |
| | Min. H _z | 6 | 281.20 | -25.00 | -14.58 |
| | Max. Vert | 15 | 321.44 | -0.16 | 26.36 |
| | Max. H _x | 24 | 29.82 | 2.21 | -4.06 |
| | Max. H _z | 2 | 282.95 | -0.05 | 29.01 |
| | Min. Vert | 21 | -256.25 | 0.15 | -33.85 |
| | Min. H _x | 18 | 29.82 | -2.22 | -4.06 |
| | Min. H _z | 21 | -256.25 | 0.15 | -33.85 |

Tower Mast Reaction Summary

| Load Combination | Vertical K | Shear _x K | Shear _z K | Overturning Moment, M _x kip-ft | Overturning Moment, M _z kip-ft | Torque kip-ft |
|-----------------------------|------------|----------------------|----------------------|---|---|---------------|
| Dead Only | 53.64 | 0.00 | 0.00 | -13.59 | 1.67 | -0.00 |
| Dead+Wind 0 deg - No Ice | 53.64 | 0.00 | -44.49 | -4591.05 | 1.68 | -1.84 |
| Dead+Wind 30 deg - No Ice | 53.64 | 21.83 | -37.85 | -3934.01 | -2258.33 | -4.13 |
| Dead+Wind 60 deg - No Ice | 53.64 | 37.57 | -21.73 | -2269.31 | -3895.55 | -5.67 |
| Dead+Wind 90 deg - No Ice | 53.64 | 43.64 | -0.02 | -15.54 | -4515.09 | -5.79 |
| Dead+Wind 120 deg - No Ice | 53.64 | 38.46 | 22.24 | 2275.04 | -3952.81 | -4.08 |
| Dead+Wind 150 deg - No Ice | 53.64 | 21.80 | 37.86 | 3908.59 | -2255.09 | -1.00 |
| Dead+Wind 180 deg - No Ice | 53.64 | 0.00 | 43.45 | 4497.66 | 1.68 | 1.80 |
| Dead+Wind 210 deg - No Ice | 53.64 | -21.80 | 37.86 | 3908.59 | 2258.44 | 4.14 |
| Dead+Wind 240 deg - No Ice | 53.64 | -38.46 | 22.24 | 2275.04 | 3956.16 | 5.91 |
| Dead+Wind 270 deg - No Ice | 53.64 | -43.64 | -0.02 | -15.54 | 4518.43 | 5.79 |
| Dead+Wind 300 deg - No Ice | 53.64 | -37.57 | -21.73 | -2269.31 | 3898.90 | 3.87 |
| Dead+Wind 330 deg - No Ice | 53.64 | -21.83 | -37.85 | -3934.01 | 2261.68 | 1.00 |
| Dead+Ice+Temp | 85.53 | 0.00 | 0.00 | -20.97 | 4.98 | 0.00 |
| Dead+Wind 0 deg+Ice+Temp | 85.53 | 0.00 | -48.99 | -5073.78 | 5.01 | -5.37 |
| Dead+Wind 30 deg+Ice+Temp | 85.53 | 23.96 | -41.52 | -4331.58 | -2481.07 | -6.97 |
| Dead+Wind 60 deg+Ice+Temp | 85.53 | 41.18 | -23.80 | -2497.75 | -4277.12 | -7.06 |
| Dead+Wind 90 deg+Ice+Temp | 85.53 | 47.90 | -0.01 | -22.66 | -4964.51 | -5.39 |
| Dead+Wind 120 deg+Ice+Temp | 85.53 | 42.38 | 24.50 | 2505.22 | -4363.24 | -2.01 |
| Dead+Wind 150 deg+Ice+Temp | 85.53 | 23.94 | 41.54 | 4290.89 | -2478.42 | 2.13 |
| Dead+Wind 180 deg+Ice+Temp | 85.53 | 0.00 | 47.61 | 4932.14 | 5.01 | 5.22 |
| Dead+Wind 210 deg+Ice+Temp | 85.53 | -23.94 | 41.54 | 4290.88 | 2488.45 | 6.97 |
| Dead+Wind 240 deg+Ice+Temp | 85.53 | -42.38 | 24.50 | 2505.21 | 4373.26 | 7.38 |
| Dead+Wind 270 deg+Ice+Temp | 85.53 | -47.90 | -0.01 | -22.66 | 4974.52 | 5.39 |
| Dead+Wind 300 deg+Ice+Temp | 85.53 | -41.18 | -23.80 | -2497.74 | 4287.13 | 1.84 |
| Dead+Wind 330 deg+Ice+Temp | 85.53 | -23.96 | -41.52 | -4331.57 | 2491.09 | -2.14 |
| Dead+Wind 0 deg - Service | 53.64 | 0.00 | -17.38 | -1801.73 | 1.67 | -0.72 |
| Dead+Wind 30 deg - Service | 53.64 | 8.53 | -14.78 | -1545.07 | -881.15 | -1.62 |
| Dead+Wind 60 deg - Service | 53.64 | 14.67 | -8.49 | -894.78 | -1520.70 | -2.22 |
| Dead+Wind 90 deg - Service | 53.64 | 17.05 | -0.01 | -14.38 | -1762.72 | -2.26 |
| Dead+Wind 120 deg - Service | 53.64 | 15.02 | 8.69 | 880.39 | -1543.07 | -1.59 |
| Dead+Wind 150 deg - Service | 53.64 | 8.52 | 14.79 | 1518.50 | -879.89 | -0.39 |
| Dead+Wind 180 deg - Service | 53.64 | 0.00 | 16.97 | 1748.61 | 1.67 | 0.70 |
| Dead+Wind 210 deg - Service | 53.64 | -8.52 | 14.79 | 1518.50 | 883.24 | 1.62 |
| Dead+Wind 240 deg - Service | 53.64 | -15.02 | 8.69 | 880.39 | 1546.42 | 2.31 |
| Dead+Wind 270 deg - Service | 53.64 | -17.05 | -0.01 | -14.38 | 1766.06 | 2.26 |
| Dead+Wind 300 deg - Service | 53.64 | -14.67 | -8.49 | -894.78 | 1524.05 | 1.51 |
| Dead+Wind 330 deg - Service | 53.64 | -8.53 | -14.78 | -1545.07 | 884.50 | 0.39 |

Solution Summary

| | | |
|--|---|----------------------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job 13001.072 - Windsor Locks NE | Page 31 of 40 |
| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| 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 | -53.64 | 0.00 | 0.00 | 53.64 | 0.00 | 0.000% |
| 2 | 0.00 | -53.64 | -44.49 | -0.00 | 53.64 | 44.49 | 0.000% |
| 3 | 21.83 | -53.64 | -37.85 | -21.83 | 53.64 | 37.85 | 0.000% |
| 4 | 37.57 | -53.64 | -21.73 | -37.57 | 53.64 | 21.73 | 0.000% |
| 5 | 43.64 | -53.64 | -0.02 | -43.64 | 53.64 | 0.02 | 0.000% |
| 6 | 38.46 | -53.64 | 22.24 | -38.46 | 53.64 | -22.24 | 0.000% |
| 7 | 21.80 | -53.64 | 37.86 | -21.80 | 53.64 | -37.86 | 0.000% |
| 8 | 0.00 | -53.64 | 43.45 | 0.00 | 53.64 | -43.45 | 0.000% |
| 9 | -21.80 | -53.64 | 37.86 | 21.80 | 53.64 | -37.86 | 0.000% |
| 10 | -38.46 | -53.64 | 22.24 | 38.46 | 53.64 | -22.24 | 0.000% |
| 11 | -43.64 | -53.64 | -0.02 | 43.64 | 53.64 | 0.02 | 0.000% |
| 12 | -37.57 | -53.64 | -21.73 | 37.57 | 53.64 | 21.73 | 0.000% |
| 13 | -21.83 | -53.64 | -37.85 | 21.83 | 53.64 | 37.85 | 0.000% |
| 14 | 0.00 | -85.53 | 0.00 | -0.00 | 85.53 | -0.00 | 0.000% |
| 15 | 0.00 | -85.53 | -48.99 | -0.00 | 85.53 | 48.99 | 0.000% |
| 16 | 23.96 | -85.53 | -41.52 | -23.96 | 85.53 | 41.52 | 0.000% |
| 17 | 41.18 | -85.53 | -23.80 | -41.18 | 85.53 | 23.80 | 0.000% |
| 18 | 47.90 | -85.53 | -0.01 | -47.90 | 85.53 | 0.01 | 0.000% |
| 19 | 42.38 | -85.53 | 24.50 | -42.38 | 85.53 | -24.50 | 0.000% |
| 20 | 23.94 | -85.53 | 41.54 | -23.94 | 85.53 | -41.54 | 0.000% |
| 21 | 0.00 | -85.53 | 47.61 | -0.00 | 85.53 | -47.61 | 0.000% |
| 22 | -23.94 | -85.53 | 41.54 | 23.94 | 85.53 | -41.54 | 0.000% |
| 23 | -42.38 | -85.53 | 24.50 | 42.38 | 85.53 | -24.50 | 0.000% |
| 24 | -47.90 | -85.53 | -0.01 | 47.90 | 85.53 | 0.01 | 0.000% |
| 25 | -41.18 | -85.53 | -23.80 | 41.18 | 85.53 | 23.80 | 0.000% |
| 26 | -23.96 | -85.53 | -41.52 | 23.96 | 85.53 | 41.52 | 0.000% |
| 27 | 0.00 | -53.64 | -17.38 | 0.00 | 53.64 | 17.38 | 0.000% |
| 28 | 8.53 | -53.64 | -14.78 | -8.53 | 53.64 | 14.78 | 0.000% |
| 29 | 14.67 | -53.64 | -8.49 | -14.67 | 53.64 | 8.49 | 0.000% |
| 30 | 17.05 | -53.64 | -0.01 | -17.05 | 53.64 | 0.01 | 0.000% |
| 31 | 15.02 | -53.64 | 8.69 | -15.02 | 53.64 | -8.69 | 0.000% |
| 32 | 8.52 | -53.64 | 14.79 | -8.52 | 53.64 | -14.79 | 0.000% |
| 33 | 0.00 | -53.64 | 16.97 | 0.00 | 53.64 | -16.97 | 0.000% |
| 34 | -8.52 | -53.64 | 14.79 | 8.52 | 53.64 | -14.79 | 0.000% |
| 35 | -15.02 | -53.64 | 8.69 | 15.02 | 53.64 | -8.69 | 0.000% |
| 36 | -17.05 | -53.64 | -0.01 | 17.05 | 53.64 | 0.01 | 0.000% |
| 37 | -14.67 | -53.64 | -8.49 | 14.67 | 53.64 | 8.49 | 0.000% |
| 38 | -8.53 | -53.64 | -14.78 | 8.53 | 53.64 | 14.78 | 0.000% |

Non-Linear Convergence Results

| Load Combination | Converged? | Number of Cycles | Displacement Tolerance | Force Tolerance |
|------------------|------------|------------------|------------------------|-----------------|
| 1 | Yes | 4 | 0.00000001 | 0.00000001 |
| 2 | Yes | 4 | 0.00000001 | 0.00000001 |
| 3 | Yes | 4 | 0.00000001 | 0.00000001 |
| 4 | Yes | 4 | 0.00000001 | 0.00000001 |
| 5 | Yes | 4 | 0.00000001 | 0.00000001 |
| 6 | Yes | 4 | 0.00000001 | 0.00000001 |
| 7 | Yes | 4 | 0.00000001 | 0.00000001 |
| 8 | Yes | 4 | 0.00000001 | 0.00000001 |
| 9 | Yes | 4 | 0.00000001 | 0.00000001 |
| 10 | Yes | 4 | 0.00000001 | 0.00000001 |
| 11 | Yes | 4 | 0.00000001 | 0.00000001 |
| 12 | Yes | 4 | 0.00000001 | 0.00000001 |

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| | Project 195' Valmont Lattice Tower - 4 Volunteer Dr., Windsor Locks, CT | Date 16:17:18 11/19/13 |
| | Client Verizon Wireless | Designed by TJL |

| | | | | |
|----|-----|---|------------|------------|
| 13 | Yes | 4 | 0.00000001 | 0.00000001 |
| 14 | Yes | 4 | 0.00000001 | 0.00000001 |
| 15 | Yes | 4 | 0.00000001 | 0.00000090 |
| 16 | Yes | 4 | 0.00000001 | 0.00000111 |
| 17 | Yes | 4 | 0.00000001 | 0.00000119 |
| 18 | Yes | 4 | 0.00000001 | 0.00000120 |
| 19 | Yes | 4 | 0.00000001 | 0.00000091 |
| 20 | Yes | 4 | 0.00000001 | 0.00000114 |
| 21 | Yes | 4 | 0.00000001 | 0.00000119 |
| 22 | Yes | 4 | 0.00000001 | 0.00000112 |
| 23 | Yes | 4 | 0.00000001 | 0.00000090 |
| 24 | Yes | 4 | 0.00000001 | 0.00000120 |
| 25 | Yes | 4 | 0.00000001 | 0.00000119 |
| 26 | Yes | 4 | 0.00000001 | 0.00000113 |
| 27 | Yes | 4 | 0.00000001 | 0.00000001 |
| 28 | Yes | 4 | 0.00000001 | 0.00000001 |
| 29 | Yes | 4 | 0.00000001 | 0.00000001 |
| 30 | Yes | 4 | 0.00000001 | 0.00000001 |
| 31 | Yes | 4 | 0.00000001 | 0.00000001 |
| 32 | Yes | 4 | 0.00000001 | 0.00000001 |
| 33 | Yes | 4 | 0.00000001 | 0.00000001 |
| 34 | Yes | 4 | 0.00000001 | 0.00000001 |
| 35 | Yes | 4 | 0.00000001 | 0.00000001 |
| 36 | Yes | 4 | 0.00000001 | 0.00000001 |
| 37 | Yes | 4 | 0.00000001 | 0.00000001 |
| 38 | Yes | 4 | 0.00000001 | 0.00000001 |

Maximum Tower Deflections - Service Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|-------------|-----------------|------------------------|-----------------|-----------|------------|
| T1 | 199 - 189 | 7.244 | 27 | 0.3188 | 0.0265 |
| T2 | 189 - 174 | 6.572 | 27 | 0.3174 | 0.0223 |
| T3 | 174 - 154 | 5.562 | 27 | 0.3090 | 0.0140 |
| T4 | 154 - 144 | 4.288 | 27 | 0.2775 | 0.0073 |
| T5 | 144 - 124 | 3.711 | 27 | 0.2548 | 0.0066 |
| T6 | 124 - 104 | 2.683 | 27 | 0.2128 | 0.0047 |
| T7 | 104 - 84 | 1.829 | 27 | 0.1744 | 0.0036 |
| T8 | 84 - 64 | 1.147 | 27 | 0.1308 | 0.0026 |
| T9 | 64 - 44 | 0.647 | 27 | 0.0950 | 0.0019 |
| T10 | 44 - 24 | 0.298 | 27 | 0.0583 | 0.0012 |
| T11 | 24 - 4 | 0.088 | 27 | 0.0291 | 0.0006 |

Critical Deflections and Radius of Curvature - Service Wind

| Elevation ft | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|-----------------|--------------------|-----------------|------------------|-----------|------------|---------------------------|
| 200.00 | 4-ft Lightning Rod | 27 | 7.244 | 0.3188 | 0.0265 | 332005 |
| 199.00 | DB224 | 27 | 7.244 | 0.3188 | 0.0265 | 332005 |
| 176.00 | 15' T-Frame | 27 | 5.695 | 0.3108 | 0.0151 | 70639 |
| 165.00 | 15' T-Frame | 27 | 4.972 | 0.2977 | 0.0096 | 36714 |
| 150.00 | 15' T-Frame | 27 | 4.052 | 0.2686 | 0.0069 | 27060 |
| 140.00 | 15' T-Frame | 27 | 3.492 | 0.2458 | 0.0063 | 29241 |
| 130.00 | APXV18-206517-C | 27 | 2.973 | 0.2246 | 0.0053 | 27497 |

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| Elevation | Appurtenance | Gov. Load Comb. | Deflection | Tilt | Twist | Radius of Curvature |
|-----------|---------------------------|-----------------|------------|--------|--------|---------------------|
| ft | | | in | ° | ° | ft |
| 119.00 | ROHN 6'x15' Boom Gate (1) | 27 | 2.453 | 0.2034 | 0.0043 | 27184 |
| 109.00 | VHLP2-23 | 27 | 2.026 | 0.1845 | 0.0038 | 28604 |
| 99.00 | Beacon | 27 | 1.642 | 0.1636 | 0.0033 | 27958 |
| 78.00 | GPS | 27 | 0.979 | 0.1194 | 0.0023 | 26629 |

Maximum Tower Deflections - Design Wind

| Section No. | Elevation | Horz. Deflection | Gov. Load Comb. | Tilt | Twist |
|-------------|-----------|------------------|-----------------|--------|--------|
| | ft | in | | ° | ° |
| T1 | 199 - 189 | 20.436 | 15 | 0.9088 | 0.1171 |
| T2 | 189 - 174 | 18.519 | 15 | 0.9043 | 0.1028 |
| T3 | 174 - 154 | 15.643 | 15 | 0.8766 | 0.0711 |
| T4 | 154 - 144 | 12.043 | 15 | 0.7814 | 0.0404 |
| T5 | 144 - 124 | 10.422 | 15 | 0.7158 | 0.0285 |
| T6 | 124 - 104 | 7.538 | 15 | 0.5972 | 0.0175 |
| T7 | 104 - 84 | 5.145 | 15 | 0.4894 | 0.0123 |
| T8 | 84 - 64 | 3.231 | 15 | 0.3674 | 0.0086 |
| T9 | 64 - 44 | 1.825 | 15 | 0.2673 | 0.0063 |
| T10 | 44 - 24 | 0.840 | 15 | 0.1642 | 0.0040 |
| T11 | 24 - 4 | 0.248 | 15 | 0.0820 | 0.0020 |

Critical Deflections and Radius of Curvature - Design Wind

| Elevation | Appurtenance | Gov. Load Comb. | Deflection | Tilt | Twist | Radius of Curvature |
|-----------|---------------------------|-----------------|------------|--------|--------|---------------------|
| ft | | | in | ° | ° | ft |
| 200.00 | 4-ft Lightning Rod | 15 | 20.436 | 0.9088 | 0.1171 | 118150 |
| 199.00 | DB224 | 15 | 20.436 | 0.9088 | 0.1171 | 118150 |
| 176.00 | 15' T-Frame | 15 | 16.022 | 0.8824 | 0.0755 | 21573 |
| 165.00 | 15' T-Frame | 15 | 13.973 | 0.8417 | 0.0532 | 11998 |
| 150.00 | 15' T-Frame | 15 | 11.379 | 0.7556 | 0.0355 | 9284 |
| 140.00 | 15' T-Frame | 15 | 9.807 | 0.6901 | 0.0255 | 10276 |
| 130.00 | APXV18-206517-C | 15 | 8.352 | 0.6304 | 0.0200 | 9749 |
| 119.00 | ROHN 6'x15' Boom Gate (1) | 15 | 6.894 | 0.5707 | 0.0158 | 9685 |
| 109.00 | VHLP2-23 | 15 | 5.699 | 0.5177 | 0.0134 | 10252 |
| 99.00 | Beacon | 15 | 4.620 | 0.4590 | 0.0113 | 10047 |
| 78.00 | GPS | 15 | 2.758 | 0.3356 | 0.0078 | 9543 |

Bolt Design Data

| Section No. | Elevation | Component Type | Bolt Grade | Bolt Size | Number Of Bolts | Maximum Load per Bolt | Allowable Load | Ratio Load Allowable | Allowable Ratio | Criteria |
|-------------|-----------|----------------|------------|-----------|-----------------|-----------------------|----------------|----------------------|-----------------|---------------|
| | ft | | | in | | K | K | | | |
| T1 | 199 | Leg | A325N | 0.5625 | 3 | 0.64 | 10.44 | 0.061 | ✓ | 1.333 Bolt DS |
| T2 | 189 | Leg | A325N | 0.6250 | 5 | 2.15 | 12.89 | 0.167 | ✓ | 1.333 Bolt DS |

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| Section No. | Elevation ft | Component Type | Bolt Grade | Bolt Size in | Number Of Bolts | Maximum Load per Bolt K | Allowable Load K | Ratio Load Allowable | Allowable Ratio | Criteria |
|-------------|-----------------|----------------|------------|-----------------|-----------------|----------------------------|---------------------|----------------------------|-----------------|----------------|
| T3 | 174 | Leg | A325N | 1.0000 | 6 | 5.44 | 34.54 | 0.158 ✓ | 1.333 | Bolt Tension |
| T4 | 154 | Leg | A325N | 1.0000 | 6 | 6.30 | 34.56 | 0.182 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325N | 1.0000 | 1 | 5.34 | 9.52 | 0.561 ✓ | 1.333 | Member Bearing |
| T5 | 144 | Leg | A325N | 1.0000 | 6 | 11.86 | 34.56 | 0.343 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325N | 1.0000 | 1 | 6.98 | 9.52 | 0.733 ✓ | 1.333 | Member Bearing |
| T6 | 124 | Leg | A325N | 1.0000 | 6 | 17.74 | 34.56 | 0.513 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325N | 1.0000 | 1 | 8.02 | 9.52 | 0.842 ✓ | 1.333 | Member Bearing |
| T7 | 104 | Leg | A325N | 1.0000 | 6 | 23.58 | 34.56 | 0.682 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325N | 1.0000 | 1 | 8.15 | 9.52 | 0.856 ✓ | 1.333 | Member Bearing |
| T8 | 84 | Leg | A325N | 1.2500 | 6 | 28.89 | 54.00 | 0.535 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325N | 1.2500 | 1 | 8.39 | 20.39 | 0.412 ✓ | 1.333 | Member Bearing |
| T9 | 64 | Leg | A325N | 1.2500 | 6 | 33.65 | 54.00 | 0.623 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325N | 1.2500 | 1 | 8.47 | 20.39 | 0.415 ✓ | 1.333 | Member Bearing |
| T10 | 44 | Leg | A325N | 1.2500 | 6 | 37.89 | 54.00 | 0.702 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325N | 1.2500 | 1 | 9.67 | 20.39 | 0.474 ✓ | 1.333 | Member Bearing |
| T11 | 24 | Leg | A687 | 1.2500 | 6 | 41.44 | 60.75 | 0.682 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325N | 1.2500 | 1 | 12.88 | 20.39 | 0.632 ✓ | 1.333 | Member Bearing |

Compression Checks

Leg Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|--------------|---------|----------------------|----------------|-----------------------|----------------------|---------------|----------------------------|------------------------------|
| T1 | 199 - 189 | 1 1/2 | 10.00 | 2.25 | 72.0 K=1.00 | 20.564 | 1.7672 | -1.92 | 36.34 | 0.053 ✓ |
| T2 | 189 - 174 | 1 1/2 | 15.00 | 2.33 | 74.7 K=1.00 | 20.058 | 1.7672 | -10.77 | 35.44 | 0.304 ✓ |
| T3 | 174 - 154 | 2 | 20.01 | 2.38 | 57.0 K=1.00 | 23.219 | 3.1416 | -39.02 | 72.94 | 0.535 ✓ |
| T4 | 154 - 144 | Pirod 105244 | 10.02 | 10.02 | 45.4 K=1.00 | 25.051 | 3.6816 | -44.94 | 92.23 | 0.487 ✓ |
| T5 | 144 - 124 | Pirod 105217 | 20.03 | 10.02 | 37.8 K=1.00 | 26.132 | 5.3014 | -86.07 | 138.54 | 0.621 ✓ |
| T6 | 124 - 104 | Pirod 105218 | 20.03 | 10.02 | 32.4 K=1.00 | 26.848 | 7.2158 | -128.34 | 193.73 | 0.662 ✓ |
| T7 | 104 - 84 | Pirod 105218 | 20.03 | 10.02 | 32.4 K=1.00 | 26.848 | 7.2158 | -169.99 | 193.73 | 0.877 ✓ |
| T8 | 84 - 64 | Pirod 105219 | 20.03 | 10.02 | 28.4 K=1.00 | 27.351 | 9.4248 | -209.39 | 257.78 | 0.812 ✓ |

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| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|--------------|---------|----------------------|----------------|-----------------------|----------------------|---------------|----------------------------|---------------------------|
| T9 | 64 - 44 | Pirod 105219 | 20.03 | 10.02 | 28.4 K=1.00 | 27.351 | 9.4248 | -246.02 | 257.78 | 0.954 ✓ |
| T10 | 44 - 24 | Pirod 105220 | 20.03 | 10.02 | 25.2 K=1.00 | 27.723 | 11.9282 | -281.78 | 330.69 | 0.852 ✓ |
| T11 | 24 - 4 | Pirod 105220 | 20.03 | 10.02 | 25.2 K=1.00 | 27.723 | 11.9282 | -316.16 | 330.69 | 0.956 ✓ |

Truss-Leg Diagonal Data

| Section No. | Elevation ft | Diagonal Size | L _d ft | Kl/r | F _a ksi | A in ² | Actual V K | Allow. V _a K | Stress Ratio |
|-------------|-----------------|---------------|----------------------|-------|-----------------------|----------------------|---------------|----------------------------|--------------|
| T4 | 154 - 144 | 0.5 | 1.48 | 121.0 | 10.193 | 0.1963 | 0.94 | 2.24 | 0.422 ✓ |
| T5 | 144 - 124 | 0.5 | 1.47 | 120.0 | 10.279 | 0.1963 | 0.69 | 2.26 | 0.305 ✓ |
| T6 | 124 - 104 | 0.5 | 1.46 | 119.0 | 10.423 | 0.1963 | 0.62 | 2.29 | 0.270 ✓ |
| T7 | 104 - 84 | 0.5 | 1.46 | 119.0 | 10.423 | 0.1963 | 0.29 | 2.29 | 0.128 ✓ |
| T8 | 84 - 64 | 0.625 | 1.45 | 94.4 | 13.671 | 0.3068 | 0.26 | 4.69 | 0.055 ✓ |
| T9 | 64 - 44 | 0.625 | 1.45 | 94.4 | 13.671 | 0.3068 | 0.24 | 4.69 | 0.051 ✓ |
| T10 | 44 - 24 | 0.625 | 1.43 | 93.6 | 13.766 | 0.3068 | 0.89 | 4.73 | 0.188 ✓ |
| T11 | 24 - 4 | 0.625 | 1.43 | 93.6 | 13.766 | 0.3068 | 1.48 | 4.73 | 0.313 ✓ |

Diagonal Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|-------------------|---------|----------------------|-----------------|-----------------------|----------------------|---------------|----------------------------|---------------------------|
| T1 | 199 - 189 | 3/4 | 4.59 | 2.22 | 106.7 K=0.75 | 13.115 | 0.4418 | -0.34 | 5.79 | 0.059 ✓ |
| T2 | 189 - 174 | 3/4 | 4.63 | 2.24 | 107.7 K=0.75 | 12.882 | 0.4418 | -1.53 | 5.69 | 0.268 ✓ |
| T3 | 174 - 154 | 1 | 5.46 | 2.67 | 96.1 K=0.75 | 15.590 | 0.7854 | -2.92 | 12.24 | 0.238 ✓ |
| T4 | 154 - 144 | L2 1/2x2 1/2x3/16 | 11.42 | 5.00 | 121.3 K=1.00 | 10.097 | 0.9020 | -5.97 | 9.11 | 0.656 ✓ |
| T5 | 144 - 124 | L2 1/2x2 1/2x3/16 | 12.50 | 5.65 | 136.9 K=1.00 | 7.965 | 0.9020 | -7.11 | 7.18 | 0.990 ✓ |
| T6 | 124 - 104 | L3x3x3/16 | 13.80 | 6.35 | 127.8 K=1.00 | 9.141 | 1.0900 | -8.28 | 9.96 | 0.831 ✓ |
| T7 | 104 - 84 | L3x3x3/16 | 15.24 | 7.10 | 143.0 | 7.302 | 1.0900 | -8.28 | 7.96 | 1.040 ✓ |

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| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|-------------------|---------|----------------------|-----------------|-----------------------|----------------------|---------------|----------------------------|---------------------------|
| T8 | 84 - 64 | L3x3x5/16 | 16.80 | 7.86 | K=1.00 160.2 | 5.822 | 1.7800 | -8.58 | 10.36 | 0.828 |
| T9 | 64 - 44 | L3x3x5/16 | 18.45 | 8.70 | K=1.00 177.2 | 4.756 | 1.7800 | -8.72 | 8.47 | 1.030 |
| T10 | 44 - 24 | L3 1/2x3 1/2x5/16 | 19.30 | 9.14 | K=1.00 158.9 | 5.916 | 2.0900 | -9.21 | 12.36 | 0.745 |
| T11 | 24 - 4 | L3 1/2x3 1/2x5/16 | 21.03 | 10.01 | K=1.00 174.1 | 4.928 | 2.0900 | -11.11 | 10.30 | 1.079 |

Horizontal Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|------|---------|----------------------|-----------------|-----------------------|----------------------|---------------|----------------------------|---------------------------|
| T1 | 199 - 189 | 3/4 | 4.00 | 3.88 | K=0.70 173.6 | 4.955 | 0.4418 | -0.01 | 2.19 | 0.007 |
| T2 | 189 - 174 | 3/4 | 4.00 | 3.88 | K=0.70 173.6 | 4.955 | 0.4418 | -0.19 | 2.19 | 0.086 |
| T3 | 174 - 154 | 7/8 | 4.14 | 3.98 | K=0.70 152.7 | 6.403 | 0.6013 | -0.47 | 3.85 | 0.121 |

Top Girt Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|------|---------|----------------------|-----------------|-----------------------|----------------------|---------------|----------------------------|---------------------------|
| T1 | 199 - 189 | 7/8 | 4.00 | 3.88 | K=0.70 148.8 | 6.744 | 0.6013 | -0.05 | 4.06 | 0.013 |
| T2 | 189 - 174 | 7/8 | 4.00 | 3.88 | K=0.70 148.8 | 6.744 | 0.6013 | -0.10 | 4.06 | 0.025 |
| T3 | 174 - 154 | 1 | 4.02 | 3.86 | K=0.70 129.6 | 8.885 | 0.7854 | -0.88 | 6.98 | 0.127 |

Bottom Girt Design Data (Compression)

| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|------|---------|----------------------|-----------------|-----------------------|----------------------|---------------|----------------------------|---------------------------|
| T1 | 199 - 189 | 7/8 | 4.00 | 3.88 | K=0.70 148.8 | 6.744 | 0.6013 | -0.16 | 4.06 | 0.039 |
| T2 | 189 - 174 | 7/8 | 4.00 | 3.88 | K=0.70 148.8 | 6.744 | 0.6013 | -0.82 | 4.06 | 0.203 |
| T3 | 174 - 154 | 1 | 4.98 | 4.81 | 161.6 | 5.721 | 0.7854 | -0.77 | 4.49 | 0.172 |

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| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|------|---------|----------------------|------|-----------------------|----------------------|---------------|----------------------------|---------------------------|
| K=0.70 | | | | | | | | | | ✓ |

Tension Checks

Leg Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|--------------|---------|----------------------|------|-----------------------|----------------------|---------------|----------------------------|---------------------------|
| T1 | 199 - 189 | 1 1/2 | 10.00 | 2.25 | 72.0 | 32.500 | 0.8575 | 1.45 | 27.87 | 0.052 |
| T2 | 189 - 174 | 1 1/2 | 15.00 | 2.33 | 74.7 | 32.500 | 0.7732 | 8.28 | 25.13 | 0.329 |
| T3 | 174 - 154 | 2 | 20.01 | 2.38 | 57.0 | 30.000 | 3.1416 | 32.65 | 94.25 | 0.346 |
| T4 | 154 - 144 | Pirod 105244 | 10.02 | 10.02 | 45.4 | 30.000 | 3.6816 | 37.78 | 110.45 | 0.342 |
| T5 | 144 - 124 | Pirod 105217 | 20.03 | 10.02 | 37.8 | 30.000 | 5.3014 | 71.14 | 159.04 | 0.447 |
| T6 | 124 - 104 | Pirod 105218 | 20.03 | 10.02 | 32.4 | 30.000 | 7.2158 | 106.42 | 216.47 | 0.492 |
| T7 | 104 - 84 | Pirod 105218 | 20.03 | 10.02 | 32.4 | 30.000 | 7.2158 | 141.46 | 216.47 | 0.653 |
| T8 | 84 - 64 | Pirod 105219 | 20.03 | 10.02 | 28.4 | 30.000 | 9.4248 | 173.34 | 282.74 | 0.613 |
| T9 | 64 - 44 | Pirod 105219 | 20.03 | 10.02 | 28.4 | 30.000 | 9.4248 | 201.93 | 282.74 | 0.714 |
| T10 | 44 - 24 | Pirod 105220 | 20.03 | 10.02 | 25.2 | 30.000 | 11.9282 | 227.32 | 357.85 | 0.635 |
| T11 | 24 - 4 | Pirod 105220 | 20.03 | 10.02 | 25.2 | 30.000 | 11.9282 | 248.67 | 357.85 | 0.695 |

Truss-Leg Diagonal Data

| Section No. | Elevation ft | Diagonal Size | L _d ft | Kl/r | F _a ksi | A in ² | Actual V K | Allow. V _a K | Stress Ratio |
|-------------|-----------------|---------------|----------------------|-------|-----------------------|----------------------|---------------|----------------------------|--------------|
| T4 | 154 - 144 | 0.5 | 1.48 | 121.0 | 10.193 | 0.1963 | 0.94 | 2.24 | 0.422 |
| T5 | 144 - 124 | 0.5 | 1.47 | 120.0 | 10.279 | 0.1963 | 0.69 | 2.26 | 0.305 |
| T6 | 124 - 104 | 0.5 | 1.46 | 119.0 | 10.423 | 0.1963 | 0.62 | 2.29 | 0.270 |
| T7 | 104 - 84 | 0.5 | 1.46 | 119.0 | 10.423 | 0.1963 | 0.29 | 2.29 | 0.128 |

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| Section No. | Elevation ft | Diagonal Size | L_d ft | Kl/r | F_a ksi | A in ² | Actual V K | Allow. V_a K | Stress Ratio |
|-------------|-----------------|---------------|-------------|--------|--------------|------------------------|--------------------|----------------------|-----------------|
| T8 | 84 - 64 | 0.625 | 1.45 | 94.4 | 13.671 | 0.3068 | 0.26 | 4.69 | 0.055 |
| T9 | 64 - 44 | 0.625 | 1.45 | 94.4 | 13.671 | 0.3068 | 0.24 | 4.69 | 0.051 |
| T10 | 44 - 24 | 0.625 | 1.43 | 93.6 | 13.766 | 0.3068 | 0.89 | 4.73 | 0.188 |
| T11 | 24 - 4 | 0.625 | 1.43 | 93.6 | 13.766 | 0.3068 | 1.48 | 4.73 | 0.313 |

Diagonal Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | L_u ft | Kl/r | F_a ksi | A in ² | Actual P K | Allow. P_a K | Ratio $\frac{P}{P_a}$ |
|-------------|-----------------|-------------------|-----------|-------------|--------|--------------|------------------------|--------------------|----------------------|--------------------------|
| T1 | 199 - 189 | 3/4 | 4.59 | 2.22 | 142.3 | 30.000 | 0.4418 | 0.33 | 13.25 | 0.025 |
| T2 | 189 - 174 | 3/4 | 4.63 | 2.24 | 143.6 | 30.000 | 0.4418 | 1.51 | 13.25 | 0.114 |
| T3 | 174 - 154 | 1 | 5.46 | 2.67 | 128.2 | 30.000 | 0.7854 | 2.81 | 23.56 | 0.119 |
| T4 | 154 - 144 | L2 1/2x2 1/2x3/16 | 11.42 | 5.00 | 80.1 | 21.600 | 0.9020 | 5.34 | 19.48 | 0.274 |
| T5 | 144 - 124 | L2 1/2x2 1/2x3/16 | 11.93 | 5.40 | 86.2 | 21.600 | 0.9020 | 6.98 | 19.48 | 0.358 |
| T6 | 124 - 104 | L3x3x3/16 | 13.80 | 6.35 | 83.5 | 21.600 | 1.0900 | 8.02 | 23.54 | 0.340 |
| T7 | 104 - 84 | L3x3x3/16 | 14.50 | 6.75 | 88.6 | 21.600 | 1.0900 | 8.15 | 23.54 | 0.346 |
| T8 | 84 - 64 | L3x3x5/16 | 16.01 | 7.47 | 100.3 | 21.600 | 1.7800 | 8.39 | 38.45 | 0.218 |
| T9 | 64 - 44 | L3x3x5/16 | 18.45 | 8.70 | 116.2 | 21.600 | 1.7800 | 8.47 | 38.45 | 0.220 |
| T10 | 44 - 24 | L3 1/2x3 1/2x5/16 | 20.16 | 9.56 | 108.8 | 21.600 | 2.0900 | 9.67 | 45.14 | 0.214 |
| T11 | 24 - 4 | L3 1/2x3 1/2x5/16 | 21.92 | 10.45 | 118.6 | 21.600 | 2.0900 | 12.88 | 45.14 | 0.285 |

Horizontal Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | L_u ft | Kl/r | F_a ksi | A in ² | Actual P K | Allow. P_a K | Ratio $\frac{P}{P_a}$ |
|-------------|-----------------|------|-----------|-------------|--------|--------------|------------------------|--------------------|----------------------|--------------------------|
| T1 | 199 - 189 | 3/4 | 4.00 | 3.88 | 248.0 | 30.000 | 0.4418 | 0.03 | 13.25 | 0.002 |
| T2 | 189 - 174 | 3/4 | 4.00 | 3.88 | 248.0 | 30.000 | 0.4418 | 0.27 | 13.25 | 0.020 |
| T3 | 174 - 154 | 7/8 | 4.14 | 3.98 | 218.2 | 30.000 | 0.6013 | 0.60 | 18.04 | 0.033 |

| | | | | |
|--|----------------|---|--------------------|-------------------|
| tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587 | Job | 13001.072 - Windsor Locks NE | Page | 39 of 40 |
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| | Client | Verizon Wireless | Designed by | TJL |

| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|------|---------|----------------------|------|-----------------------|----------------------|---------------|----------------------------|---------------------------|
| | | | | | | | | | | ✓ |

Top Girt Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|------|---------|----------------------|-------|-----------------------|----------------------|---------------|----------------------------|---------------------------|
| T1 | 199 - 189 | 7/8 | 4.00 | 3.88 | 212.6 | 30.000 | 0.6013 | 0.04 | 18.04 | 0.002 ✓ |
| T2 | 189 - 174 | 7/8 | 4.00 | 3.88 | 212.6 | 30.000 | 0.6013 | 0.11 | 18.04 | 0.006 ✓ |
| T3 | 174 - 154 | 1 | 4.02 | 3.86 | 185.2 | 30.000 | 0.7854 | 0.89 | 23.56 | 0.038 ✓ |

Bottom Girt Design Data (Tension)

| Section No. | Elevation ft | Size | L ft | L _u ft | Kl/r | F _a ksi | A in ² | Actual P K | Allow. P _a K | Ratio P P _a |
|-------------|-----------------|------|---------|----------------------|-------|-----------------------|----------------------|---------------|----------------------------|---------------------------|
| T1 | 199 - 189 | 7/8 | 4.00 | 3.88 | 212.6 | 30.000 | 0.6013 | 0.17 | 18.04 | 0.009 ✓ |
| T2 | 189 - 174 | 7/8 | 4.00 | 3.88 | 212.6 | 30.000 | 0.6013 | 0.81 | 18.04 | 0.045 ✓ |
| T3 | 174 - 154 | 1 | 4.98 | 4.81 | 230.8 | 30.000 | 0.7854 | 1.02 | 23.56 | 0.043 ✓ |

Section Capacity Table

| Section No. | Elevation ft | Component Type | Size | Critical Element | P K | SF*P _{allow} K | % Capacity | Pass Fail |
|-------------|-----------------|----------------|-------------------|------------------|---------|----------------------------|------------|-----------|
| T1 | 199 - 189 | Leg | 1 1/2 | 1 | -1.92 | 48.44 | 4.0 | Pass |
| T2 | 189 - 174 | Leg | 1 1/2 | 39 | 8.28 | 33.50 | 24.7 | Pass |
| T3 | 174 - 154 | Leg | 2 | 87 | -39.02 | 97.24 | 40.1 | Pass |
| T4 | 154 - 144 | Leg | Pirod 105244 | 153 | -44.94 | 122.94 | 36.6 | Pass |
| T5 | 144 - 124 | Leg | Pirod 105217 | 162 | -86.07 | 184.67 | 46.6 | Pass |
| T6 | 124 - 104 | Leg | Pirod 105218 | 177 | -128.34 | 258.24 | 49.7 | Pass |
| T7 | 104 - 84 | Leg | Pirod 105218 | 192 | -169.99 | 258.24 | 65.8 | Pass |
| T8 | 84 - 64 | Leg | Pirod 105219 | 207 | -209.39 | 343.62 | 60.9 | Pass |
| T9 | 64 - 44 | Leg | Pirod 105219 | 222 | -246.02 | 343.62 | 71.6 | Pass |
| T10 | 44 - 24 | Leg | Pirod 105220 | 237 | -281.78 | 440.81 | 63.9 | Pass |
| T11 | 24 - 4 | Leg | Pirod 105220 | 252 | -316.16 | 440.81 | 71.7 | Pass |
| T1 | 199 - 189 | Diagonal | 3/4 | 10 | -0.34 | 7.72 | 4.4 | Pass |
| T2 | 189 - 174 | Diagonal | 3/4 | 46 | -1.53 | 7.59 | 20.1 | Pass |
| T3 | 174 - 154 | Diagonal | 1 | 97 | -2.92 | 16.32 | 17.9 | Pass |
| T4 | 154 - 144 | Diagonal | L2 1/2x2 1/2x3/16 | 158 | -5.97 | 12.14 | 49.2 | Pass |

| | | |
|--|---|----------------------------------|
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| | Client Verizon Wireless | Designed by TJL |

| Section No. | Elevation ft | Component Type | Size | Critical Element | P K | SF*P _{allow} K | % Capacity | Pass Fail | |
|-------------|--------------|----------------|-------------------|------------------|--------|-------------------------|------------------|-------------|-------------|
| T5 | 144 - 124 | Diagonal | L2 1/2x2 1/2x3/16 | 168 | -7.11 | 9.58 | 74.2 | Pass | |
| T6 | 124 - 104 | Diagonal | L3x3x3/16 | 183 | -8.28 | 13.28 | 62.4 | Pass | |
| | | | | | | | 63.2 (b) | | |
| T7 | 104 - 84 | Diagonal | L3x3x3/16 | 198 | -8.28 | 10.61 | 78.0 | Pass | |
| T8 | 84 - 64 | Diagonal | L3x3x5/16 | 213 | -8.58 | 13.81 | 62.1 | Pass | |
| T9 | 64 - 44 | Diagonal | L3x3x5/16 | 228 | -8.72 | 11.28 | 77.3 | Pass | |
| T10 | 44 - 24 | Diagonal | L3 1/2x3 1/2x5/16 | 249 | -9.21 | 16.48 | 55.9 | Pass | |
| T11 | 24 - 4 | Diagonal | L3 1/2x3 1/2x5/16 | 264 | -11.11 | 13.73 | 80.9 | Pass | |
| T1 | 199 - 189 | Horizontal | 3/4 | 23 | -0.01 | 2.92 | 0.5 | Pass | |
| T2 | 189 - 174 | Horizontal | 3/4 | 52 | -0.19 | 2.92 | 6.5 | Pass | |
| T3 | 174 - 154 | Horizontal | 7/8 | 144 | -0.47 | 5.13 | 9.1 | Pass | |
| T1 | 199 - 189 | Top Girt | 7/8 | 6 | -0.05 | 5.41 | 1.0 | Pass | |
| T2 | 189 - 174 | Top Girt | 7/8 | 40 | -0.10 | 5.41 | 1.9 | Pass | |
| T3 | 174 - 154 | Top Girt | 1 | 91 | -0.88 | 9.30 | 9.5 | Pass | |
| T1 | 199 - 189 | Bottom Girt | 7/8 | 8 | -0.16 | 5.41 | 2.9 | Pass | |
| T2 | 189 - 174 | Bottom Girt | 7/8 | 45 | -0.82 | 5.41 | 15.2 | Pass | |
| T3 | 174 - 154 | Bottom Girt | 1 | 93 | -0.77 | 5.99 | 12.9 | Pass | |
| | | | | | | | Summary | | |
| | | | | | | | Leg (T11) | 71.7 | Pass |
| | | | | | | | Diagonal (T11) | 80.9 | Pass |
| | | | | | | | Horizontal (T3) | 9.1 | Pass |
| | | | | | | | Top Girt (T3) | 9.5 | Pass |
| | | | | | | | Bottom Girt (T2) | 15.2 | Pass |
| | | | | | | | Bolt Checks | 64.2 | Pass |
| | | | | | | | RATING = | 80.9 | Pass |

Pier and Mat Foundation Analysis:

Input Data:

Tower Data

| | | |
|---|---------------------------|-----------------------------|
| Overturning Moment = | OM := 5074-ft kips | (User Input from RISATower) |
| Shear Force = | S _t := 49-kip | (User Input from RISATower) |
| Axial Force = | WT _t := 86-kip | (User Input from RISATower) |
| Max Compression Force = | C _t := 321-kip | (User Input from RISATower) |
| Max Uplift Force = | U _t := 258-kip | (User Input from RISATower) |
| Tower Height = | H _t := 195-ft | (User Input) |
| Tower Width = | W _t := 20-ft | (User Input) |
| Tower Position on Foundation (1=offset, 2=centered) = | Pos _t := 1 | (User Input) |

Footing Data:

| | | |
|---------------------------------|----------------------------|--------------|
| Overall Depth of Footing = | D _f := 10.0-ft | (User Input) |
| Length of Pier = | L _p := 11.5-ft | (User Input) |
| Extension of Pier Above Grade = | L _{pag} := 5.0-ft | (User Input) |
| Diameter of Pier = | d _p := 5.0-ft | (User Input) |
| Thickness of Footing = | T _f := 3.5-ft | (User Input) |
| Width of Footing = | W _f := 29.5-ft | (User Input) |

Material Properties:

| | | |
|--|------------------------------|-------------------------------------|
| Concrete Compressive Strength = | f _c := 3000-psi | (User Input) |
| Steel Reinforcement Yield Strength = | f _y := 60000-psi | (User Input) |
| Internal Friction Angle of Soil = | Φ _s := 30-deg | (User Input) |
| Allowable Soil Bearing Capacity = | q _s := 4000-psf | (User Input) |
| Unit Weight of Soil = | γ _{soil} := 120-pcf | (User Input) |
| Unit Weight of Concrete = | γ _{conc} := 150-pcf | (User Input) |
| Foundation Bouyancy = | Bouyancy := 0 | (User Input) (Yes=1 / No=0) |
| Depth to Neglect = | n := 0-ft | (User Input) |
| Cohesion of Clay Type Soil = | c := 0-ksf | (User Input) (Use 0 for Sandy Soil) |
| Seismic Zone Factor = | Z := 2 | (User Input) (UBC-1997 Fig 23-2) |
| Coefficient of Friction Between Concrete = | μ := 0.45 | (User Input) |

Pier Reinforcement:

| | | | |
|---------------------------------|--|--------------|-------------------|
| Bar Size = | BS _{pier} := 8 | (User Input) | |
| Bar Diameter = | d _b _{pier} := 1.0-in | (User Input) | |
| Number of Bars = | NB _{pier} := 27 | (User Input) | |
| Clear Cover of Reinforcement = | Cv _r _{pier} := 3 in | (User Input) | |
| Reinforcement Location Factor = | α _{pier} := 1.0 | (User Input) | (ACI-2008 12.2.4) |
| Coating Factor = | β _{pier} := 1.0 | (User Input) | (ACI-2008 12.2.4) |
| Concrete Strength Factor = | λ _{pier} := 1.0 | (User Input) | (ACI-2008 12.2.4) |
| Reinforcement Size Factor = | γ _{pier} := 1.0 | (User Input) | (ACI-2008 12.2.4) |
| Diameter of Tie = | d _{Tie} := 4 in | (User Input) | |

Pad Reinforcement:

| | | | |
|---------------------------------|---|--------------|-------------------|
| Bar Size = | BS _{top} := 9 | (User Input) | (Top of Pad) |
| Bar Diameter = | d _b _{top} := 1.125-in | (User Input) | (Top of Pad) |
| Number of Bars = | NB _{top} := 39 | (User Input) | (Top of Pad) |
| Bar Size = | BS _{bot} := 9 | (User Input) | (Bottom of Pad) |
| Bar Diameter = | d _b _{bot} := 1.125-in | (User Input) | (Bottom of Pad) |
| Number of Bars = | NB _{bot} := 39 | (User Input) | (Bottom of Pad) |
| Clear Cover of Reinforcement = | Cv _r _{pad} := 3.0-in | (User Input) | |
| Reinforcement Location Factor = | α _{pad} := 1.0 | (User Input) | (ACI-2008 12.2.4) |
| Coating Factor = | β _{pad} := 1.0 | (User Input) | (ACI-2008 12.2.4) |
| Concrete Strength Factor = | λ _{pad} := 1.0 | (User Input) | (ACI-2008 12.2.4) |
| Reinforcement Size Factor = | γ _{pad} := 1.0 | (User Input) | (ACI-2008 12.2.4) |

Calculated Factors:

| | | |
|--|--|--|
| Pier Reinforcement Bar Area = | $A_{b\text{pier}} := \frac{\pi \cdot d_{b\text{pier}}^2}{4} = 0.785 \cdot \text{in}^2$ | |
| Pad Top Reinforcement Bar Area = | $A_{b\text{top}} := \frac{\pi \cdot d_{b\text{top}}^2}{4} = 0.994 \cdot \text{in}^2$ | |
| Pad Bottom Reinforcement Bar Area = | $A_{b\text{bot}} := \frac{\pi \cdot d_{b\text{bot}}^2}{4} = 0.994 \cdot \text{in}^2$ | |
| Coefficient of Lateral Soil Pressure = | $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$ | |
| Load Factor = | $LF := \begin{cases} 1.333 & \text{if } H_t \leq 700\text{-ft} \\ 1.7 & \text{if } H_t \geq 1200\text{-ft} \\ 1.333 + \left(\frac{H_t - 700\text{ft}}{1200\text{ft} - 700\text{ft}} \right) \cdot 0.4 & \text{otherwise} \end{cases} = 1.333$ | |

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{conc}} - 62.4 \text{pcf}, \gamma_{\text{conc}}) = 150 \text{pcf}$

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{soil}} - 62.4 \text{pcf}, \gamma_{\text{soil}}) = 120 \text{pcf}$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \text{ksf}$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 2.34 \text{ksf}$

$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] = 2.34 \text{ksf}$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 3.6 \text{ksf}$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 2.97 \text{ksf}$

$T_p := \text{if}[n < (D_f - T_f), T_f, (D_f - n)] = 3.5$

$A_p := W_f \cdot T_p = 103.25$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 306.653 \text{kip}$

Weight of Concrete Pad = $WT_{pad} := (W_f^2 \cdot T_f) \cdot \gamma_c = 456.881 \text{kip}$

Weight of Concrete Piers = $WT_{pier} := 3 \cdot \left[\left(L_p \cdot \frac{d_p^2 \cdot \pi}{4} \right) \cdot \gamma_c \right] = 101.611 \text{kip}$

Total Weight of Concrete = $WT_c := WT_{pad} + WT_{pier} = 558 \text{kip}$

Weight of Soil Above Footing = $WT_{s1} := \left(W_f^2 - 3 \cdot \frac{d_p^2 \cdot \pi}{4} \right) \cdot (L_p - L_{pag}) \cdot \gamma_s = 633 \text{kip}$

Weight of Soil Above Footing = $WT_{s2} := \left[\frac{\tan(\phi_s) \cdot (L_p - L_{pag})^2}{2} \cdot W_f \right] \cdot \gamma_s = 43 \text{kip}$

Tower Offset = $X_{t1} := \left[\frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \text{deg}))}{2} \right]$ $X_{t2} := \frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \text{deg}))}{3}$

$X_t := \text{if}(Pos_t, X_{t1}, X_{t2}) = 6.09$

$X_{off} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \text{deg}))}{3} + X_t \right] = 2.887$

Resisting Moment = $M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \cdot \left[W_f + \frac{\tan(\phi_s) \cdot (L_p - L_{pag})}{3} \right] = 19258 \text{ki}$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 5809 \text{kip-ft}$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 3.32$

Factor of Safety Required = $FS_{req} := 2$

OverTurning_Moment_Check := $\text{if}(FS \geq FS_{req}, \text{"Okay"}, \text{"No Good"})$

OverTurning_Moment_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 1277 \cdot kip$

Area of the Mat = $A_{mat} := W_f^2 = 870.25$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 4278.73 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 2.825 \cdot ksf$

Max_Pressure_Check := if($P_{max} < q_s$, "Okay", "No Good")

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = 0.11 \cdot ksf$

Min_Pressure_Check := if($(P_{min} \geq 0) \cdot (P_{min} < q_s)$, "Okay", "No Good")

Min_Pressure_Check = "Okay"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{P_{max} - P_{min}} \cdot \frac{1}{3} = 10.232$

Distance to Kern = $X_k := \frac{W_f}{6} = 4.917$ Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 4.548$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \left(\frac{W_f}{2} - e \right)} = 2.829 \cdot ksf$

$q_{adj} := \text{if}(P_{min} < 0, P_a, P_{max}) = 2.825 \cdot ksf$

Pressure_Check := if($q_{adj} < q_s$, "Okay", "No Good")

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 4.686 \times 10^3 \cdot kips$ (ACI-2008 10.14)

Bearing_Check := if($P_b > LF \cdot C_t$, "Okay", "No Good")

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear:

(Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$$\phi_c := 0.85 \quad (\text{ACI 9.3.2.5})$$

$$d := T_f - C_{vr_{pad}} - d_{bbot} = 37.875 \text{ in}$$

$$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$$

$$d_2 := d_1 - d$$

$$L := \left(\frac{W_f}{2} - e \right) \cdot 3$$

$$\text{Slope} := \text{if} \left(L > W_f, \frac{P_{\max} - P_{\min}}{W_f}, \frac{q_{adj}}{L} \right)$$

$$V_{req} := LF \cdot \left[q_{adj} - \text{Slope} \cdot d_1 \right] + \left(\frac{\text{Slope} \cdot d_1}{2} \right) \cdot W_f \cdot d_1 = 1.089 \times 10^3 \cdot \text{kip}$$

$$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c} \cdot \text{psi} \cdot W_f \cdot d = 1248 \cdot \text{kip} \quad (\text{ACI-2008 11.2.1.1})$$

$$\text{Beam_Shear_Check} := \text{if}(V_{req} < V_{Avail}, \text{"Okay"}, \text{"No Good"})$$

Beam_Shear_Check = "Okay"

Punching Shear:

(Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear =

$$b_o := (d_p + d) \cdot \pi = 25.6$$

Area Included Inside Perimeter =

$$A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 52.2$$

Area Outside of Perimeter =

$$A_{out} := A_{mat} - A_{bo} = 818$$

Guess Value =

$$v_u := 1 \text{ksf}$$

(From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given

$$d^2 + d_p \cdot d = \frac{\text{Load}_{tot}}{\pi \cdot v_u}$$

$$v_u := \text{Find}(v_u) = 1.6 \times 10^4 \text{ lbf}$$

$$V_u := v_u \cdot d \cdot W_f = 1.5 \times 10^3 \cdot \text{kips}$$

Required Shear Strength =

$$V_{req} := LF \cdot V_u = 2 \times 10^3 \text{ kips}$$

Available Shear Strength =

$$V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot \text{psi}} \cdot b_o \cdot d = 2168.8 \text{ kip} \quad (\text{ACI-2008 11.11.2.1})$$

$$\text{Punching_Shear_Check} := \text{if}(V_{req} < V_{Avail}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Punching_Shear_Check} = \text{"Okay"}$$

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor =

$$\phi_m := .90 \quad (\text{ACI-2008 9.3.2.1})$$

$$M_{nT} := LF \cdot \left[U_t \left(W_t \cdot \sin(60 \cdot \text{deg}) - \frac{d_p}{2} \right) + S_t (D_f + L_{\text{pag}}) \right] - W T_t \cdot X_{\text{off}} = 5828 \text{ ft}\cdot\text{k}$$

$$M_{nS} := -1 \cdot \left[\frac{1}{2} \cdot \left(\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot \text{deg}) - \frac{d_p}{2} \right)^2 \cdot W_t \cdot [\gamma_s \cdot (T_f - T_f)] \right]$$

$$M_{nC} := -1 \cdot \left[\frac{1}{2} \cdot \left(\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot \text{deg}) - \frac{d_p}{2} \right)^2 \cdot W_t \cdot (\gamma_c \cdot T_f) \right]$$

Design Moment =

$$M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 4.581 \times 10^3 \text{ kips}\cdot\text{ft}$$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \text{ psi} \leq f_c \leq 4000 \text{ psi} \\ 0.65 & \text{if } f_c > 8000 \text{ psi} \end{cases} = 0.85$$

$$\left[\left[\left[\frac{f_c}{\text{psi}} - 4000 \right] \right] \right] \cdot 0.5 \quad \text{otherwise} \quad (\text{ACI-2008 10.2.7.3})$$

$$b_{\text{eff}} := W_t \cdot \cos(30 \cdot \text{deg}) + d_p = 267.846 \text{ in}$$

$$d := T_f - C_{\text{vr}}_{\text{pad}} - d_{\text{bbot}} = 37.875 \text{ in}$$

$$A_s := \frac{M_n}{(f_y \cdot d)} = 24.191 \text{ in}^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{\text{eff}}} = 2.125 \text{ in}$$

$$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2} \right)} = 24.889 \text{ in}^2$$

$$\rho := \frac{A_s}{b_{\text{eff}} \cdot d} = 0.00245$$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \text{ psi} \\ .0020 & \text{otherwise} \end{cases} = 0.0018 \quad (\text{ACI-2008 7.12.2.1})$$

Check Bottom Bars:

$$A_s := \begin{cases} (\rho \cdot b_{eff} \cdot d) & \text{if } (\rho \cdot b_{eff} \cdot d) > \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \\ \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d & \text{otherwise} \end{cases} = 24.889 \cdot \text{in}^2$$

$$A_{s_{prov}} := A_{b_{bot}} \cdot NB_{bot} = 38.8 \cdot \text{in}^2$$

$$Pad_Reinforcement_Bot := \text{if}(A_{s_{prov}} > A_s, \text{"Okay"}, \text{"No Good"})$$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$A_s := \text{if} \left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \right) = 24.9 \cdot \text{in}^2$$

$$A_{s_{prov}} := A_{b_{top}} \cdot NB_{top} = 38.8 \cdot \text{in}^2$$

$$Pad_Reinforcement_Top := \text{if}(A_{s_{prov}} > A_s, \text{"Okay"}, \text{"No Good"})$$

Pad_Reinforcement_Top = "Okay"

Development Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot C_{vr_{pad}} - NB_{bot} \cdot d_{b_{bot}}}{NB_{bot} - 1} = 8 \cdot \text{in}$$

Spacing or Cover Dimension =

$$c := \text{if} \left(C_{vr_{pad}} < \frac{B_{sPad}}{2}, C_{vr_{pad}}, \frac{B_{sPad}}{2} \right) = 3 \cdot \text{in}$$

Transverse Reinforcement Index =

$$k_{tr} := 0 \quad (\text{ACI-2008 12.2.3})$$

Minimum Development Length =

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \beta_{pad} \gamma_{pad} \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot \text{psi}} \cdot \frac{c + k_{tr}}{d_{b_{bot}}}} \cdot d_{b_{bot}} = 34.7 \cdot \text{in}$$

$$L_{dbmin} := 12 \cdot \text{in} \quad (\text{ACI-2008 12.2.1})$$

$$L_{dbtCheck} := \text{if}(L_{dbt} \geq L_{dbmin}, \text{"Use L.dbt"}, \text{"Use L.dbmin"}) = \text{"Use L.dbt"}$$

Available Length in Pad =

$$L_{pad} := \frac{W_f}{2} - \frac{W_t}{2} - C_{vr_{pad}} = 54 \cdot \text{in}$$

$$L_{pad_Check} := \text{if}(L_{pad} > L_{dbt}, \text{"Okay"}, \text{"No Good"})$$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier =

$$A_p := \frac{\pi \cdot d_p^2}{4} = 2827.43 \cdot \text{in}^2$$

$$A_{smin} := 0.01 \cdot 0.05 \cdot A_p = 1.41 \cdot \text{in}^2 \quad (\text{ACI-2008 10.8.4 \& 10.9.1})$$

$$A_{sprov} := NB_{pier} \cdot A_{bpier} = 21.21 \cdot \text{in}^2$$

$$\text{Steel_Area_Check} := \text{if}(A_{sprov} > A_{smin}, \text{"Okay"}, \text{"No Good"})$$

Steel_Area_Check = "Okay"

Bar Spacing In Pier =

$$B_{spier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 5.981 \cdot \text{in}$$

Diameter of Reinforcement Cage =

$$\text{Diam}_{cage} := d_p - 2 \cdot C_{vripier} = 54 \cdot \text{in}$$

Maximum Moment in Pier =

$$M_p := \left[S_t \left(L_p + \frac{A_{BP}}{2} \right) \right] \cdot LF = 9405.6 \cdot \text{in} \cdot \text{kips}$$

Pier Check evaluated from outside program and results are listed below;

$$(D \ N \ n \ P_u \ M_{xu}) := \left(d_p^{12} \ NB_{pier} \ BS_{pier} \frac{C_t \cdot 1.333}{\text{kips}} \frac{M_p}{\text{in} \cdot \text{kips}} \right)$$

$$(D \ N \ n \ P_u \ M_{xu}) = (60 \ 27 \ 8 \ 427.9 \ 9405.6)$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := (0 \ 0 \ 0 \ 0)$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := \phi P_n^T (D, N, n, P_u, M_{xu})^T$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) = (2036.4 \ 44763.4 \ -60 \ 0)$$

$$\text{Axial_Load_Check} := \text{if}(\phi P_n \geq P_u, \text{"Okay"}, \text{"No Good"})$$

Axial_Load_Check = "Okay"

$$\text{Bending_Check} := \text{if}(\phi M_{xn} \geq M_{xu}, \text{"Okay"}, \text{"No Good"})$$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$$L_{\text{pier}} := L_p - C_{\text{vr pier}} = 135 \text{ in}$$

$$L_{\text{pad}} := T_f - C_{\text{vr pad}} = 39 \text{ in}$$

Tension:

(ACI-2008 12.2.3)

Spacing or Cover Dimension =

$$c := \text{if} \left(C_{\text{vr pier}} < \frac{B_{\text{SPier}}}{2}, C_{\text{vr pier}}, \frac{B_{\text{SPier}}}{2} \right) = 2.991 \text{ in}$$

Transverse Reinforcement =

$$k_{\text{tr}} := 0$$

(ACI-2008 12.2.3)

$$L_{\text{dbt}} := \frac{3 f_y \alpha_{\text{pier}} \beta_{\text{pier}} \gamma_{\text{pier}} \lambda_{\text{pier}}}{40 \cdot \sqrt{f_c \cdot \text{psi}} \left(\frac{c + k_{\text{tr}}}{d_{\text{bpier}}} \right)} d_{\text{bpier}} = 27.47 \text{ in}$$

Minimum Development Length =

$$L_{\text{dh}} := \frac{1200 \cdot d_{\text{bpier}}}{\sqrt{\frac{f_c}{\text{psi}}}} \cdot .7 = 15.336 \text{ in} \quad (\text{ACI } 12.2.1)$$

Pier reinforcement bars are standard 90 degree hooks and therefore development in the pad is computed as follows:

$$L_{\text{db}} := \max(L_{\text{dbt}}, L_{\text{dbmin}})$$

$$L_{\text{tension_check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{db}}, \text{"Okay"}, \text{"No Good"})$$

$$L_{\text{tension_check}} = \text{"Okay"}$$

Compression:

(ACI-2008 12.3.2)

$$L_{\text{dbc1}} := \frac{.02 \cdot d_{\text{bpier}} \cdot f_y}{\sqrt{f_c \cdot \text{psi}}} = 21.909 \text{ in}$$

$$L_{\text{dbmin}} := 0.0003 \cdot \frac{\text{in}^2}{\text{lb}} \cdot (d_{\text{bpier}} \cdot f_y) = 18 \text{ in}$$

$$L_{\text{dbc}} := \text{if}(L_{\text{dbc1}} \geq L_{\text{dbmin}}, L_{\text{dbc1}}, L_{\text{dbmin}}) = 21.909 \text{ in}$$

$$L_{\text{compression_check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{dbc}}, \text{"Okay"}, \text{"No Good"})$$

$$L_{\text{compression_check}} = \text{"Okay"}$$

Tie Size and Spacing in Column:

Minimum Tie Size = $Tie_{min} := \text{if}(BS_{pier} \leq 10, 3, 4) = 3$

Used #3 Ties

Seismic Factor = $z := \text{if}(Z \leq 2, 1, 0.5) = 1$ (ACI-2008 21.10.5)

$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 16 \cdot \text{in}$

$s_{lim2} := \frac{48 \cdot d_{Tie}}{8} \cdot z = 24 \cdot \text{in}$

$s_{lim3} := D_r \cdot z = 120 \cdot \text{in}$

$s_{lim4} := 18 \cdot \text{in}$

Maximum Spacing =

$s_{tie} := \min \begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix} = 16 \cdot \text{in}$

Number of Ties Required =

$n_{tie} := \frac{L_{pier} - 3 \cdot \text{in}}{s_{tie}} + 1 = 9.25$

Check Anchor Steel Embedment:

Depth Available =

$D_{ab} := L_{st} - A_{BP} = 5 \cdot \text{ft}$

Length of Anchor Bolt =

$L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot \text{in}}{\sqrt{f_c \cdot \text{psi}}} = 12.552 \cdot \text{ft}$

$\text{Depth_Check} := \text{if}(D_{ab} \geq L_{anchor}, \text{"Okay"}, \text{"No Good"})$

Depth_Check = "No Good"

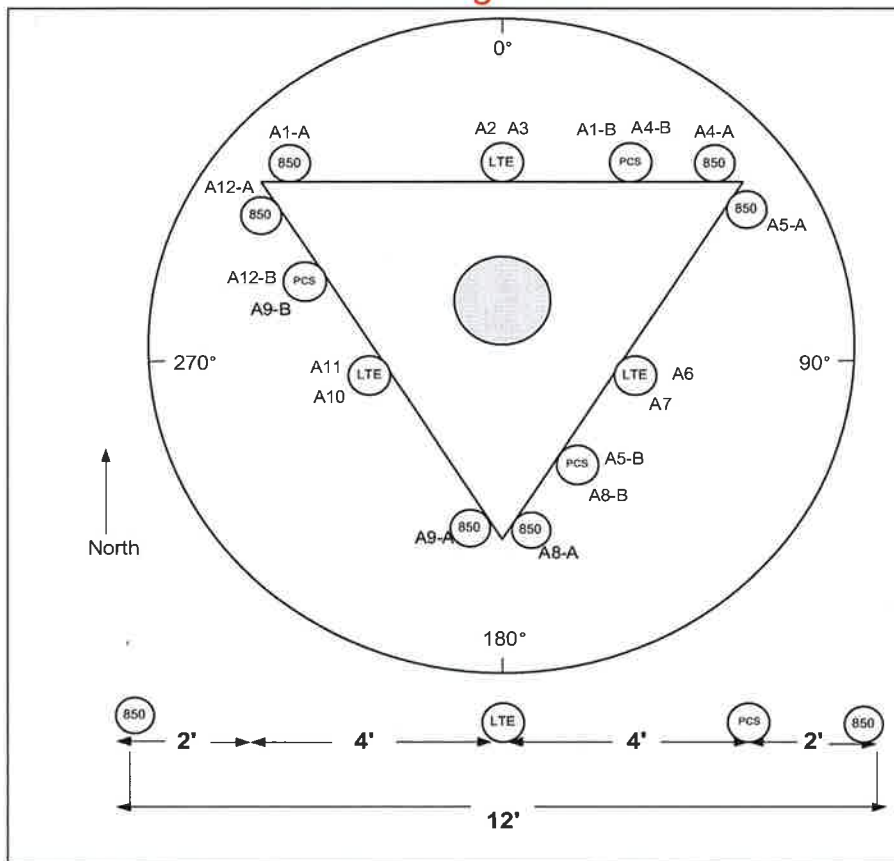
Note: Anchor plate is provided

13001.072

| SITE NAME | WINDSOR LOCKS NE CT | | ECP - CELL # | 8 | 190 |
|--------------------------------------|----------------------------|-----------------|----------------------------|-----------------|----------------------------|
| LATITUDE | 41-55-41.18 N | | LONGITUDE | 72-38-48.38 W | |
| Additional Comments: 2014 AWS ADD. | | | SAVE BUTTON | Lattice | |
| STRUCTURE TYPE | | | Lattice | | |
| AWS - LTE ANTENNA ADD | ALPHA | | BETA | | GAMMA |
| EQUIPMENT TYPE | 2100 MHz BBU | | 2100 MHz BBU | | 2100 MHz BBU |
| ANTENNA TYPE | BXA-171063-12CF-EDIN-5 | | BXA-171063-12CF-EDIN-5 | | BXA-171063-12CF-EDIN-5 |
| QTY OF ANTENNAS PER FACE | 1 | | 1 | | 1 |
| ORIENTATION (DEG) | 30 | | 150 | | 270 |
| DOWN TILT (MECH/DEG) | 4 | | 4 | | 4 |
| RAD CTR (FT AGL) | 150 | | 150 | | 150 |
| TMA - QTY / MODEL | | | | | |
| DIPLEXER - QTY / MODEL | | | | | |
| RRH - QTY/MODEL | 1 | ALU RH_2X40-AWS | 1 | ALU RH_2X40-AWS | 1 ALU RH_2X40-AW |
| SECTOR DISTRIBUTION BOX | | | | | |
| MAIN DISTRIBUTION BOX | 1 | | DB-T1-6Z-8AB-0Z | | |
| 700 Mhz - LTE Current Config | ALPHA | | BETA | | GAMMA |
| EQUIPMENT TYPE | eNodeB | | eNodeB | | eNodeB |
| ANTENNA TYPE | LNX-6514DS-T4M | | BXA-70063-6CF-2 | | BXA-70063-6CF-2 |
| QTY OF ANTENNAS PER FACE | 1 | | 1 | | 1 |
| ORIENTATION (DEG) | 30 | | 150 | | 270 |
| DOWN TILT (MECH/DEG) | 3 | | 3 | | 3 |
| RAD CTR (FT AGL) | 150 | | 150 | | 150 |
| TMA - QTY / MODEL | | | | | |
| DIPLEXER - QTY / MODEL | | | | | |
| MCPA BRICKS (QTY) | | | | | |
| RRH - QTY/MODEL | | | | | |
| SECTOR DISTRIBUTION BOX | | | | | |
| MAIN DISTRIBUTION BOX | | | | | |
| 700 Mhz - LTE Future Config | ALPHA | | BETA | | GAMMA |
| EQUIPMENT TYPE | eNodeB | | eNodeB | | eNodeB |
| ANTENNA TYPE | LNX-6514DS-T4M | | BXA-70063-6CF-2 | | BXA-70063-6CF-2 |
| QTY OF ANTENNAS PER FACE | 1 | | 1 | | 1 |
| ORIENTATION (DEG) | 30 | | 150 | | 270 |
| DOWN TILT (MECH/DEG) | 0 | | 3 | | 0 |
| RAD CTR (FT AGL) | 150 | | 150 | | 150 |
| TMA - QTY / MODEL | | | | | |
| DIPLEXER - QTY / MODEL | | | | | |
| MCPA BRICKS (QTY) | | | | | |
| RRH - QTY/MODEL | | | | | |
| SECTOR DISTRIBUTION BOX | | | | | |
| MAIN DISTRIBUTION BOX | | | | | |
| 850 Cellular - Current Config | ALPHA | | BETA | | GAMMA |
| EQUIPMENT TYPE | #N/A | | #N/A | | #N/A |
| ANTENNA TYPE | LPA-80063-6CF-5 | | LPA-80063-6CF-5 | | LPA-80063-6CF-5 |
| QTY OF ANTENNAS PER FACE | 2 | | 2 | | 2 |
| ORIENTATION (DEG) | 30 | | 150 | | 270 |
| DOWN TILT (MECH/DEG) | 3 | | 3 | | 3 |
| RAD CTR (FT AGL) | 150 | | 150 | | 150 |
| TMA - QTY / MODEL | | | | | |
| DIPLEXER - QTY / MODEL | 2 | FD9R6004/2C-3L | 2 | FD9R6004/2C-3L | 2 FD9R6004/2C-3L |
| DIPLEX WITH LTE CABLE | | | | | |
| MCPA BRICKS (QTY) | | | | | |
| 850 Cellular - Future Config | ALPHA | | BETA | | GAMMA |
| EQUIPMENT TYPE | #N/A | | #N/A | | #N/A |
| ANTENNA TYPE | BXA-70063-6CF-5 | | BXA-70063-6CF-5 | | BXA-70063-6CF-5 |
| QTY OF ANTENNAS PER FACE | 1 | | 1 | | 1 |
| ORIENTATION (DEG) | 30 | | 150 | | 270 |
| DOWN TILT (MECH/DEG) | 3 | | 3 | | 3 |
| RAD CTR (FT AGL) | 150 | | 150 | | 150 |
| TMA - QTY / MODEL | | | | | |
| DIPLEXER - QTY / MODEL | 2 | FD9R6004/2C-3L | 2 | FD9R6004/2C-3L | 2 FD9R6004/2C-3L |
| DIPLEX WITH LTE CABLE | | | | | |
| MCPA BRICKS (QTY) | | | | | |
| 1900 PCS - Current Config | ALPHA | | BETA | | GAMMA |
| EQUIPMENT TYPE | PCS Modcell 4.0B | | PCS Modcell 4.0B | | PCS Modcell 4.0B |
| ANTENNA TYPE | BXA-185060-12CF-2 | | BXA-185060-12CF-2 | | BXA-185060-12CF-2 |
| QTY OF ANTENNAS PER FACE | 1 | | 1 | | 1 |
| ORIENTATION (DEG) | 30 | | 150 | | 270 |
| DOWN TILT (MECH/DEG) | 2 | | 2 | | 2 |
| RAD CTR (FT AGL) | 150 | | 150 | | 150 |
| TMA - QTY / MODEL | | | | | |
| DIPLEXER - QTY / MODEL | | | | | |
| DIPLEX WITH CELLULAR CABLE | DIPLEX with Cellular Cable | | DIPLEX with Cellular Cable | | DIPLEX with Cellular Cable |
| MCPA BRICKS (QTY) | | | | | |
| 1900 PCS - Future Config | ALPHA | | BETA | | GAMMA |
| EQUIPMENT TYPE | PCS Modcell 4.0B | | PCS Modcell 4.0B | | PCS Modcell 4.0B |
| ANTENNA TYPE | BXA-185060-12CF-2 | | BXA-185060-12CF-2 | | BXA-185060-12CF-2 |
| QTY OF ANTENNAS PER FACE | 1 | | 1 | | 1 |
| ORIENTATION (DEG) | 30 | | 150 | | 270 |
| DOWN TILT (MECH/DEG) | 2 | | 2 | | 2 |
| RAD CTR (FT AGL) | 150 | | 150 | | 150 |
| TMA - QTY / MODEL | | | | | |
| DIPLEXER - QTY / MODEL | | | | | |
| DIPLEX WITH CELLULAR CABLE | DIPLEX with Cellular Cable | | DIPLEX with Cellular Cable | | DIPLEX with Cellular Cable |
| MCPA BRICKS (QTY) | | | | | |

| NUMBER OF CABLE'S NEEDED | | | | | ESTIMATED CABLE LENGTH | | | | | | |
|----------------------------|--------|------------------------|----------------|-------------------|------------------------|--------------------|------------------|----------|-------|------------|--------------------|
| MAINLINE SIZE | 1 5/8" | TOTAL # OF MAINLINES | | | 12 | MAINLINE (FT) | | | | | |
| JUMPER SIZE | 1/2 " | TOTAL # OF TOP JUMPERS | | | 18 | TOP JUMPER (FT) | | | | | |
| Equipment Cable Ordering | | MAIN CABLE | 12 | + | 0 | TOP JUMPER # | | 12 | + | 6 | |
| FIBER LINE SIZE | 1 5/8" | TOTAL # OF FIBER LINES | | | 1 | FIBER LINE MODEL # | | | | 1-08U8 | |
| JUMPER SIZE | 5/8" | TOTAL # OF TOP JUMPERS | | | 3 | TOP JUMPER MODEL # | | | | 1-08U1 | |
| Fiber Cable Ordering | | FIBER CABLE | 0 | + | 1 | TOP JUMPER # | | 0 | + | 3 | |
| TX / RX FREQUENCIES | | | | | TX POWER OUTPUT | | | | | | |
| Cellular A-Band | | | PCS F-Band | | 700 Mhz C - B | | Cellular (Watts) | | ## | | |
| TX - 869-880,890-891.5 MHz | | | TX - 1970-1975 | | TX - 746-757 | | PCS (Watts) | | 16 | | |
| RX - 824-835,845-846.5 MHz | | | RX - 1890-1895 | | RX - 776-787 | | LTE (Watts) | | 40 | | |
| ALPHA | | | BETA | | | GAMMA | | | | | |
| Ant. | Freq. | Func. | Color Code | Ant. | Freq. | Func. | Color Code | Ant. | Freq. | Func. | Color Code |
| A1-A | 800 | Tx1/Rx0 | RED | A5-A | 800 | Tx2/Rx0 | BLUE | A9-A | 800 | Tx3/Rx0 | GREEN |
| A1-B | 1900 | Tx1/Rx0 | RED/WHITE | A5-B | 1900 | Tx2/Rx0 | BLUE/WHITE | A9-B | 1900 | Tx3/Rx0 | GREEN/WHITE |
| A2 | 700 | Tx1/Rx0 | RED/ORANGE | A6 | 700 | Tx2/Rx0 | BLUE/ORANGE | A10 | 700 | Tx3/Rx0 | GREEN/ORANGE |
| A3 | 700 | Tx4/Rx1 | RED/RED/ORANGE | A7 | 700 | Tx5/Rx1 | BLUE/BLUE/ORANGE | A11 | 700 | Tx6/Rx1 | GREEN/GREEN/ORANGE |
| A4-B | 1900 | Tx4/Rx1 | RED/RED/WHITE | A8-B | 1900 | Tx5/Rx1 | BLUE/BLUE/WHITE | A12-B | 1900 | Tx6/Rx1 | GREEN/GREEN/WHITE |
| A4-A | 800 | Tx4/Rx1 | RED/RED | A8-A | 800 | Tx5/Rx1 | BLUE/BLUE | A12-A | 800 | Tx6/Rx1 | GREEN/GREEN |
| RF ENGINEER | | | | RF MANAGER | | | | INITIALS | | DATE | |
| Prepared By : Justin Kober | | | | Robert Hesselbach | | | | JK | | 11/19/2013 | |

Site Configuration



BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

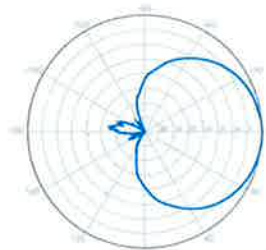
Replace "X" with desired electrical downtilt

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

| Electrical Characteristics | | 696-900 MHz | | |
|--------------------------------------|---|--|--------------------|--------|
| Frequency bands | 696-806 MHz | 806-900 MHz | | |
| Polarization | ±45° | | | |
| Horizontal beamwidth | 65° | 63° | | |
| Vertical beamwidth | 13° | 11° | | |
| Gain | 14.0 dBd (16.1 dBi) | 14.5 dBd (16.6 dBi) | | |
| Electrical downtilt (X) | 0, 2, 3, 4, 5, 6, 8, 10 | | | |
| Impedance | 50Ω | | | |
| VSWR | ≤1.35:1 | | | |
| Upper sidelobe suppression (0°) | -18.3 dB | -18.2 dB | | |
| Front-to-back ratio (+/-30°) | -33.4 dB | -36.3 dB | | |
| Null fill | 5% (-26.02 dB) | | | |
| Isolation between ports | < -25 dB | | | |
| Input power | 500 W | | | |
| Lightning protection | Direct Ground | | | |
| Connector(s) | 2 Ports / EDIN or NE / Female / Center (Back) | | | |
| Mechanical Characteristics | | | | |
| Dimensions Length x Width x Depth | 1804 x 285 x 132 mm | 71.0 x 11.2 x 5.2 in | | |
| Depth with z-brackets | 172 mm | 6.8 in | | |
| Weight without mounting brackets | 7.9 kg | 17 lbs | | |
| Survival wind speed | > 201 km/hr | | > 125 mph | |
| Wind area | Front: 0.51 m ² Side: 0.24 m ² | Front: 5.5 ft ² Side: 2.6 ft ² | | |
| Wind load @ 161 km/hr (100 mph) | Front: 759 N Side: 391 N | Front: 169 lbf Side: 89 lbf | | |
| Mounting Options | | Part Number | Fits Pipe Diameter | Weight |
| 3-Point Mounting Bracket Kit | 36210003 | 50-160 mm 2.0-6.3 in | 6.3 kg 14 lbs | |
| 3-Point Downtilt Bracket Kit (0-14°) | 36210004 | 50-160 mm 2.0-6.3 in | 7.3 kg 16 lbs | |
| Downtilt Mounting Applications | A mounting bracket and downtilt bracket kit must be ordered for downtilt applications | | | |
| Concealment Configurations | For concealment configurations, order BXA-70063-6CF-EDIN-X-FP | | | |

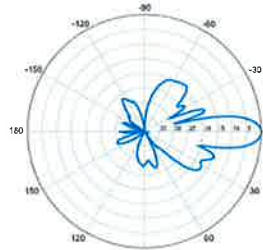


BXA-70063-6CF-EDIN-X



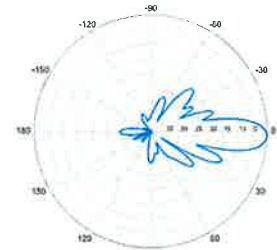
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

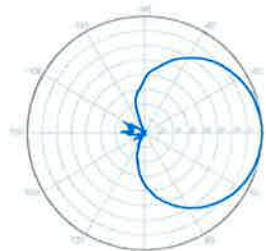


0° | Vertical | 750 MHz

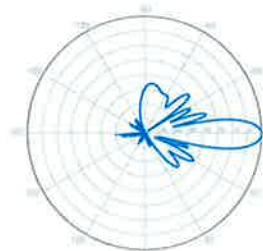
BXA-70063-6CF-EDIN-2



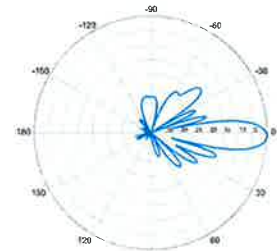
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

BXA-171063-12CF-EDIN-X

X-Pol | FET Panel | 63° | 19.0 dBi

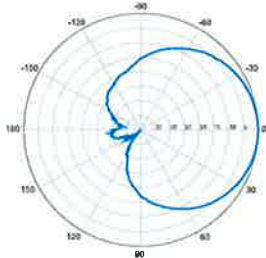
Replace 'X' with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace 'EDIN' with 'NE' in the model number when ordering.

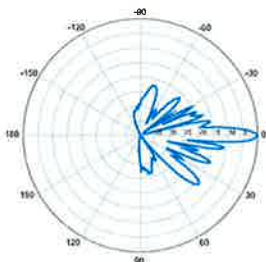


| Electrical Characteristics | 1710-2170 MHz | | |
|---|---|--|---------------------|
| Frequency bands | 1710-1880 MHz | 1850-1990 MHz | 1920-2170 MHz |
| Polarization | ±45° | ±45° | ±45° |
| Horizontal beamwidth | 68° | 65° | 60° |
| Vertical beamwidth | 4.5° | 4.5° | 4.5° |
| Gain | 16.1 dBd / 18.2 dBi | 16.5 dBd / 18.6 dBi | 16.9 dBd / 19.0 dBi |
| Electrical downtilt (X) | 0, 2, 5 | | |
| Impedance | 50Ω | | |
| VSWR | ≤1.5:1 | | |
| First upper sidelobe | < -17 dB | | |
| Front-to-back ratio | > 30 dB | | |
| In-band isolation | < -25 dB | | |
| IM3 (20W carrier) | < -150 dBc | | |
| Input power | 300 W | | |
| Lightning protection | Direct Ground | | |
| Connector(s) | 2 Ports / EDIN or NE / Female / Center (Back) | | |
| Operating temperature | -40° to +60° C / -40° to +140° F | | |
| Mechanical Characteristics | | | |
| Dimensions Length x Width x Depth | 1842 x 154 x 105 mm | 72.5 x 6.1 x 4.1 in | |
| Depth with z-brackets | 133 mm | 5.2 in | |
| Weight without mounting brackets | 5.8 kg | 12.8 lbs | |
| Survival wind speed | > 201 km/hr | | > 125 mph |
| Wind area | Front: 0.28 m ² Side: 0.19 m ² | Front: 3.1 ft ² Side: 2.1 ft ² | |
| Wind load @ 161 km/hr (100 mph) | Front: 460 N Side: 304 N | Front: 103 lbf Side: 68 lbf | |
| Mounting Options | Part Number | Fits Pipe Diameter | Weight |
| 2-Point Mounting Bracket Kit | 26799997 | 50-102 mm 2.0-4.0 in | 2.3 kg 5 lbs |
| 2-Point Mounting & Downtilt Bracket Kit | 26799999 | 50-102 mm 2.0-4.0 in | 3.6 kg 8 lbs |
| Concealment Configurations | For concealment configurations, order BXA-171063-12CF-EDIN-X-FP | | |

BXA-171063-12CF-EDIN-X

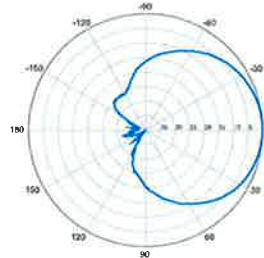


Horizontal | 1710-1880 MHz
BXA-171063-12CF-EDIN-0

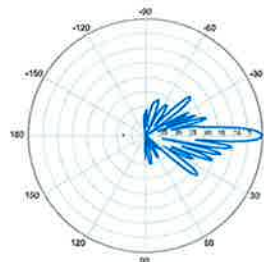


0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-X

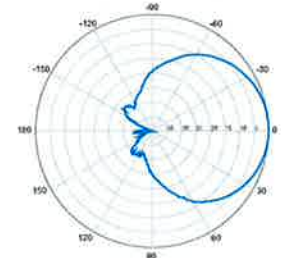


Horizontal | 1850-1990 MHz
BXA-171063-12CF-EDIN-0

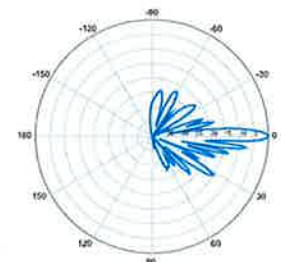


0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



Horizontal | 1920-2170 MHz
BXA-171063-12CF-EDIN-0



0° | Vertical | 1920-2170 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



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

The Alcatel-Lucent RRH2x40-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-AWS is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low

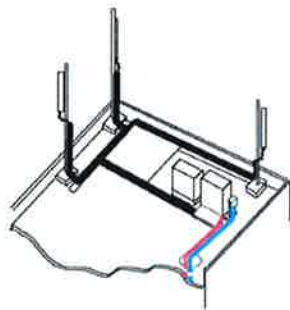
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-AWS is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-AWS is compact and weighs less than 20 kg (44 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-AWS provides more RF power while at the same time consuming less electricity.



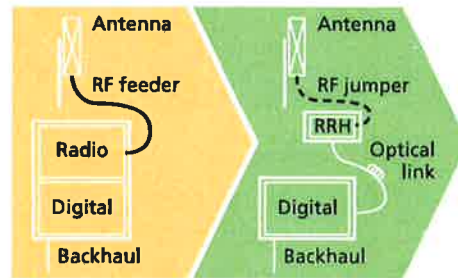
Macro

Features

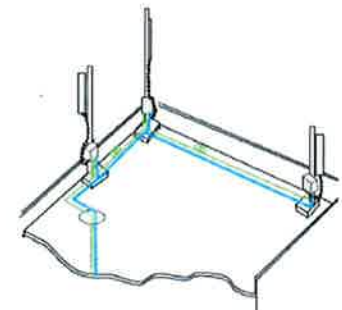
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170mm (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
 - With solar load: -40°C to +50°C (-40°F to +122°F)
 - Without solar load: -40°C to +55°C (-40°F to +131°F)

- Passive convection cooling (no fans)
- Enclosure protection
 - IP65 (International Protection rating)

RF characteristics

- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
 - TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
 - One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
 - Single mode dual fiber (SM/DF)
- Multi-mode variant
 - Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Digital Ports and Alarms

- Two optical ports to support daisy-chaining
- Six external alarms

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DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

The RFS Distribution Box design comes with the option for pluggable over voltage protection (OVP) for up to 6 remote radios and the connection for 6 pairs of optical fiber with LC optical fiber cable management. There is a hybrid cable input with a jumper configuration for power and optical fiber to the remote radio heads (RRHs). A custom wall, a 2-inch pole, and an H-Frame mounting bracket are included. Both the compact and standard design are available with lightening protection.



Features/Benefits

- Designed to accommodate varying diameters of HYBRIFLEX™ (combined power and fiber optic) cables – up to 2 inches
- Supports Single- and Multi-Mode Optical fiber
- NEMA 4x rated enclosure – allows **flexibility for indoor or outdoor installation** on a roof or tower top
- Weatherproof enclosure and ports – **improves system reliability**
- Modular design – makes replacement or addition of OVP easy without removal of other components within the box
- Strikesorb OVP technology – protects equipment from damaging surges up to 60 kA on an 8/20 waveform and up to 5 kA on a 10/350 waveform (certain models only)
- Low residual voltage and high impedance – **ideally suited for RRH technology** – won't shut down the RRH the way spark gap technology does (certain models only)

Technical Specifications

Mechanical Specifications

| | | |
|---------------------------------|--|-----------------------------------|
| Model Number | DB-B1-6C-8AB-0Z | DB-T1-6Z-8AB-0Z |
| Enclosure Design | Standard, 6 OVP's | Standard without OVP |
| Dimensions - H x W x D, mm (in) | 610 x 610 x 254 (24 x 24 x 10) | 610 x 610 x 254 (24 x 24 x 10) |
| Weight, kg (lb) | 20 (44) | 20 (44) |
| Suppression Connection Method | Compression lug, #2-#14 AWG Copper, #2-#12 Aluminum | |
| Fiber Connection Method | LC-LC Single- or Multi-mode duplex | |
| Environmental Rating | NEMA 4x | |
| Operating Temperature, °C (°F) | -40 to +80 (-40 to +176) | |
| UV Protection | ISO 4892-2 Method A Xenon-Arc 2160 hrs | |

Electrical Specifications

| | | |
|---|---------------------|-----|
| Nominal Operating Voltage | 48 VDC | |
| Nominal Discharge Current (I _n) per UL 1449 3rd Ed | 20 kA 8/20 μs | N/A |
| Maximum Discharge Current (I _{max}) per NEMA LS-1 | 60 kA 8/20 μs | N/A |
| Maximum Impulse (Lightning) Current (I _{imp}) per IEC 61643-1 | 5 kA 10/350 μs | N/A |
| Maximum Continuous Operating Voltage (U _c) | 75 VDC | N/A |
| Voltage Protection Rating per UL1449 3rd Ed | 400 V | N/A |
| Protection Class as per IEC 61643-1 | Class 1 | N/A |
| Strikesorb OVP Compliance | ANSI/UL 1449-3rd Ed | N/A |
| | IEEE C62.41 | N/A |
| | NEMA LS-1 | N/A |
| | IEC 61643-1 | N/A |
| | IEC 61643-12 | N/A |
| | EN 61643-11 | N/A |

* This data is provisional and subject to change.

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