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Also admitted in Massachusetts

August 10, 2015

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

Re: **Notice of Exempt Modification – Facility Modification
62 North Main Street, Sprague, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) antennas at the 165-foot level of the existing 175-foot tower at 62 North Main Street in Sprague, Connecticut (the “Property”). The tower is owned by Wireless Solutions, LLC. The Council approved Cellco’s use of this tower in 2007. Cellco now intends to replace six (6) of its existing antennas with three (3) model LNX-6514DS-VTM, 700 MHz antennas; three (3) model LNX-9014DS-VTM, 1900 MHz antennas and add three (3) model HBXX-6517DS-VTM, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 165-foot level. Cellco also intends to install nine (9) remote radio heads (“RRHs”) behind its antennas and two (2) HYBRIFLEX™ fiber optic antenna cables. Included in Attachment 1 are specifications for Cellco’s replacement antennas, RRHs and HYBRIFLEX™ cables.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Catherine A. Osten, First Selectman of the Town of Sprague. The Town of Sprague is the owner of the Property. A copy of this letter is also being sent to Wireless Solutions, LLC, the tower owner.

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

Robinson+Cole

Melanie A. Bachman

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1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRH's will be located at the 165-foot level on the 175-foot tower.

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

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

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

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

6. The tower and its foundation can support Cellco's proposed modifications. (See Structural Analysis Report 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:

Catherine A. Osten, Sprague First Selectman
Wireless Solutions, LLC
Tim Parks

ATTACHMENT 1

Product Specifications

COMMScope®

LNx-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

POWERED BY



Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.7	16.3
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Horizontal Tolerance, degrees	±3	±3
Beamwidth, Vertical, degrees	12.5	11.2
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	20	20
CPR at Sector, dB	10	10
Isolation, dB	30	30
VSWR Return Loss, dB	1.4 15.6	1.4 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°

Mechanical Specifications

Color Radome Material	Light gray Fiberglass, UV resistant
Connector Interface Location Quantity	7-16 DIN Female Bottom 2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h 149.8 mph
Antenna Dimensions, L x W x D	1847.0 mm x 301.0 mm x 181.0 mm 72.7 in x 11.9 in x 7.1 in
Net Weight	17.6 kg 38.8 lb
Model with factory installed AISG 2.0 RET	LNx-6514DS-A1M





HBXX-9014DS-VTM

DualPol® Quad Teletilt® Antenna, 1710–2180 MHz, 90° horizontal beamwidth, RET compatible

- 2x2 MIMO ready
- Two DualPol® antennas under one radome
- High front-to-back ratio aids in minimizing co-channel interference
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- Enhanced control of out-of-sector power improves co-channel interference, reduces softer hand-offs, improves capacity
- Fully supports PCS 1900, GSM 1800, UMTS 2100, and AWS spectrum

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain, dBi	16.0	16.0	16.2
Beamwidth, Horizontal, degrees	90	90	90
Beamwidth, Vertical, degrees	7.4	7.0	6.6
Beam Tilt, degrees	0–10	0–10	0–10
USLS, typical, dB	17	17	18
Front-to-Back Ratio at 180°, dB	30	30	30
Isolation, dB	30	30	30
VSWR Return Loss, dB	1.4:1 15.6	1.4:1 15.6	1.4:1 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-150	-150	-150
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm
Lightning Protection	dc Ground	dc Ground	dc Ground

Mechanical Specifications

Color Radome Material	Light gray PVC, UV resistant
Connector Interface Location Quantity	7-16 DIN Female Bottom 4
Wind Loading, maximum	419.5 N @ 150 km/h 94.3 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h 149.8 mph

Dimensions

Depth	166.0 mm 6.5 in
Length	1294.00 mm 50.94 in
Width	305.00 mm 12.01 in
Net Weight	13.50 kg 29.76 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator HBXX-9014DS-R2M

Model with Factory Installed AISG 2.0 Actuator HBXX-9014DS-A2M

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2002/95/EC	Compliant by Exemption

Product Specifications

COMMScope®

HBXX-9014DS-VTM



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

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



Included Products

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members

Product Specifications

COMMScope®

POWERED BY



HBXX-6517DS-VTM

Andrew® Quad Port Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Superior azimuth tracking and pattern symmetry with excellent passive intermodulation suppression

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain, dBi	19.0	19.1	19.2
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
CPR at Boresight, dB	21	22	21
CPR at Sector, dB	10	11	9
Isolation, dB	30	30	30
VSWR Return Loss, dB	1.4 15.6	1.4 15.6	1.4 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
	0 ° 18.4	0 ° 18.4	0 ° 18.7
	3 ° 18.7	3 ° 18.7	3 ° 18.9
	6 ° 18.4	6 ° 18.5	6 ° 18.6
Gain by Beam Tilt, average, dBi			
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® quad
Band	Single band
Brand	DualPol® Teletilt®
Operating Frequency Band	1710 – 2180 MHz

Product Specifications

COMMScope®

HBXX-6517DS-VTM

POWERED BY

ANDREW

Performance Note

Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h 149.8 mph

Dimensions

Depth	166.0 mm 6.5 in
Length	1903.0 mm 74.9 in
Width	305.0 mm 12.0 in
Net Weight	19.5 kg 43.0 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	HBXX-6517DS-A2M
RET System	Teletilt®

Regulatory Compliance/Certifications

Agency

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

Classification

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



Included Products

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance
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ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

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

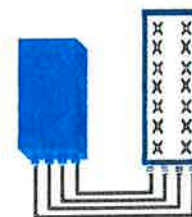


FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

TECHNICAL SPECIFICATIONS

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

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PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

RRH2x60	
RF Output Power	2x60W
Instantaneous Bandwidth	20MHz
Transmitter	2 TX
Receiver	1900 HW version 1900A HW version
Features	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3 AISG 2.0 for RET/TMA
Power	Internal Smart Bias-T -48VDC
CPRI Ports	2 CPRI Rate 3 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (top mounted)



** Not a Verizon Wireless deployed product

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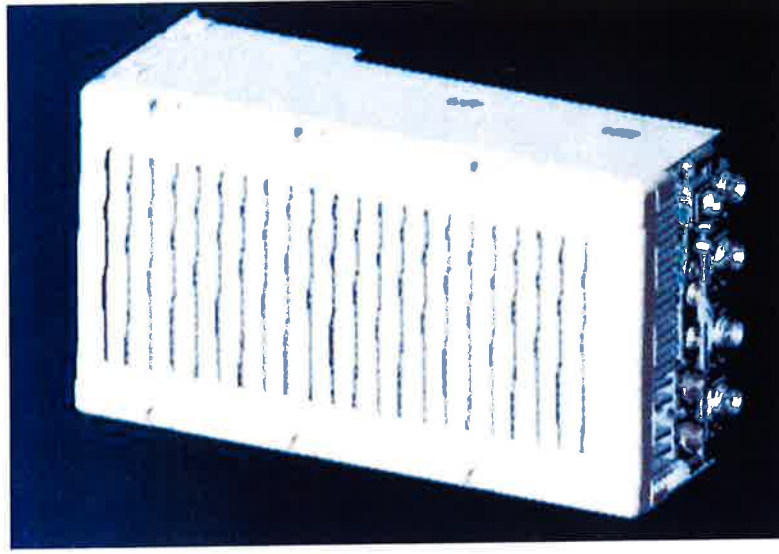
NEW PCS RF MODULES FOR VZW

RRH2X60 - HW CHARACTERISTICS

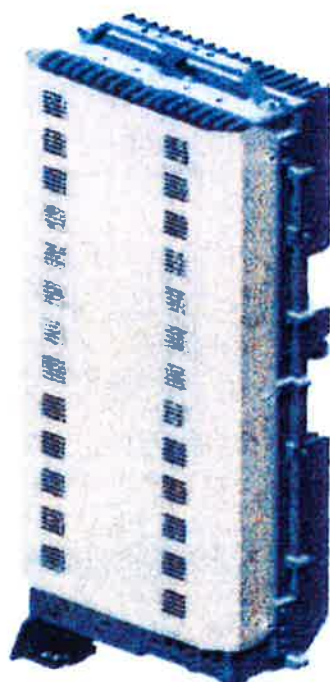
LR14.3

RRH2x60	
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (downward facing)
Dimensions	22"(h) x 12"(w) x 9.4" (d)**
Weight	55lb**

** - Includes solar shield but not mounting brackets (8 lbs.)



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



A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart. The Alcatel-Lucent RRH2x60-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 RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

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

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

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

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

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

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

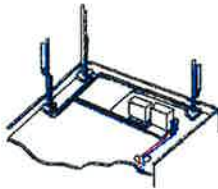
The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

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

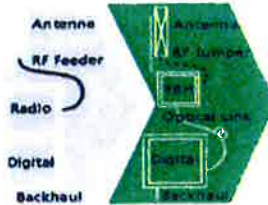
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

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

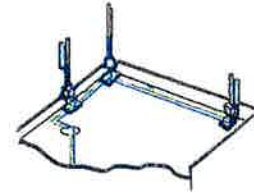
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

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

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

- silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

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

Dimensions and weights

- HxWxD : 510x285x186mm (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 250W @2x60W

RF Characteristics

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

Connectivity

- Two CPRI optical ports for daisy chaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

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

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

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AT THE SPEED OF IDEAS™

Alcatel-Lucent



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

Product Description

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

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

Features/Benefits

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



Figure 1: HYBRIFLEX Series

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	(mm (in))	46.5 (1.83)
Jacket	Polyethylene, PE	(mm (in))	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes

Weight, Approximate	(kg/m (lb/ft))	1.9 (1.30)
Minimum Bending Radius, Single Bending	(mm (in))	200 (8)
Minimum Bending Radius, Repeated Bending	(mm (in))	500 (20)
Recommended/Maximum Clamp Spacing	(m (ft))	1.0 / 1.2 (3.25 / 4.0)

DC-Resistance Outer Conductor Armor	(Ω/km (Ω/1000ft))	0.68 (0.205)
DC-Resistance Power Cable, 8.4mm ² (8AWG)	(Ω/km (Ω/1000ft))	2.1 (0.307)

Version		Single-mode OM3
Quantity, Fiber Count		16 (8 pairs)
Core/Clad	(μm)	50/125
Primary Coating (Acrylate)	(μm)	245
Buffer Diameter, Nominal	(μm)	900
Secondary Protection, Jacket, Nominal	(mm (in))	2.0 (0.08)
Minimum Bending Radius	(mm (in))	104 (4.1)
Insertion Loss @ wavelength 850nm	dB/km	3.0
Insertion Loss @ wavelength 1310nm	dB/km	1.0
Standards (Meets or exceeds)		UL94-V0, UL1666 RoHS Compliant

Size (Power)	(mm (AWG))	8.4 (8)
Quantity, Wire Count (Power)		16 (8 pairs)
Size (Alarm)	(mm (AWG))	0.8 (18)
Quantity, Wire Count (Alarm)		4 (2 pairs)
Type	UV protected	
Strands	19	
Primary Jacket Diameter, Nominal	(mm (in))	6.8 (0.27)
Standards (Meets or exceeds)	NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant	

Installation Temperature	(°C (°F))	-40 to +65 (-40 to 149)
Operation Temperature	(°C (°F))	-40 to +65 (-40 to 149)

* This data is provisional and subject to change

RFS The Clear Choice®

HB158-1-08U8-S8J18

Rev: P1

Print Date: 27.6.2012

Radio Frequency Systems

ATTACHMENT 2

ATTACHMENT 3

Structural Analysis Report

175-ft Existing Valmont Lattice Tower

*Proposed Verizon Wireless
Antenna Upgrade*

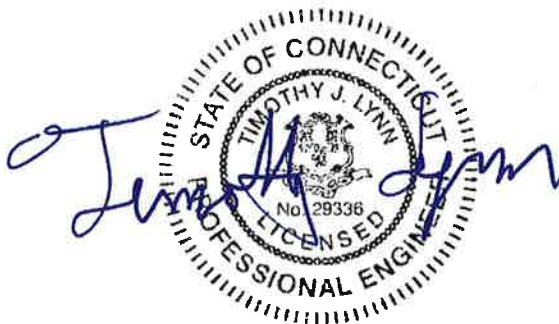
Verizon Site Ref: Baltic

*62 North Main Street
Sprague, CT*

Centek Project No. 15001.056

~~Date: June 11, 2015~~

Rev 1: June 15, 2015



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 upgrade proposed by Verizon Wireless on the existing lattice tower located in Sprague, Connecticut.

The host tower is a 175-ft, three legged, lattice tower originally manufactured by Valmont eng file no. A-122359-1 dated 10/23/06. The tower geometry, structure member sizes and foundation information were taken from the aforementioned tower design documents.

Antenna and appurtenance inventory were taken from a previous structural report prepared by Hudson Design Group dated October 25, 2012 and a Verizon RF data sheet.

The tower consists of two (2) vertical sections consisting of solid round pipe legs, diagonal and horizontal bracing conforming to ASTM A572 Gr. 50 and eight (8) vertical sections consisting of truss legs conforming to ASTM A572 GR. 50 with diagonal steel angle bracing conforming to ASTM A36. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 5-ft at the top and 20-ft at the bottom.

Verizon Wireless proposes the replacement of six (6) existing panel antennas with nine (9) proposed panel antennas and the installation of nine (9) remote radio heads and two (2) distribution boxes mounted on the 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 and proposed loads considered in the analysis consist of the following:

- UNKNOWN (Existing):
Antenna: One (1) 8' whip antenna pipe mounted with an elevation of ± 175 -ft above grade level.
Coax Cable: One (1) 1-5/8" $\varnothing$ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- AT&T (Existing):
Antennas: Six (6) Powerwave 7770 panel antennas, one (1) Powerwave P65-17-XLH-RR panel antenna, two (2) Andrew SNHH-1D6565C panel antennas, six (6) Powerwave LGP-21401 TMAs, six (6) Powerwave LGP-21901 diplexers, six (6) RRUS-11 remote radio heads and one (1) Raycap DC6-48-60-18-8F surge arrestor mounted on three (3) 15-ft T-Frames with a RAD center elevation of ± 175 -ft above grade level.
Coax Cables: Twelve (12) 1-5/8" $\varnothing$ coax cables, one (1) fiber trunk and two (2) DC trunks running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remain):
Antennas: Six (6) Antel LPA-80080/4CF panel antennas mounted on (3) 15-ft T-Frames with a RAD center elevation of ± 165 -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: Three (3) Antel BXA-70063/6CF and three (3) Antel BXA-171085-8CF panel antennas mounted on (3) 15-ft T-Frames with a RAD center elevation of ± 165 -ft above grade level.
Coax Cables: Six (6) 1-5/8" $\varnothing$ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Proposed):
Antennas: Three (3) Andrew HBXX-6517DS panel antennas, three (3) Andrew LNX-6514DS panel antennas, three (3) Andrew HBXX-9014DS panel antennas, three (3) Alcatel-Lucent RRH2x60-LTE remote radio heads, three (3) Alcatel-Lucent RRH2x60-AWS remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads and two (2) RFS DB-T1-6Z-8AB-0Z distribution boxes mounted on (3) 15-ft T-Frames with a RAD center elevation of ± 165 -ft above grade level.
Coax Cables: Two (2) 1-5/8" $\varnothing$ fiber cables 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.

Analysis

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.

Tower Loading

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:	New London; v = 85 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	Sprague; v = 105 mph (3 second gust) equivalent to v = 85 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	Appendix-K and TIA/EIA-222-F wind speeds are equal.	
Load Cases:	<u>Load Case 1</u> ; 85 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> ; 74 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 74 mph wind speed velocity represents 75% of the wind pressure generated by the 85 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 **49.0%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T6)	80'-0"-100'-0"	49.0%	PASS
Diagonal (T7)	60'-0"-80'-0"	48.6%	PASS

Foundation and Anchors

The existing foundation consists of a 37.5-ft square x 3.5-ft thick reinforced concrete mat. The sub-grade conditions used in the analysis of the existing foundation were obtained from the original design documents. Tower legs are connected to the foundation by means of (12) 1.25"Ø, 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	44 kips
	Compression	77 kips
	Moment	4702 kip-ft
Leg	Shear	28 kips
	Uplift	228 kips
	Compression	297 kips

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	22.0%	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	2.87	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.

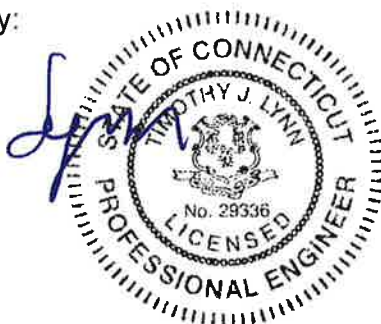
The analysis is based, in part, on the information provided to this office by Verizon Wireless. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
 Structural Engineer



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:

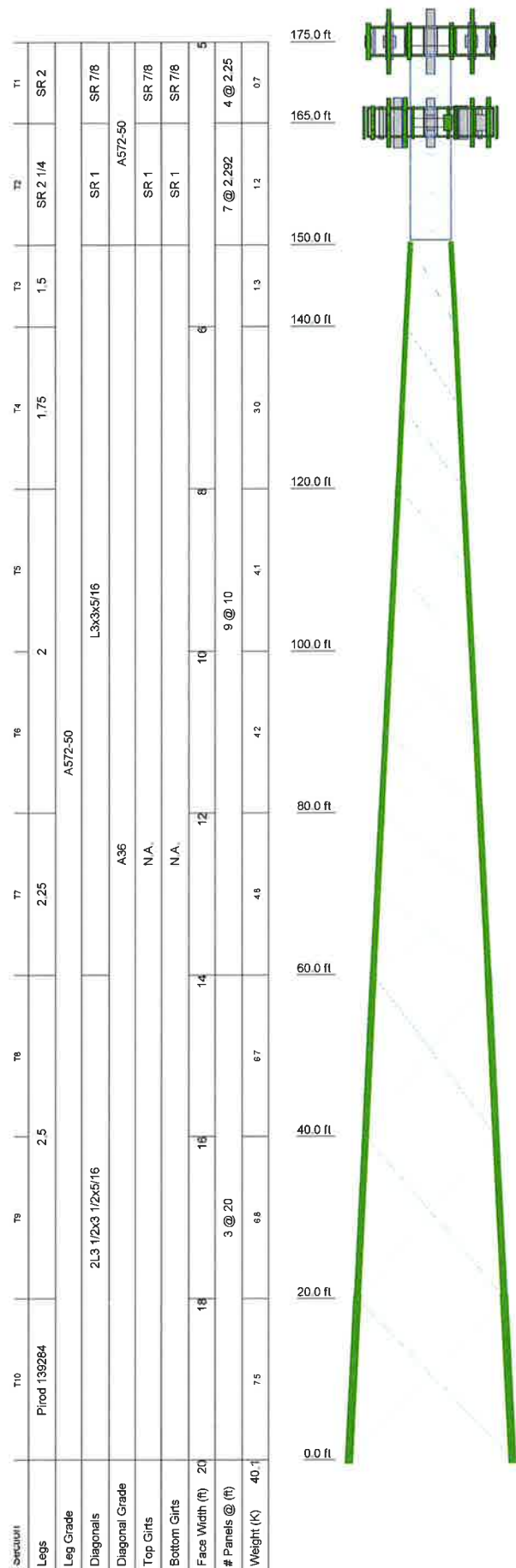
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or 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 un-corroded 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.

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 RISA Tower, 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.



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
8" x 2.5" Dia omni	175	LPA-80080-4CF (Verizon - Existing)	165
50"x3" Pipe Mount	175	HBXX-6517DS (Verizon - Proposed)	165
(2) 7770.00 (ATI - Existing)	175	LNK-6514DS (Verizon - Proposed)	165
P65-17-XLH-RR (ATI - Existing)	175	HBXX-9014DS (Verizon - Proposed)	165
(2) LGP21401 TMA (ATI - Existing)	175	LPA-80080-4CF (Verizon - Existing)	165
(2) LGP21901 Diplexer (ATI - Existing)	175	LPA-80080-4CF (Verizon - Existing)	165
(2) 7770.00 (ATI - Existing)	175	HBXX-6517DS (Verizon - Proposed)	165
SBNH-1D6565C (ATI - Existing)	175	LNK-6514DS (Verizon - Proposed)	165
(2) LGP21401 TMA (ATI - Existing)	175	HBXX-9014DS (Verizon - Proposed)	165
(2) LGP21901 Diplexer (ATI - Existing)	175	LPA-80080-4CF (Verizon - Existing)	165
(2) 7770.00 (ATI - Existing)	175	RRH2x60-AWS (Verizon - Proposed)	165
SBNH-1D6565C (ATI - Existing)	175	RRH2x60-AWS (Verizon - Proposed)	165
(2) LGP21401 TMA (ATI - Existing)	175	RRH2x60-AWS (Verizon - Proposed)	165
(2) LGP21901 Diplexer (ATI - Existing)	175	RRH2x60-PCS (Verizon - Proposed)	165
(2) RRUS-11 (ATI - Existing)	175	RRH2x60-PCS (Verizon - Proposed)	165
(2) RRUS-11 (ATI - Existing)	175	RRH2x60-PCS (Verizon - Proposed)	165
(2) RRUS-11 (ATI - Existing)	175	RRH4x30-B13 (Verizon - Proposed)	165
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	175	RRH4x30-B13 (Verizon - Proposed)	165
15' T-Frame (ATI - Existing)	175	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	165
15' T-Frame (ATI - Existing)	175	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	165
15' T-Frame (ATI - Existing)	175	15' T-Frame (Verizon - Existing)	165
LPA-80080-4CF (Verizon - Existing)	165	15' T-Frame (Verizon - Existing)	165
HBXX-6517DS (Verizon - Proposed)	165	15' T-Frame (Verizon - Existing)	165
LNK-6514DS (Verizon - Proposed)	165	15' T-Frame (Verizon - Existing)	165
HBXX-9014DS (Verizon - Proposed)	165		
LPA-80080-4CF (Verizon - Existing)	165		

MATERIAL STRENGTH

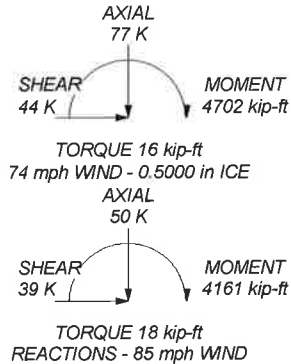
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 49%

MAX. CORNER REACTIONS AT BASE:

DOWN: 297 K
UPLIFT: -228 K
SHEAR: 28 K



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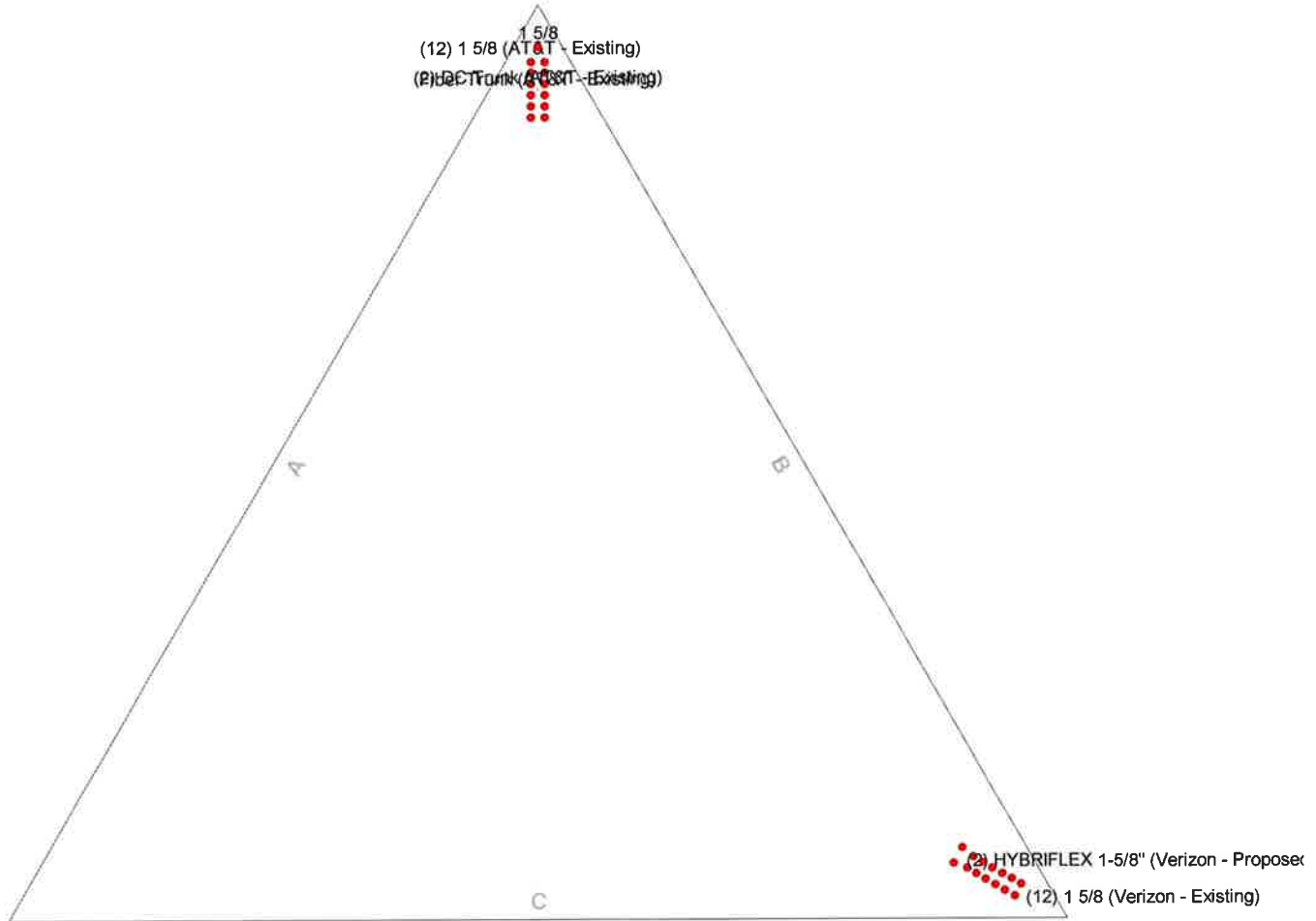
Job: 15001.056 - Baltic

Project: 175' Lattice Tower - 62 North Main St, Sprague,

Client: Verizon Wireless Drawn by: TJL App'd:

Code: TIA/EIA-222-F Date: 06/15/15 Scale: NTS

Path: J:\15001.056\15001.056-175' Lattice Tower.dwg Dwg No. E-1



0' - 175'

Round

Flat

App In Face

App Out Face

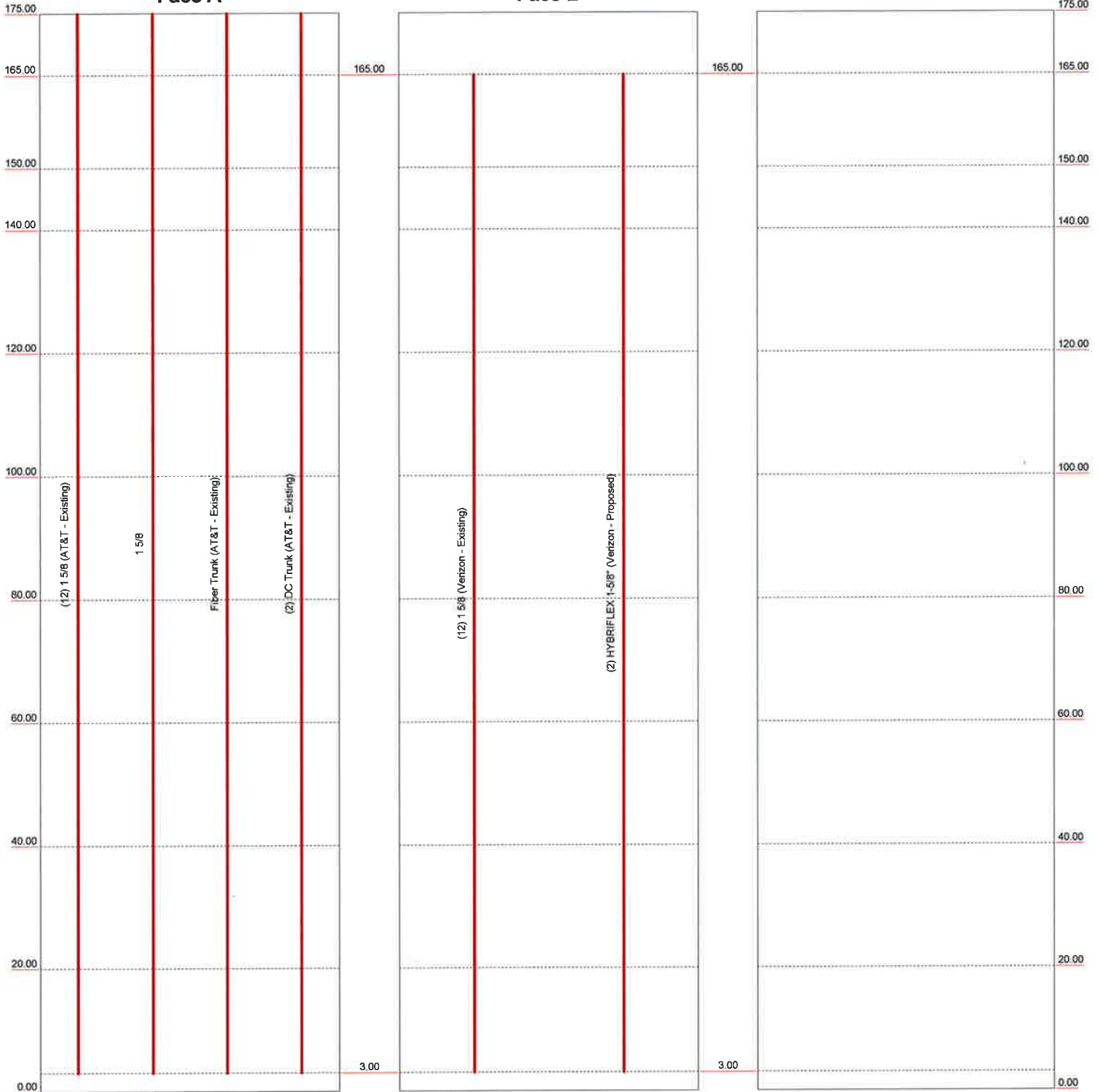
Truss Leg

Face A

Face B

Face C

Elevation (ft)



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Client: Verizon Wireless

Drawn by: TJL

App'd:

Code: TIA/EIA-222-F

Date: 06/15/15

Scale: NTS

Path:

Dwg No. E-7

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	Client Verizon Wireless	Designed by T.J.L.

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 175.00 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 5.00 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 85 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

A wind speed of 74 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.

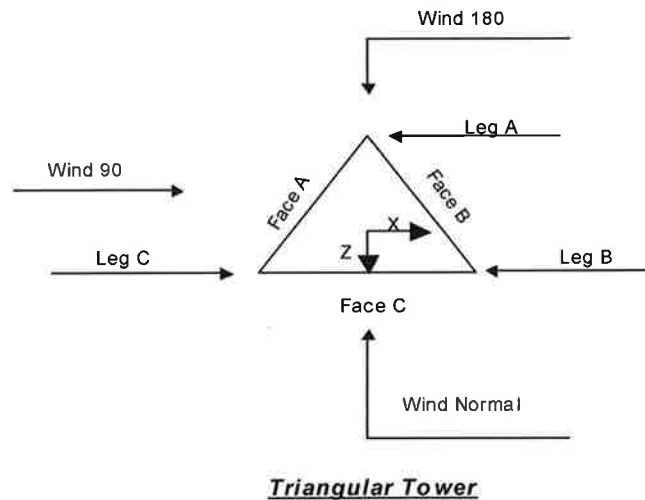
Stress ratio used in tower member design is 1.333.

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

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	√ Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	√ SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retention Guys To Initial Tension	√ All Leg Panels Have Same Allowable
Escalate Ice	Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
Leg Bolts Are At Top Of Section	√ SR Members Have Cut Ends	Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

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Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	175.00-165.00			5.00	1	10.00
T2	165.00-150.00			5.00	1	15.00
T3	150.00-140.00			5.00	1	10.00
T4	140.00-120.00			6.00	1	20.00
T5	120.00-100.00			8.00	1	20.00
T6	100.00-80.00			10.00	1	20.00
T7	80.00-60.00			12.00	1	20.00
T8	60.00-40.00			14.00	1	20.00
T9	40.00-20.00			16.00	1	20.00
T10	20.00-0.00			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	175.00-165.00	2.25	X Brace	No	No	6.0000	6.0000
T2	165.00-150.00	2.29	X Brace	No	No	7.4880	7.4880
T3	150.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T4	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T5	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000

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<i>Tower Section</i>	<i>Tower Elevation</i>	<i>Diagonal Spacing</i>	<i>Bracing Type</i>	<i>Has K Brace End Panels</i>	<i>Has Horizontals</i>	<i>Top Girt Offset</i>	<i>Bottom Girt Offset</i>
	<i>ft</i>	<i>ft</i>				<i>in</i>	<i>in</i>
T6	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T7	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T8	60.00-40.00	20.00	X Brace	No	No	0.0000	0.0000
T9	40.00-20.00	20.00	X Brace	No	No	0.0000	0.0000
T10	20.00-0.00	20.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry (cont'd)

<i>Tower Elevation</i>	<i>Leg Type</i>	<i>Leg Size</i>	<i>Leg Grade</i>	<i>Diagonal Type</i>	<i>Diagonal Size</i>	<i>Diagonal Grade</i>
<i>ft</i>						
T1 175.00-165.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 165.00-150.00	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T3 150.00-140.00	Truss Leg	1.5	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T4 140.00-120.00	Truss Leg	1.75	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T5 120.00-100.00	Truss Leg	2	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T6 100.00-80.00	Truss Leg	2	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T7 80.00-60.00	Truss Leg	2.25	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T8 60.00-40.00	Truss Leg	2.5	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x5/16	A36 (36 ksi)
T9 40.00-20.00	Truss Leg	2.5	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x5/16	A36 (36 ksi)
T10 20.00-0.00	Truss Leg	Pirol 139284	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x5/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

<i>Tower Elevation</i>	<i>Top Girt Type</i>	<i>Top Girt Size</i>	<i>Top Girt Grade</i>	<i>Bottom Girt Type</i>	<i>Bottom Girt Size</i>	<i>Bottom Girt Grade</i>
<i>ft</i>						
T1 175.00-165.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 165.00-150.00	Solid Round	1	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

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	Client Verizon Wireless	Designed by TJL

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
ft	ft ²	in						
T1 175.00-165.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 165.00-150.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 150.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T9 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000
T10 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	Mid-Pt	36.0000

Tower Section Geometry (cont'd)

Tower Elevation	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
T1 175.00-165.00	Yes	Yes	1	1	1	1	1	1	1	1
T2 165.00-150.00	Yes	Yes	1	1	1	1	1	1	1	1
T3 150.00-140.00	Yes	Yes	1	1	1	1	1	1	1	1
T4 140.00-120.00	Yes	Yes	1	1	1	1	1	1	1	1
T5 120.00-100.00	Yes	Yes	1	1	1	1	1	1	1	1
T6 100.00-80.00	Yes	Yes	1	1	1	1	1	1	1	1
T7 80.00-60.00	Yes	Yes	1	1	1	1	1	1	1	1
T8 60.00-40.00	Yes	Yes	1	1	1	1	1	1	1	1
T9 40.00-20.00	Yes	Yes	1	1	1	1	1	1	1	1
T10 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1

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.

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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
T3 150.00-140.00	1	1	1	1	0.5	0.85
T4 140.00-120.00	1	1	1	1	0.5	0.85
T5 120.00-100.00	1	1	1	1	0.5	0.85
T6 100.00-80.00	1	1	1	1	0.5	0.85
T7 80.00-60.00	1	1	1	1	0.5	0.85
T8 60.00-40.00	1	1	1	1	0.5	0.85
T9 40.00-20.00	1	1	1	1	0.5	0.85
T10 20.00-0.00	1	1	1	1	0.5	0.85

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 175.00-165.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 165.00-150.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 150.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T10 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry (cont'd)

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Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 175.00-165.00	Sleeve DS	0.7500 A325N	5	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 165.00-150.00	Flange	1.0000 A325N	6	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 150.00-140.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 120.00-100.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 100.00-80.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 80.00-60.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 60.00-40.00	Flange	1.2500 A325N	12	1.0000 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	0
T9 40.00-20.00	Flange	1.2500 A325N	12	1.0000 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	0
T10 20.00-0.00	Flange	1.2500 A687	12	1.0000 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325X	0

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 (AT&T - Existing)	A	No	Ar (Leg)	175.00 - 3.00	0.0000	0.08	12	6	0.5000 1.0000	1.9800		1.04
1 5/8 (Verizon - Existing)	B	No	Ar (Leg)	165.00 - 3.00	0.0000	0.08	12	6	0.5000 1.0000	1.9800		1.04
1 5/8	A	No	Ar (Leg)	175.00 - 3.00	0.0000	0.04	1	1	0.5000 1.0000	1.9800		1.04
HYBRIFLEX 1-5/8" (Verizon - Proposed)	B	No	Ar (Leg)	165.00 - 3.00	0.0000	0.12	2	1	1.9800	1.9800		1.90
Fiber Trunk (AT&T - Existing)	A	No	Ar (Leg)	175.00 - 3.00	0.0000	0.08	1	1	0.4000	0.4000		1.00
DC Trunk (AT&T - Existing)	A	No	Ar (Leg)	175.00 - 3.00	0.0000	0.08	2	2	0.4000	0.4000		0.11

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R	A _F	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
			ft ²	ft ²			

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Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
T1	175.00-165.00	A	12.550	0.000	0.000	0.000	0.15
		B	12.550	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	165.00-150.00	A	18.825	0.000	0.000	0.000	0.22
		B	36.150	0.000	0.000	0.000	0.24
		C	17.325	0.000	0.000	0.000	0.00
T3	150.00-140.00	A	12.550	0.000	0.000	0.000	0.15
		B	24.100	0.000	0.000	0.000	0.16
		C	11.550	0.000	0.000	0.000	0.00
T4	140.00-120.00	A	25.100	0.000	0.000	0.000	0.29
		B	48.200	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.00
T5	120.00-100.00	A	25.100	0.000	0.000	0.000	0.29
		B	48.200	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.00
T6	100.00-80.00	A	25.100	0.000	0.000	0.000	0.29
		B	48.200	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.00
T7	80.00-60.00	A	25.100	0.000	0.000	0.000	0.29
		B	48.200	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.00
T8	60.00-40.00	A	25.100	0.000	0.000	0.000	0.29
		B	48.200	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.00
T9	40.00-20.00	A	25.100	0.000	0.000	0.000	0.29
		B	48.200	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.00
T10	20.00-0.00	A	21.335	0.000	0.000	0.000	0.25
		B	40.970	0.000	0.000	0.000	0.28
		C	19.635	0.000	0.000	0.000	0.00

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	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
T1	175.00-165.00	A	0.500	7.300	11.000	0.000	0.000	0.38
		B		7.300	11.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	165.00-150.00	A	0.500	10.950	16.500	0.000	0.000	0.56
		B		18.400	32.000	0.000	0.000	0.59
		C		7.450	15.500	0.000	0.000	0.00
T3	150.00-140.00	A	0.500	7.300	11.000	0.000	0.000	0.38
		B		12.267	21.333	0.000	0.000	0.39
		C		4.967	10.333	0.000	0.000	0.00
T4	140.00-120.00	A	0.500	14.600	22.000	0.000	0.000	0.75
		B		24.533	42.667	0.000	0.000	0.78
		C		9.933	20.667	0.000	0.000	0.00
T5	120.00-100.00	A	0.500	14.600	22.000	0.000	0.000	0.75
		B		24.533	42.667	0.000	0.000	0.78
		C		9.933	20.667	0.000	0.000	0.00
T6	100.00-80.00	A	0.500	14.600	22.000	0.000	0.000	0.75
		B		24.533	42.667	0.000	0.000	0.78
		C		9.933	20.667	0.000	0.000	0.00
T7	80.00-60.00	A	0.500	14.600	22.000	0.000	0.000	0.75
		B		24.533	42.667	0.000	0.000	0.78
		C		9.933	20.667	0.000	0.000	0.00
T8	60.00-40.00	A	0.500	14.600	22.000	0.000	0.000	0.75

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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
T9	40.00-20.00	B	0.500	24.533	42.667	0.000	0.000	0.78
		C		9.933	20.667	0.000	0.000	0.00
		A		14.600	22.000	0.000	0.000	0.75
		B		24.533	42.667	0.000	0.000	0.78
T10	20.00-0.00	C	0.500	9.933	20.667	0.000	0.000	0.00
		A		12.410	18.700	0.000	0.000	0.64
		B		20.853	36.267	0.000	0.000	0.66
		C		8.443	17.567	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	175.00-165.00	0.0000	-8.1408	0.0000	-5.8301
T2	165.00-150.00	4.1185	-2.9049	3.0237	-2.3636
T3	150.00-140.00	3.1360	-2.2119	2.3684	-1.8514
T4	140.00-120.00	3.8911	-2.7445	2.9417	-2.2995
T5	120.00-100.00	4.7689	-3.3637	3.6065	-2.8192
T6	100.00-80.00	5.7091	-4.0268	4.3252	-3.3810
T7	80.00-60.00	6.4727	-4.5654	4.9100	-3.8381
T8	60.00-40.00	7.0847	-4.9971	5.5240	-4.3181
T9	40.00-20.00	7.9726	-5.6233	6.2205	-4.8625
T10	20.00-0.00	7.7398	-5.4591	6.0508	-4.7299

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
8' x 2.5" Dia omni	A	From Leg	1.00	0.0000	175.00	No Ice	2.00	0.03
			0.00			1/2" Ice	2.83	0.04
			7.00					
5'0"x3" Pipe Mount	A	From Leg	0.00	0.0000	175.00	No Ice	1.36	0.03
			0.00			1/2" Ice	1.67	0.04
			3.00					
(2) 7770.00 (AT&T - Existing)	A	From Leg	3.00	0.0000	175.00	No Ice	5.88	0.04
			0.00			1/2" Ice	6.31	0.07
			0.00					
P65-17-XLH-RR (AT&T - Existing)	A	From Leg	3.00	0.0000	175.00	No Ice	11.47	0.06
			0.00			1/2" Ice	12.08	0.12
			0.00					
(2) LGP21401 TMA (AT&T - Existing)	A	From Leg	3.00	0.0000	175.00	No Ice	0.95	0.02
			0.00			1/2" Ice	1.09	0.02
			0.00					
(2) LGP21901 Diplexer (AT&T - Existing)	A	From Leg	3.00	0.0000	175.00	No Ice	0.23	0.01
			0.00			1/2" Ice	0.30	0.01
			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
(2) 7770.00 (AT&T - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
SBNH-1D6565C (AT&T - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	11.41 12.03	7.70 8.29	0.06 0.13
(2) LGP21401 TMA (AT&T - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) LGP21901 Diplexer (AT&T - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	0.23 0.30	0.12 0.17	0.01 0.01
(2) 7770.00 (AT&T - Existing)	C	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
SBNH-1D6565C (AT&T - Existing)	C	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	11.41 12.03	7.70 8.29	0.06 0.13
(2) LGP21401 TMA (AT&T - Existing)	C	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) LGP21901 Diplexer (AT&T - Existing)	C	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	0.23 0.30	0.12 0.17	0.01 0.01
(2) RRUS-11 (AT&T - Existing)	A	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
(2) RRUS-11 (AT&T - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
(2) RRUS-11 (AT&T - Existing)	C	From Leg	3.00 0.00 0.00	0.0000	175.00	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)	A	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	0.02 0.04
15' T-Frame (AT&T - Existing)	A	From Leg	2.00 0.00 0.00	0.0000	175.00	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 Leg	2.00 0.00 0.00	0.0000	175.00	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 Leg	2.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	15.00 20.60	15.00 20.60	0.50 0.65
LPA-80080-4CF (Verizon - Existing)	A	From Leg	3.00 -6.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	0.01 0.05
HBXX-6517DS (Verizon - Proposed)	A	From Leg	3.00 -4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	8.74 9.31	5.24 5.71	0.05 0.10
LNx-6514DS (Verizon - Proposed)	A	From Leg	3.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice	8.41 8.96	5.41 5.86	0.04 0.09
HBXX-9014DS (Verizon - Proposed)	A	From Leg	3.00 4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	5.94 6.35	3.28 3.61	0.04 0.07

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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
LPA-80080-4CF (Verizon - Existing)	A	From Leg	3.00 6.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	0.01 0.05
LPA-80080-4CF (Verizon - Existing)	B	From Leg	3.00 -6.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	0.01 0.05
HBXX-6517DS (Verizon - Proposed)	B	From Leg	3.00 -4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	8.74 9.31	5.24 5.71	0.05 0.10
LNK-6514DS (Verizon - Proposed)	B	From Leg	3.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice	8.41 8.96	5.41 5.86	0.04 0.09
HBXX-9014DS (Verizon - Proposed)	B	From Leg	3.00 4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	5.94 6.35	3.28 3.61	0.04 0.07
LPA-80080-4CF (Verizon - Existing)	B	From Leg	3.00 6.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	0.01 0.05
LPA-80080-4CF (Verizon - Existing)	C	From Leg	3.00 -6.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	0.01 0.05
HBXX-6517DS (Verizon - Proposed)	C	From Leg	3.00 -4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	8.74 9.31	5.24 5.71	0.05 0.10
LNK-6514DS (Verizon - Proposed)	C	From Leg	3.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice	8.41 8.96	5.41 5.86	0.04 0.09
HBXX-9014DS (Verizon - Proposed)	C	From Leg	3.00 4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	5.94 6.35	3.28 3.61	0.04 0.07
LPA-80080-4CF (Verizon - Existing)	C	From Leg	3.00 6.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	0.01 0.05
RRH2x60-AWS (Verizon - Proposed)	A	From Leg	3.00 -4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	3.78 4.09	2.07 2.35	0.06 0.08
RRH2x60-AWS (Verizon - Proposed)	B	From Leg	3.00 -4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	3.78 4.09	2.07 2.35	0.06 0.08
RRH2x60-AWS (Verizon - Proposed)	C	From Leg	3.00 -4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	3.78 4.09	2.07 2.35	0.06 0.08
RRH2x60-PCS (Verizon - Proposed)	A	From Leg	3.00 4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.51 2.73	1.55 1.74	0.06 0.07
RRH2x60-PCS (Verizon - Proposed)	B	From Leg	3.00 4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.51 2.73	1.55 1.74	0.06 0.07
RRH2x60-PCS (Verizon - Proposed)	C	From Leg	3.00 4.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.51 2.73	1.55 1.74	0.06 0.07
RRH4x30-B13 (Verizon - Proposed)	A	From Leg	3.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.52 2.74	1.89 2.09	0.06 0.08
RRH4x30-B13 (Verizon - Proposed)	B	From Leg	3.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.52 2.74	1.89 2.09	0.06 0.08

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	15001.056 - Baltic	Page 11 of 36
	Project	175' Lattice Tower - 62 North Main St, Sprague, CT	Date 14:33:37 06/15/15
	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
RRH4x30-B13 (Verizon - Proposed)	C	From Leg	3.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice	2.52 2.74	1.89 2.09	0.06 0.08
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	A	From Leg	3.00 6.00 0.00	0.0000	165.00	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	0.04 0.08
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	B	From Leg	3.00 6.00 0.00	0.0000	165.00	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	0.04 0.08
15' T-Frame (Verizon - Existing)	A	From Leg	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 (Verizon - Existing)	B	From Leg	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 (Verizon - Existing)	C	From Leg	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

Truss-Leg Properties

Section Designation	Area in ²	Area Ice in ²	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in ²
1.5	2301.1922	3672.5129	0.56	0.45	7.9903	12.7518	5.3014
1.75	2430.1348	3855.2440	0.69	0.46	8.4380	13.3863	7.2158
2	2600.4148	4117.8473	1.03	0.50	9.0292	14.2981	9.4248
2	2600.4148	4117.8473	1.03	0.50	9.0292	14.2981	9.4248
2.25	2737.4313	4322.7042	1.20	0.51	9.5050	15.0094	11.9282
2.5	3259.4891	4835.3718	1.51	0.64	11.3177	16.7895	14.7262
2.5	3259.4891	4835.3718	1.51	0.64	11.3177	16.7895	14.7262
Pirol 139284	3390.1403	5001.1204	1.72	0.65	11.7713	17.3650	17.8187

Tower Pressures - No Ice

$$G_H = 1.123$$

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 _{AA} In Face ft ²	C _{AA} Out Face ft ²
T1 175.00-165.00	170.00	1.597	30	51.667	A B C	0.000 0.000 0.000	19.680 19.680 7.130	3.333	16.94 16.94 46.75	0.000 0.000 0.000	0.000 0.000 0.000
T2 165.00-150.00	157.50	1.563	29	77.813	A B	0.000 0.000	30.546 47.871	5.625	18.41 11.75	0.000 0.000	0.000 0.000

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	Project 175' Lattice Tower - 62 North Main St, Sprague, CT	Date 14:33:37 06/15/15
	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 _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			
T3 150.00-140.00	145.00	1.526	28	66.264	C	0.000	29.046		19.37	0.000	0.000
					A	5.093	25.889	13.339	43.05	0.000	0.000
					B	5.093	37.439		31.36	0.000	0.000
					C	5.093	24.889		44.49	0.000	0.000
T4 140.00-120.00	130.00	1.48	27	162.945	A	10.467	53.273	28.173	44.20	0.000	0.000
					B	10.467	76.373		32.44	0.000	0.000
					C	10.467	51.273		45.63	0.000	0.000
T5 120.00-100.00	110.00	1.411	26	203.362	A	11.964	55.248	30.148	44.85	0.000	0.000
					B	11.964	78.348		33.38	0.000	0.000
					C	11.964	53.248		46.23	0.000	0.000
T6 100.00-80.00	90.00	1.332	25	243.362	A	13.520	55.248	30.148	43.84	0.000	0.000
					B	13.520	78.348		32.82	0.000	0.000
					C	13.520	53.248		45.15	0.000	0.000
T7 80.00-60.00	70.00	1.24	23	283.780	A	15.144	56.836	31.736	44.09	0.000	0.000
					B	15.144	79.936		33.38	0.000	0.000
					C	15.144	54.836		45.35	0.000	0.000
T8 60.00-40.00	50.00	1.126	21	334.209	A	13.373	62.888	37.788	49.55	0.000	0.000
					B	13.373	85.988		38.03	0.000	0.000
					C	13.373	60.888		50.89	0.000	0.000
T9 40.00-20.00	30.00	1	18	374.209	A	13.965	62.888	37.788	49.17	0.000	0.000
					B	13.965	85.988		37.81	0.000	0.000
					C	13.965	60.888		50.48	0.000	0.000
T10 20.00-0.00	10.00	1	18	414.627	A	14.825	60.638	39.303	52.08	0.000	0.000
					B	14.825	80.273		41.33	0.000	0.000
					C	14.825	58.938		53.28	0.000	0.000

Tower Pressure - With Ice

$$G_H = 1.123$$

Section Elevation	z	K _Z	q _z	t _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			
T1 175.00-165.00	170.00	1.597	22	0.5000	52.500	A	11.000	20.436	5.000	15.91	0.000	0.000
						B	11.000	20.436		15.91	0.000	0.000
						C	0.000	13.136		38.06	0.000	0.000
T2 165.00-150.00	157.50	1.563	22	0.5000	79.063	A	16.500	31.267	8.125	17.01	0.000	0.000
						B	32.000	38.717		11.49	0.000	0.000
						C	15.500	27.767		18.78	0.000	0.000
T3 150.00-140.00	145.00	1.526	21	0.5000	67.098	A	16.093	30.286	21.288	45.90	0.000	0.000
						B	26.426	35.253		34.51	0.000	0.000
						C	15.426	27.953		49.08	0.000	0.000
T4 140.00-120.00	130.00	1.48	21	0.5000	164.614	A	32.467	62.784	44.695	46.92	0.000	0.000
						B	53.134	72.718		35.51	0.000	0.000
						C	31.134	58.118		50.08	0.000	0.000
T5 120.00-100.00	110.00	1.411	20	0.5000	205.031	A	33.964	66.328	47.740	47.60	0.000	0.000
						B	54.631	76.261		36.47	0.000	0.000
						C	32.631	61.661		50.63	0.000	0.000
T6 100.00-80.00	90.00	1.332	18	0.5000	245.031	A	35.520	66.846	47.740	46.64	0.000	0.000
						B	56.186	76.780		35.90	0.000	0.000
						C	34.186	62.180		49.54	0.000	0.000
T7 80.00-60.00	70.00	1.24	17	0.5000	285.448	A	37.144	69.763	50.115	46.88	0.000	0.000
						B	57.811	79.696		36.45	0.000	0.000
						C	35.811	65.096		49.66	0.000	0.000
T8 60.00-40.00	50.00	1.126	16	0.5000	335.878	A	35.373	74.479	56.058	51.03	0.000	0.000

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	Project	175' Lattice Tower - 62 North Main St, Sprague, CT	Date 14:33:37 06/15/15
	Client	Verizon Wireless	Designed by TJL

Section Elevation ft	z ft	K _Z	q _z psf	t _z in	A _G ft ²	F a c e ft ²	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
T9 40.00-20.00	30.00	1	14	0.5000	375.878	B C A B C	56.039 34.039 35.965 56.632 34.632	84.412 69.812 74.648 84.581 69.981	56.058	39.91 53.98 50.68 39.70 53.59	0.000 0.000 0.000 0.000 0.000	0.000 0.000 0.000 0.000 0.000
T10 20.00-0.00	10.00	1	14	0.5000	416.295	A B C	33.525 51.092 32.392	74.626 83.069 70.659	57.980	53.61 43.22 56.26	0.000 0.000 0.000	0.000 0.000 0.000

Tower Pressure - Service

$$G_H = 1.123$$

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e ft ²	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 175.00-165.00	170.00	1.597	10	51.667	A B C	0.000 0.000 0.000	19.680 19.680 7.130	3.333	16.94	0.000	0.000
T2 165.00-150.00	157.50	1.563	10	77.813	A B C	0.000 0.000 0.000	30.546 47.871 29.046	5.625	18.41 11.75 19.37	0.000 0.000 0.000	0.000 0.000 0.000
T3 150.00-140.00	145.00	1.526	10	66.264	A B C	5.093 5.093 5.093	25.889 37.439 24.889	13.339	43.05 31.36 44.49	0.000 0.000 0.000	0.000 0.000 0.000
T4 140.00-120.00	130.00	1.48	9	162.945	A B C	10.467 10.467 10.467	53.273 76.373 51.273	28.173	44.20 32.44 45.63	0.000 0.000 0.000	0.000 0.000 0.000
T5 120.00-100.00	110.00	1.411	9	203.362	A B C	11.964 11.964 11.964	55.248 78.348 53.248	30.148	44.85 33.38 46.23	0.000 0.000 0.000	0.000 0.000 0.000
T6 100.00-80.00	90.00	1.332	9	243.362	A B C	13.520 13.520 13.520	55.248 78.348 53.248	30.148	43.84 32.82 45.15	0.000 0.000 0.000	0.000 0.000 0.000
T7 80.00-60.00	70.00	1.24	8	283.780	A B C	15.144 15.144 15.144	56.836 79.936 54.836	31.736	44.09 33.38 45.35	0.000 0.000 0.000	0.000 0.000 0.000
T8 60.00-40.00	50.00	1.126	7	334.209	A B C	13.373 13.373 13.373	62.888 85.988 60.888	37.788	49.55 38.03 50.89	0.000 0.000 0.000	0.000 0.000 0.000
T9 40.00-20.00	30.00	1	6	374.209	A B C	13.965 13.965 13.965	62.888 85.988 60.888	37.788	49.17 37.81 50.48	0.000 0.000 0.000	0.000 0.000 0.000
T10 20.00-0.00	10.00	1	6	414.627	A B C	14.825 14.825 14.825	60.638 80.273 58.938	39.303	52.08 41.33 53.28	0.000 0.000 0.000	0.000 0.000 0.000

Tower Forces - No Ice - Wind Normal To Face

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	Project	175' Lattice Tower - 62 North Main St, Sprague, CT	Date 14:33:37 06/15/15
	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 175.00-165.00	0.15	0.65	A	0.381	2.103	0.644	1	1	12.674	0.88	88.42	B
			B	0.381	2.103	0.644	1	1	12.674			
			C	0.138	2.816	0.58	1	1	4.133			
T2 165.00-150.00	0.47	1.22	A	0.393	2.079	0.649	1	1	19.812	2.13	141.90	B
			B	0.615	1.795	0.763	1	1	36.527			
			C	0.373	2.119	0.641	1	1	18.620			
T3 150.00-140.00	0.31	1.26	A	0.468	1.946	0.681	1	1	22.736	1.94	193.97	B
			B	0.642	1.784	0.78	1	1	34.300			
			C	0.452	1.969	0.674	1	1	21.878			
T4 140.00-120.00	0.62	2.96	A	0.391	2.082	0.648	1	1	44.990	3.72	186.00	B
			B	0.533	1.861	0.715	1	1	65.063			
			C	0.379	2.107	0.643	1	1	43.447			
T5 120.00-100.00	0.62	4.09	A	0.331	2.218	0.626	1	1	46.533	3.75	187.37	B
			B	0.444	1.983	0.671	1	1	64.503			
			C	0.321	2.242	0.622	1	1	45.108			
T6 100.00-80.00	0.62	4.19	A	0.283	2.343	0.611	1	1	47.261	3.73	186.42	B
			B	0.377	2.11	0.643	1	1	63.872			
			C	0.274	2.366	0.608	1	1	45.915			
T7 80.00-60.00	0.62	4.81	A	0.254	2.427	0.603	1	1	49.406	3.71	185.46	B
			B	0.335	2.207	0.627	1	1	65.284			
			C	0.247	2.448	0.601	1	1	48.101			
T8 60.00-40.00	0.62	6.67	A	0.228	2.505	0.597	1	1	50.889	3.57	178.44	B
			B	0.297	2.303	0.615	1	1	66.262			
			C	0.222	2.524	0.595	1	1	49.612			
T9 40.00-20.00	0.62	6.77	A	0.205	2.578	0.592	1	1	51.164	3.28	163.86	B
			B	0.267	2.387	0.606	1	1	66.107			
			C	0.2	2.596	0.59	1	1	49.914			
T10 20.00-0.00	0.53	7.51	A	0.182	2.657	0.587	1	1	50.413	3.26	162.91	B
			B	0.229	2.501	0.597	1	1	62.735			
			C	0.178	2.671	0.586	1	1	49.371			
Sum Weight:	5.17	40.13						OTM	2567.13 kip-ft	29.96		

Tower Forces - No Ice - Wind 45 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 175.00-165.00	0.15	0.65	A	0.381	2.103	0.644	0.825	1	12.674	0.88	88.42	B
			B	0.381	2.103	0.644	0.825	1	12.674			
			C	0.138	2.816	0.58	0.825	1	4.133			
T2 165.00-150.00	0.47	1.22	A	0.393	2.079	0.649	0.825	1	19.812	2.13	141.90	B
			B	0.615	1.795	0.763	0.825	1	36.527			
			C	0.373	2.119	0.641	0.825	1	18.620			
T3 150.00-140.00	0.31	1.26	A	0.468	1.946	0.681	0.825	1	21.845	1.89	188.93	B
			B	0.642	1.784	0.78	0.825	1	33.408			
			C	0.452	1.969	0.674	0.825	1	20.987			
T4 140.00-120.00	0.62	2.96	A	0.391	2.082	0.648	0.825	1	43.159	3.62	180.76	B
			B	0.533	1.861	0.715	0.825	1	63.231			
			C	0.379	2.107	0.643	0.825	1	41.615			
T5 120.00-100.00	0.62	4.09	A	0.331	2.218	0.626	0.825	1	44.439	3.63	181.29	B
			B	0.444	1.983	0.671	0.825	1	62.409			
			C	0.321	2.242	0.622	0.825	1	43.014			
T6 100.00-80.00	0.62	4.19	A	0.283	2.343	0.611	0.825	1	44.895	3.59	179.51	B
			B	0.377	2.11	0.643	0.825	1	61.506			

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	Project	175' Lattice Tower - 62 North Main St, Sprague, CT	Date	14:33:37 06/15/15
	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	
T7	0.62	4.81	C	0.274	2.366	0.608	0.825	1	43.549			
80.00-60.00			A	0.254	2.427	0.603	0.825	1	46.755	3.56	177.93	B
			B	0.335	2.207	0.627	0.825	1	62.634			
			C	0.247	2.448	0.601	0.825	1	45.451			
T8	0.62	6.67	A	0.228	2.505	0.597	0.825	1	48.549	3.44	172.14	B
60.00-40.00			B	0.297	2.303	0.615	0.825	1	63.922			
			C	0.222	2.524	0.595	0.825	1	47.272			
T9	0.62	6.77	A	0.205	2.578	0.592	0.825	1	48.720	3.16	157.80	B
40.00-20.00			B	0.267	2.387	0.606	0.825	1	63.663			
			C	0.2	2.596	0.59	0.825	1	47.470			
T10	0.53	7.51	A	0.182	2.657	0.587	0.825	1	47.819	3.12	156.17	B
20.00-0.00			B	0.229	2.501	0.597	0.825	1	60.140			
			C	0.178	2.671	0.586	0.825	1	46.777			
Sum Weight:	5.17	40.13						OTM	2498.57 kip-ft	29.01		

Tower Forces - No 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	0.15	0.65	A	0.381	2.103	0.644	0.8	1	12.674	0.88	88.42	B
175.00-165.00			B	0.381	2.103	0.644	0.8	1	12.674			
			C	0.138	2.816	0.58	0.8	1	4.133			
T2	0.47	1.22	A	0.393	2.079	0.649	0.8	1	19.812	2.13	141.90	B
165.00-150.00			B	0.615	1.795	0.763	0.8	1	36.527			
			C	0.373	2.119	0.641	0.8	1	18.620			
T3	0.31	1.26	A	0.468	1.946	0.681	0.8	1	21.718	1.88	188.21	B
150.00-140.00			B	0.642	1.784	0.78	0.8	1	33.281			
			C	0.452	1.969	0.674	0.8	1	20.860			
T4	0.62	2.96	A	0.391	2.082	0.648	0.8	1	42.897	3.60	180.01	B
140.00-120.00			B	0.533	1.861	0.715	0.8	1	62.970			
			C	0.379	2.107	0.643	0.8	1	41.354			
T5	0.62	4.09	A	0.331	2.218	0.626	0.8	1	44.140	3.61	180.42	B
120.00-100.00			B	0.444	1.983	0.671	0.8	1	62.110			
			C	0.321	2.242	0.622	0.8	1	42.715			
T6	0.62	4.19	A	0.283	2.343	0.611	0.8	1	44.557	3.57	178.52	B
100.00-80.00			B	0.377	2.11	0.643	0.8	1	61.168			
			C	0.274	2.366	0.608	0.8	1	43.211			
T7	0.62	4.81	A	0.254	2.427	0.603	0.8	1	46.377	3.54	176.85	B
80.00-60.00			B	0.335	2.207	0.627	0.8	1	62.255			
			C	0.247	2.448	0.601	0.8	1	45.073			
T8	0.62	6.67	A	0.228	2.505	0.597	0.8	1	48.214	3.42	171.24	B
60.00-40.00			B	0.297	2.303	0.615	0.8	1	63.588			
			C	0.222	2.524	0.595	0.8	1	46.938			
T9	0.62	6.77	A	0.205	2.578	0.592	0.8	1	48.371	3.14	156.94	B
40.00-20.00			B	0.267	2.387	0.606	0.8	1	63.314			
			C	0.2	2.596	0.59	0.8	1	47.121			
T10	0.53	7.51	A	0.182	2.657	0.587	0.8	1	47.448	3.10	155.21	B
20.00-0.00			B	0.229	2.501	0.597	0.8	1	59.770			
			C	0.178	2.671	0.586	0.8	1	46.406			
Sum Weight:	5.17	40.13						OTM	2488.78 kip-ft	28.88		

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	Project	175' Lattice Tower - 62 North Main St, Sprague, CT	Date	14:33:37 06/15/15
	Client	Verizon Wireless	Designed by	TJL

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	0.15	0.65	A	0.381	2.103	0.644	0.85	1	12.674	0.88	88.42	B
175.00-165.00			B	0.381	2.103	0.644	0.85	1	12.674			
			C	0.138	2.816	0.58	0.85	1	4.133			
T2	0.47	1.22	A	0.393	2.079	0.649	0.85	1	19.812	2.13	141.90	B
165.00-150.00			B	0.615	1.795	0.763	0.85	1	36.527			
			C	0.373	2.119	0.641	0.85	1	18.620			
T3	0.31	1.26	A	0.468	1.946	0.681	0.85	1	21.972	1.90	189.65	B
150.00-140.00			B	0.642	1.784	0.78	0.85	1	33.536			
			C	0.452	1.969	0.674	0.85	1	21.114			
T4	0.62	2.96	A	0.391	2.082	0.648	0.85	1	43.420	3.63	181.51	B
140.00-120.00			B	0.533	1.861	0.715	0.85	1	63.493			
			C	0.379	2.107	0.643	0.85	1	41.877			
T5	0.62	4.09	A	0.331	2.218	0.626	0.85	1	44.738	3.64	182.16	B
120.00-100.00			B	0.444	1.983	0.671	0.85	1	62.708			
			C	0.321	2.242	0.622	0.85	1	43.313			
T6	0.62	4.19	A	0.283	2.343	0.611	0.85	1	45.233	3.61	180.50	B
100.00-80.00			B	0.377	2.11	0.643	0.85	1	61.844			
			C	0.274	2.366	0.608	0.85	1	43.887			
T7	0.62	4.81	A	0.254	2.427	0.603	0.85	1	47.134	3.58	179.01	B
80.00-60.00			B	0.335	2.207	0.627	0.85	1	63.013			
			C	0.247	2.448	0.601	0.85	1	45.830			
T8	0.62	6.67	A	0.228	2.505	0.597	0.85	1	48.883	3.46	173.04	B
60.00-40.00			B	0.297	2.303	0.615	0.85	1	64.256			
			C	0.222	2.524	0.595	0.85	1	47.606			
T9	0.62	6.77	A	0.205	2.578	0.592	0.85	1	49.069	3.17	158.67	B
40.00-20.00			B	0.267	2.387	0.606	0.85	1	64.012			
			C	0.2	2.596	0.59	0.85	1	47.819			
T10	0.53	7.51	A	0.182	2.657	0.587	0.85	1	48.190	3.14	157.13	B
20.00-0.00			B	0.229	2.501	0.597	0.85	1	60.511			
			C	0.178	2.671	0.586	0.85	1	47.148			
Sum Weight:	5.17	40.13						OTM	2508.36 kip-ft	29.15		

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	0.38	0.83	A	0.599	1.805	0.753	1	1	26.385	1.18	118.47	B
175.00-165.00			B	0.599	1.805	0.753	1	1	26.385			
			C	0.25	2.437	0.602	1	1	7.907			
T2	1.15	1.50	A	0.604	1.801	0.756	1	1	40.143	3.26	217.26	B
165.00-150.00			B	0.894	1.916	0.978	1	1	69.866			
			C	0.547	1.846	0.723	1	1	35.568			
T3	0.77	2.12	A	0.691	1.776	0.814	1	1	40.735	2.86	286.31	B
150.00-140.00			B	0.919	1.953	1	1	1	61.679			
			C	0.646	1.783	0.783	1	1	37.317			
T4	1.53	4.75	A	0.579	1.819	0.741	1	1	78.975	4.81	240.31	B
140.00-120.00			B	0.765	1.794	0.868	1	1	116.259			

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	Project 175' Lattice Tower - 62 North Main St, Sprague, CT Client Verizon Wireless	Date 14:33:37 06/15/15 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	
T5 120.00-100.00	1.53	6.02	C	0.542	1.851	0.72	1	1	72.974			
			A	0.489	1.914	0.692	1	1	79.865	4.47	223.46	B
			B	0.638	1.785	0.778	1	1	113.951			
			C	0.46	1.958	0.678	1	1	74.429			
T6 100.00-80.00	1.53	6.17	A	0.418	2.03	0.659	1	1	79.572	4.28	214.01	B
			B	0.543	1.851	0.72	1	1	111.482			
			C	0.393	2.077	0.649	1	1	74.534			
T7 80.00-60.00	1.53	6.88	A	0.375	2.117	0.642	1	1	81.899	4.19	209.37	B
			B	0.482	1.925	0.688	1	1	112.669			
			C	0.354	2.163	0.634	1	1	77.064			
T8 60.00-40.00	1.53	9.27	A	0.327	2.227	0.625	1	1	81.889	3.97	198.73	B
			B	0.418	2.029	0.659	1	1	111.682			
			C	0.309	2.272	0.619	1	1	77.236			
T9 40.00-20.00	1.53	9.41	A	0.294	2.311	0.614	1	1	81.811	3.65	182.64	B
			B	0.376	2.114	0.642	1	1	110.931			
			C	0.278	2.355	0.61	1	1	77.286			
T10 20.00-0.00	1.30	10.23	A	0.26	2.408	0.604	1	1	78.631	3.59	179.27	B
			B	0.322	2.238	0.623	1	1	102.841			
			C	0.248	2.445	0.601	1	1	74.876			
Sum Weight:	12.79	57.18						OTM	3268.78 kip-ft	36.26		

Tower Forces - With Ice - Wind 45 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 175.00-165.00	0.38	0.83	A	0.599	1.805	0.753	0.825	1	24.460	1.10	109.83	B
			B	0.599	1.805	0.753	0.825	1	24.460			
			C	0.25	2.437	0.602	0.825	1	7.907			
T2 165.00-150.00	1.15	1.50	A	0.604	1.801	0.756	0.825	1	37.256	3.00	199.85	B
			B	0.894	1.916	0.978	0.825	1	64.266			
			C	0.547	1.846	0.723	0.825	1	32.856			
T3 150.00-140.00	0.77	2.12	A	0.691	1.776	0.814	0.825	1	37.919	2.65	264.85	B
			B	0.919	1.953	1	0.825	1	57.054			
			C	0.646	1.783	0.783	0.825	1	34.618			
T4 140.00-120.00	1.53	4.75	A	0.579	1.819	0.741	0.825	1	73.293	4.42	221.09	B
			B	0.765	1.794	0.868	0.825	1	106.961			
			C	0.542	1.851	0.72	0.825	1	67.525			
T5 120.00-100.00	1.53	6.02	A	0.489	1.914	0.692	0.825	1	73.921	4.09	204.71	B
			B	0.638	1.785	0.778	0.825	1	104.390			
			C	0.46	1.958	0.678	0.825	1	68.718			
T6 100.00-80.00	1.53	6.17	A	0.418	2.03	0.659	0.825	1	73.356	3.90	195.14	B
			B	0.543	1.851	0.72	0.825	1	101.649			
			C	0.393	2.077	0.649	0.825	1	68.551			
T7 80.00-60.00	1.53	6.88	A	0.375	2.117	0.642	0.825	1	75.399	3.81	190.57	B
			B	0.482	1.925	0.688	0.825	1	102.553			
			C	0.354	2.163	0.634	0.825	1	70.797			
T8 60.00-40.00	1.53	9.27	A	0.327	2.227	0.625	0.825	1	75.698	3.63	181.28	B
			B	0.418	2.029	0.659	0.825	1	101.875			
			C	0.309	2.272	0.619	0.825	1	71.279			
T9 40.00-20.00	1.53	9.41	A	0.294	2.311	0.614	0.825	1	75.517	3.33	166.32	B
			B	0.376	2.114	0.642	0.825	1	101.021			
			C	0.278	2.355	0.61	0.825	1	71.225			
T10	1.30	10.23	A	0.26	2.408	0.604	0.825	1	72.764	3.27	163.69	B

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	Project 175' Lattice Tower - 62 North Main St, Sprague, CT	Date 14:33:37 06/15/15
	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	
20.00-0.00			B	0.322	2.238	0.623	0.825	1	93.900			
			C	0.248	2.445	0.601	0.825	1	69.207			
Sum Weight:	12.79	57.18						OTM	2999.94 kip-ft	33.20		

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	0.38	0.83	A	0.599	1.805	0.753	0.8	1	24.185	1.09	108.59	B
175.00-165.00			B	0.599	1.805	0.753	0.8	1	24.185			
			C	0.25	2.437	0.602	0.8	1	7.907			
T2	1.15	1.50	A	0.604	1.801	0.756	0.8	1	36.843	2.96	197.36	B
165.00-150.00			B	0.894	1.916	0.978	0.8	1	63.466			
			C	0.547	1.846	0.723	0.8	1	32.468			
T3	0.77	2.12	A	0.691	1.776	0.814	0.8	1	37.517	2.62	261.78	B
150.00-140.00			B	0.919	1.953	1	0.8	1	56.394			
			C	0.646	1.783	0.783	0.8	1	34.232			
T4	1.53	4.75	A	0.579	1.819	0.741	0.8	1	72.482	4.37	218.35	B
140.00-120.00			B	0.765	1.794	0.868	0.8	1	105.633			
			C	0.542	1.851	0.72	0.8	1	66.747			
T5	1.53	6.02	A	0.489	1.914	0.692	0.8	1	73.072	4.04	202.03	B
120.00-100.00			B	0.638	1.785	0.778	0.8	1	103.025			
			C	0.46	1.958	0.678	0.8	1	67.903			
T6	1.53	6.17	A	0.418	2.03	0.659	0.8	1	72.468	3.85	192.44	B
100.00-80.00			B	0.543	1.851	0.72	0.8	1	100.244			
			C	0.393	2.077	0.649	0.8	1	67.696			
T7	1.53	6.88	A	0.375	2.117	0.642	0.8	1	74.471	3.76	187.89	B
80.00-60.00			B	0.482	1.925	0.688	0.8	1	101.107			
			C	0.354	2.163	0.634	0.8	1	69.902			
T8	1.53	9.27	A	0.327	2.227	0.625	0.8	1	74.814	3.58	178.78	B
60.00-40.00			B	0.418	2.029	0.659	0.8	1	100.474			
			C	0.309	2.272	0.619	0.8	1	70.428			
T9	1.53	9.41	A	0.294	2.311	0.614	0.8	1	74.618	3.28	163.99	B
40.00-20.00			B	0.376	2.114	0.642	0.8	1	99.605			
			C	0.278	2.355	0.61	0.8	1	70.359			
T10	1.30	10.23	A	0.26	2.408	0.604	0.8	1	71.926	3.23	161.46	B
20.00-0.00			B	0.322	2.238	0.623	0.8	1	92.623			
			C	0.248	2.445	0.601	0.8	1	68.397			
Sum Weight:	12.79	57.18						OTM	2961.54 kip-ft	32.76		

Tower Forces - With 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	0.38	0.83	A	0.599	1.805	0.753	0.85	1	24.735	1.11	111.06	B

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	Project	175' Lattice Tower - 62 North Main St, Sprague, CT	Date	14:33:37 06/15/15
	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	
175.00-165.00			B	0.599	1.805	0.753	0.85	1	24.735			
			C	0.25	2.437	0.602	0.85	1	7.907			
T2	1.15	1.50	A	0.604	1.801	0.756	0.85	1	37.668	3.04	202.34	B
165.00-150.00			B	0.894	1.916	0.978	0.85	1	65.066			
			C	0.547	1.846	0.723	0.85	1	33.243			
T3	0.77	2.12	A	0.691	1.776	0.814	0.85	1	38.321	2.68	267.91	B
150.00-140.00			B	0.919	1.953	1	0.85	1	57.715			
			C	0.646	1.783	0.783	0.85	1	35.004			
T4	1.53	4.75	A	0.579	1.819	0.741	0.85	1	74.105	4.48	223.84	B
140.00-120.00			B	0.765	1.794	0.868	0.85	1	108.289			
			C	0.542	1.851	0.72	0.85	1	68.304			
T5	1.53	6.02	A	0.489	1.914	0.692	0.85	1	74.770	4.15	207.39	B
120.00-100.00			B	0.638	1.785	0.778	0.85	1	105.756			
			C	0.46	1.958	0.678	0.85	1	69.534			
T6	1.53	6.17	A	0.418	2.03	0.659	0.85	1	74.244	3.96	197.83	B
100.00-80.00			B	0.543	1.851	0.72	0.85	1	103.054			
			C	0.393	2.077	0.649	0.85	1	69.406			
T7	1.53	6.88	A	0.375	2.117	0.642	0.85	1	76.328	3.87	193.26	B
80.00-60.00			B	0.482	1.925	0.688	0.85	1	103.998			
			C	0.354	2.163	0.634	0.85	1	71.693			
T8	1.53	9.27	A	0.327	2.227	0.625	0.85	1	76.583	3.68	183.77	B
60.00-40.00			B	0.418	2.029	0.659	0.85	1	103.276			
			C	0.309	2.272	0.619	0.85	1	72.130			
T9	1.53	9.41	A	0.294	2.311	0.614	0.85	1	76.417	3.37	168.65	B
40.00-20.00			B	0.376	2.114	0.642	0.85	1	102.437			
			C	0.278	2.355	0.61	0.85	1	72.091			
T10	1.30	10.23	A	0.26	2.408	0.604	0.85	1	73.602	3.32	165.91	B
20.00-0.00			B	0.322	2.238	0.623	0.85	1	95.178			
			C	0.248	2.445	0.601	0.85	1	70.017			
Sum Weight:	12.79	57.18						OTM	3038.35 kip-ft	33.64		

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							ft ²	K	plf	
T1	0.15	0.65	A	0.381	2.103	0.644	1	1	12.674	0.31	30.59	B
175.00-165.00			B	0.381	2.103	0.644	1	1	12.674			
			C	0.138	2.816	0.58	1	1	4.133			
T2	0.47	1.22	A	0.393	2.079	0.649	1	1	19.812	0.74	49.10	B
165.00-150.00			B	0.615	1.795	0.763	1	1	36.527			
			C	0.373	2.119	0.641	1	1	18.620			
T3	0.31	1.26	A	0.468	1.946	0.681	1	1	22.736	0.67	67.12	B
150.00-140.00			B	0.642	1.784	0.78	1	1	34.300			
			C	0.452	1.969	0.674	1	1	21.878			
T4	0.62	2.96	A	0.391	2.082	0.648	1	1	44.990	1.29	64.36	B
140.00-120.00			B	0.533	1.861	0.715	1	1	65.063			
			C	0.379	2.107	0.643	1	1	43.447			
T5	0.62	4.09	A	0.331	2.218	0.626	1	1	46.533	1.30	64.83	B
120.00-100.00			B	0.444	1.983	0.671	1	1	64.503			
			C	0.321	2.242	0.622	1	1	45.108			
T6	0.62	4.19	A	0.283	2.343	0.611	1	1	47.261	1.29	64.50	B
100.00-80.00			B	0.377	2.11	0.643	1	1	63.872			
			C	0.274	2.366	0.608	1	1	45.915			

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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	
T7 80.00-60.00	0.62	4.81	A	0.254	2.427	0.603	1	1	49.406	1.28	64.17	B
			B	0.335	2.207	0.627	1	1	65.284			
			C	0.247	2.448	0.601	1	1	48.101			
T8 60.00-40.00	0.62	6.67	A	0.228	2.505	0.597	1	1	50.889	1.23	61.74	B
			B	0.297	2.303	0.615	1	1	66.262			
			C	0.222	2.524	0.595	1	1	49.612			
T9 40.00-20.00	0.62	6.77	A	0.205	2.578	0.592	1	1	51.164	1.13	56.70	B
			B	0.267	2.387	0.606	1	1	66.107			
			C	0.2	2.596	0.59	1	1	49.914			
T10 20.00-0.00	0.53	7.51	A	0.182	2.657	0.587	1	1	50.413	1.13	56.37	B
			B	0.229	2.501	0.597	1	1	62.735			
			C	0.178	2.671	0.586	1	1	49.371			
Sum Weight:	5.17	40.13						OTM	888.28 kip-ft	10.37		

Tower Forces - Service - Wind 45 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 175.00-165.00	0.15	0.65	A	0.381	2.103	0.644	0.825	1	12.674	0.31	30.59	B
			B	0.381	2.103	0.644	0.825	1	12.674			
			C	0.138	2.816	0.58	0.825	1	4.133			
T2 165.00-150.00	0.47	1.22	A	0.393	2.079	0.649	0.825	1	19.812	0.74	49.10	B
			B	0.615	1.795	0.763	0.825	1	36.527			
			C	0.373	2.119	0.641	0.825	1	18.620			
T3 150.00-140.00	0.31	1.26	A	0.468	1.946	0.681	0.825	1	21.845	0.65	65.37	B
			B	0.642	1.784	0.78	0.825	1	33.408			
			C	0.452	1.969	0.674	0.825	1	20.987			
T4 140.00-120.00	0.62	2.96	A	0.391	2.082	0.648	0.825	1	43.159	1.25	62.55	B
			B	0.533	1.861	0.715	0.825	1	63.231			
			C	0.379	2.107	0.643	0.825	1	41.615			
T5 120.00-100.00	0.62	4.09	A	0.331	2.218	0.626	0.825	1	44.439	1.25	62.73	B
			B	0.444	1.983	0.671	0.825	1	62.409			
			C	0.321	2.242	0.622	0.825	1	43.014			
T6 100.00-80.00	0.62	4.19	A	0.283	2.343	0.611	0.825	1	44.895	1.24	62.11	B
			B	0.377	2.11	0.643	0.825	1	61.506			
			C	0.274	2.366	0.608	0.825	1	43.549			
T7 80.00-60.00	0.62	4.81	A	0.254	2.427	0.603	0.825	1	46.755	1.23	61.57	B
			B	0.335	2.207	0.627	0.825	1	62.634			
			C	0.247	2.448	0.601	0.825	1	45.451			
T8 60.00-40.00	0.62	6.67	A	0.228	2.505	0.597	0.825	1	48.549	1.19	59.56	B
			B	0.297	2.303	0.615	0.825	1	63.922			
			C	0.222	2.524	0.595	0.825	1	47.272			
T9 40.00-20.00	0.62	6.77	A	0.205	2.578	0.592	0.825	1	48.720	1.09	54.60	B
			B	0.267	2.387	0.606	0.825	1	63.663			
			C	0.2	2.596	0.59	0.825	1	47.470			
T10 20.00-0.00	0.53	7.51	A	0.182	2.657	0.587	0.825	1	47.819	1.08	54.04	B
			B	0.229	2.501	0.597	0.825	1	60.140			
			C	0.178	2.671	0.586	0.825	1	46.777			
Sum Weight:	5.17	40.13						OTM	864.56 kip-ft	10.04		

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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 175.00-165.00	0.15	0.65	A	0.381	2.103	0.644	0.8	1	12.674	0.31	30.59	B
			B	0.381	2.103	0.644	0.8	1	12.674			
			C	0.138	2.816	0.58	0.8	1	4.133			
T2 165.00-150.00	0.47	1.22	A	0.393	2.079	0.649	0.8	1	19.812	0.74	49.10	B
			B	0.615	1.795	0.763	0.8	1	36.527			
			C	0.373	2.119	0.641	0.8	1	18.620			
T3 150.00-140.00	0.31	1.26	A	0.468	1.946	0.681	0.8	1	21.718	0.65	65.12	B
			B	0.642	1.784	0.78	0.8	1	33.281			
			C	0.452	1.969	0.674	0.8	1	20.860			
T4 140.00-120.00	0.62	2.96	A	0.391	2.082	0.648	0.8	1	42.897	1.25	62.29	B
			B	0.533	1.861	0.715	0.8	1	62.970			
			C	0.379	2.107	0.643	0.8	1	41.354			
T5 120.00-100.00	0.62	4.09	A	0.331	2.218	0.626	0.8	1	44.140	1.25	62.43	B
			B	0.444	1.983	0.671	0.8	1	62.110			
			C	0.321	2.242	0.622	0.8	1	42.715			
T6 100.00-80.00	0.62	4.19	A	0.283	2.343	0.611	0.8	1	44.557	1.24	61.77	B
			B	0.377	2.11	0.643	0.8	1	61.168			
			C	0.274	2.366	0.608	0.8	1	43.211			
T7 80.00-60.00	0.62	4.81	A	0.254	2.427	0.603	0.8	1	46.377	1.22	61.20	B
			B	0.335	2.207	0.627	0.8	1	62.255			
			C	0.247	2.448	0.601	0.8	1	45.073			
T8 60.00-40.00	0.62	6.67	A	0.228	2.505	0.597	0.8	1	48.214	1.19	59.25	B
			B	0.297	2.303	0.615	0.8	1	63.588			
			C	0.222	2.524	0.595	0.8	1	46.938			
T9 40.00-20.00	0.62	6.77	A	0.205	2.578	0.592	0.8	1	48.371	1.09	54.30	B
			B	0.267	2.387	0.606	0.8	1	63.314			
			C	0.2	2.596	0.59	0.8	1	47.121			
T10 20.00-0.00	0.53	7.51	A	0.182	2.657	0.587	0.8	1	47.448	1.07	53.70	B
			B	0.229	2.501	0.597	0.8	1	59.770			
			C	0.178	2.671	0.586	0.8	1	46.406			
Sum Weight:	5.17	40.13						OTM	861.17 kip-ft	9.99		

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							ft ²	K	plf	
T1 175.00-165.00	0.15	0.65	A	0.381	2.103	0.644	0.85	1	12.674	0.31	30.59	B
			B	0.381	2.103	0.644	0.85	1	12.674			
			C	0.138	2.816	0.58	0.85	1	4.133			
T2 165.00-150.00	0.47	1.22	A	0.393	2.079	0.649	0.85	1	19.812	0.74	49.10	B
			B	0.615	1.795	0.763	0.85	1	36.527			
			C	0.373	2.119	0.641	0.85	1	18.620			
T3 150.00-140.00	0.31	1.26	A	0.468	1.946	0.681	0.85	1	21.972	0.66	65.62	B
			B	0.642	1.784	0.78	0.85	1	33.536			
			C	0.452	1.969	0.674	0.85	1	21.114			
T4 140.00-120.00	0.62	2.96	A	0.391	2.082	0.648	0.85	1	43.420	1.26	62.81	B
			B	0.533	1.861	0.715	0.85	1	63.493			
			C	0.379	2.107	0.643	0.85	1	41.877			

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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	
T5 120.00-100.00	0.62	4.09	A	0.331	2.218	0.626	0.85	1	44.738	1.26	63.03	B
			B	0.444	1.983	0.671	0.85	1	62.708			
			C	0.321	2.242	0.622	0.85	1	43.313			
T6 100.00-80.00	0.62	4.19	A	0.283	2.343	0.611	0.85	1	45.233	1.25	62.46	B
			B	0.377	2.11	0.643	0.85	1	61.844			
			C	0.274	2.366	0.608	0.85	1	43.887			
T7 80.00-60.00	0.62	4.81	A	0.254	2.427	0.603	0.85	1	47.134	1.24	61.94	B
			B	0.335	2.207	0.627	0.85	1	63.013			
			C	0.247	2.448	0.601	0.85	1	45.830			
T8 60.00-40.00	0.62	6.67	A	0.228	2.505	0.597	0.85	1	48.883	1.20	59.88	B
			B	0.297	2.303	0.615	0.85	1	64.256			
			C	0.222	2.524	0.595	0.85	1	47.606			
T9 40.00-20.00	0.62	6.77	A	0.205	2.578	0.592	0.85	1	49.069	1.10	54.90	B
			B	0.267	2.387	0.606	0.85	1	64.012			
			C	0.2	2.596	0.59	0.85	1	47.819			
T10 20.00-0.00	0.53	7.51	A	0.182	2.657	0.587	0.85	1	48.190	1.09	54.37	B
			B	0.229	2.501	0.597	0.85	1	60.511			
			C	0.178	2.671	0.586	0.85	1	47.148			
Sum Weight:	5.17	40.13						OTM	867.95 kip-ft	10.09		

Force Totals

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Overturning Moments, M _x	Sum of Overturning Moments, M _z	Sum of Torques
	K	K	K	kip-ft	kip-ft	kip-ft
Leg Weight	27.91					
Bracing Weight	12.22					
Total Member Self-Weight	40.13			-7.03	-13.33	
Total Weight	50.33			-7.03	-13.33	
Wind 0 deg - No Ice		-0.05	-39.25	-4148.49	-5.65	15.04
Wind 30 deg - No Ice		19.14	-33.26	-3538.91	-2040.80	7.58
Wind 45 deg - No Ice		26.99	-27.05	-2881.57	-2877.65	3.13
Wind 60 deg - No Ice		32.96	-19.04	-2031.93	-3515.72	-1.48
Wind 90 deg - No Ice		38.35	0.05	0.65	-4081.57	-10.17
Wind 120 deg - No Ice		33.94	19.66	2070.35	-3591.25	-16.58
Wind 135 deg - No Ice		27.06	27.12	2878.38	-2888.51	-17.45
Wind 150 deg - No Ice		19.22	33.31	3532.53	-2054.10	-17.75
Wind 180 deg - No Ice		0.05	38.17	4056.08	-21.01	-14.48
Wind 210 deg - No Ice		-19.14	33.26	3524.85	2014.14	-7.58
Wind 225 deg - No Ice		-26.99	27.05	2867.52	2850.99	-3.13
Wind 240 deg - No Ice		-33.89	19.58	2057.05	3556.92	1.55
Wind 270 deg - No Ice		-38.35	-0.05	-14.70	4054.90	10.17
Wind 300 deg - No Ice		-33.00	-19.12	-2045.23	3496.74	15.97
Wind 315 deg - No Ice		-27.06	-27.12	-2892.43	2861.85	17.45
Wind 330 deg - No Ice		-19.22	-33.31	-3546.58	2027.43	17.75
Member Ice	17.05					
Total Weight Ice	77.28			-18.61	-32.04	
Wind 0 deg - Ice		-0.04	-44.48	-4681.32	-26.13	13.45
Wind 30 deg - Ice		20.86	-36.23	-3854.12	-2237.53	5.95
Wind 45 deg - Ice		29.22	-29.26	-3121.37	-3126.98	1.91
Wind 60 deg - Ice		35.42	-20.46	-2191.22	-3791.46	-2.15
Wind 90 deg - Ice		41.79	0.04	-12.69	-4453.27	-9.79
Wind 120 deg - Ice		38.48	22.27	2317.87	-4063.45	-15.87
Wind 135 deg - Ice		29.27	29.31	3092.52	-3135.35	-15.57

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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
Wind 150 deg - Ice		20.93	36.27	3822.82	-2247.78	-15.73
Wind 180 deg - Ice		0.04	40.98	4336.86	-37.96	-12.21
Wind 210 deg - Ice		-20.86	36.23	3816.90	2173.44	-5.95
Wind 225 deg - Ice		-29.22	29.26	3084.15	3062.89	-1.91
Wind 240 deg - Ice		-38.45	22.21	2307.62	3993.45	2.41
Wind 270 deg - Ice		-41.79	-0.04	-24.53	4389.18	9.79
Wind 300 deg - Ice		-35.45	-20.52	-2201.47	3733.29	14.36
Wind 315 deg - Ice		-29.27	-29.31	-3129.73	3071.26	15.57
Wind 330 deg - Ice		-20.93	-36.27	-3860.04	2183.69	15.73
Total Weight	50.33			-7.03	-13.33	
Wind 0 deg - Service		-0.02	-13.58	-1433.26	2.33	5.20
Wind 30 deg - Service		6.62	-11.51	-1222.33	-701.87	2.62
Wind 45 deg - Service		9.34	-9.36	-994.88	-991.44	1.08
Wind 60 deg - Service		11.40	-6.59	-700.89	-1212.22	-0.51
Wind 90 deg - Service		13.27	0.02	2.43	-1408.02	-3.52
Wind 120 deg - Service		11.74	6.80	718.58	-1238.36	-5.74
Wind 135 deg - Service		9.36	9.38	998.18	-995.20	-6.04
Wind 150 deg - Service		6.65	11.53	1224.53	-706.47	-6.14
Wind 180 deg - Service		0.02	13.21	1405.69	-2.98	-5.01
Wind 210 deg - Service		-6.62	11.51	1221.87	701.22	-2.62
Wind 225 deg - Service		-9.34	9.36	994.42	990.79	-1.08
Wind 240 deg - Service		-11.73	6.78	713.98	1235.06	0.53
Wind 270 deg - Service		-13.27	-0.02	-2.89	1407.37	3.52
Wind 300 deg - Service		-11.42	-6.62	-705.49	1214.23	5.53
Wind 315 deg - Service		-9.36	-9.38	-998.64	994.55	6.04
Wind 330 deg - Service		-6.65	-11.53	-1224.99	705.82	6.14

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 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp

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Comb. No.	Description
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	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	175 - 165	Leg	Max Tension	15	9.96	-1.05	-0.67
			Max. Compression	19	-12.24	-0.02	-0.22
			Max. Mx	6	-10.41	1.16	0.14
			Max. My	2	-12.18	-0.03	-1.25
			Max. Vy	6	1.76	0.28	-0.04
			Max. Vx	2	-1.99	-0.03	-0.26
		Diagonal	Max Tension	17	2.61	0.00	0.00
			Max. Compression	9	-2.59	0.00	0.00
			Max. Mx	19	0.06	-0.00	-0.00
			Max. My	16	-2.53	-0.00	0.00
			Max. Vy	19	-0.00	-0.00	-0.00
			Max. Vx	16	0.00	0.00	0.00
		Top Girt	Max Tension	2	0.94	0.00	0.00
			Max. Compression	10	-0.95	0.00	0.00
			Max. Mx	18	-0.01	0.01	0.00
			Max. My	34	-0.01	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	34	-0.00	0.00	0.00
		Bottom Girt	Max Tension	10	0.94	0.00	0.00
			Max. Compression	2	-0.94	0.00	0.00
			Max. Mx	18	0.01	0.01	0.00
			Max. My	34	0.06	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	34	-0.00	0.00	0.00
T2	165 - 150	Leg	Max Tension	5	45.95	0.55	-0.32
			Max. Compression	19	-51.49	0.10	2.73
			Max. Mx	30	-50.12	2.35	-1.38
			Max. My	19	-51.49	0.10	2.73

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	Project 175' Lattice Tower - 62 North Main St, Sprague, CT	Date 14:33:37 06/15/15
	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
T3	150 - 140	Diagonal	Max. Vy	30	-4.70	2.35	-1.38
			Max. Vx	19	-5.47	0.10	2.73
			Max Tension	9	5.09	0.00	0.00
			Max. Compression	17	-5.14	0.00	0.00
			Max. Mx	19	0.12	-0.01	-0.00
			Max. My	17	-5.12	-0.00	0.00
		Top Girt	Max. Vy	19	-0.01	-0.01	-0.00
			Max. Vx	17	-0.00	-0.00	0.00
			Max Tension	2	2.05	0.00	0.00
			Max. Compression	10	-2.04	0.00	0.00
			Max. Mx	18	0.01	0.01	0.00
			Max. My	34	-0.04	0.00	0.00
		Bottom Girt	Max. Vy	18	0.01	0.00	0.00
			Max. Vx	34	0.00	0.00	0.00
			Max Tension	10	1.25	0.00	0.00
			Max. Compression	2	-1.18	0.00	0.00
			Max. Mx	18	0.07	0.01	0.00
			Max. My	34	0.06	0.00	0.00
		Leg	Max. Vy	18	0.01	0.00	0.00
			Max. Vx	34	0.00	0.00	0.00
			Max Tension	10	51.51	-2.58	0.11
			Max. Compression	19	-57.81	2.42	0.00
			Max. Mx	22	48.90	-2.82	0.02
			Max. My	3	-2.37	-0.16	-5.28
T4	140 - 120	Diagonal	Max. Vy	30	0.19	2.72	-0.02
			Max. Vx	23	-0.54	-0.22	5.20
			Max Tension	32	6.81	0.00	0.00
			Max. Compression	24	-7.98	0.00	0.00
			Max. Mx	22	6.27	0.11	-0.01
			Max. My	34	-6.82	-0.07	-0.04
		Leg	Max. Vy	22	0.03	0.11	-0.01
			Max. Vx	34	0.01	0.00	0.00
			Max Tension	10	83.96	-3.78	0.05
			Max. Compression	19	-99.23	3.57	-0.01
			Max. Mx	19	-81.93	4.14	-0.02
			Max. My	3	-3.07	-0.16	-5.28
		Diagonal	Max. Vy	30	-0.30	4.08	-0.01
			Max. Vx	23	0.37	-0.22	5.20
			Max Tension	26	6.75	0.00	0.00
			Max. Compression	26	-6.66	0.00	0.00
			Max. Mx	19	5.58	0.12	-0.01
			Max. My	33	3.42	0.09	-0.01
T5	120 - 100	Leg	Max. Vy	19	-0.04	0.11	-0.01
			Max. Vx	33	0.00	0.00	0.00
			Max Tension	22	112.50	-3.87	0.01
			Max. Compression	19	-135.23	4.00	-0.00
			Max. Mx	19	-118.14	4.09	-0.00
			Max. My	20	-7.05	-0.10	-3.84
		Diagonal	Max. Vy	32	0.17	-3.85	-0.06
			Max. Vx	23	0.16	-0.09	3.84
			Max Tension	26	6.36	0.00	0.00
			Max. Compression	26	-6.58	0.00	0.00
			Max. Mx	19	4.70	0.10	-0.01
			Max. My	33	-6.15	-0.01	-0.01
T6	100 - 80	Leg	Max. Vy	19	-0.04	0.10	-0.01
			Max. Vx	25	-0.00	0.00	0.00
			Max Tension	22	138.20	-3.81	0.01
			Max. Compression	19	-168.32	3.90	0.01
			Max. Mx	19	-151.38	4.00	-0.00
			Max. My	20	-11.83	0.07	-4.51
		Diagonal	Max. Vy	32	-0.17	-3.79	-0.06

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	Project	175' Lattice Tower - 62 North Main St, Sprague, CT	Date	14:33:37 06/15/15
	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
T7	80 - 60	Diagonal	Max. Vx	23	-0.18	-0.04	4.22
			Max Tension	26	6.50	0.00	0.00
			Max. Compression	26	-6.75	0.00	0.00
			Max. Mx	19	4.88	0.11	-0.01
			Max. My	33	-6.27	0.00	-0.01
			Max. Vy	19	-0.04	0.11	-0.01
		Leg	Max. Vx	33	0.00	0.00	0.00
			Max Tension	22	163.12	-4.89	-0.00
			Max. Compression	19	-200.37	9.37	-0.14
			Max. Mx	19	-200.37	9.37	-0.14
			Max. My	23	-14.55	2.19	8.71
			Max. Vy	30	-0.68	9.33	-0.03
		Diagonal	Max. Vx	23	-0.93	2.19	8.71
			Max Tension	26	6.95	0.00	0.00
			Max. Compression	26	-6.99	0.00	0.00
			Max. Mx	21	2.75	0.11	0.01
			Max. My	33	-6.67	0.04	-0.02
			Max. Vy	21	0.04	0.11	0.01
T8	60 - 40	Leg	Max. Vx	33	0.00	0.00	0.00
			Max Tension	22	174.42	-4.49	0.03
			Max. Compression	19	-221.51	4.27	-0.03
			Max. Mx	22	172.74	-14.66	0.02
			Max. My	23	-19.55	-5.46	9.27
			Max. Vy	32	0.82	-14.63	-0.18
		Diagonal	Max. Vx	23	-0.30	-5.46	9.27
			Max Tension	33	11.06	0.00	0.00
			Max. Compression	24	-10.31	0.00	0.00
			Max. Mx	22	9.78	-0.36	-0.02
			Max. My	34	-8.96	-0.07	0.08
			Max. Vy	22	-0.10	-0.36	-0.02
		Leg	Max. Vx	34	-0.01	0.00	0.00
			Max Tension	22	202.92	-14.66	0.02
			Max. Compression	19	-251.82	16.54	-0.01
			Max. Mx	19	-251.82	16.54	-0.01
			Max. My	23	-19.42	6.74	15.26
			Max. Vy	32	-0.90	-14.63	-0.18
T9	40 - 20	Diagonal	Max. Vx	23	-0.55	6.74	15.26
			Max Tension	8	9.27	0.00	0.00
			Max. Compression	33	-11.95	0.00	0.00
			Max. Mx	22	4.51	-0.45	-0.05
			Max. My	24	-4.44	-0.39	-0.06
			Max. Vy	22	-0.12	-0.45	-0.05
		Leg	Max. Vx	24	0.01	0.00	0.00
			Max Tension	22	213.61	-2.41	0.02
			Max. Compression	19	-283.26	-0.00	0.00
			Max. Mx	19	-280.68	16.54	-0.01
			Max. My	23	-26.25	6.74	15.26
			Max. Vy	30	1.02	16.47	-0.02
		Diagonal	Max. Vx	23	1.02	6.74	15.26
			Max Tension	33	13.35	0.00	0.00
			Max. Compression	7	-11.32	0.00	0.00
			Max. Mx	19	10.00	-0.37	-0.08
			Max. My	24	8.72	-0.37	-0.09
			Max. Vy	20	-0.12	-0.37	0.08
T10	20 - 0	Leg	Max. Vx	24	0.01	0.00	0.00

Maximum Reactions

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	Client Verizon Wireless	Designed by TJL

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	293.20	23.73	-13.78
	Max. H _x	30	293.20	23.73	-13.78
	Max. H _z	22	-228.17	-23.69	13.75
	Min. Vert	22	-228.17	-23.69	13.75
	Min. H _x	22	-228.17	-23.69	13.75
Leg B	Min. H _z	30	293.20	23.73	-13.78
	Max. Vert	24	297.01	-23.62	-14.21
	Max. H _x	32	-225.55	23.51	14.00
	Max. H _z	32	-225.55	23.51	14.00
	Min. Vert	32	-225.55	23.51	14.00
Leg A	Min. H _x	24	297.01	-23.62	-14.21
	Min. H _z	24	297.01	-23.62	-14.21
	Max. Vert	19	297.21	0.43	27.57
	Max. H _x	31	27.19	1.30	-0.96
	Max. H _z	19	297.21	0.43	27.57
	Min. Vert	27	-225.73	-0.31	-27.37
	Min. H _x	24	-108.64	-1.37	-15.30
	Min. H _z	27	-225.73	-0.31	-27.37

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	50.33	0.00	0.00	-7.03	-13.33	0.00
Dead+Wind 0 deg - No Ice	50.33	-0.05	-39.25	-4160.94	-5.69	15.08
Dead+Wind 30 deg - No Ice	50.33	19.14	-33.26	-3549.57	-2046.96	7.61
Dead+Wind 45 deg - No Ice	50.33	26.99	-27.05	-2890.27	-2886.34	3.15
Dead+Wind 60 deg - No Ice	50.33	32.96	-19.04	-2038.08	-3526.34	-1.48
Dead+Wind 90 deg - No Ice	50.33	38.35	0.05	0.63	-4093.87	-10.21
Dead+Wind 120 deg - No Ice	50.33	33.94	19.66	2076.54	-3602.05	-16.64
Dead+Wind 135 deg - No Ice	50.33	27.06	27.12	2887.05	-2897.25	-17.51
Dead+Wind 150 deg - No Ice	50.33	19.22	33.31	3543.18	-2060.32	-17.80
Dead+Wind 180 deg - No Ice	50.33	0.05	38.17	4068.36	-21.11	-14.53
Dead+Wind 210 deg - No Ice	50.33	-19.14	33.26	3535.50	2020.18	-7.61
Dead+Wind 225 deg - No Ice	50.33	-26.99	27.05	2876.17	2859.58	-3.15
Dead+Wind 240 deg - No Ice	50.33	-33.89	19.58	2063.22	3567.58	1.55
Dead+Wind 270 deg - No Ice	50.33	-38.35	-0.05	-14.79	4067.13	10.21
Dead+Wind 300 deg - No Ice	50.33	-33.00	-19.12	-2051.46	3507.30	16.02
Dead+Wind 315 deg - No Ice	50.33	-27.06	-27.12	-2901.21	2870.48	17.50
Dead+Wind 330 deg - No Ice	50.33	-19.22	-33.31	-3557.31	2033.53	17.80
Dead+Ice+Temp	77.28	-0.00	0.00	-18.64	-32.10	-0.00
Dead+Wind 0 deg+Ice+Temp	77.28	-0.04	-44.48	-4701.59	-26.25	13.58
Dead+Wind 30 deg+Ice+Temp	77.28	20.86	-36.23	-3870.95	-2247.30	6.04
Dead+Wind 45 deg+Ice+Temp	77.28	29.22	-29.26	-3135.01	-3140.65	1.95
Dead+Wind 60 deg+Ice+Temp	77.28	35.42	-20.46	-2200.82	-3808.05	-2.16
Dead+Wind 90 deg+Ice+Temp	77.28	41.79	0.04	-12.76	-4472.70	-9.88
Dead+Wind 120 deg+Ice+Temp	77.28	38.48	22.27	2327.89	-4081.04	-16.00
Dead+Wind 135 deg+Ice+Temp	77.28	29.27	29.31	3106.03	-3149.07	-15.70
Dead+Wind 150 deg+Ice+Temp	77.28	20.93	36.27	3839.52	-2257.62	-15.86
Dead+Wind 180 deg+Ice+Temp	77.28	0.04	40.98	4355.88	-38.17	-12.32
Dead+Wind 210 deg+Ice+Temp	77.28	-20.86	36.23	3833.58	2182.90	-6.04
Dead+Wind 225 deg+Ice+Temp	77.28	-29.22	29.26	3097.63	3076.25	-1.95
Dead+Wind 240 deg+Ice+Temp	77.28	-38.45	22.21	2317.58	4010.71	2.42
Dead+Wind 270 deg+Ice+Temp	77.28	-41.79	-0.04	-24.69	4408.34	9.88
Dead+Wind 300 deg+Ice+Temp	77.28	-35.45	-20.52	-2211.18	3749.64	14.48

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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+Wind 315 deg+Ice+Temp	77.28	-29.27	-29.31	-3143.47	3084.69	15.70
Dead+Wind 330 deg+Ice+Temp	77.28	-20.93	-36.27	-3876.93	2193.22	15.86
Dead+Wind 0 deg - Service	50.33	-0.02	-13.58	-1444.40	-10.70	5.22
Dead+Wind 30 deg - Service	50.33	6.62	-11.51	-1232.84	-717.02	2.63
Dead+Wind 45 deg - Service	50.33	9.34	-9.36	-1004.72	-1007.49	1.09
Dead+Wind 60 deg - Service	50.33	11.40	-6.59	-709.83	-1228.94	-0.51
Dead+Wind 90 deg - Service	50.33	13.27	0.02	-4.38	-1425.30	-3.53
Dead+Wind 120 deg - Service	50.33	11.74	6.80	713.94	-1255.14	-5.76
Dead+Wind 135 deg - Service	50.33	9.36	9.38	994.39	-1011.27	-6.06
Dead+Wind 150 deg - Service	50.33	6.65	11.53	1221.40	-721.66	-6.16
Dead+Wind 180 deg - Service	50.33	0.02	13.21	1403.14	-16.04	-5.03
Dead+Wind 210 deg - Service	50.33	-6.62	11.51	1218.73	690.29	-2.63
Dead+Wind 225 deg - Service	50.33	-9.34	9.36	990.62	980.75	-1.08
Dead+Wind 240 deg - Service	50.33	-11.73	6.78	709.32	1225.73	0.54
Dead+Wind 270 deg - Service	50.33	-13.27	-0.02	-9.71	1398.56	3.53
Dead+Wind 300 deg - Service	50.33	-11.42	-6.62	-714.46	1204.87	5.54
Dead+Wind 315 deg - Service	50.33	-9.36	-9.38	-1008.49	984.52	6.06
Dead+Wind 330 deg - Service	50.33	-6.65	-11.53	-1235.51	694.90	6.16

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-50.33	0.00	0.00	50.33	0.00	0.000%
2	-0.05	-50.33	-39.25	0.05	50.33	39.25	0.001%
3	19.14	-50.33	-33.26	-19.14	50.33	33.26	0.000%
4	26.99	-50.33	-27.05	-26.99	50.33	27.05	0.000%
5	32.96	-50.33	-19.04	-32.96	50.33	19.04	0.000%
6	38.35	-50.33	0.05	-38.35	50.33	-0.05	0.000%
7	33.94	-50.33	19.66	-33.94	50.33	-19.66	0.001%
8	27.06	-50.33	27.12	-27.06	50.33	-27.12	0.000%
9	19.22	-50.33	33.31	-19.22	50.33	-33.31	0.000%
10	0.05	-50.33	38.17	-0.05	50.33	-38.17	0.000%
11	-19.14	-50.33	33.26	19.14	50.33	-33.26	0.000%
12	-26.99	-50.33	27.05	26.99	50.33	-27.05	0.000%
13	-33.89	-50.33	19.58	33.89	50.33	-19.58	0.000%
14	-38.35	-50.33	-0.05	38.35	50.33	0.05	0.000%
15	-33.00	-50.33	-19.12	33.00	50.33	19.12	0.000%
16	-27.06	-50.33	-27.12	27.06	50.33	27.12	0.000%
17	-19.22	-50.33	-33.31	19.22	50.33	33.31	0.000%
18	0.00	-77.28	0.00	0.00	77.28	-0.00	0.000%
19	-0.04	-77.28	-44.48	0.04	77.28	44.48	0.000%
20	20.86	-77.28	-36.23	-20.86	77.28	36.23	0.000%
21	29.22	-77.28	-29.26	-29.22	77.28	29.26	0.000%
22	35.42	-77.28	-20.46	-35.42	77.28	20.46	0.000%
23	41.79	-77.28	0.04	-41.79	77.28	-0.04	0.000%
24	38.48	-77.28	22.27	-38.48	77.28	-22.27	0.000%
25	29.27	-77.28	29.31	-29.27	77.28	-29.31	0.000%
26	20.93	-77.28	36.27	-20.93	77.28	-36.27	0.000%
27	0.04	-77.28	40.98	-0.04	77.28	-40.98	0.000%
28	-20.86	-77.28	36.23	20.86	77.28	-36.23	0.000%
29	-29.22	-77.28	29.26	29.22	77.28	-29.26	0.000%
30	-38.45	-77.28	22.21	38.45	77.28	-22.21	0.000%
31	-41.79	-77.28	-0.04	41.79	77.28	0.04	0.000%
32	-35.45	-77.28	-20.52	35.45	77.28	20.52	0.000%
33	-29.27	-77.28	-29.31	29.27	77.28	29.31	0.000%
34	-20.93	-77.28	-36.27	20.93	77.28	36.27	0.000%

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	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	
35	-0.02	-50.33	-13.58	0.02	50.33	13.58	0.000%
36	6.62	-50.33	-11.51	-6.62	50.33	11.51	0.000%
37	9.34	-50.33	-9.36	-9.34	50.33	9.36	0.000%
38	11.40	-50.33	-6.59	-11.40	50.33	6.59	0.000%
39	13.27	-50.33	0.02	-13.27	50.33	-0.02	0.000%
40	11.74	-50.33	6.80	-11.74	50.33	-6.80	0.000%
41	9.36	-50.33	9.38	-9.36	50.33	-9.38	0.000%
42	6.65	-50.33	11.53	-6.65	50.33	-11.53	0.000%
43	0.02	-50.33	13.21	-0.02	50.33	-13.21	0.000%
44	-6.62	-50.33	11.51	6.62	50.33	-11.51	0.000%
45	-9.34	-50.33	9.36	9.34	50.33	-9.36	0.000%
46	-11.73	-50.33	6.78	11.73	50.33	-6.78	0.000%
47	-13.27	-50.33	-0.02	13.27	50.33	0.02	0.000%
48	-11.42	-50.33	-6.62	11.42	50.33	6.62	0.000%
49	-9.36	-50.33	-9.38	9.36	50.33	9.38	0.000%
50	-6.65	-50.33	-11.53	6.65	50.33	11.53	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
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
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

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36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	175 - 165	3.900	35	0.2286	0.0263
T2	165 - 150	3.390	35	0.2243	0.0232
T3	150 - 140	2.667	35	0.1974	0.0171
T4	140 - 120	2.263	35	0.1756	0.0142
T5	120 - 100	1.589	35	0.1386	0.0103
T6	100 - 80	1.056	35	0.1087	0.0075
T7	80 - 60	0.648	35	0.0782	0.0052
T8	60 - 40	0.352	35	0.0541	0.0031
T9	40 - 20	0.152	35	0.0349	0.0019
T10	20 - 0	0.036	35	0.0154	0.0009

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
175.00	8' x 2.5" Dia omni	35	3.900	0.2286	0.0263	337617
165.00	LPA-80080-4CF	35	3.390	0.2243	0.0232	111068

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	175 - 165	12.306	19	0.7003	0.0760
T2	165 - 150	10.756	19	0.6890	0.0670
T3	150 - 140	8.537	19	0.6146	0.0494
T4	140 - 120	7.275	19	0.5526	0.0409
T5	120 - 100	5.136	19	0.4420	0.0298
T6	100 - 80	3.424	19	0.3492	0.0217

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T7	80 - 60	2.108	19	0.2527	0.0149
T8	60 - 40	1.145	19	0.1755	0.0088
T9	40 - 20	0.496	19	0.1132	0.0054
T10	20 - 0	0.118	19	0.0502	0.0026

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
175.00	8' x 2.5" Dia omni	19	12.306	0.7003	0.0760	124426
165.00	LPA-80080-4CF	19	10.756	0.6890	0.0670	39949

Bolt Design Data

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
T1	175	Leg	A325N	0.7500	5	2.45	18.56	0.132 ✓	1.333	Bolt DS
T2	165	Leg	A325N	1.0000	6	7.66	34.51	0.222 ✓	1.333	Bolt Tension
T3	150	Leg	A325N	1.0000	6	8.59	34.56	0.248 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	7.98	16.49	0.484 ✓	1.333	Bolt Shear
T4	140	Leg	A325N	1.0000	6	13.99	34.56	0.405 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	6.75	15.86	0.426 ✓	1.333	Member Bearing
T5	120	Leg	A325N	1.2500	6	18.75	54.00	0.347 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	6.36	20.39	0.312 ✓	1.333	Member Bearing
T6	100	Leg	A325N	1.2500	6	23.03	54.00	0.427 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	6.50	20.39	0.319 ✓	1.333	Member Bearing
T7	80	Leg	A325N	1.2500	6	27.19	54.00	0.504 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	6.95	20.39	0.341 ✓	1.333	Member Bearing
T8	60	Leg	A325N	1.2500	12	14.54	54.00	0.269 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	2	5.53	32.99	0.168 ✓	1.333	Bolt Shear
T9	40	Leg	A325N	1.2500	12	16.91	54.00	0.313 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	2	5.98	32.99	0.181 ✓	1.333	Bolt Shear
T10	20	Leg	A687	1.2500	12	17.80	60.75	0.293 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	2	6.68	32.99	0.202 ✓	1.333	Bolt Shear

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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 $\frac{P}{P_a}$
T1	175 - 165	2	10.00	2.25	54.0 K=1.00	23.715	3.1416	-12.24	74.50	0.164 ✓
T2	165 - 150	2 1/4	15.00	2.29	48.9 K=1.00	24.522	3.9761	-51.49	97.50	0.528 ✓
T3	150 - 140	1.5	10.02	10.02	37.8 K=1.00	26.132	5.3014	-57.81	138.54	0.417 ✓
T4	140 - 120	1.75	20.03	10.02	32.4 K=1.00	26.848	7.2158	-99.23	193.73	0.512 ✓
T5	120 - 100	2	20.03	10.02	28.4 K=1.00	27.351	9.4248	-135.23	257.78	0.525 ✓
T6	100 - 80	2	20.03	10.02	28.4 K=1.00	27.351	9.4248	-168.32	257.78	0.653 ✓
T7	80 - 60	2.25	20.03	10.02	25.2 K=1.00	27.723	11.9282	-200.37	330.69	0.606 ✓
T8	60 - 40	2.5	20.03	20.03	32.6 K=1.00	26.826	14.7262	-221.51	395.05	0.561 ✓
T9	40 - 20	2.5	20.03	20.03	32.6 K=1.00	26.826	14.7262	-251.82	395.05	0.637 ✓
T10	20 - 0	Pirol 139284	20.03	20.03	32.6 K=1.00	26.829	17.8187	-283.26	478.06	0.593 ✓

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
T3	150 - 140	0.5	1.47	141.2	7.490	0.1963	0.54	1.65	0.330 ✓
T4	140 - 120	0.5	1.46	140.0	7.617	0.1963	0.37	1.67	0.224 ✓
T5	120 - 100	0.625	1.45	111.1	11.525	0.3068	0.19	3.96	0.048 ✓
T6	100 - 80	0.625	1.45	111.1	11.525	0.3068	0.20	3.96	0.051 ✓
T7	80 - 60	0.625	1.43	110.2	11.648	0.3068	0.98	4.00	0.245 ✓
T8	60 - 40	0.75	1.73	110.5	11.604	0.4418	0.82	7.06	0.116 ✓
T9	40 - 20	0.75	1.73	110.5	11.604	0.4418	0.95	7.06	0.135 ✓
T10	20 - 0	0.75	1.71	109.5	12.452	0.4418	1.10	7.58	0.145 ✓

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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	175 - 165	7/8	5.48	2.65	109.0 K=0.75	12.562	0.6013	-2.59	7.55	0.343
T2	165 - 150	1	5.50	2.65	95.3 K=0.75	15.777	0.7854	-5.14	12.39	0.415
T3	150 - 140	L3x3x5/16	11.42	5.00	106.4 K=1.04	12.145	1.7800	-7.98	21.62	0.369
T4	140 - 120	L3x3x5/16	12.50	5.65	116.3 K=1.01	10.806	1.7800	-6.64	19.24	0.345
T5	120 - 100	L3x3x5/16	13.80	6.31	128.5 K=1.00	9.047	1.7800	-6.58	16.10	0.408
T6	100 - 80	L3x3x5/16	15.24	7.06	143.9 K=1.00	7.216	1.7800	-6.75	12.84	0.525
T7	80 - 60	L3x3x5/16	16.80	7.86	160.2 K=1.00	5.822	1.7800	-6.72	10.36	0.648
T8	60 - 40	2L3 1/2x3 1/2x5/16	25.01	11.78	128.3 K=0.98	9.073	4.1800	-10.31	37.92	0.272
T9	40 - 20	2L3 1/2x3 1/2x5/16	26.26	12.43	133.8 K=0.97	8.337	4.1800	-11.95	34.85	0.343
T10	20 - 0	2L3 1/2x3 1/2x5/16	27.59	13.12	139.7 K=0.96	7.653	4.1800	-11.32	31.99	0.354

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	175 - 165	7/8	5.00	4.83	185.6 K=0.70	4.335	0.6013	-0.95	2.61	0.364
T2	165 - 150	1	5.00	4.81	161.7 K=0.70	5.711	0.7854	-2.04	4.49	0.454

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	175 - 165	7/8	5.00	4.83	185.6 K=0.70	4.335	0.6013	-0.94	2.61	0.362
T2	165 - 150	1	5.00	4.81	161.7 K=0.70	5.711	0.7854	-1.18	4.49	0.262

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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 $\frac{P}{P_a}$
T1	175 - 165	2	10.00	2.25	54.0	32.500	1.5625	9.96	50.78	0.196 ✓
T2	165 - 150	2 1/4	15.00	2.29	48.9	30.000	3.9761	45.95	119.28	0.385 ✓
T3	150 - 140	1.5	10.02	10.02	37.8	30.000	5.3014	51.51	159.04	0.324 ✓
T4	140 - 120	1.75	20.03	10.02	32.4	30.000	7.2158	83.96	216.47	0.388 ✓
T5	120 - 100	2	20.03	10.02	28.4	30.000	9.4248	112.50	282.74	0.398 ✓
T6	100 - 80	2	20.03	10.02	28.4	30.000	9.4248	138.20	282.74	0.489 ✓
T7	80 - 60	2.25	20.03	10.02	25.2	30.000	11.9282	163.13	357.85	0.456 ✓
T8	60 - 40	2.5	20.03	20.03	32.6	30.000	14.7262	174.42	441.79	0.395 ✓
T9	40 - 20	2.5	20.03	20.03	32.6	30.000	14.7262	202.92	441.79	0.459 ✓
T10	20 - 0	Pirol 139284	20.03	20.03	32.6	30.000	17.8187	213.61	534.56	0.400 ✓

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
T3	150 - 140	0.5	1.47	141.2	7.490	0.1963	0.54	1.65	0.330 ✓
T4	140 - 120	0.5	1.46	140.0	7.617	0.1963	0.37	1.67	0.224 ✓
T5	120 - 100	0.625	1.45	111.1	11.525	0.3068	0.19	3.96	0.048 ✓
T6	100 - 80	0.625	1.45	111.1	11.525	0.3068	0.20	3.96	0.051 ✓
T7	80 - 60	0.625	1.43	110.2	11.648	0.3068	0.98	4.00	0.245 ✓
T8	60 - 40	0.75	1.73	110.5	11.604	0.4418	0.82	7.06	0.116 ✓
T9	40 - 20	0.75	1.73	110.5	11.604	0.4418	0.95	7.06	0.135 ✓
T10	20 - 0	0.75	1.71	109.5	12.452	0.4418	1.10	7.58	0.145 ✓

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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 P P _a
T1	175 - 165	7/8	5.48	2.65	145.4	30.000	0.6013	2.61	18.04	0.145
T2	165 - 150	1	5.50	2.65	127.1	30.000	0.7854	5.09	23.56	0.216
T3	150 - 140	L3x3x5/16	11.42	5.00	67.6	21.600	1.7800	6.81	38.45	0.177
T4	140 - 120	L3x3x5/16	11.93	5.40	72.8	21.600	1.7800	6.75	38.45	0.176
T5	120 - 100	L3x3x5/16	13.13	5.99	81.0	21.600	1.7800	6.36	38.45	0.165
T6	100 - 80	L3x3x5/16	15.24	7.06	94.9	21.600	1.7800	6.50	38.45	0.169
T7	80 - 60	L3x3x5/16	16.01	7.47	100.3	21.600	1.7800	6.95	38.45	0.181
T8	60 - 40	2L3 1/2x3 1/2x5/16	25.01	11.78	134.3	21.600	4.1800	11.06	90.29	0.122
T9	40 - 20	2L3 1/2x3 1/2x5/16	26.26	12.43	141.6	21.600	4.1800	9.27	90.29	0.103
T10	20 - 0	2L3 1/2x3 1/2x5/16	27.59	13.12	149.3	21.600	4.1800	13.35	90.29	0.148

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	175 - 165	7/8	5.00	4.83	265.1	30.000	0.6013	0.94	18.04	0.052
T2	165 - 150	1	5.00	4.81	231.0	30.000	0.7854	2.05	23.56	0.087

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	175 - 165	7/8	5.00	4.83	265.1	30.000	0.6013	0.94	18.04	0.052
T2	165 - 150	1	5.00	4.81	231.0	30.000	0.7854	1.25	23.56	0.053

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Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
T1	175 - 165	Leg	2	2	9.96	67.69	14.7	Pass
T2	165 - 150	Leg	2 1/4	36	-51.49	129.97	39.6	Pass
T3	150 - 140	Leg	1.5	81	-57.81	184.67	31.3	Pass
T4	140 - 120	Leg	1.75	90	-99.23	258.24	38.4	Pass
T5	120 - 100	Leg	2	105	-135.23	343.62	39.4	Pass
T6	100 - 80	Leg	2	120	-168.32	343.62	49.0	Pass
T7	80 - 60	Leg	2.25	135	-200.37	440.81	45.5	Pass
T8	60 - 40	Leg	2.5	150	-221.51	526.59	42.1	Pass
T9	40 - 20	Leg	2.5	159	-251.82	526.59	47.8	Pass
T10	20 - 0	Leg	Pirol 139284	168	-283.26	637.26	44.5	Pass
T1	175 - 165	Diagonal	7/8	12	-2.59	10.07	25.7	Pass
T2	165 - 150	Diagonal	1	76	-5.14	16.52	31.1	Pass
T3	150 - 140	Diagonal	L3x3x5/16	84	-7.98	28.82	27.7	Pass
							36.3 (b)	
T4	140 - 120	Diagonal	L3x3x5/16	93	-6.64	25.64	25.9	Pass
							31.9 (b)	
T5	120 - 100	Diagonal	L3x3x5/16	108	-6.58	21.47	30.6	Pass
T6	100 - 80	Diagonal	L3x3x5/16	123	-6.75	17.12	39.4	Pass
T7	80 - 60	Diagonal	L3x3x5/16	139	-6.72	13.81	48.6	Pass
T8	60 - 40	Diagonal	2L3 1/2x3 1/2x5/16	153	-10.31	50.55	20.4	Pass
T9	40 - 20	Diagonal	2L3 1/2x3 1/2x5/16	163	-11.95	46.45	25.7	Pass
T10	20 - 0	Diagonal	2L3 1/2x3 1/2x5/16	171	-11.32	42.64	26.5	Pass
T1	175 - 165	Top Girt	7/8	4	-0.95	3.47	27.3	Pass
T2	165 - 150	Top Girt	1	37	-2.04	5.98	34.1	Pass
T1	175 - 165	Bottom Girt	7/8	7	-0.94	3.47	27.2	Pass
T2	165 - 150	Bottom Girt	1	40	-1.18	5.98	19.7	Pass
							Summary	
							Leg (T6)	49.0 Pass
							Diagonal (T7)	48.6 Pass
							Top Girt (T2)	34.1 Pass
							Bottom Girt (T1)	27.2 Pass
							Bolt Checks	37.8 Pass
							RATING =	49.0 Pass

Mat Foundation Analysis:

Input Data:

Tower Data

Overturing Moment =	OM := 4702-ft-kips	(User Input from tnxTower)
Shear Force =	S _t := 44-kip	(User Input from tnxTower)
Axial Force =	WT _t := 77-kip	(User Input from tnxTower)
Max Compression Force =	C _t := 297-kip	(User Input from tnxTower)
Max Uplift Force =	U _t := 228-kip	(User Input from tnxTower)
Tower Height =	H _t := 175-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 := 3-ft	(User Input)
Thickness of Footing =	T _f := 3.5-ft	(User Input)
Width of Footing =	W _f := 37.5-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)

Pad Reinforcement:

Bar Size =	$BS_{top} := 11$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.41 \cdot \text{in}$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 44$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 11$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.41 \cdot \text{in}$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 44$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot \text{in}$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pad Top Reinforcement Bar Area =	$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 1.561 \cdot \text{in}^2$	
Pad Bottom Reinforcement Bar Area =	$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 1.561 \cdot \text{in}^2$	
Coefficient of Lateral Soil Pressure =	$K_p := \frac{1 + \sin(\phi_s)}{1 - \sin(\phi_s)} = 3$	
Load Factor =	$LF := \begin{cases} 1.333 & \text{if } H_t \leq 700 \cdot \text{ft} \\ 1.7 & \text{if } H_t \geq 1200 \cdot \text{ft} \\ 1.333 + \left(\frac{H_t - 700 \cdot \text{ft}}{1200 \cdot \text{ft} - 700 \cdot \text{ft}} \right) \cdot 0.4 & \text{otherwise} \end{cases}$	= 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 =

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

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = -0.18 \text{ksf}$$

$$P_{top} := \text{if}(n < (D_f - T_f), P_{pt}, P_{pn}) = 0 \text{ksf}$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.08 \text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0.54 \text{ksf}$$

$$T_p := \text{if}(n < (D_f - T_f), T_f, (D_f - n)) = 3$$

$$A_p := W_f \cdot T_p = 112.5$$

Ultimate Shear =

$$S_u := P_{ave} \cdot A_p = 60.75 \text{kip}$$

Weight of Concrete =

$$W_{Tc} := (W_f^2 \cdot T_f) \cdot \gamma_c = 738.281 \text{kip}$$

Tower Offset =

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

$$X_t := \text{if}(\text{Pos}_t, X_{t1}, X_{t2}) = 10.09$$

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

Total Weight =

$$W_{T_{tot}} := W_{Tc} = 738.3 \text{kip}$$

Resisting Moment =

$$M_r := (W_{T_{tot}}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} = 13914 \text{kip-ft}$$

Overturing Moment =

$$M_{ot} := OM + S_t \cdot T_f = 4856 \text{kip-ft}$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 2.87$$

Factor of Safety Required =

$$FS_{req} := 2$$

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

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

Bearing Pressure Caused by Footing:

Total Load =

$$\text{Load}_{\text{tot}} := \text{WT}_{\text{c}} + \text{WT}_{\text{t}} = 815 \cdot \text{kip}$$

Area of the Mat =

$$A_{\text{mat}} := W_f^2 = 1.406 \times 10^3$$

Section Modulus of Mat =

$$S := \frac{W_f^3}{6} = 8789.06 \cdot \text{ft}^3$$

Maximum Pressure in Mat =

$$P_{\text{max}} := \frac{\text{Load}_{\text{tot}}}{A_{\text{mat}}} + \frac{M_{\text{ot}}}{S} = 1.132 \cdot \text{ksf}$$

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

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

Minimum Pressure in Mat =

$$P_{\text{min}} := \frac{\text{Load}_{\text{tot}}}{A_{\text{mat}}} - \frac{M_{\text{ot}}}{S} = 0.027 \cdot \text{ksf}$$

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

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

Distance to Resultant of Pressure Distribution =

$$X_p := \frac{\frac{P_{\text{max}}}{P_{\text{max}} - P_{\text{min}}} \cdot \frac{1}{3}}{\frac{W_f}{W_f}} = 12.808$$

Distance to Kern =

$$X_k := \frac{W_f}{6} = 6.25$$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity =

$$e := \frac{M_{\text{ot}}}{\text{WT}_{\text{tot}}} = 6.577$$

Adjusted Soil Pressure =

$$P_a := \frac{2 \cdot \text{WT}_{\text{tot}}}{3 \cdot W_f \left(\frac{W_f}{2} - e \right)} = 1.078 \cdot \text{ksf}$$

$$q_{\text{adj}} := \text{if}(P_{\text{min}} < 0, P_a, P_{\text{max}}) = 1.132 \cdot \text{ksf}$$

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

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

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor =

$$\phi_m := .90$$

(ACI-2008 9.3.2.1)

$$M_{nT} := LF \cdot \left[U_t \cdot \left(W_t \cdot \sin(60 \cdot \text{deg}) - \frac{d_p}{2} \right) + S_t \cdot (D_f + L_{\text{pag}}) \right] - W_{tT} \cdot X_{\text{off}} = 5218 \cdot \text{ft} \cdot \text{k}$$

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

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

Design Moment =

$$M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 2,289 \times 10^3 \cdot \text{kips} \cdot \text{ft}$$

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

(ACI-2008 10.2.7.3)

$$\left[\left[0.85 - \left[\frac{\left(\frac{f_c}{\text{psi}} - 4000 \right)}{1000} \right] \cdot 0.5 \right] \right] \text{ otherwise}$$

$$b_{\text{eff}} := W_t \cdot \cos(30 \cdot \text{deg}) + d_p = 207.846 \cdot \text{in}$$

$$d := T_f - C_{\text{vr}}_{\text{pad}} - d_{\text{bbot}} = 37.59 \cdot \text{in}$$

$$A_s := \frac{M_n}{(f_y \cdot d)} = 12.181 \cdot \text{in}^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{\text{eff}}} = 1.379 \cdot \text{in}$$

$$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2} \right)} = 12.408 \cdot \text{in}^2$$

$$\rho := \frac{A_s}{b_{\text{eff}} \cdot d} = 0.01906 \cdot \text{in}$$

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:

$$A_s := \text{if} \left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \right) = 7 \cdot \text{in}^2$$

$$A_{s_{prov}} := A_{bbot} \cdot NB_{bot} = 68.7 \cdot \text{in}^2$$

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

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

Check top Bars:

$$A_s := \text{if} \left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \right) = 7 \cdot \text{in}^2$$

$$A_{s_{prov}} := A_{btop} \cdot NB_{top} = 68.7 \cdot \text{in}^2$$

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

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

Development Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 8.88 \cdot \text{in}$$

Spacing or Cover Dimension =

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

Transverse Reinforcement Index =

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

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot \text{psi}} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 54.4 \cdot \text{in}$$

Minimum Development Length =

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

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 102 \cdot \text{in}$$

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

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

SITE NAME	BALTIC CT		ECP & CELL #		2	0010	
Note: AWS add, *WARNING!!!! PCS RRH is for leasing purpose only. Do not order PCS RRH equipment. Add RRH 2X60 AWS Change 700,PCS to Ret Change RRH 2X40 700 to RRH 2X60 700			LATITUDE		41-37-27.00 N		
			LONGITUDE		72-04-41.00 W		
			STRUCTURE TYPE		Monopole		
2100 MHz AWS LTE - FUTURE CONFIG	ALPHA		BETA		GAMMA		
EQUIPMENT TYPE	LTE-AWS BBU+RRH		LTE-AWS BBU+RRH		LTE-AWS BBU+RRH		
ANTENNA TYPE	HBXX-6517DS-A2M_PORT 4 -- 45_00DT_2110		HBXX-6517DS-A2M_PORT 4 -- 45_00DT_2110		HBXX-6517DS-A2M_PORT 4 -- 45_00DT_2110		
QTY OF ANTENNAS PER FACE	1		1		1		
ORIENTATION (DEG)	30		150		270		
DOWN TILT (MECH/DEG)	0		0		0		
RAD CTR (FT AGL)	165		165		165		
TMA - QTY / MODEL							
DIPLEX WITH LTE CABLE	NO		NO		NO		
RRH - QTY / MODEL	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS	
SECTOR DISTRIBUTION BOX							
MAIN DISTRIBUTION BOX	1			DB-T1-6Z-8AB-0Z			
700 MHz LTE - CURRENT CONFIG	ALPHA		BETA		GAMMA		
EQUIPMENT TYPE	LTE-700 eNodeB		LTE-700 eNodeB		LTE-700 eNodeB		
ANTENNA TYPE	BXA-70063-6CF-750MHZ		BXA-70063-6CF-750MHZ		BXA-70063-6CF-750MHZ		
QTY OF ANTENNAS PER FACE	1		1		1		
ORIENTATION (DEG)	30		150		270		
DOWN TILT (MECH/DEG)	0		0		0		
RAD CTR (FT AGL)	165		165		165		
TMA - QTY / MODEL							
DIPLEXER - QTY / MODEL							
RRH - QTY/MODEL							
SECTOR DISTRIBUTION BOX - QTY / MODEL							
MAIN DISTRIBUTION BOX - QTY / MODEL							
700 MHz LTE - FUTURE CONFIG	ALPHA		BETA		GAMMA		
EQUIPMENT TYPE	LTE-700 BBU+RRH		LTE-700 BBU+RRH		LTE-700 BBU+RRH		
ANTENNA TYPE	LNX-6514DS-A1M_2DT_750MHZ		LNX-6514DS-A1M_0DT_750MHZ		LNX-6514DS-A1M_4DT_750MHZ		
QTY OF ANTENNAS PER FACE	1		1		1		
ORIENTATION (DEG)	40		140		250		
DOWN TILT (MECH/DEG)	0		0		0		
RAD CTR (FT AGL)	165		165		165		
TMA - QTY / MODEL							
DIPLEXER - QTY / MODEL							
RRH - QTY/MODEL	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U	
SECTOR DISTRIBUTION BOX - QTY / MODEL							
MAIN DISTRIBUTION BOX - QTY / MODEL	1			DB-T1-6Z-8AB-0Z			
850 MHz CELLULAR - CURRENT CONFIG	ALPHA		BETA		GAMMA		
EQUIPMENT TYPE	Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B		
ANTENNA TYPE	LPA-80080-4CF		LPA-80080-4CF		LPA-80080-4CF		
QTY OF ANTENNAS PER FACE	2		2		2		
ORIENTATION (DEG)	30		150		270		
DOWN TILT (MECH/DEG)	0		5		4		
RAD CTR (FT AGL)	165		165		165		
TMA - QTY / MODEL							
DIPLEXER - QTY / MODEL							
850 MHz CELLULAR - FUTURE CONFIG	ALPHA		BETA		GAMMA		
EQUIPMENT TYPE	Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B		
ANTENNA TYPE	LPA-80080-4CF		LPA-80080-4CF		LPA-80080-4CF		
QTY OF ANTENNAS PER FACE	2		2		2		
ORIENTATION (DEG)	30		150		270		
DOWN TILT (MECH/DEG)	0		5		4		
RAD CTR (FT AGL)	165		165		165		
TMA - QTY / MODEL							
DIPLEXER - QTY / MODEL							

1900 MHz PCS - CURRENT CONFIG				ALPHA				BETA				GAMMA							
EQUIPMENT TYPE				PCS Mod 4.0B				PCS Mod 4.0B				PCS Mod 4.0B							
ANTENNA TYPE				BXA-171085-8CF-EDIN-2				BXA-171085-8CF-EDIN-2				BXA-171085-8CF-EDIN-2							
QTY OF ANTENNAS PER FACE				1				1				1							
ORIENTATION (DEG)				30				150				270							
DOWN TILT (MECH/DEG)				0				0				0							
RAD CTR (FT AGL)				165				165				165							
TMA - QTY / MODEL																			
DIPLEX WITH CELLULAR CABLE				NO				NO				NO							
RRH - QTY / MODEL																			
SECTOR DISTRIBUTION BOX																			
MAIN DISTRIBUTION BOX																			
1900 MHz PCS - FUTURE CONFIG				ALPHA				BETA				GAMMA							
EQUIPMENT TYPE				PCS Mod 4.0B				PCS Mod 4.0B				PCS Mod 4.0B							
ANTENNA TYPE				HBXX-9014DS-VTM_PORT 1 - +45_02DT_1920				HBXX-9014DS-VTM_PORT 1 - +45_02DT_1920				HBXX-9014DS-VTM_PORT 1 - +45_02DT_1920							
QTY OF ANTENNAS PER FACE				1				1				1							
ORIENTATION (DEG)				30				150				270							
DOWN TILT (MECH/DEG)				0				0				0							
RAD CTR (FT AGL)				165				165				165							
TMA - QTY / MODEL																			
DIPLEX WITH CELLULAR CABLE				NO				NO				NO							
RRH - QTY / MODEL				1 ALU RH_2X60-PCS*				1 ALU RH_2X60-PCS*				1 ALU RH_2X60-PCS*							
SECTOR DISTRIBUTION BOX																			
MAIN DISTRIBUTION BOX																			
NUMBER OF CABLES NEEDED								FIBER LINES MODEL NUMBER											
TOTAL # FIBER LINES				2		TOTAL # OF MAIN COAX LINES		12		FIBER LINE MODEL #				HB158-1-08U8-S8J18					
TOTAL # FIBER TOP JUMPERS				6		TOTAL # OF TOP JUMPERS		24		FIBER TOP JUMPER MODEL #				HB114-1-08U4-S4J18					
EQUIPMENT CABLE ORDERING				MAIN CABLE #		18		+ -6		TOP JUMPER #				18 + 6					
TX / RX FREQUENCIES								TX POWER OUTPUT											
Cellular-A Band				PCS-F/AWS Band				700 MHz C-Block				Cellular (Watts)				20			
TX: 869-880/890-891.5 MHz				TX: 1970-1975/2145-2155 MHz				TX: 746-757 MHz				PCS (Watts)				16			
RX: 824-835/845-846.5 MHz				RX: 1890-1895/1745-1755 MHz				RX: 776-787 MHz				LTE 700/AWS/PCS (Watts)				60/60/60			
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								
F1-A	1700	Tx/Rx	RED/BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN								
F1-D	1700	Tx/Rx	RED/RED/BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BROWN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN								
RF ENGINEER				RF MANAGER				INITIALS				DATE							
Prepared by: Ray Paradis				Robert Hesselbach				RLP				3/10/2015							
Revised by: Ray Paradis				Alejandro Restrepo				RLP				6/15/2015							

Product Specifications

COMMScope®

POWERED BY



HBXX-6517DS-VTM

Andrew® Quad Port Teletilt® Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Superior azimuth tracking and pattern symmetry with excellent passive intermodulation suppression
- The values presented on this datasheet have been calculated based on N-P-BASTA White Paper version 9.6 by the NGMN Alliance

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
	0 ° 18.4	0 ° 18.4	0 ° 18.7
Gain by Beam Tilt, average, dBi	3 ° 18.7	3 ° 18.7	3 ° 18.9
	6 ° 18.4	6 ° 18.5	6 ° 18.6
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9
Isolation, dB	30	30	30
VSWR Return Loss, dB	1.4 15.6	1.4 15.6	1.4 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® single band, quad
Band	Single band
Brand	DualPol® Teletilt®
Operating Frequency Band	1710 – 2180 MHz
Number of Ports, all types	4

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom

HBXX-6517DS-VTM



RF Connector Quantity, total	4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h 149.8 mph

Dimensions

Depth	166.0 mm 6.5 in
Length	1903.0 mm 74.9 in
Width	305.0 mm 12.0 in
Net Weight	19.5 kg 43.0 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	HBXX-6517DS-R2M
Model with Factory Installed AISG 2.0 Actuator	HBXX-6517DS-A2M
RET System	Teletilt®

Regulatory Compliance/Certifications

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



Included Products

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

Product Specifications

COMMScope®



LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.7	16.3
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Horizontal Tolerance, degrees	±3	±3
Beamwidth, Vertical, degrees	12.5	11.2
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	20	20
CPR at Sector, dB	10	10
Isolation, dB	30	30
VSWR Return Loss, dB	1.4 15.6	1.4 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® Teletilt®
Operating Frequency Band	698 – 896 MHz

Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity, total	2
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h 149.8 mph

LNx-6514DS-VTM



Dimensions

Depth	181.0 mm		7.1 in
Length	1847.0 mm		72.7 in
Width	301.0 mm		11.9 in
Net Weight	17.6 kg		38.8 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	LNx-6514DS-R2M
Model with Factory Installed AISG 2.0 Actuator	LNx-6514DS-A1M
RET System	Teletilt®

Regulatory Compliance/Certifications

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



Included Products

- DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.
- DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.



HBXX-9014DS-VTM

Andrew® Quad Port Teletilt® Antenna, 1710–2180 MHz, 90° horizontal beamwidth, RET compatible

- Enhanced control of out-of-sector power improves co-channel interference, reduces softer hand-offs, improves capacity

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain, dBi	16.0	16.0	16.2
Beamwidth, Horizontal, degrees	88	88	88
Beamwidth, Vertical, degrees	7.5	7.1	6.7
Beam Tilt, degrees	0–10	0–10	0–10
USLS, dB	17	17	18
Front-to-Back Ratio at 180°, dB	30	30	30
CPR at Boresight, dB	17	17	16
CPR at Sector, dB	8	9	8
Isolation, dB	30	30	30
VSWR Return Loss, dB	1.4 15.6	1.4 15.6	1.4 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-150	-150	-150
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	15.9	15.9	16.0
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.4	±0.4
	0 ° 15.9	0 ° 15.9	0 ° 16.0
Gain by Beam Tilt, average, dBi	5 ° 16.1	5 ° 16.1	5 ° 16.2
	10 ° 15.7	10 ° 15.7	10 ° 15.7
Beamwidth, Horizontal Tolerance, degrees	±4.7	±3.1	±3.8
Beamwidth, Vertical Tolerance, degrees	±0.4	±0.4	±0.5
USLS, dB	17	18	18
Front-to-Back Total Power at 180° ± 30°, dB	21	21	21
CPR at Boresight, dB	19	20	20
CPR at Sector, dB	8	8	8

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® quad
Band	Single band
Brand	DualPol® Teletilt®
Operating Frequency Band	1710 – 2180 MHz

HBXX-9014DS-VTM



Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	4
Wind Loading, maximum	420.0 N @ 150 km/h 94.4 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h 149.8 mph

Dimensions

Depth	166.0 mm 6.5 in
Length	1294.0 mm 50.9 in
Width	305.0 mm 12.0 in
Net Weight	13.5 kg 29.8 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	HBXX-9014DS-R2M
Model with Factory Installed AISG 2.0 Actuator	HBXX-9014DS-A2M
RET System	Teletilt®

Regulatory Compliance/Certifications

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



Included Products

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

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

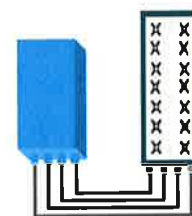


FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

TECHNICAL SPECIFICATIONS

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

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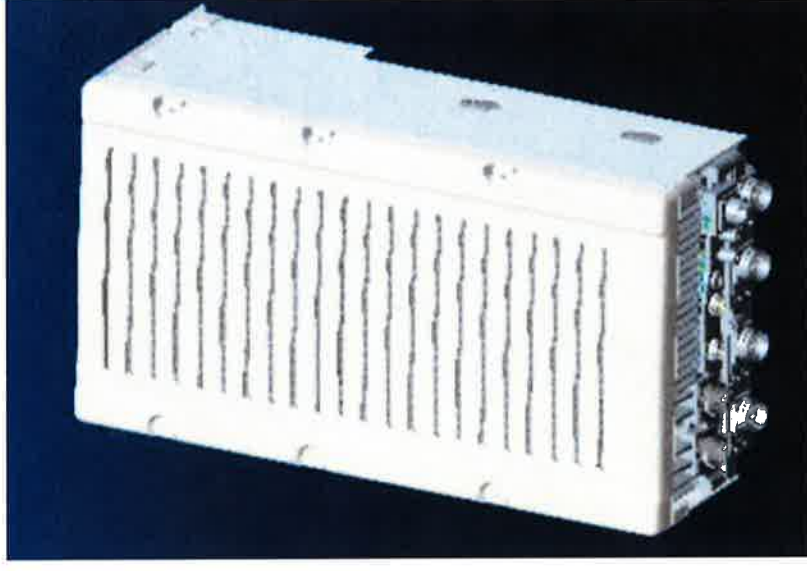
NEW PCS RF MODULES FOR VZW

RRH2X60 - HW CHARACTERISTICS

LR14.3

	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (downward facing)
Dimensions	22"(h) x 12"(w) x 9.4" (d)**
Weight	55lb**

** - Includes solar shield but not mounting brackets (8 lbs.)



ALCATEL-LUCENT

WIRELESS PRODUCT DATASHEET

RRH2X60-AWS FOR BAND 4 APPLICATIONS

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



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

The Alcatel-Lucent RRH2x60-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.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

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

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

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

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

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

OPTIMIZED TCO

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

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

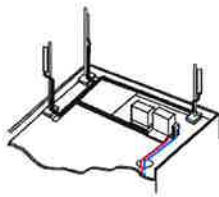
EASY INSTALLATION

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

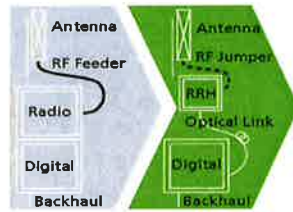
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

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

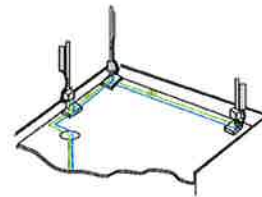
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

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

BENEFITS

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

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

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

TECHNICAL SPECIFICATIONS

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

36.7"x10.6"x5.8"

Dimensions and weights

- HxWxD : ~~510x285x106mm~~ (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 250W @2x60W

RF Characteristics

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

Connectivity

- Two CPRI optical ports for daisy chaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

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

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

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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 μ s	N/A
Maximum Discharge Current (I_{max}) per NEMA LS-1	60 kA 8/20 μ s	N/A
Maximum Impulse (Lightning) Current (I_{imp}) per IEC 61643-1	5 kA 10/350 μ s	N/A
Maximum Continuous Operating Voltage (U_o)	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.