Robinson+Cole

KENNETH C. BALDWIN

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Also admitted in Massachusetts

September 25, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
88 Parsonage Hill Road, North Branford, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 145-foot level of the existing 195-foot tower at 88 Parsonage Hill Road in North Branford, Connecticut (the "Property"). The tower is owned by Ochenkowski Towers LLC. The Council approved Cellco's use of this tower in 2006. Cellco now intends to replace nine (9) of its existing antennas with three (3) model SBNHH-1D65B, 700 MHz antennas; three (3) model SBNHH-1D65B, 1900 MHz antennas; and three (3) model SBNHH-1D65B, 2100 MHz antennas, all at the same level on the tower. Cellco also intends to replace three (3) existing remote radio heads ("RRHs"), and install six (6) new RRHs 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 Michael T. Paulhus, Town Manager for the Town of North Branford. A copy of this letter is also being sent to K.W. and J.J. Ochenkowski, Jr. and Jean Szwabowski, the owners of the Property, and Ochenkowski Towers 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).

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 145-foot level of the 195-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:
Michael T. Paulhus, Town Manager for the Town of North Branford
K.W. and J.J. Ochenkowski, Jr. and Jean Szwabowski
Ochenkowski Towers, LLC
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

Andrew® Tri-band Antenna, 698–896 and 2x 1695–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.

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

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS, dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

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

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Product Specifications

SBNHH-1D65B

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.4 km/h | 150.0 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male
RET System	Teletilt®

Packed Dimensions

Depth	299.0 mm | 11.8 in
Length	1970.0 mm | 77.6 in
Width	409.0 mm | 16.1 in
Shipping Weight	31.0 kg | 68.3 lb

Regulatory Compliance/Certifications

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

Included Products

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Product Specifications

SBNHH-1D65B

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

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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.

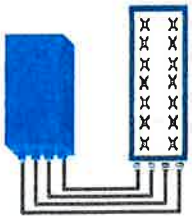
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

Alcatel·Lucent

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.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) 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	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3
Features	AISG 2.0 for RET/TMA
	Internal Smart Bias-T
Power	-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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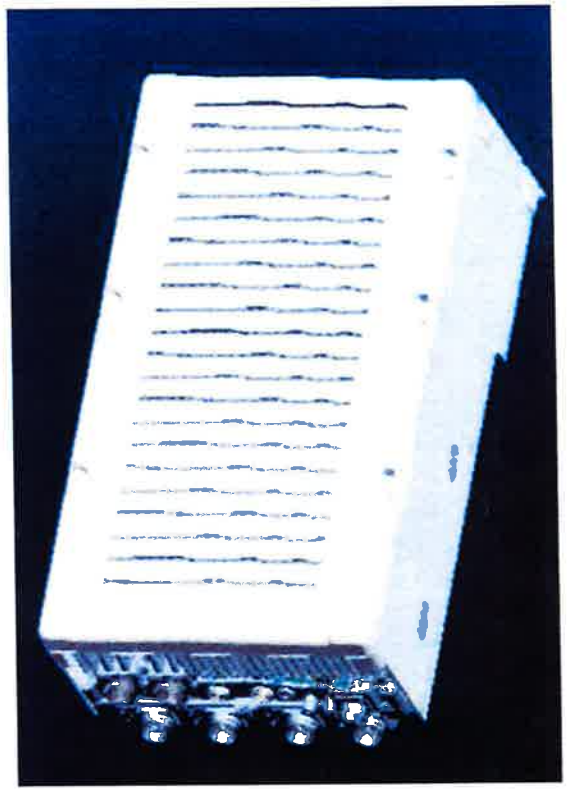
NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

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.)

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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.

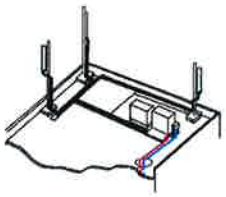
EASY INSTALLATION

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.

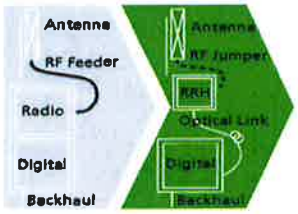
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

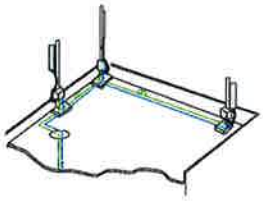
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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.

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 daisychaining 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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Alcatel·Lucent

AT THE SPEED OF IDEAS™

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm² (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)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (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 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

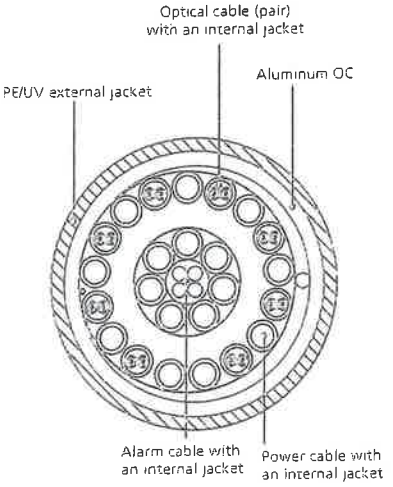


Figure 2: Construction Detail

* This data is provisional and subject to change

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

ATTACHMENT 2

	General	Power	Density					
Site Name: Northford (North Branford)								
Tower Height: 195ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Nextel	9	100	160	0.0126	850	0.5667	2.23%	
*Motient	4	381	140	0.0280	855	0.5700	4.91%	
*Sprint CDMA/LTE	4	693	190.5	0.0275	1900	1.0000	2.75%	
*Sprint CDMA/LTE	1	390	190.5	0.0039	850	0.5667	0.68%	
*Sprint CDMA/LTE	2	693	190.5	0.0137	2500	1.0000	1.37%	
*T-Mobile PCS/AWS	2	953	180	0.0212	1900	1.0000	2.12%	
*T-Mobile PCS/AWS	4	477	180	0.0212	2100	1.0000	2.12%	
*T-Mobile LTE	1	700	180	0.0078	700	0.4667	1.67%	
*AT&T UMTS	2	1077	173	0.0259	1900	1.0000	2.59%	
*AT&T UMTS	2	565	173	0.0136	880	0.5867	2.32%	
*AT&T GSM	1	283	173	0.0034	880	0.5867	0.58%	
*AT&T GSM	4	646	173	0.0311	1900	1.0000	3.11%	
*AT&T LTE	1	1313	173	0.0158	734	0.4893	3.23%	
Verizon PCS	**1**	**2213**	**145**	**0.0378**	**1970**	**1.0000**	**3.78%**	
Verizon Cellular	**9**	**275**	**145**	**0.0423**	**869**	**0.5793**	**7.31%**	
Verizon AWS	**0**	**2494**	**145**	**0.0000**	**2145**	**1.0000**	**0.00%**	
Verizon 700	**1**	**1050**	**145**	**0.0180**	**746**	**0.4973**	**3.61%**	
								44.36%
* Source: Siting Council								

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

195' Existing Lattice Tower

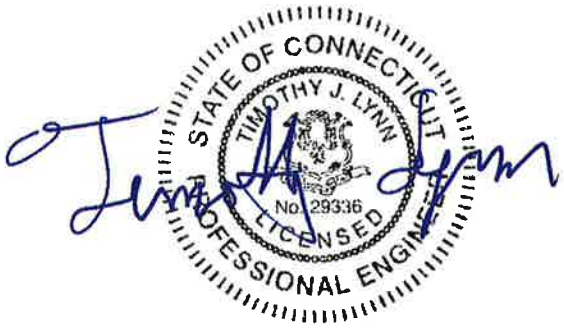
Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Northford

88 Parsonage Hill Road
Northford, CT

CENTEK Project No. 15001.103

Date: September 10, 2015



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

Table of Contents

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 Northford (North Branford), Connecticut.

The host tower is a 195-ft, three legged, lattice tower originally designed and manufactured by Central Tower project no. F-722 dated 4/9/99. The tower geometry, structure member sizes and foundation information were taken from the aforementioned design documents.

Antenna and appurtenance inventory were taken from a previous structural report prepared by Atlantis Group for T-Mobile dated September 2, 2014 and a RF data sheet.

The tower consists of ten (10) vertical sections consisting of solid round pipe legs conforming to ASTM A529 Gr. 50 and steel angle lateral 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 0-in at the top and 23-ft 6-in at the bottom.

Verizon proposes the removal of nine (9) panel antennas and three (3) remote radio heads and the installation of nine (9) panel antennas, nine (9) remote radio heads and one (1) main distribution box mounted to the existing three (3) 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:

- Sprint (Existing):
  Antenna: Three (3) RFS APXVSPP18-C-A20 panel antennas, three (3) RFS APXVTM-14 panel antennas, three (3) 1900MHz 4X45W RRH's, three (3) 800MHz 2X50W RRH's and three (3) TD-RRH8x20-25 RRH's mounted on a 15-ft triangular platform with a RAD center elevation of ±190-ft above grade level.
  Coax Cable: Four (4) 1-1/4"∅ Hybriflex cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- T-MOBILE (Existing):
  Antennas: Six (6) Ericsson AIR21 panel antennas, three (3) Andrew LNX-6515DS panel antennas, three (3) TMAs and three (3) Ericsson RRUS-11 mounted on three (3) 15-ft T-Frames with a RAD center elevation of ±180-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and one (1) 1-5/8" ∅ fiber cable running on a face of the existing tower as specified in Section 3 of this report.
- AT&T (Existing):
  Antennas: One (1) Raycap DC6-48-60-18-8F surge arrestor leg mounted with an elevation of 175-ft above grade level.
  Coax Cables: One (1) fiber cable and two (2) dc control cables.

- AT&T (Existing):
  Antenna: Three (3) Kathrein 800-10121 panel antennas, three (3) KMW AM-X-CD-16-65-00T panel antennas, six (6) Powerwave LGP21401TMA's and six (6) Ericsson RRUS-11 remote radio heads mounted on three (3) 12-ft T-Frames with a RAD center elevation of ±173-ft above grade level.
  Coax Cable: Six (6) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- Nextel (Existing):
  Antenna: Twelve (12) Andrew DB844H90E-XY panel antennas mounted on three (3) 15-ft T-Frames with a RAD center elevation of ±160-ft above grade level.
  Coax Cable: Twelve (12) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- Sprint (Existing):
  Antenna: One (1) GPS antenna on a 2-ft standoff with an elevation of ±80-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Verizon (Existing):
  Antenna: One (1) GPS antenna on a 2-ft standoff with an elevation of ±80-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cable running on a leg/face of the existing tower.
- Verizon (Existing to Remain):
  Antennas: Three (3) Andrew LNX-6513DS panel antennas mounted on (3) 15-ft T-Frames with a RAD center elevation of ±145-ft above grade level.
  Appurtenances: Two (2) RFS FD9R6004/2C-3L Diplexers and one (1) RFS DB-T1-6Z-8AB-0Z distribution box mounted on (3) 15-ft T-Frames.
  Coax Cable: Twelve (12) 1-5/8" ∅ coax cables and one (1) 1-5/8" ∅ fiber cable 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-171063-12CF, three (3) Antel BXA-171085/8BF and three (3) Antel BXA-70063/6CF panel antennas mounted on (3) 15-ft T-Frames with a RAD center elevation of ±145-ft above grade level.
  Appurtenances: Four (4) RFS FD9R6004/2C-3L Diplexers and three (3) Alcatel-Lucent RRH2x40-AWS remote radio heads mounted on (3) 15-ft T-Frames.
- **VERIZON (PROPOSED):**
  Antennas: Nine (9) Andrew SBNHH-1D65B panel antennas mounted on (3) 15-ft T-Frames with a RAD center elevation of ±145-ft above grade level.
  Appurtenances: Three (3) Alcatel-Lucent RRH2x60-LTE remote radio heads, three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads and one (1) RFS DB-T1-6Z-8AB-0Z distribution box mounted on (3) 15-ft T-Frames.
  Coax Cables: One (1) 1-5/8" ∅ fiber cable running on a leg/face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

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

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 CSBC[1] 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 on 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 Haven; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Northford (North Branford); v = 110 mph (3 second gust) equivalent to v = 90 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	Appendix K wind speed controls.	
Load Cases:	Load Case 1; 90 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]*
	Load Case 2; 78 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 78 mph wind speed velocity represents 75% of the wind pressure generated by the 90 mph wind speed..	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; 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 1, per tnxTower "Section Capacity Table", this tower was found to be at **76.9%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Diagonal (T2)	155'-0"-175'-0"	76.9%	**PASS**
Leg (T9)	20'-0"-40'-0"	64.8%	**PASS**

Foundation and Anchors

The existing foundation consists of a three (3) 3-ft ∅ x 4-ft long reinforced concrete piers concentrically bearing on a 34-ft square x 2-ft 6-in thick reinforced concrete mat. The sub grade conditions used in the foundation analysis were derived from the aforementioned design documents. The base of the tower is connected to the foundation by means of (8) 1.375"∅, ASTM A449 anchor bolts per leg embedded 5-ft 10-in into the concrete foundation structure.

- The tower reactions developed from the governing Load Case 1 were used in the verification of the foundation and anchor bolts:

Load Effect	Proposed Tower Reactions
Leg Shear	37 kips
Leg Compression	367 kips
Leg Tension	311 kips
Base Moment	6988 ft-kips
Base Shear	61 kips

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

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	56.0%	**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)[4]	Proposed Loading (FS)[3]	Result
Reinforced Concrete Pad and Piers	Overturning	2.00	2.34	**PASS**

Note 3: FS denotes Factor of Safety

Conclusion and Recommendations

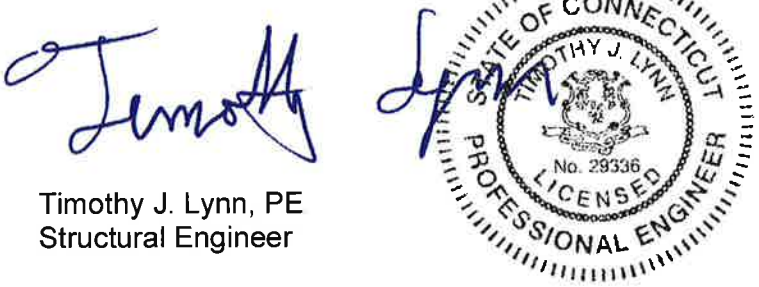
This analysis shows that the subject tower **is adequate** to support the proposed antenna configuration with the below recommendations.

- **All coax cables routed as specified in Section 3 of this report.**

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:

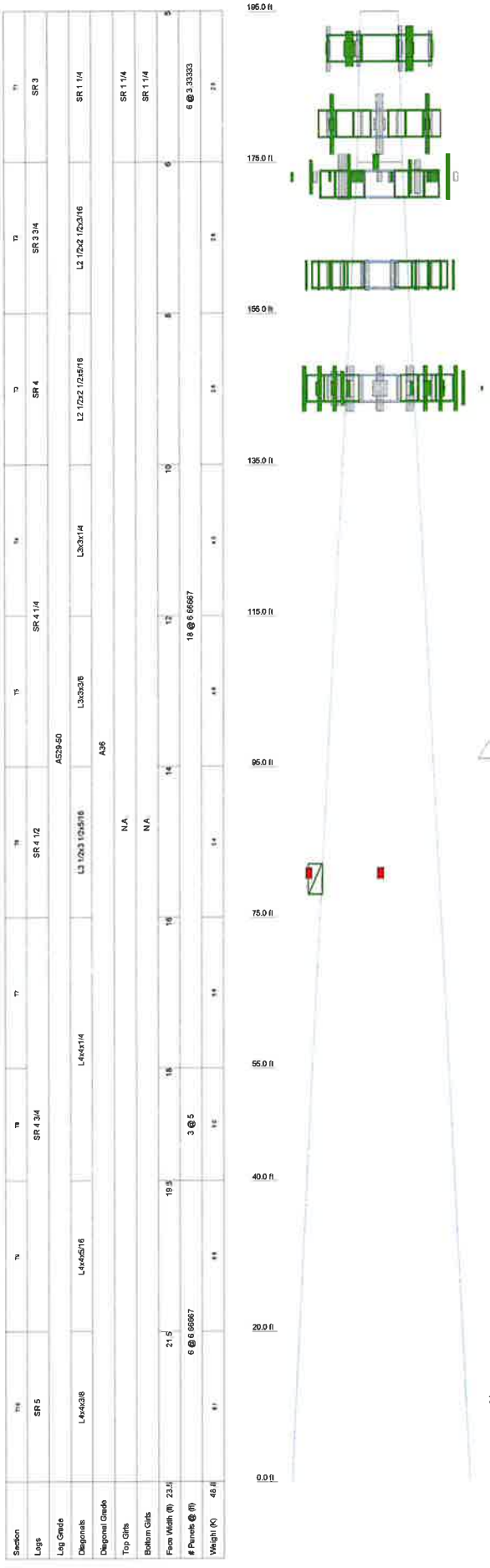
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or 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
15-ft Triangular Mount (Sprint Existing)	190	Pirod 12' T-Frame Sector Mount (1) (ATT Existing)	172
APXVTM14 (Sprint Existing)	190	Pirod 12' T-Frame Sector Mount (1) (ATT Existing)	172
APXVTM14 (Sprint Existing)	190	Pirod 12' T-Frame Sector Mount (1) (ATT Existing)	172
APXVTM14 (Sprint Existing)	190	Pirod 15' T-Frame Sector Mount (1) (Nextel Existing)	160
APXVSPP18-C-A20 (Sprint Existing)	190	Pirod 15' T-Frame Sector Mount (1) (Nextel Existing)	160
APXVSPP18-C-A20 (Sprint Existing)	190	Pirod 15' T-Frame Sector Mount (1) (Nextel Existing)	160
APXVSPP18-C-A20 (Sprint Existing)	190	(4) DB844H90E-XY (Nextel Existing)	160
FD-RRH 2x50 800 (Sprint Existing)	190	(4) DB844H90E-XY (Nextel Existing)	160
FD-RRH 2x50 800 (Sprint Existing)	190	(4) DB844H90E-XY (Nextel Existing)	160
FD-RRH 2x50 800 (Sprint Existing)	190	Pirod 15' T-Frame Sector Mount (1) (Verizon Existing)	145
FD-RRH 4x45 1900 (Sprint Existing)	190	Pirod 15' T-Frame Sector Mount (1) (Verizon Existing)	145
FD-RRH 4x45 1900 (Sprint Existing)	190	Pirod 15' T-Frame Sector Mount (1) (Verizon Existing)	145
FD-RRH 4x45 1900 (Sprint Existing)	190	LNX-6513DS-VTM (Verizon Existing)	145
TD-RRH8x20-25 (Sprint Existing)	190	SBNHH-1D65B (Verizon Proposed)	145
TD-RRH8x20-25 (Sprint Existing)	190	SBNHH-1D65B (Verizon Proposed)	145
TD-RRH8x20-25 (Sprint Existing)	190	SBNHH-1D65B (Verizon Proposed)	145
Pirod 15' T-Frame Sector Mount (1) (T-Mobile Existing)	180	LNX-6513DS-VTM (Verizon Existing)	145
Pirod 15' T-Frame Sector Mount (1) (T-Mobile Existing)	180	SBNHH-1D65B (Verizon Proposed)	145
Pirod 15' T-Frame Sector Mount (1) (T-Mobile Existing)	180	SBNHH-1D65B (Verizon Proposed)	145
LNX-6515DS (T-Mobile Existing)	180	SBNHH-1D65B (Verizon Proposed)	145
LNX-6515DS (T-Mobile Existing)	180	SBNHH-1D65B (Verizon Proposed)	145
LNX-6515DS (T-Mobile Existing)	180	SBNHH-1D65B (Verizon Proposed)	145
(2) AIR21 (T-Mobile Existing)	180	LNX-6513DS-VTM (Verizon Existing)	145
(2) AIR21 (T-Mobile Existing)	180	SBNHH-1D65B (Verizon Proposed)	145
(2) AIR21 (T-Mobile Existing)	180	SBNHH-1D65B (Verizon Proposed)	145
RRUS-11 (T-Mobile Existing)	180	SBNHH-1D65B (Verizon Proposed)	145
RRUS-11 (T-Mobile Existing)	180	RRH4x45/2x90-AWS (Verizon Proposed)	145
RRUS-11 (T-Mobile Existing)	180	RRH4x45/2x90-AWS (Verizon Proposed)	145
TMA (T-Mobile Existing)	180	RRH4x45/2x90-AWS (Verizon Proposed)	145
TMA (T-Mobile Existing)	180	RRH2x60-07-U (Verizon Proposed)	145
TMA (T-Mobile Existing)	180	RRH2x60-07-U (Verizon Proposed)	145
DC6-48-60-18-8F Surge Arrestor (ATT Existing)	175	RRH2x60-07-U (Verizon Proposed)	145
800 10121 (ATT Existing)	173	RRH2x60-PCS (Verizon Proposed)	145
800 10121 (ATT Existing)	173	RRH2x60-PCS (Verizon Proposed)	145
800 10121 (ATT Existing)	173	RRH2x60-PCS (Verizon Proposed)	145
(2) LGP21401 TMA (ATT Existing)	173	DB-T1-6Z-8AB-0Z (Verizon Existing)	145
(2) LGP21401 TMA (ATT Existing)	173	DB-T1-6Z-8AB-0Z (Verizon Proposed)	145
(2) LGP21401 TMA (ATT Existing)	173	(2) FD9R6004/2C-3L Diplexer (Verizon Existing)	145
(2) RRUS-11 (ATT Existing)	173	GPS (Sprint Existing)	80
(2) RRUS-11 (ATT Existing)	173	2-ft Stand Off (Sprint Existing)	80
(2) RRUS-11 (ATT Existing)	173	GPS (Verizon Existing)	80
AM-X-CD-16-65-00T-RET(72") (ATT Existing)	173	2-ft Stand Off (Verizon Existing)	80
AM-X-CD-16-65-00T-RET(72") (ATT Existing)	173		
AM-X-CD-16-65-00T-RET(72") (ATT Existing)	173		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A529-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for a 90 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 78 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 76.9%

MAX. CORNER REACTIONS AT BASE:
DOWN: 367 K
SHEAR: 37 K

UPLIFT: -311 K
SHEAR: 32 K

AXIAL
98 K
SHEAR 56 K *MOMENT 6530 kip-ft*

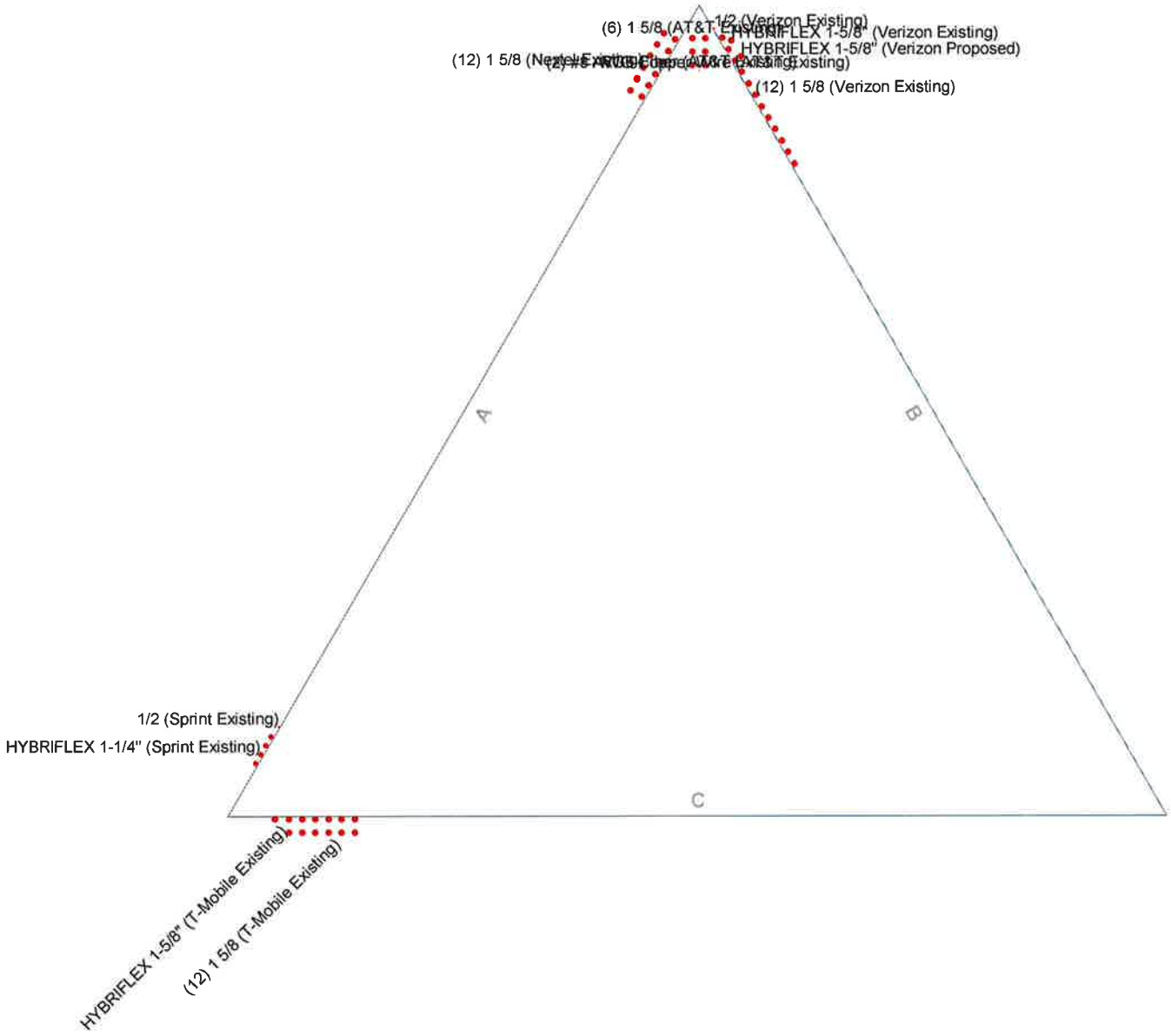
TORQUE 58 kip-ft
78 mph WIND - 0.5000 in ICE
AXIAL
70 K
SHEAR 61 K *MOMENT 6988 kip-ft*

TORQUE 55 kip-ft
REACTIONS - 90 mph WIND

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: 15001.103 - Northford			
Project: 195' Lattice Tower - 88 Parsonage Hill Rd., Northford, CT			
Client: Verizon Wireless	Drawn by: TJL	Appd:	
Code: TIA/EIA-222-F	Date: 09/10/15	Scale: NTS	
Path:		Dwg No. E-1	

Round Flat App In Face App Out Face

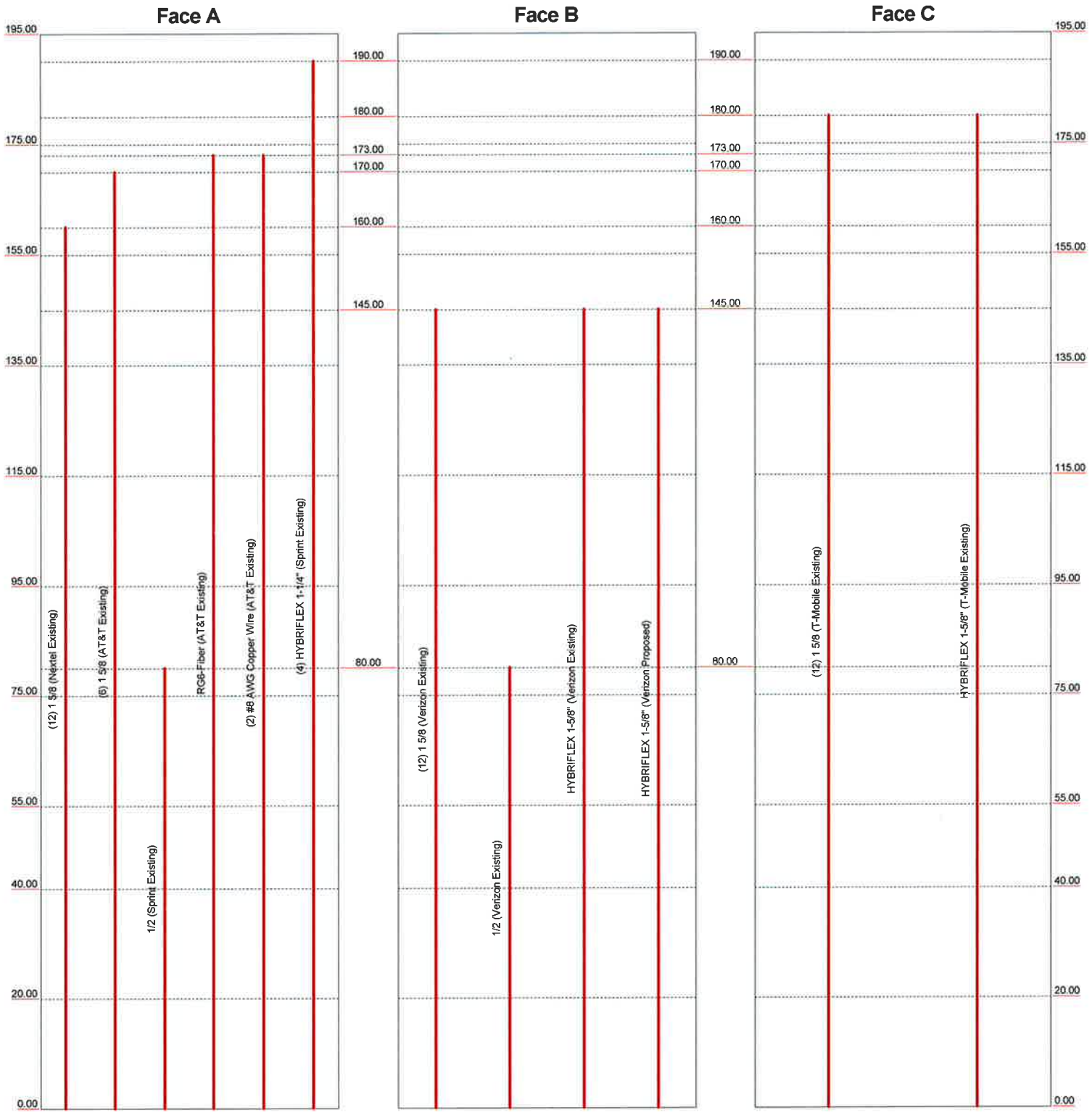


Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: **15001.103 - Northford**			
Project: ***195' Lattice Tower - 88 Parsonage Hill Rd., Northford,***			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 09/10/15	Scale: NTS	
Path:		Dwg No. E-7	

0' - 195'

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



Centek Engineering Inc.
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Phone: (203) 488-0580
FAX: (203) 488-8587

Job: 15001.103 - Northford			
Project: 195' Lattice Tower - 88 Parsonage Hill Rd., Northford,			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 09/10/15	Scale: NTS	
Path:		Dwg No. E-7	

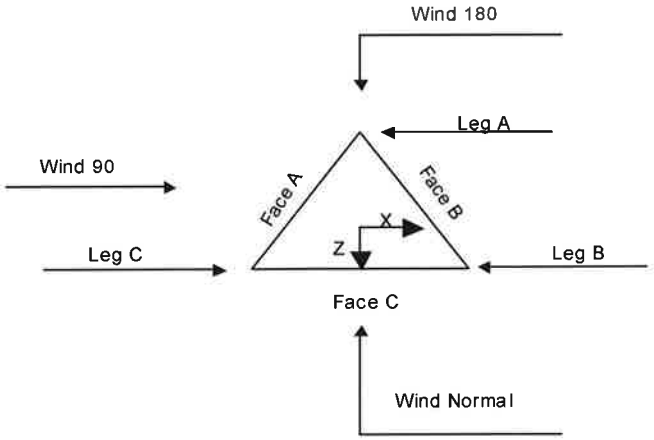
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 195.00 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 23.50 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 90 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 78 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, feed line 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	Retension 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	Use TIA-222-G Tension Splice Capacity Exemption	



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	195.00-175.00			5.00	1	20.00
T2	175.00-155.00			6.00	1	20.00
T3	155.00-135.00			8.00	1	20.00
T4	135.00-115.00			10.00	1	20.00
T5	115.00-95.00			12.00	1	20.00
T6	95.00-75.00			14.00	1	20.00
T7	75.00-55.00			16.00	1	20.00
T8	55.00-40.00			18.00	1	15.00
T9	40.00-20.00			19.50	1	20.00
T10	20.00-0.00			21.50	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	195.00-175.00	3.33	X Brace	No	Yes	0.0000	0.0000
T2	175.00-155.00	6.67	X Brace	No	No	0.0000	0.0000
T3	155.00-135.00	6.67	X Brace	No	No	0.0000	0.0000
T4	135.00-115.00	6.67	X Brace	No	No	0.0000	0.0000
T5	115.00-95.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T6	95.00-75.00	6.67	X Brace	No	No	0.0000	0.0000
T7	75.00-55.00	6.67	X Brace	No	No	0.0000	0.0000
T8	55.00-40.00	5.00	X Brace	No	No	0.0000	0.0000
T9	40.00-20.00	6.67	X Brace	No	No	0.0000	0.0000
T10	20.00-0.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 195.00-175.00	Solid Round	3	A529-50 (50 ksi)	Solid Round	1 1/4	A36 (36 ksi)
T2 175.00-155.00	Solid Round	3 3/4	A529-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 155.00-135.00	Solid Round	4	A529-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x5/16	A36 (36 ksi)
T4 135.00-115.00	Solid Round	4 1/4	A529-50 (50 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T5 115.00-95.00	Solid Round	4 1/4	A529-50 (50 ksi)	Single Angle	L3x3x3/8	A36 (36 ksi)
T6 95.00-75.00	Solid Round	4 1/2	A529-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T7 75.00-55.00	Solid Round	4 3/4	A529-50 (50 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T8 55.00-40.00	Solid Round	4 3/4	A529-50 (50 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T9 40.00-20.00	Solid Round	4 3/4	A529-50 (50 ksi)	Single Angle	L4x4x5/16	A36 (36 ksi)
T10 20.00-0.00	Solid Round	5	A529-50 (50 ksi)	Single Angle	L4x4x3/8	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 195.00-175.00	Solid Round	1 1/4	A36 (36 ksi)	Solid Round	1 1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	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

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	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
T1 195.00-175.00	0.00	0.0000	A36 (36 ksi)	1	1	1	30.0000	30.0000
T2 175.00-155.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 155.00-135.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 135.00-115.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 115.00-95.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 95.00-75.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 75.00-55.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 55.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
195.00-175.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
175.00-155.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
155.00-135.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
135.00-115.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
115.00-95.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
95.00-75.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
75.00-55.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
55.00-40.00				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
20.00-0.00				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	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 195.00-175.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T2 175.00-155.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 155.00-135.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 135.00-115.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 115.00-95.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 95.00-75.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 75.00-55.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 55.00-40.00	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)*

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 195.00-175.00	Flange	1.1250 A325N	4	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 175.00-155.00	Flange	1.1250 A325N	6	0.8750 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 155.00-135.00	Flange	1.1250 A325N	6	0.8750 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 135.00-115.00	Flange	1.1250 A325N	6	0.8750 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 115.00-95.00	Flange	1.1250 A325N	8	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 95.00-75.00	Flange	1.1250 A325N	8	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 75.00-55.00	Flange	1.2500 A325N	8	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 55.00-40.00	Flange	1.2500 A325N	8	1.0000 A325N	1	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	8	1.0000 A325N	1	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	1.3750 A449	8	1.0000 A325N	1	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 (Verizon Existing)	B	Yes	Ar (CfAe)	145.00 - 0.00	0.0000	-0.38	12	12	1.9800	1.9800		1.04
1 5/8 (Nextel Existing)	A	Yes	Ar (CfAe)	160.00 - 0.00	0.0000	0.42	12	6	1.9800	1.9800		1.04
1 5/8 (AT&T Existing)	A	No	Ar (Leg)	170.00 - 0.00	0.0000	0.05	6	3	1.9800	1.9800		1.04
1 5/8 (T-Mobile Existing)	C	Yes	Ar (CfAe)	180.00 - 0.00	0.0000	0.4	12	6	1.9800	1.9800		1.04
1/2 (Sprint Existing)	A	Yes	Ar (CfAe)	80.00 - 0.00	0.0000	-0.39	1	1	0.5800	0.5800		0.25
1/2 (Verizon Existing)	B	Yes	Ar (CfAe)	80.00 - 0.00	0.0000	-0.47	1	1	0.5800	0.5800		0.25
RG6-Fiber (AT&T Existing)	A	No	Ar (Leg)	173.00 - 0.00	0.0000	0.07	1	1	0.5000	0.5000		1.00
#8 AWG Copper WIre (AT&T Existing)	A	No	Ar (Leg)	173.00 - 0.00	0.0000	0.07	2	1	0.2500	0.1285		0.05
HYBRIFLEX 1-5/8" (T-Mobile Existing)	C	Yes	Ar (CfAe)	180.00 - 0.00	0.0000	0.45	1	1	1.9800	1.9800		1.90
HYBRIFLEX 1-1/4" (Sprint Existing)	A	Yes	Ar (CfAe)	190.00 - 0.00	0.0000	-0.42	4	4	1.5400	1.5400		1.30
HYBRIFLEX 1-5/8" (Verizon Existing)	B	Yes	Ar (CfAe)	145.00 - 0.00	2.0000	-0.45	1	1	1.9800	1.9800		1.90
HYBRIFLEX 1-5/8" (Verizon Proposed)	B	Yes	Ar (CfAe)	145.00 - 0.00	2.0000	-0.43	1	1	1.9800	1.9800		1.90

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	195.00-175.00	A	7.700	0.000	0.000	0.000	0.08
		B	0.000	0.000	0.000	0.000	0.00
		C	5.775	0.000	0.000	0.000	0.07
T2	175.00-155.00	A	23.584	0.000	0.000	0.000	0.28
		B	8.368	0.000	0.000	0.000	0.00
		C	23.100	0.000	0.000	0.000	0.29
T3	155.00-135.00	A	41.014	0.000	0.000	0.000	0.50
		B	34.047	0.000	0.000	0.000	0.16
		C	23.100	0.000	0.000	0.000	0.29
T4	135.00-115.00	A	41.014	0.000	0.000	0.000	0.50

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B	57.148	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.29
T5	115.00-95.00	A	41.014	0.000	0.000	0.000	0.50
		B	57.148	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.29
T6	95.00-75.00	A	41.256	0.000	0.000	0.000	0.50
		B	57.389	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.29
T7	75.00-55.00	A	41.981	0.000	0.000	0.000	0.51
		B	58.114	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.29
T8	55.00-40.00	A	31.486	0.000	0.000	0.000	0.38
		B	43.586	0.000	0.000	0.000	0.25
		C	17.325	0.000	0.000	0.000	0.22
T9	40.00-20.00	A	41.981	0.000	0.000	0.000	0.51
		B	58.114	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.29
T10	20.00-0.00	A	41.981	0.000	0.000	0.000	0.51
		B	58.114	0.000	0.000	0.000	0.33
		C	23.100	0.000	0.000	0.000	0.29

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	195.00-175.00	A	0.500	12.700	0.000	0.000	0.000	0.15
		B		0.000	0.000	0.000	0.000	0.00
		C		8.692	0.000	0.000	0.000	0.17
T2	175.00-155.00	A	0.500	39.501	0.000	0.000	0.000	0.63
		B		15.118	0.000	0.000	0.000	0.00
		C		34.767	0.000	0.000	0.000	0.68
T3	155.00-135.00	A	0.500	66.014	0.000	0.000	0.000	1.17
		B		54.047	0.000	0.000	0.000	0.37
		C		34.767	0.000	0.000	0.000	0.68
T4	135.00-115.00	A	0.500	66.014	0.000	0.000	0.000	1.17
		B		88.814	0.000	0.000	0.000	0.75
		C		34.767	0.000	0.000	0.000	0.68
T5	115.00-95.00	A	0.500	66.014	0.000	0.000	0.000	1.17
		B		88.814	0.000	0.000	0.000	0.75
		C		34.767	0.000	0.000	0.000	0.68
T6	95.00-75.00	A	0.500	66.672	0.000	0.000	0.000	1.18
		B		89.472	0.000	0.000	0.000	0.75
		C		34.767	0.000	0.000	0.000	0.68
T7	75.00-55.00	A	0.500	68.647	0.000	0.000	0.000	1.19
		B		91.448	0.000	0.000	0.000	0.77
		C		34.767	0.000	0.000	0.000	0.68
T8	55.00-40.00	A	0.500	51.486	0.000	0.000	0.000	0.89
		B		68.586	0.000	0.000	0.000	0.58
		C		26.075	0.000	0.000	0.000	0.51
T9	40.00-20.00	A	0.500	68.647	0.000	0.000	0.000	1.19
		B		91.448	0.000	0.000	0.000	0.77
		C		34.767	0.000	0.000	0.000	0.68
T10	20.00-0.00	A	0.500	68.647	0.000	0.000	0.000	1.19
		B		91.448	0.000	0.000	0.000	0.77
		C		34.767	0.000	0.000	0.000	0.68

Feed Line Shielding

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
T1	195.00-175.00	A	0.643	1.910	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.483	1.307	0.000	0.000
T2	175.00-155.00	A	0.000	0.845	1.318	2.112
		B	0.000	0.000	0.000	0.000
		C	0.000	1.204	2.001	3.011
T3	155.00-135.00	A	0.000	1.456	2.342	3.641
		B	0.000	1.083	1.800	2.709
		C	0.000	1.083	1.800	2.709
T4	135.00-115.00	A	0.000	1.367	2.639	4.102
		B	0.000	2.034	4.055	6.103
		C	0.000	1.017	2.028	3.052
T5	115.00-95.00	A	0.000	1.314	2.535	3.941
		B	0.000	1.955	3.896	5.864
		C	0.000	0.977	1.948	2.932
T6	95.00-75.00	A	0.000	1.297	2.903	4.539
		B	0.000	1.921	4.448	6.723
		C	0.000	0.951	2.213	3.330
T7	75.00-55.00	A	0.000	1.326	3.334	5.304
		B	0.000	1.938	5.067	7.753
		C	0.000	0.934	2.482	3.735
T8	55.00-40.00	A	0.000	1.277	3.212	5.109
		B	0.000	1.867	4.882	7.469
		C	0.000	0.900	2.391	3.598
T9	40.00-20.00	A	0.000	1.298	3.264	5.192
		B	0.000	1.897	4.960	7.589
		C	0.000	0.914	2.429	3.656
T10	20.00-0.00	A	0.000	1.287	3.237	5.149
		B	0.000	1.882	4.920	7.527
		C	0.000	0.907	2.409	3.626

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	195.00-175.00	-5.4714	3.2578	-5.2505	3.0864
T2	175.00-155.00	-9.0203	1.0949	-9.3664	0.5002
T3	155.00-135.00	-7.9889	-10.9359	-8.3308	-11.6590
T4	135.00-115.00	-7.0690	-16.9163	-7.5352	-18.0149
T5	115.00-95.00	-8.0653	-19.2966	-8.6216	-20.5989
T6	95.00-75.00	-8.4257	-20.1069	-9.2358	-21.9244
T7	75.00-55.00	-8.7273	-20.5658	-9.8868	-22.9281
T8	55.00-40.00	-8.0348	-19.0818	-9.1620	-21.4929
T9	40.00-20.00	-9.8099	-23.1140	-11.1843	-25.9270
T10	20.00-0.00	-10.2753	-24.2100	-11.7789	-27.3018

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft / ft / ft	°	ft		ft^2	ft^2	K
15-ft Triangular Mount (Sprint Existing)	C	From Face	2.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice	75.30 86.60	75.30 86.60	2.50 2.88
APXVTM14 (Sprint Existing)	A	From Face	4.00 4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	6.90 7.35	3.61 3.97	0.06 0.10
APXVTM14 (Sprint Existing)	B	From Face	4.00 4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	6.90 7.35	3.61 3.97	0.06 0.10
APXVTM14 (Sprint Existing)	C	From Face	4.00 4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	6.90 7.35	3.61 3.97	0.06 0.10
APXVSPP18-C-A20 (Sprint Existing)	A	From Face	4.00 -4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	8.26 8.81	5.28 5.74	0.06 0.11
APXVSPP18-C-A20 (Sprint Existing)	B	From Face	4.00 -4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	8.26 8.81	5.28 5.74	0.06 0.11
APXVSPP18-C-A20 (Sprint Existing)	C	From Face	4.00 -4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	8.26 8.81	5.28 5.74	0.06 0.11
FD-RRH 2x50 800 (Sprint Existing)	A	From Face	4.00 -4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	2.40 2.61	2.25 2.46	0.06 0.09
FD-RRH 2x50 800 (Sprint Existing)	B	From Face	4.00 -4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	2.40 2.61	2.25 2.46	0.06 0.09
FD-RRH 2x50 800 (Sprint Existing)	C	From Face	4.00 -4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	2.40 2.61	2.25 2.46	0.06 0.09
FD-RRH 4x45 1900 (Sprint Existing)	A	From Face	4.00 -4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	2.71 2.94	2.78 3.02	0.06 0.08
FD-RRH 4x45 1900 (Sprint Existing)	B	From Face	4.00 -4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	2.71 2.94	2.78 3.02	0.06 0.08
FD-RRH 4x45 1900 (Sprint Existing)	C	From Face	4.00 -4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	2.71 2.94	2.78 3.02	0.06 0.08
TD-RRH8x20-25 (Sprint Existing)	A	From Face	4.00 4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	4.72 5.01	1.70 1.92	0.07 0.10
TD-RRH8x20-25 (Sprint Existing)	B	From Face	4.00 4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	4.72 5.01	1.70 1.92	0.07 0.10
TD-RRH8x20-25 (Sprint Existing)	C	From Face	4.00 4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	4.72 5.01	1.70 1.92	0.07 0.10
Pirod 15' T-Frame Sector Mount (1) (T-Mobile Existing)	A	From Leg	2.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	15.00 20.60	15.00 20.60	0.50 0.65
Pirod 15' T-Frame Sector Mount (1) (T-Mobile Existing)	B	From Leg	2.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	15.00 20.60	15.00 20.60	0.50 0.65

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Pirod 15' T-Frame Sector Mount (1) (T-Mobile Existing)	C	From Leg	2.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	15.00 20.60	15.00 20.60	0.50 0.65
LNX-6515DS (T-Mobile Existing)	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	11.45 12.06	7.70 8.29	0.06 0.12
LNX-6515DS (T-Mobile Existing)	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	11.45 12.06	7.70 8.29	0.06 0.12
LNX-6515DS (T-Mobile Existing)	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	11.45 12.06	7.70 8.29	0.06 0.12
(2) AIR21 (T-Mobile Existing)	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
(2) AIR21 (T-Mobile Existing)	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
(2) AIR21 (T-Mobile Existing)	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
RRUS-11 (T-Mobile Existing)	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
RRUS-11 (T-Mobile Existing)	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
RRUS-11 (T-Mobile Existing)	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
TMA (T-Mobile Existing)	A	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	1.17 1.31	0.39 0.48	0.01 0.02
TMA (T-Mobile Existing)	B	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	1.17 1.31	0.39 0.48	0.01 0.02
TMA (T-Mobile Existing)	C	From Leg	4.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	1.17 1.31	0.39 0.48	0.01 0.02
Pirod 12' T-Frame Sector Mount (1) (AT&T Existing)	A	From Leg	2.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	0.47 0.60
Pirod 12' T-Frame Sector Mount (1) (AT&T Existing)	B	From Leg	2.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	0.47 0.60
Pirod 12' T-Frame Sector Mount (1) (AT&T Existing)	C	From Leg	2.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice	13.60 18.40	13.60 18.40	0.47 0.60
800 10121 (AT&T Existing)	A	From Leg	4.00 5.00 0.00	0.0000	173.00	No Ice 1/2" Ice	5.46 5.88	3.29 3.64	0.05 0.08
800 10121 (AT&T Existing)	B	From Leg	4.00 5.00 0.00	0.0000	173.00	No Ice 1/2" Ice	5.46 5.88	3.29 3.64	0.05 0.08
800 10121 (AT&T Existing)	C	From Leg	4.00 5.00 0.00	0.0000	173.00	No Ice 1/2" Ice	5.46 5.88	3.29 3.64	0.05 0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) LGP21401 TMA	A	From Leg	4.00	0.0000	173.00	No Ice	0.95	0.37	0.02
(AT&T Existing)			5.00			1/2" Ice	1.09	0.48	0.02
			0.00						
(2) LGP21401 TMA	B	From Leg	4.00	0.0000	173.00	No Ice	0.95	0.37	0.02
(AT&T Existing)			5.00			1/2" Ice	1.09	0.48	0.02
			0.00						
(2) LGP21401 TMA	C	From Leg	4.00	0.0000	173.00	No Ice	0.95	0.37	0.02
(AT&T Existing)			5.00			1/2" Ice	1.09	0.48	0.02
			0.00						
DC6-48-60-18-8F Surge	C	From Face	0.50	0.0000	175.00	No Ice	2.23	2.23	0.02
Arrestor			0.50			1/2" Ice	2.45	2.45	0.04
(AT&T Existing)			0.00						
(2) RRUS-11	A	From Face	4.00	0.0000	173.00	No Ice	2.99	1.25	0.05
(AT&T Existing)			-2.00			1/2" Ice	3.23	1.41	0.07
			0.00						
(2) RRUS-11	B	From Face	4.00	0.0000	173.00	No Ice	2.99	1.25	0.05
(AT&T Existing)			-2.00			1/2" Ice	3.23	1.41	0.07
			0.00						
(2) RRUS-11	C	From Face	4.00	0.0000	173.00	No Ice	2.99	1.25	0.05
(AT&T Existing)			-2.00			1/2" Ice	3.23	1.41	0.07
			0.00						
AM-X-CD-16-65-00T-RET(7	A	From Leg	4.00	0.0000	173.00	No Ice	8.26	4.64	0.05
2")			-5.00			1/2" Ice	8.81	5.09	0.10
(AT&T Existing)			0.00						
AM-X-CD-16-65-00T-RET(7	B	From Leg	4.00	0.0000	173.00	No Ice	8.26	4.64	0.05
2")			-5.00			1/2" Ice	8.81	5.09	0.10
(AT&T Existing)			0.00						
AM-X-CD-16-65-00T-RET(7	C	From Leg	4.00	0.0000	173.00	No Ice	8.26	4.64	0.05
2")			-5.00			1/2" Ice	8.81	5.09	0.10
(AT&T Existing)			0.00						
Pirod 15' T-Frame Sector	A	From Leg	2.00	0.0000	160.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Nextel Existing)			0.00						
Pirod 15' T-Frame Sector	B	From Leg	2.00	0.0000	160.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Nextel Existing)			0.00						
Pirod 15' T-Frame Sector	C	From Leg	2.00	0.0000	160.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Nextel Existing)			0.00						
(4) DB844H90E-XY	A	From Leg	4.00	0.0000	160.00	No Ice	2.87	3.73	0.01
(Nextel Existing)			0.00			1/2" Ice	3.18	4.10	0.04
			0.00						
(4) DB844H90E-XY	B	From Leg	4.00	0.0000	160.00	No Ice	2.87	3.73	0.01
(Nextel Existing)			0.00			1/2" Ice	3.18	4.10	0.04
			0.00						
(4) DB844H90E-XY	C	From Leg	4.00	0.0000	160.00	No Ice	2.87	3.73	0.01
(Nextel Existing)			0.00			1/2" Ice	3.18	4.10	0.04
			0.00						
Pirod 15' T-Frame Sector	A	From Leg	2.00	0.0000	145.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Verizon Existing)			0.00						
Pirod 15' T-Frame Sector	B	From Leg	2.00	0.0000	145.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Verizon Existing)			0.00						
Pirod 15' T-Frame Sector	C	From Leg	2.00	0.0000	145.00	No Ice	15.00	15.00	0.50
Mount (1)			0.00			1/2" Ice	20.60	20.60	0.65
(Verizon Existing)			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
LNX-6513DS-VTM	A	From Leg	4.00	0.0000	145.00	No Ice	6.33	3.84	0.03
(Verizon Existing)			-6.00			1/2" Ice	6.76	4.19	0.07
			0.00						
SBNHH-1D65B	A	From Leg	4.00	0.0000	145.00	No Ice	8.33	5.34	0.04
(Verizon Proposed)			-4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	A	From Leg	4.00	0.0000	145.00	No Ice	8.33	5.34	0.04
(Verizon Proposed)			0.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	A	From Leg	4.00	0.0000	145.00	No Ice	8.33	5.34	0.04
(Verizon Proposed)			4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
LNX-6513DS-VTM	B	From Leg	4.00	0.0000	145.00	No Ice	6.33	3.84	0.03
(Verizon Existing)			-6.00			1/2" Ice	6.76	4.19	0.07
			0.00						
SBNHH-1D65B	B	From Leg	4.00	0.0000	145.00	No Ice	8.33	5.34	0.04
(Verizon Proposed)			-4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	B	From Leg	4.00	0.0000	145.00	No Ice	8.33	5.34	0.04
(Verizon Proposed)			0.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	B	From Leg	4.00	0.0000	145.00	No Ice	8.33	5.34	0.04
(Verizon Proposed)			4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
LNX-6513DS-VTM	C	From Leg	4.00	0.0000	145.00	No Ice	6.33	3.84	0.03
(Verizon Existing)			-6.00			1/2" Ice	6.76	4.19	0.07
			0.00						
SBNHH-1D65B	C	From Leg	4.00	0.0000	145.00	No Ice	8.33	5.34	0.04
(Verizon Proposed)			-4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	C	From Leg	4.00	0.0000	145.00	No Ice	8.33	5.34	0.04
(Verizon Proposed)			0.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	C	From Leg	4.00	0.0000	145.00	No Ice	8.33	5.34	0.04
(Verizon Proposed)			4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
RRH4x45/2x90-AWS	A	From Leg	2.00	0.0000	145.00	No Ice	3.01	1.91	0.08
(Verizon Proposed)			-4.00			1/2" Ice	3.26	2.13	0.10
			0.00						
RRH4x45/2x90-AWS	B	From Leg	2.00	0.0000	145.00	No Ice	3.01	1.91	0.08
(Verizon Proposed)			-4.00			1/2" Ice	3.26	2.13	0.10
			0.00						
RRH4x45/2x90-AWS	C	From Leg	2.00	0.0000	145.00	No Ice	3.01	1.91	0.08
(Verizon Proposed)			-4.00			1/2" Ice	3.26	2.13	0.10
			0.00						
RRH2x60-07-U	A	From Leg	2.00	0.0000	145.00	No Ice	2.45	1.63	0.05
(Verizon Proposed)			0.00			1/2" Ice	2.67	1.83	0.07
			0.00						
RRH2x60-07-U	B	From Leg	2.00	0.0000	145.00	No Ice	2.45	1.63	0.05
(Verizon Proposed)			0.00			1/2" Ice	2.67	1.83	0.07
			0.00						
RRH2x60-07-U	C	From Leg	2.00	0.0000	145.00	No Ice	2.45	1.63	0.05
(Verizon Proposed)			0.00			1/2" Ice	2.67	1.83	0.07
			0.00						
RRH2x60-PCS	A	From Leg	2.00	0.0000	145.00	No Ice	2.51	1.55	0.06
(Verizon Proposed)			4.00			1/2" Ice	2.73	1.74	0.07
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRH2x60-PCS	B	From Leg	2.00	0.0000	145.00	No Ice	2.51	1.55	0.06
(Verizon Proposed)			4.00			1/2" Ice	2.73	1.74	0.07
			0.00						
RRH2x60-PCS	C	From Leg	2.00	0.0000	145.00	No Ice	2.51	1.55	0.06
(Verizon Proposed)			4.00			1/2" Ice	2.73	1.74	0.07
			0.00						
DB-T1-6Z-8AB-0Z	A	From Leg	2.00	0.0000	145.00	No Ice	5.60	2.33	0.04
(Verizon Existing)			0.00			1/2" Ice	5.92	2.56	0.08
			0.00						
DB-T1-6Z-8AB-0Z	B	From Leg	2.00	0.0000	145.00	No Ice	5.60	2.33	0.04
(Verizon Proposed)			0.00			1/2" Ice	5.92	2.56	0.08
			0.00						
(2) FD9R6004/2C-3L	B	From Leg	4.00	0.0000	145.00	No Ice	0.37	0.08	0.00
Diplexer			-6.00			1/2" Ice	0.45	0.14	0.01
(Verizon Existing)			0.00						
GPS	C	From Leg	2.00	0.0000	80.00	No Ice	1.00	1.00	0.01
(Sprint Existing)			0.00			1/2" Ice	1.50	1.50	0.01
			0.00						
2-ft Stand Off	C	From Leg	1.00	0.0000	80.00	No Ice	1.07	1.07	0.02
(Sprint Existing)			0.00			1/2" Ice	1.62	1.62	0.03
			0.00						
GPS	A	From Leg	2.00	0.0000	80.00	No Ice	1.00	1.00	0.01
(Verizon Existing)			0.00			1/2" Ice	1.50	1.50	0.01
			0.00						
2-ft Stand Off	A	From Leg	1.00	0.0000	80.00	No Ice	1.07	1.07	0.02
(Verizon Existing)			0.00			1/2" Ice	1.62	1.62	0.03
			0.00						

Tower Pressures - No Ice

$G_H = 1.116$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1	185.00	1.636	34	115.002	A	0.000	25.830	10.004	38.73	0.000	0.000
195.00-175.00					B	0.000	18.774		53.29	0.000	0.000
					C	0.000	24.066		41.57	0.000	0.000
T2	165.00	1.584	33	146.258	A	10.255	36.105	12.521	27.01	0.000	0.000
175.00-155.00					B	11.572	20.889		38.57	0.000	0.000
					C	9.572	35.621		27.71	0.000	0.000
T3	145.00	1.526	32	186.675	A	11.152	54.370	13.356	20.38	0.000	0.000
155.00-135.00					B	11.695	47.403		22.60	0.000	0.000
					C	11.695	36.456		27.74	0.000	0.000
T4	125.00	1.463	30	227.092	A	16.046	55.204	14.190	19.92	0.000	0.000
135.00-115.00					B	14.630	71.338		16.51	0.000	0.000
					C	16.657	37.290		26.30	0.000	0.000
T5	105.00	1.392	29	267.092	A	18.787	55.204	14.190	19.18	0.000	0.000
115.00-95.00					B	17.426	71.338		15.99	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	19.374	37.290		25.04	0.000	0.000
T6 95.00-75.00	85.00	1.31	27	307.509	A	25.116	56.281	15.025	18.46	0.000	0.000
					B	23.571	72.414		15.65	0.000	0.000
					C	25.806	38.125		23.50	0.000	0.000
T7 75.00-55.00	65.00	1.214	25	347.927	A	32.348	57.841	15.860	17.59	0.000	0.000
					B	30.615	73.974		15.16	0.000	0.000
					C	33.200	38.960		21.98	0.000	0.000
T8 55.00-40.00	47.50	1.11	23	287.195	A	34.781	43.380	11.895	15.22	0.000	0.000
					B	33.111	55.480		13.43	0.000	0.000
					C	35.602	29.220		18.35	0.000	0.000
T9 40.00-20.00	30.00	1	21	417.927	A	39.020	57.841	15.860	16.37	0.000	0.000
					B	37.324	73.974		14.25	0.000	0.000
					C	39.855	38.960		20.12	0.000	0.000
T10 20.00-0.00	10.00	1	21	458.344	A	42.838	58.675	16.694	16.45	0.000	0.000
					B	41.155	74.809		14.40	0.000	0.000
					C	43.665	39.794		20.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.116$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	185.00	1.636	25	0.5000	116.669	A	0.000	39.913	13.339	33.42	0.000	0.000
195.00-175.00						B	0.000	29.124		45.80	0.000	0.000
						C	0.000	36.508		36.54	0.000	0.000
T2	165.00	1.584	25	0.5000	147.927	A	9.461	59.145	15.860	23.12	0.000	0.000
175.00-155.00						B	11.572	35.606		33.62	0.000	0.000
						C	8.561	54.051		25.33	0.000	0.000
T3	145.00	1.526	24	0.5000	188.344	A	9.854	86.650	16.694	17.30	0.000	0.000
155.00-135.00						B	10.786	75.056		19.45	0.000	0.000
						C	10.786	55.775		25.08	0.000	0.000
T4	125.00	1.463	23	0.5000	228.761	A	14.583	88.404	17.529	17.02	0.000	0.000
135.00-115.00						B	12.582	110.537		14.24	0.000	0.000
						C	15.633	57.507		23.97	0.000	0.000
T5 115.00-95.00	105.00	1.392	22	0.5000	268.761	A	17.381	89.337	17.529	16.43	0.000	0.000
						B	15.459	111.496		13.81	0.000	0.000
						C	18.391	58.426		22.82	0.000	0.000
T6 95.00-75.00	85.00	1.31	20	0.5000	309.178	A	23.480	91.745	18.364	15.94	0.000	0.000
						B	21.296	113.921		13.58	0.000	0.000
						C	24.689	60.184		21.64	0.000	0.000
T7 75.00-55.00	65.00	1.214	19	0.5000	349.595	A	30.378	95.441	19.199	15.26	0.000	0.000
						B	27.929	117.628		13.19	0.000	0.000
						C	31.947	61.952		20.45	0.000	0.000
T8 55.00-40.00	47.50	1.11	17	0.5000	288.446	A	32.883	74.105	14.399	13.46	0.000	0.000
						B	30.524	90.615		11.89	0.000	0.000
						C	34.394	49.073		17.25	0.000	0.000
T9 40.00-20.00	30.00	1	16	0.5000	419.595	A	37.092	97.119	19.199	14.30	0.000	0.000
						B	34.695	119.320		12.47	0.000	0.000
						C	38.628	63.622		18.78	0.000	0.000
T10 20.00-0.00	10.00	1	16	0.5000	460.012	A	40.925	98.912	20.033	14.33	0.000	0.000
						B	38.547	121.118		12.55	0.000	0.000
						C	42.448	65.412		18.57	0.000	0.000

Tower Pressure - Service

$G_H = 1.116$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	185.00	1.636	10	115.002	A	0.000	25.830	10.004	38.73	0.000	0.000
195.00-175.00					B	0.000	18.774		53.29	0.000	0.000
					C	0.000	24.066		41.57	0.000	0.000
T2	165.00	1.584	10	146.258	A	10.255	36.105	12.521	27.01	0.000	0.000
175.00-155.00					B	11.572	20.889		38.57	0.000	0.000
					C	9.572	35.621		27.71	0.000	0.000
T3	145.00	1.526	10	186.675	A	11.152	54.370	13.356	20.38	0.000	0.000
155.00-135.00					B	11.695	47.403		22.60	0.000	0.000
					C	11.695	36.456		27.74	0.000	0.000
T4	125.00	1.463	9	227.092	A	16.046	55.204	14.190	19.92	0.000	0.000
135.00-115.00					B	14.630	71.338		16.51	0.000	0.000
					C	16.657	37.290		26.30	0.000	0.000
T5	105.00	1.392	9	267.092	A	18.787	55.204	14.190	19.18	0.000	0.000
115.00-95.00					B	17.426	71.338		15.99	0.000	0.000
					C	19.374	37.290		25.04	0.000	0.000
T6 95.00-75.00	85.00	1.31	8	307.509	A	25.116	56.281	15.025	18.46	0.000	0.000
					B	23.571	72.414		15.65	0.000	0.000
					C	25.806	38.125		23.50	0.000	0.000
T7 75.00-55.00	65.00	1.214	8	347.927	A	32.348	57.841	15.860	17.59	0.000	0.000
					B	30.615	73.974		15.16	0.000	0.000
					C	33.200	38.960		21.98	0.000	0.000
T8 55.00-40.00	47.50	1.11	7	287.195	A	34.781	43.380	11.895	15.22	0.000	0.000
					B	33.111	55.480		13.43	0.000	0.000
					C	35.602	29.220		18.35	0.000	0.000
T9 40.00-20.00	30.00	1	6	417.927	A	39.020	57.841	15.860	16.37	0.000	0.000
					B	37.324	73.974		14.25	0.000	0.000
					C	39.855	38.960		20.12	0.000	0.000
T10 20.00-0.00	10.00	1	6	458.344	A	42.838	58.675	16.694	16.45	0.000	0.000
					B	41.155	74.809		14.40	0.000	0.000
					C	43.665	39.794		20.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.15	2.55	A	0.225	2.516	0.596	1	1	15.388	1.47	73.27	A
195.00-175.00			B	0.163	2.723	0.584	1	1	10.956			
			C	0.209	2.565	0.592	1	1	14.255			
T2	0.57	2.79	A	0.317	2.252	0.621	1	1	32.685	2.70	134.82	A
175.00-155.00			B	0.222	2.524	0.595	1	1	24.004			
			C	0.309	2.272	0.619	1	1	31.610			
T3	0.95	3.57	A	0.351	2.169	0.633	1	1	45.559	3.49	174.47	A
155.00-135.00			B	0.317	2.253	0.621	1	1	41.137			
			C	0.258	2.414	0.604	1	1	33.711			
T4	1.11	4.04	A	0.314	2.26	0.62	1	1	50.284	4.32	215.82	B
135.00-115.00			B	0.379	2.108	0.643	1	1	60.506			
			C	0.238	2.475	0.599	1	1	38.986			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T5	1.11	4.79	A	0.277	2.359	0.609	1	1	52.414	4.43	221.32	B
115.00-95.00			B	0.332	2.214	0.626	1	1	62.107			
			C	0.212	2.556	0.593	1	1	41.486			
T6	1.12	5.35	A	0.265	2.394	0.606	1	1	59.207	4.70	234.87	B
95.00-75.00			B	0.312	2.264	0.62	1	1	68.445			
			C	0.208	2.57	0.592	1	1	48.378			
T7	1.12	5.79	A	0.259	2.41	0.604	1	1	67.299	4.91	245.38	B
75.00-55.00			B	0.301	2.294	0.616	1	1	76.189			
			C	0.207	2.571	0.592	1	1	56.262			
T8	0.84	5.02	A	0.272	2.373	0.608	1	1	61.146	3.94	262.35	B
55.00-40.00			B	0.308	2.274	0.619	1	1	67.427			
			C	0.226	2.512	0.596	1	1	53.016			
T9	1.12	6.79	A	0.232	2.493	0.597	1	1	73.574	4.54	227.07	B
40.00-20.00			B	0.266	2.389	0.606	1	1	82.164			
			C	0.189	2.635	0.588	1	1	62.768			
T10	1.12	8.13	A	0.221	2.526	0.595	1	1	77.750	4.84	242.22	B
20.00-0.00			B	0.253	2.429	0.603	1	1	86.238			
			C	0.182	2.657	0.587	1	1	67.021			
Sum Weight:	9.22	48.83						OTM	3316.19 kip-ft	39.32		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.15	2.55	A	0.225	2.516	0.596	0.825	1	15.388	1.47	73.27	A
195.00-175.00			B	0.163	2.723	0.584	0.825	1	10.956			
			C	0.209	2.565	0.592	0.825	1	14.255			
T2	0.57	2.79	A	0.317	2.252	0.621	0.825	1	30.890	2.55	127.42	A
175.00-155.00			B	0.222	2.524	0.595	0.825	1	21.979			
			C	0.309	2.272	0.619	0.825	1	29.935			
T3	0.95	3.57	A	0.351	2.169	0.633	0.825	1	43.607	3.34	166.99	A
155.00-135.00			B	0.317	2.253	0.621	0.825	1	39.091			
			C	0.258	2.414	0.604	0.825	1	31.665			
T4	1.11	4.04	A	0.314	2.26	0.62	0.825	1	47.476	4.13	206.69	B
135.00-115.00			B	0.379	2.108	0.643	0.825	1	57.946			
			C	0.238	2.475	0.599	0.825	1	36.071			
T5	1.11	4.79	A	0.277	2.359	0.609	0.825	1	49.126	4.21	210.45	B
115.00-95.00			B	0.332	2.214	0.626	0.825	1	59.058			
			C	0.212	2.556	0.593	0.825	1	38.095			
T6	1.12	5.35	A	0.265	2.394	0.606	0.825	1	54.812	4.41	220.72	B
95.00-75.00			B	0.312	2.264	0.62	0.825	1	64.320			
			C	0.208	2.57	0.592	0.825	1	43.862			
T7	1.12	5.79	A	0.259	2.41	0.604	0.825	1	61.638	4.56	228.13	B
75.00-55.00			B	0.301	2.294	0.616	0.825	1	70.831			
			C	0.207	2.571	0.592	0.825	1	50.452			
T8	0.84	5.02	A	0.272	2.373	0.608	0.825	1	55.060	3.60	239.80	B
55.00-40.00			B	0.308	2.274	0.619	0.825	1	61.633			
			C	0.226	2.512	0.596	0.825	1	46.786			
T9	1.12	6.79	A	0.232	2.493	0.597	0.825	1	66.745	4.18	209.02	B
40.00-20.00			B	0.266	2.389	0.606	0.825	1	75.633			
			C	0.189	2.635	0.588	0.825	1	55.794			
T10	1.12	8.13	A	0.221	2.526	0.595	0.825	1	70.254	4.44	221.99	B
20.00-0.00			B	0.253	2.429	0.603	0.825	1	79.036			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
Sum Weight:	9.22	48.83	C	0.182	2.657	0.587	0.825	1 OTM	59.379 3147.00 kip-ft	36.89		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.15	2.55	A	0.225	2.516	0.596	0.8	1	15.388	1.47	73.27	A
195.00-175.00			B	0.163	2.723	0.584	0.8	1	10.956			
			C	0.209	2.565	0.592	0.8	1	14.255			
T2	0.57	2.79	A	0.317	2.252	0.621	0.8	1	30.634	2.53	126.36	A
175.00-155.00			B	0.222	2.524	0.595	0.8	1	21.689			
			C	0.309	2.272	0.619	0.8	1	29.696			
T3	0.95	3.57	A	0.351	2.169	0.633	0.8	1	43.328	3.32	165.93	A
155.00-135.00			B	0.317	2.253	0.621	0.8	1	38.798			
			C	0.258	2.414	0.604	0.8	1	31.372			
T4	1.11	4.04	A	0.314	2.26	0.62	0.8	1	47.075	4.11	205.39	B
135.00-115.00			B	0.379	2.108	0.643	0.8	1	57.580			
			C	0.238	2.475	0.599	0.8	1	35.655			
T5	1.11	4.79	A	0.277	2.359	0.609	0.8	1	48.657	4.18	208.90	B
115.00-95.00			B	0.332	2.214	0.626	0.8	1	58.622			
			C	0.212	2.556	0.593	0.8	1	37.611			
T6	1.12	5.35	A	0.265	2.394	0.606	0.8	1	54.184	4.37	218.70	B
95.00-75.00			B	0.312	2.264	0.62	0.8	1	63.731			
			C	0.208	2.57	0.592	0.8	1	43.217			
T7	1.12	5.79	A	0.259	2.41	0.604	0.8	1	60.830	4.51	225.66	B
75.00-55.00			B	0.301	2.294	0.616	0.8	1	70.066			
			C	0.207	2.571	0.592	0.8	1	49.622			
T8	0.84	5.02	A	0.272	2.373	0.608	0.8	1	54.190	3.55	236.58	B
55.00-40.00			B	0.308	2.274	0.619	0.8	1	60.805			
			C	0.226	2.512	0.596	0.8	1	45.896			
T9	1.12	6.79	A	0.232	2.493	0.597	0.8	1	65.770	4.13	206.44	B
40.00-20.00			B	0.266	2.389	0.606	0.8	1	74.700			
			C	0.189	2.635	0.588	0.8	1	54.797			
T10	1.12	8.13	A	0.221	2.526	0.595	0.8	1	69.183	4.38	219.10	B
20.00-0.00			B	0.253	2.429	0.603	0.8	1	78.007			
			C	0.182	2.657	0.587	0.8	1	58.288			
Sum Weight:	9.22	48.83						OTM	3122.83 kip-ft	36.54		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.15	2.55	A	0.225	2.516	0.596	0.85	1	15.388	1.47	73.27	A
195.00-175.00			B	0.163	2.723	0.584	0.85	1	10.956			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.209	2.565	0.592	0.85	1	14.255			
T2	0.57	2.79	A	0.317	2.252	0.621	0.85	1	31.146	2.57	128.48	A
175.00-155.00			B	0.222	2.524	0.595	0.85	1	22.268			
			C	0.309	2.272	0.619	0.85	1	30.174			
T3	0.95	3.57	A	0.351	2.169	0.633	0.85	1	43.886	3.36	168.06	A
155.00-135.00			B	0.317	2.253	0.621	0.85	1	39.383			
			C	0.258	2.414	0.604	0.85	1	31.957			
T4	1.11	4.04	A	0.314	2.26	0.62	0.85	1	47.877	4.16	208.00	B
135.00-115.00			B	0.379	2.108	0.643	0.85	1	58.312			
			C	0.238	2.475	0.599	0.85	1	36.488			
T5	1.11	4.79	A	0.277	2.359	0.609	0.85	1	49.596	4.24	212.01	B
115.00-95.00			B	0.332	2.214	0.626	0.85	1	59.493			
			C	0.212	2.556	0.593	0.85	1	38.580			
T6	1.12	5.35	A	0.265	2.394	0.606	0.85	1	55.440	4.45	222.74	B
95.00-75.00			B	0.312	2.264	0.62	0.85	1	64.909			
			C	0.208	2.57	0.592	0.85	1	44.507			
T7	1.12	5.79	A	0.259	2.41	0.604	0.85	1	62.447	4.61	230.59	B
75.00-55.00			B	0.301	2.294	0.616	0.85	1	71.597			
			C	0.207	2.571	0.592	0.85	1	51.282			
T8	0.84	5.02	A	0.272	2.373	0.608	0.85	1	55.929	3.65	243.02	B
55.00-40.00			B	0.308	2.274	0.619	0.85	1	62.461			
			C	0.226	2.512	0.596	0.85	1	47.676			
T9	1.12	6.79	A	0.232	2.493	0.597	0.85	1	67.721	4.23	211.60	B
40.00-20.00			B	0.266	2.389	0.606	0.85	1	76.566			
			C	0.189	2.635	0.588	0.85	1	56.790			
T10	1.12	8.13	A	0.221	2.526	0.595	0.85	1	71.325	4.50	224.88	B
20.00-0.00			B	0.253	2.429	0.603	0.85	1	80.065			
			C	0.182	2.657	0.587	0.85	1	60.471			
Sum Weight:	9.22	48.83						OTM	3171.17 kip-ft	37.24		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.32	2.96	A	0.342	2.19	0.63	1	1	25.133	1.56	78.13	A
195.00-175.00			B	0.25	2.439	0.602	1	1	17.526			
			C	0.313	2.262	0.62	1	1	22.633			
T2	1.31	3.35	A	0.464	1.952	0.68	1	1	49.661	2.66	133.15	A
175.00-155.00			B	0.319	2.247	0.622	1	1	33.715			
			C	0.423	2.02	0.661	1	1	44.309			
T3	2.23	4.21	A	0.512	1.884	0.704	1	1	70.846	3.54	176.77	A
155.00-135.00			B	0.456	1.964	0.676	1	1	61.519			
			C	0.353	2.164	0.634	1	1	46.130			
T4	2.60	4.84	A	0.45	1.973	0.673	1	1	74.111	4.33	216.42	B
135.00-115.00			B	0.538	1.855	0.718	1	1	91.917			
			C	0.32	2.245	0.622	1	1	51.410			
T5	2.60	5.68	A	0.397	2.07	0.65	1	1	75.487	4.29	214.63	B
115.00-95.00			B	0.472	1.939	0.684	1	1	91.700			
			C	0.286	2.334	0.612	1	1	54.128			
T6	2.61	6.46	A	0.373	2.121	0.641	1	1	82.273	4.41	220.72	B
95.00-75.00			B	0.437	1.995	0.668	1	1	97.343			
			C	0.275	2.366	0.608	1	1	61.307			
T7	2.64	7.13	A	0.36	2.149	0.636	1	1	91.084	4.51	225.49	B

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
75.00-55.00			B	0.416	2.033	0.658	1	1	105.377			
			C	0.269	2.383	0.607	1	1	69.539			
T8	1.98	6.39	A	0.371	2.124	0.64	1	1	80.323	3.52	234.84	B
55.00-40.00			B	0.42	2.026	0.66	1	1	90.325			
			C	0.289	2.325	0.613	1	1	64.461			
T9	2.64	8.34	A	0.32	2.245	0.622	1	1	97.518	4.10	205.19	B
40.00-20.00			B	0.367	2.133	0.639	1	1	110.906			
			C	0.244	2.457	0.6	1	1	76.819			
T10	2.64	9.80	A	0.304	2.285	0.617	1	1	101.967	4.35	217.34	B
20.00-0.00			B	0.347	2.178	0.631	1	1	115.026			
			C	0.234	2.485	0.598	1	1	81.567			
Sum Weight:	21.59	59.16						OTM	3235.14 kip-ft	37.28		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.32	2.96	A	0.342	2.19	0.63	0.825	1	25.133	1.56	78.13	A
195.00-175.00			B	0.25	2.439	0.602	0.825	1	17.526			
			C	0.313	2.262	0.62	0.825	1	22.633			
T2	1.31	3.35	A	0.464	1.952	0.68	0.825	1	48.006	2.57	128.71	A
175.00-155.00			B	0.319	2.247	0.622	0.825	1	31.690			
			C	0.423	2.02	0.661	0.825	1	42.811			
T3	2.23	4.21	A	0.512	1.884	0.704	0.825	1	69.121	3.45	172.46	A
155.00-135.00			B	0.456	1.964	0.676	0.825	1	59.632			
			C	0.353	2.164	0.634	0.825	1	44.243			
T4	2.60	4.84	A	0.45	1.973	0.673	0.825	1	71.559	4.22	211.24	B
135.00-115.00			B	0.538	1.855	0.718	0.825	1	89.715			
			C	0.32	2.245	0.622	0.825	1	48.675			
T5	2.60	5.68	A	0.397	2.07	0.65	0.825	1	72.446	4.17	208.30	B
115.00-95.00			B	0.472	1.939	0.684	0.825	1	88.994			
			C	0.286	2.334	0.612	0.825	1	50.909			
T6	2.61	6.46	A	0.373	2.121	0.641	0.825	1	78.164	4.25	212.27	B
95.00-75.00			B	0.437	1.995	0.668	0.825	1	93.616			
			C	0.275	2.366	0.608	0.825	1	56.986			
T7	2.64	7.13	A	0.36	2.149	0.636	0.825	1	85.768	4.30	215.03	B
75.00-55.00			B	0.416	2.033	0.658	0.825	1	100.489			
			C	0.269	2.383	0.607	0.825	1	63.948			
T8	1.98	6.39	A	0.371	2.124	0.64	0.825	1	74.568	3.31	220.95	B
55.00-40.00			B	0.42	2.026	0.66	0.825	1	84.984			
			C	0.289	2.325	0.613	0.825	1	58.442			
T9	2.64	8.34	A	0.32	2.245	0.622	0.825	1	91.027	3.88	193.96	B
40.00-20.00			B	0.367	2.133	0.639	0.825	1	104.834			
			C	0.244	2.457	0.6	0.825	1	70.059			
T10	2.64	9.80	A	0.304	2.285	0.617	0.825	1	94.805	4.09	204.59	B
20.00-0.00			B	0.347	2.178	0.631	0.825	1	108.280			
			C	0.234	2.485	0.598	0.825	1	74.139			
Sum Weight:	21.59	59.16						OTM	3134.61 kip-ft	35.81		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.32	2.96	A	0.342	2.19	0.63	0.8	1	25.133	1.56	78.13	A
195.00-175.00			B	0.25	2.439	0.602	0.8	1	17.526			
			C	0.313	2.262	0.62	0.8	1	22.633			
T2	1.31	3.35	A	0.464	1.952	0.68	0.8	1	47.769	2.56	128.07	A
175.00-155.00			B	0.319	2.247	0.622	0.8	1	31.401			
			C	0.423	2.02	0.661	0.8	1	42.597			
T3	2.23	4.21	A	0.512	1.884	0.704	0.8	1	68.875	3.44	171.85	A
155.00-135.00			B	0.456	1.964	0.676	0.8	1	59.362			
			C	0.353	2.164	0.634	0.8	1	43.973			
T4	2.60	4.84	A	0.45	1.973	0.673	0.8	1	71.195	4.21	210.50	B
135.00-115.00			B	0.538	1.855	0.718	0.8	1	89.401			
			C	0.32	2.245	0.622	0.8	1	48.284			
T5	2.60	5.68	A	0.397	2.07	0.65	0.8	1	72.011	4.15	207.39	B
115.00-95.00			B	0.472	1.939	0.684	0.8	1	88.608			
			C	0.286	2.334	0.612	0.8	1	50.449			
T6	2.61	6.46	A	0.373	2.121	0.641	0.8	1	77.577	4.22	211.06	B
95.00-75.00			B	0.437	1.995	0.668	0.8	1	93.084			
			C	0.275	2.366	0.608	0.8	1	56.369			
T7	2.64	7.13	A	0.36	2.149	0.636	0.8	1	85.009	4.27	213.54	B
75.00-55.00			B	0.416	2.033	0.658	0.8	1	99.791			
			C	0.269	2.383	0.607	0.8	1	63.150			
T8	1.98	6.39	A	0.371	2.124	0.64	0.8	1	73.746	3.28	218.97	B
55.00-40.00			B	0.42	2.026	0.66	0.8	1	84.221			
			C	0.289	2.325	0.613	0.8	1	57.582			
T9	2.64	8.34	A	0.32	2.245	0.622	0.8	1	90.099	3.85	192.35	B
40.00-20.00			B	0.367	2.133	0.639	0.8	1	103.967			
			C	0.244	2.457	0.6	0.8	1	69.094			
T10	2.64	9.80	A	0.304	2.285	0.617	0.8	1	93.782	4.06	202.77	B
20.00-0.00			B	0.347	2.178	0.631	0.8	1	107.316			
			C	0.234	2.485	0.598	0.8	1	73.077			
Sum Weight:	21.59	59.16						OTM	3120.25 kip-ft	35.60		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.32	2.96	A	0.342	2.19	0.63	0.85	1	25.133	1.56	78.13	A
195.00-175.00			B	0.25	2.439	0.602	0.85	1	17.526			
			C	0.313	2.262	0.62	0.85	1	22.633			
T2	1.31	3.35	A	0.464	1.952	0.68	0.85	1	48.242	2.59	129.34	A
175.00-155.00			B	0.319	2.247	0.622	0.85	1	31.979			
			C	0.423	2.02	0.661	0.85	1	43.025			
T3	2.23	4.21	A	0.512	1.884	0.704	0.85	1	69.368	3.46	173.08	A
155.00-135.00			B	0.456	1.964	0.676	0.85	1	59.902			
			C	0.353	2.164	0.634	0.85	1	44.513			
T4	2.60	4.84	A	0.45	1.973	0.673	0.85	1	71.924	4.24	211.98	B
135.00-115.00			B	0.538	1.855	0.718	0.85	1	90.030			
			C	0.32	2.245	0.622	0.85	1	49.065			
T5	2.60	5.68	A	0.397	2.07	0.65	0.85	1	72.880	4.18	209.20	B
115.00-95.00			B	0.472	1.939	0.684	0.85	1	89.381			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.286	2.334	0.612	0.85	1	51.369			
T6	2.61	6.46	A	0.373	2.121	0.641	0.85	1	78.751	4.27	213.48	B
95.00-75.00			B	0.437	1.995	0.668	0.85	1	94.149			
			C	0.275	2.366	0.608	0.85	1	57.604			
T7	2.64	7.13	A	0.36	2.149	0.636	0.85	1	86.528	4.33	216.52	B
75.00-55.00			B	0.416	2.033	0.658	0.85	1	101.187			
			C	0.269	2.383	0.607	0.85	1	64.747			
T8	1.98	6.39	A	0.371	2.124	0.64	0.85	1	75.390	3.34	222.94	B
55.00-40.00			B	0.42	2.026	0.66	0.85	1	85.747			
			C	0.289	2.325	0.613	0.85	1	59.302			
T9	2.64	8.34	A	0.32	2.245	0.622	0.85	1	91.954	3.91	195.56	B
40.00-20.00			B	0.367	2.133	0.639	0.85	1	105.701			
			C	0.244	2.457	0.6	0.85	1	71.025			
T10	2.64	9.80	A	0.304	2.285	0.617	0.85	1	95.828	4.13	206.42	B
20.00-0.00			B	0.347	2.178	0.631	0.85	1	109.244			
			C	0.234	2.485	0.598	0.85	1	75.200			
Sum Weight:	21.59	59.16						OTM	3148.97 kip-ft	36.02		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.15	2.55	A	0.225	2.516	0.596	1	1	15.388	0.45	22.61	A
195.00-175.00			B	0.163	2.723	0.584	1	1	10.956			
			C	0.209	2.565	0.592	1	1	14.255			
T2	0.57	2.79	A	0.317	2.252	0.621	1	1	32.685	0.83	41.61	A
175.00-155.00			B	0.222	2.524	0.595	1	1	24.004			
			C	0.309	2.272	0.619	1	1	31.610			
T3	0.95	3.57	A	0.351	2.169	0.633	1	1	45.559	1.08	53.85	A
155.00-135.00			B	0.317	2.253	0.621	1	1	41.137			
			C	0.258	2.414	0.604	1	1	33.711			
T4	1.11	4.04	A	0.314	2.26	0.62	1	1	50.284	1.33	66.61	B
135.00-115.00			B	0.379	2.108	0.643	1	1	60.506			
			C	0.238	2.475	0.599	1	1	38.986			
T5	1.11	4.79	A	0.277	2.359	0.609	1	1	52.414	1.37	68.31	B
115.00-95.00			B	0.332	2.214	0.626	1	1	62.107			
			C	0.212	2.556	0.593	1	1	41.486			
T6	1.12	5.35	A	0.265	2.394	0.606	1	1	59.207	1.45	72.49	B
95.00-75.00			B	0.312	2.264	0.62	1	1	68.445			
			C	0.208	2.57	0.592	1	1	48.378			
T7	1.12	5.79	A	0.259	2.41	0.604	1	1	67.299	1.51	75.74	B
75.00-55.00			B	0.301	2.294	0.616	1	1	76.189			
			C	0.207	2.571	0.592	1	1	56.262			
T8	0.84	5.02	A	0.272	2.373	0.608	1	1	61.146	1.21	80.97	B
55.00-40.00			B	0.308	2.274	0.619	1	1	67.427			
			C	0.226	2.512	0.596	1	1	53.016			
T9	1.12	6.79	A	0.232	2.493	0.597	1	1	73.574	1.40	70.08	B
40.00-20.00			B	0.266	2.389	0.606	1	1	82.164			
			C	0.189	2.635	0.588	1	1	62.768			
T10	1.12	8.13	A	0.221	2.526	0.595	1	1	77.750	1.50	74.76	B
20.00-0.00			B	0.253	2.429	0.603	1	1	86.238			
			C	0.182	2.657	0.587	1	1	67.021			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
Sum Weight:	9.22	48.83						OTM	1023.51 kip-ft	12.14		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.15	2.55	A	0.225	2.516	0.596	0.825	1	15.388	0.45	22.61	A
195.00-175.00			B	0.163	2.723	0.584	0.825	1	10.956			
			C	0.209	2.565	0.592	0.825	1	14.255			
T2	0.57	2.79	A	0.317	2.252	0.621	0.825	1	30.890	0.79	39.33	A
175.00-155.00			B	0.222	2.524	0.595	0.825	1	21.979			
			C	0.309	2.272	0.619	0.825	1	29.935			
T3	0.95	3.57	A	0.351	2.169	0.633	0.825	1	43.607	1.03	51.54	A
155.00-135.00			B	0.317	2.253	0.621	0.825	1	39.091			
			C	0.258	2.414	0.604	0.825	1	31.665			
T4	1.11	4.04	A	0.314	2.26	0.62	0.825	1	47.476	1.28	63.79	B
135.00-115.00			B	0.379	2.108	0.643	0.825	1	57.946			
			C	0.238	2.475	0.599	0.825	1	36.071			
T5	1.11	4.79	A	0.277	2.359	0.609	0.825	1	49.126	1.30	64.95	B
115.00-95.00			B	0.332	2.214	0.626	0.825	1	59.058			
			C	0.212	2.556	0.593	0.825	1	38.095			
T6	1.12	5.35	A	0.265	2.394	0.606	0.825	1	54.812	1.36	68.12	B
95.00-75.00			B	0.312	2.264	0.62	0.825	1	64.320			
			C	0.208	2.57	0.592	0.825	1	43.862			
T7	1.12	5.79	A	0.259	2.41	0.604	0.825	1	61.638	1.41	70.41	B
75.00-55.00			B	0.301	2.294	0.616	0.825	1	70.831			
			C	0.207	2.571	0.592	0.825	1	50.452			
T8	0.84	5.02	A	0.272	2.373	0.608	0.825	1	55.060	1.11	74.01	B
55.00-40.00			B	0.308	2.274	0.619	0.825	1	61.633			
			C	0.226	2.512	0.596	0.825	1	46.786			
T9	1.12	6.79	A	0.232	2.493	0.597	0.825	1	66.745	1.29	64.51	B
40.00-20.00			B	0.266	2.389	0.606	0.825	1	75.633			
			C	0.189	2.635	0.588	0.825	1	55.794			
T10	1.12	8.13	A	0.221	2.526	0.595	0.825	1	70.254	1.37	68.52	B
20.00-0.00			B	0.253	2.429	0.603	0.825	1	79.036			
			C	0.182	2.657	0.587	0.825	1	59.379			
Sum Weight:	9.22	48.83						OTM	971.30 kip-ft	11.39		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.15	2.55	A	0.225	2.516	0.596	0.8	1	15.388	0.45	22.61	A
195.00-175.00			B	0.163	2.723	0.584	0.8	1	10.956			
			C	0.209	2.565	0.592	0.8	1	14.255			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T2	0.57	2.79	A	0.317	2.252	0.621	0.8	1	30.634	0.78	39.00	A
175.00-155.00			B	0.222	2.524	0.595	0.8	1	21.689			
			C	0.309	2.272	0.619	0.8	1	29.696			
T3	0.95	3.57	A	0.351	2.169	0.633	0.8	1	43.328	1.02	51.21	A
155.00-135.00			B	0.317	2.253	0.621	0.8	1	38.798			
			C	0.258	2.414	0.604	0.8	1	31.372			
T4	1.11	4.04	A	0.314	2.26	0.62	0.8	1	47.075	1.27	63.39	B
135.00-115.00			B	0.379	2.108	0.643	0.8	1	57.580			
			C	0.238	2.475	0.599	0.8	1	35.655			
T5	1.11	4.79	A	0.277	2.359	0.609	0.8	1	48.657	1.29	64.48	B
115.00-95.00			B	0.332	2.214	0.626	0.8	1	58.622			
			C	0.212	2.556	0.593	0.8	1	37.611			
T6	1.12	5.35	A	0.265	2.394	0.606	0.8	1	54.184	1.35	67.50	B
95.00-75.00			B	0.312	2.264	0.62	0.8	1	63.731			
			C	0.208	2.57	0.592	0.8	1	43.217			
T7	1.12	5.79	A	0.259	2.41	0.604	0.8	1	60.830	1.39	69.65	B
75.00-55.00			B	0.301	2.294	0.616	0.8	1	70.066			
			C	0.207	2.571	0.592	0.8	1	49.622			
T8	0.84	5.02	A	0.272	2.373	0.608	0.8	1	54.190	1.10	73.02	B
55.00-40.00			B	0.308	2.274	0.619	0.8	1	60.805			
			C	0.226	2.512	0.596	0.8	1	45.896			
T9	1.12	6.79	A	0.232	2.493	0.597	0.8	1	65.770	1.27	63.72	B
40.00-20.00			B	0.266	2.389	0.606	0.8	1	74.700			
			C	0.189	2.635	0.588	0.8	1	54.797			
T10	1.12	8.13	A	0.221	2.526	0.595	0.8	1	69.183	1.35	67.62	B
20.00-0.00			B	0.253	2.429	0.603	0.8	1	78.007			
			C	0.182	2.657	0.587	0.8	1	58.288			
Sum Weight:	9.22	48.83						OTM	963.84 kip-ft	11.28		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.15	2.55	A	0.225	2.516	0.596	0.85	1	15.388	0.45	22.61	A
195.00-175.00			B	0.163	2.723	0.584	0.85	1	10.956			
			C	0.209	2.565	0.592	0.85	1	14.255			
T2	0.57	2.79	A	0.317	2.252	0.621	0.85	1	31.146	0.79	39.65	A
175.00-155.00			B	0.222	2.524	0.595	0.85	1	22.268			
			C	0.309	2.272	0.619	0.85	1	30.174			
T3	0.95	3.57	A	0.351	2.169	0.633	0.85	1	43.886	1.04	51.87	A
155.00-135.00			B	0.317	2.253	0.621	0.85	1	39.383			
			C	0.258	2.414	0.604	0.85	1	31.957			
T4	1.11	4.04	A	0.314	2.26	0.62	0.85	1	47.877	1.28	64.20	B
135.00-115.00			B	0.379	2.108	0.643	0.85	1	58.312			
			C	0.238	2.475	0.599	0.85	1	36.488			
T5	1.11	4.79	A	0.277	2.359	0.609	0.85	1	49.596	1.31	65.43	B
115.00-95.00			B	0.332	2.214	0.626	0.85	1	59.493			
			C	0.212	2.556	0.593	0.85	1	38.580			
T6	1.12	5.35	A	0.265	2.394	0.606	0.85	1	55.440	1.37	68.75	B
95.00-75.00			B	0.312	2.264	0.62	0.85	1	64.909			
			C	0.208	2.57	0.592	0.85	1	44.507			
T7	1.12	5.79	A	0.259	2.41	0.604	0.85	1	62.447	1.42	71.17	B
75.00-55.00			B	0.301	2.294	0.616	0.85	1	71.597			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.207	2.571	0.592	0.85	1	51.282			
T8	0.84	5.02	A	0.272	2.373	0.608	0.85	1	55.929	1.13	75.01	B
55.00-40.00			B	0.308	2.274	0.619	0.85	1	62.461			
			C	0.226	2.512	0.596	0.85	1	47.676			
T9	1.12	6.79	A	0.232	2.493	0.597	0.85	1	67.721	1.31	65.31	B
40.00-20.00			B	0.266	2.389	0.606	0.85	1	76.566			
			C	0.189	2.635	0.588	0.85	1	56.790			
T10	1.12	8.13	A	0.221	2.526	0.595	0.85	1	71.325	1.39	69.41	B
20.00-0.00			B	0.253	2.429	0.603	0.85	1	80.065			
			C	0.182	2.657	0.587	0.85	1	60.471			
Sum Weight:	9.22	48.83						OTM	978.76 kip-ft	11.49		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	29.31					
Bracing Weight	19.52					
Total Member Self-Weight	48.83			-21.74	21.21	
Total Weight	70.25			-21.74	21.21	
Wind 0 deg - No Ice		-0.06	-60.77	-6965.03	29.70	-27.86
Wind 30 deg - No Ice		29.27	-50.79	-5904.97	-3367.11	-44.78
Wind 45 deg - No Ice		41.17	-41.21	-4805.75	-4757.91	-49.13
Wind 60 deg - No Ice		50.15	-28.94	-3389.36	-5814.17	-50.02
Wind 90 deg - No Ice		58.64	0.06	-13.25	-6770.14	-43.95
Wind 120 deg - No Ice		52.61	30.43	3457.26	-5990.11	-26.98
Wind 135 deg - No Ice		41.26	41.29	4774.27	-4769.92	-12.25
Wind 150 deg - No Ice		29.37	50.85	5869.98	-3381.82	0.83
Wind 180 deg - No Ice		0.06	57.99	6728.19	12.72	25.82
Wind 210 deg - No Ice		-29.27	50.79	5861.49	3409.53	44.78
Wind 225 deg - No Ice		-41.17	41.21	4762.26	4800.33	49.13
Wind 240 deg - No Ice		-52.55	30.33	3442.55	6024.04	54.84
Wind 270 deg - No Ice		-58.64	-0.06	-30.24	6812.56	43.95
Wind 300 deg - No Ice		-50.21	-29.05	-3404.06	5865.08	24.20
Wind 315 deg - No Ice		-41.26	-41.29	-4817.76	4812.34	12.25
Wind 330 deg - No Ice		-29.37	-50.85	-5913.47	3424.24	-0.83
Member Ice	10.33					
Total Weight Ice	97.62			-63.89	47.77	
Wind 0 deg - Ice		-0.05	-56.26	-6502.64	54.39	-29.03
Wind 30 deg - Ice		27.44	-47.61	-5562.08	-3120.17	-48.31
Wind 45 deg - Ice		38.69	-38.71	-4541.00	-4425.65	-53.45
Wind 60 deg - Ice		47.22	-27.25	-3220.08	-5421.01	-54.87
Wind 90 deg - Ice		54.97	0.05	-57.26	-6299.58	-48.14
Wind 120 deg - Ice		48.72	28.17	3161.23	-5527.14	-29.11
Wind 135 deg - Ice		38.75	38.78	4422.60	-4435.02	-14.11
Wind 150 deg - Ice		27.52	47.66	5440.93	-3131.65	0.17
Wind 180 deg - Ice		0.05	54.58	6259.98	41.14	27.65
Wind 210 deg - Ice		-27.44	47.61	5434.30	3215.70	48.31
Wind 225 deg - Ice		-38.69	38.71	4413.23	4521.18	53.45
Wind 240 deg - Ice		-48.67	28.09	3149.75	5616.04	58.14
Wind 270 deg - Ice		-54.97	-0.05	-70.51	6395.11	48.14
Wind 300 deg - Ice		-47.26	-27.33	-3231.56	5523.17	27.23
Wind 315 deg - Ice		-38.75	-38.78	-4550.38	4530.55	14.11

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 330 deg - Ice		-27.52	-47.66	-5568.70	3227.18	-0.17
Total Weight	70.25			-21.74	21.21	
Wind 0 deg - Service		-0.02	-18.75	-2134.46	2.58	-8.60
Wind 30 deg - Service		9.03	-15.68	-1807.28	-1045.82	-13.82
Wind 45 deg - Service		12.71	-12.72	-1468.01	-1475.07	-15.16
Wind 60 deg - Service		15.48	-8.93	-1030.85	-1801.08	-15.44
Wind 90 deg - Service		18.10	0.02	11.15	-2096.13	-13.56
Wind 120 deg - Service		16.24	9.39	1082.30	-1855.38	-8.33
Wind 135 deg - Service		12.73	12.74	1488.78	-1478.78	-3.78
Wind 150 deg - Service		9.06	15.69	1826.96	-1050.36	0.26
Wind 180 deg - Service		0.02	17.90	2091.84	-2.66	7.97
Wind 210 deg - Service		-9.03	15.68	1824.34	1045.74	13.82
Wind 225 deg - Service		-12.71	12.72	1485.08	1475.00	15.16
Wind 240 deg - Service		-16.22	9.36	1077.76	1852.69	16.93
Wind 270 deg - Service		-18.10	-0.02	5.91	2096.06	13.56
Wind 300 deg - Service		-15.50	-8.96	-1035.39	1803.62	7.47
Wind 315 deg - Service		-12.73	-12.74	-1471.72	1478.70	3.78
Wind 330 deg - Service		-9.06	-15.69	-1809.90	1050.28	-0.26

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
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

Comb. No.	Description
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	195 - 175	Leg	Max Tension	10	17.65	-0.22	0.00
			Max. Compression	13	-22.22	0.48	-0.03
			Max. Mx	5	-1.83	1.05	-0.23
			Max. My	16	-0.30	0.09	-1.51
			Max. Vy	5	0.96	-0.53	-0.23
			Max. Vx	16	1.28	0.09	0.61
		Diagonal	Max Tension	6	5.01	0.00	0.00
			Max. Compression	6	-5.05	0.00	0.00
			Max. Mx	29	2.99	-0.01	0.00
			Max. My	14	-3.81	-0.00	-0.00
			Max. Vy	29	-0.01	-0.01	-0.00
			Max. Vx	14	0.00	-0.00	-0.00
		Top Girt	Max Tension	10	0.12	0.00	0.00
			Max. Compression	7	-0.14	0.00	0.00
			Max. Mx	18	-0.02	0.02	0.00
			Max. My	8	0.02	0.00	-0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	8	0.00	0.00	0.00
		Bottom Girt	Max Tension	2	0.30	0.00	0.00
			Max. Compression	15	-0.34	0.00	0.00
			Max. Mx	18	-0.02	0.02	0.00
			Max. My	34	-0.02	0.00	-0.00
			Max. Vy	18	-0.02	0.00	0.00
			Max. Vx	34	0.00	0.00	0.00
T2	175 - 155	Leg	Max Tension	10	52.79	-0.53	-0.02
			Max. Compression	13	-61.84	0.34	-0.00
			Max. Mx	5	24.77	1.16	0.03
			Max. My	17	-4.72	-0.04	-1.15
			Max. Vy	5	-0.86	-0.53	0.01
			Max. Vx	17	0.81	-0.01	0.38
		Diagonal	Max Tension	6	7.31	0.00	0.00
			Max. Compression	6	-7.40	0.00	0.00
			Max. Mx	28	3.34	0.02	-0.00
			Max. My	14	-6.88	0.00	0.02
			Max. Vy	27	0.02	0.02	-0.00
			Max. Vx	14	-0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T3	155 - 135	Leg	Max Tension	10	92.84	-1.15	0.00
			Max. Compression	13	-107.71	-0.15	-0.05
			Max. Mx	15	76.18	2.07	-0.04
			Max. My	6	-5.86	-0.05	-2.10
			Max. Vy	10	0.99	-1.15	0.00
			Max. Vx	14	0.99	-0.03	-1.07
		Diagonal	Max Tension	6	8.78	0.00	0.00
			Max. Compression	6	-8.84	0.00	0.00
			Max. Mx	33	5.98	0.04	-0.00
			Max. My	32	-7.02	0.02	0.01
			Max. Vy	33	0.03	0.04	-0.00
			Max. Vx	32	-0.00	0.00	0.00
T4	135 - 115	Leg	Max Tension	10	133.85	-0.13	-0.02
			Max. Compression	13	-152.90	0.34	-0.06
			Max. Mx	7	-152.38	0.34	0.03
			Max. My	14	-8.90	-0.00	-0.31
			Max. Vy	10	0.12	-0.31	-0.02
			Max. Vx	14	0.11	-0.00	-0.19
		Diagonal	Max Tension	6	8.20	0.00	0.00
			Max. Compression	6	-8.25	0.00	0.00
			Max. Mx	30	6.07	0.06	-0.01
			Max. My	27	-6.54	0.03	-0.01
			Max. Vy	32	0.03	0.06	0.01
			Max. Vx	27	0.00	0.00	0.00
T5	115 - 95	Leg	Max Tension	15	168.97	-0.22	-0.03
			Max. Compression	13	-192.71	0.19	-0.06
			Max. Mx	7	-165.75	0.34	0.03
			Max. My	14	-9.24	-0.00	-0.31
			Max. Vy	10	-0.07	-0.34	-0.03
			Max. Vx	13	-0.10	-0.17	-0.29
		Diagonal	Max Tension	3	8.28	0.00	0.00
			Max. Compression	3	-8.40	0.00	0.00
			Max. Mx	32	6.29	0.09	-0.01
			Max. My	21	-7.79	0.05	0.01
			Max. Vy	32	0.05	0.09	-0.01
			Max. Vx	21	-0.00	0.00	0.00
T6	95 - 75	Leg	Max Tension	15	201.14	-0.26	-0.03
			Max. Compression	2	-230.00	0.19	0.02
			Max. Mx	10	200.41	-0.26	-0.03
			Max. My	14	-12.95	-0.01	-0.32
			Max. Vy	27	-0.09	-0.25	-0.03
			Max. Vx	30	-0.14	-0.13	-0.28
		Diagonal	Max Tension	3	8.91	0.00	0.00
			Max. Compression	3	-8.99	0.00	0.00
			Max. Mx	32	6.38	0.12	-0.01
			Max. My	21	-8.41	0.06	0.02
			Max. Vy	32	0.05	0.12	-0.01
			Max. Vx	21	-0.00	0.00	0.00
T7	75 - 55	Leg	Max Tension	15	231.34	-0.30	-0.03
			Max. Compression	2	-266.06	0.07	-0.01
			Max. Mx	27	206.48	-0.32	-0.03
			Max. My	14	-15.58	-0.04	-0.39
			Max. Vy	27	-0.10	-0.32	-0.03
			Max. Vx	14	-0.13	-0.04	-0.39
		Diagonal	Max Tension	3	9.60	0.00	0.00
			Max. Compression	3	-9.71	0.00	0.00
			Max. Mx	19	6.58	0.14	0.02
			Max. My	21	-8.82	0.07	0.02
			Max. Vy	32	0.06	0.14	-0.02
			Max. Vx	21	-0.00	0.00	0.00
T8	55 - 40	Leg	Max Tension	15	254.16	-0.12	-0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	2	-294.14	0.61	0.06
			Max. Mx	27	226.05	-1.05	-0.05
			Max. My	31	-27.18	-0.51	-0.58
			Max. Vy	27	0.29	-1.05	-0.05
			Max. Vx	23	-0.14	-0.51	0.58
		Diagonal	Max Tension	28	9.89	0.00	0.00
			Max. Compression	11	-9.96	0.00	0.00
			Max. Mx	32	6.39	0.14	-0.02
			Max. My	21	-9.08	0.09	0.03
			Max. Vy	32	0.06	0.14	-0.02
			Max. Vx	21	-0.00	0.00	0.00
T9	40 - 20	Leg	Max Tension	15	280.80	-0.28	-0.02
			Max. Compression	2	-327.48	0.31	0.03
			Max. Mx	24	-308.78	2.29	0.04
			Max. My	31	-27.36	-0.51	-0.58
			Max. Vy	24	-0.51	2.29	0.04
			Max. Vx	14	0.13	-0.03	-0.55
		Diagonal	Max Tension	28	11.02	0.00	0.00
			Max. Compression	28	-11.84	0.00	0.00
			Max. Mx	32	5.74	0.26	-0.02
			Max. My	21	-11.43	0.20	0.03
			Max. Vy	32	0.09	0.26	-0.02
			Max. Vx	21	-0.00	0.00	0.00
T10	20 - 0	Leg	Max Tension	15	307.14	-0.29	-0.03
			Max. Compression	2	-361.71	-0.00	-0.00
			Max. Mx	24	-329.70	3.56	0.03
			Max. My	14	-23.57	-0.05	-0.67
			Max. Vy	27	-0.98	-3.22	-0.01
			Max. Vx	14	-0.17	-0.05	-0.67
		Diagonal	Max Tension	28	14.67	0.00	0.00
			Max. Compression	28	-14.04	0.00	0.00
			Max. Mx	32	4.10	0.40	-0.03
			Max. My	21	-12.97	0.32	0.05
			Max. Vy	32	0.11	0.40	-0.03
			Max. Vx	21	-0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	13	365.45	31.70	-19.85
	Max. H_x	13	365.45	31.70	-19.85
	Max. H_z	21	-268.60	-29.64	19.84
	Min. Vert	5	-308.35	-27.41	17.25
	Min. H_x	22	-278.55	-31.02	19.43
	Min. H_z	13	365.45	31.70	-19.85
Leg B	Max. Vert	7	364.37	-32.07	-19.28
	Max. H_x	32	-283.20	31.45	18.93
	Max. H_z	33	-273.31	30.22	19.07
	Min. Vert	15	-310.89	27.80	16.75
	Min. H_x	7	364.37	-32.07	-19.28
	Min. H_z	7	364.37	-32.07	-19.28
Leg A	Max. Vert	2	366.77	-0.68	37.45
	Max. H_x	14	24.91	5.64	1.88
	Max. H_z	2	366.77	-0.68	37.45
	Min. Vert	10	-308.27	0.63	-32.41

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. H_x	6	24.07	-5.67	1.81
	Min. H_z	27	-276.35	0.66	-36.58

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	70.25	0.00	0.00	-21.74	21.21	0.00
Dead+Wind 0 deg - No Ice	70.25	-0.06	-60.77	-6987.77	29.83	-27.93
Dead+Wind 30 deg - No Ice	70.25	29.27	-50.79	-5924.36	-3378.15	-44.85
Dead+Wind 45 deg - No Ice	70.25	41.17	-41.21	-4821.56	-4773.54	-49.18
Dead+Wind 60 deg - No Ice	70.25	50.15	-28.94	-3400.52	-5833.31	-50.07
Dead+Wind 90 deg - No Ice	70.25	58.64	0.06	-13.29	-6792.42	-43.96
Dead+Wind 120 deg - No Ice	70.25	52.61	30.43	3468.60	-6009.73	-26.97
Dead+Wind 135 deg - No Ice	70.25	41.26	41.29	4790.03	-4785.63	-12.23
Dead+Wind 150 deg - No Ice	70.25	29.37	50.85	5889.33	-3392.93	0.88
Dead+Wind 180 deg - No Ice	70.25	0.06	57.99	6750.40	12.79	25.89
Dead+Wind 210 deg - No Ice	70.25	-29.27	50.79	5880.78	3420.78	44.85
Dead+Wind 225 deg - No Ice	70.25	-41.17	41.21	4777.95	4816.16	49.19
Dead+Wind 240 deg - No Ice	70.25	-52.55	30.33	3453.82	6043.78	54.90
Dead+Wind 270 deg - No Ice	70.25	-58.64	-0.06	-30.31	6834.96	43.96
Dead+Wind 300 deg - No Ice	70.25	-50.21	-29.05	-3415.22	5884.39	24.18
Dead+Wind 315 deg - No Ice	70.25	-41.26	-41.29	-4833.55	4828.17	12.21
Dead+Wind 330 deg - No Ice	70.25	-29.37	-50.85	-5932.84	3435.51	-0.88
Dead+Ice+Temp	97.62	0.00	0.00	-63.89	47.76	-0.00
Dead+Wind 0 deg+Ice+Temp	97.62	-0.05	-56.26	-6529.65	54.62	-29.15
Dead+Wind 30 deg+Ice+Temp	97.62	27.44	-47.61	-5585.28	-3133.24	-48.47
Dead+Wind 45 deg+Ice+Temp	97.62	38.69	-38.71	-4559.96	-4444.20	-53.62
Dead+Wind 60 deg+Ice+Temp	97.62	47.22	-27.25	-3233.53	-5443.77	-55.03
Dead+Wind 90 deg+Ice+Temp	97.62	54.97	0.05	-57.45	-6326.01	-48.25
Dead+Wind 120 deg+Ice+Temp	97.62	48.72	28.17	3174.51	-5550.25	-29.13
Dead+Wind 135 deg+Ice+Temp	97.62	38.75	38.78	4441.24	-4453.63	-14.09
Dead+Wind 150 deg+Ice+Temp	97.62	27.52	47.66	5463.84	-3144.77	0.24
Dead+Wind 180 deg+Ice+Temp	97.62	0.05	54.58	6286.41	41.45	27.77
Dead+Wind 210 deg+Ice+Temp	97.62	-27.44	47.61	5457.16	3229.21	48.47
Dead+Wind 225 deg+Ice+Temp	97.62	-38.69	38.71	4431.81	4540.15	53.62
Dead+Wind 240 deg+Ice+Temp	97.62	-48.67	28.09	3162.98	5639.50	58.29
Dead+Wind 270 deg+Ice+Temp	97.62	-54.97	-0.05	-70.71	6421.88	48.25
Dead+Wind 300 deg+Ice+Temp	97.62	-47.26	-27.33	-3245.10	5546.30	27.25
Dead+Wind 315 deg+Ice+Temp	97.62	-38.75	-38.78	-4569.30	4549.51	14.09
Dead+Wind 330 deg+Ice+Temp	97.62	-27.52	-47.66	-5591.88	3240.67	-0.24
Dead+Wind 0 deg - Service	70.25	-0.02	-18.75	-2171.78	23.90	-8.62
Dead+Wind 30 deg - Service	70.25	9.03	-15.68	-1843.56	-1027.95	-13.84
Dead+Wind 45 deg - Service	70.25	12.71	-12.72	-1503.18	-1458.63	-15.18
Dead+Wind 60 deg - Service	70.25	15.48	-8.93	-1064.59	-1785.72	-15.45
Dead+Wind 90 deg - Service	70.25	18.10	0.02	-19.14	-2081.74	-13.57
Dead+Wind 120 deg - Service	70.25	16.24	9.39	1055.52	-1840.16	-8.32
Dead+Wind 135 deg - Service	70.25	12.73	12.74	1463.37	-1462.35	-3.77
Dead+Wind 150 deg - Service	70.25	9.06	15.69	1802.66	-1032.51	0.27
Dead+Wind 180 deg - Service	70.25	0.02	17.90	2068.43	18.64	7.99
Dead+Wind 210 deg - Service	70.25	-9.03	15.68	1800.03	1070.50	13.84
Dead+Wind 225 deg - Service	70.25	-12.71	12.72	1459.65	1501.18	15.18
Dead+Wind 240 deg - Service	70.25	-16.22	9.36	1050.97	1880.08	16.95
Dead+Wind 270 deg - Service	70.25	-18.10	-0.02	-24.40	2124.28	13.57
Dead+Wind 300 deg - Service	70.25	-15.50	-8.96	-1069.13	1830.89	7.46
Dead+Wind 315 deg - Service	70.25	-12.73	-12.74	-1506.90	1504.89	3.77

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 330 deg - Service	70.25	-9.06	-15.69	-1846.18	1075.06	-0.27

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-70.25	0.00	0.00	70.25	0.00	0.000%
2	-0.06	-70.25	-60.77	0.06	70.25	60.77	0.000%
3	29.27	-70.25	-50.79	-29.27	70.25	50.79	0.000%
4	41.17	-70.25	-41.21	-41.17	70.25	41.21	0.000%
5	50.15	-70.25	-28.94	-50.15	70.25	28.94	0.000%
6	58.64	-70.25	0.06	-58.64	70.25	-0.06	0.001%
7	52.61	-70.25	30.43	-52.61	70.25	-30.43	0.000%
8	41.26	-70.25	41.29	-41.26	70.25	-41.29	0.000%
9	29.37	-70.25	50.85	-29.37	70.25	-50.85	0.000%
10	0.06	-70.25	57.99	-0.06	70.25	-57.99	0.000%
11	-29.27	-70.25	50.79	29.27	70.25	-50.79	0.000%
12	-41.17	-70.25	41.21	41.17	70.25	-41.21	0.001%
13	-52.55	-70.25	30.33	52.55	70.25	-30.33	0.000%
14	-58.64	-70.25	-0.06	58.64	70.25	0.06	0.001%
15	-50.21	-70.25	-29.05	50.21	70.25	29.05	0.000%
16	-41.26	-70.25	-41.29	41.26	70.25	41.29	0.000%
17	-29.37	-70.25	-50.85	29.37	70.25	50.85	0.000%
18	0.00	-97.62	0.00	-0.00	97.62	-0.00	0.000%
19	-0.05	-97.62	-56.26	0.05	97.62	56.26	0.000%
20	27.44	-97.62	-47.61	-27.44	97.62	47.61	0.000%
21	38.69	-97.62	-38.71	-38.69	97.62	38.71	0.000%
22	47.22	-97.62	-27.25	-47.22	97.62	27.25	0.000%
23	54.97	-97.62	0.05	-54.97	97.62	-0.05	0.000%
24	48.72	-97.62	28.17	-48.72	97.62	-28.17	0.000%
25	38.75	-97.62	38.78	-38.75	97.62	-38.78	0.000%
26	27.52	-97.62	47.66	-27.52	97.62	-47.66	0.000%
27	0.05	-97.62	54.58	-0.05	97.62	-54.58	0.000%
28	-27.44	-97.62	47.61	27.44	97.62	-47.61	0.000%
29	-38.69	-97.62	38.71	38.69	97.62	-38.71	0.000%
30	-48.67	-97.62	28.09	48.67	97.62	-28.09	0.000%
31	-54.97	-97.62	-0.05	54.97	97.62	0.05	0.000%
32	-47.26	-97.62	-27.33	47.26	97.62	27.33	0.000%
33	-38.75	-97.62	-38.78	38.75	97.62	38.78	0.000%
34	-27.52	-97.62	-47.66	27.52	97.62	47.66	0.000%
35	-0.02	-70.25	-18.75	0.02	70.25	18.75	0.000%
36	9.03	-70.25	-15.68	-9.03	70.25	15.68	0.000%
37	12.71	-70.25	-12.72	-12.71	70.25	12.72	0.000%
38	15.48	-70.25	-8.93	-15.48	70.25	8.93	0.000%
39	18.10	-70.25	0.02	-18.10	70.25	-0.02	0.000%
40	16.24	-70.25	9.39	-16.24	70.25	-9.39	0.000%
41	12.73	-70.25	12.74	-12.73	70.25	-12.74	0.000%
42	9.06	-70.25	15.69	-9.06	70.25	-15.69	0.000%
43	0.02	-70.25	17.90	-0.02	70.25	-17.90	0.000%
44	-9.03	-70.25	15.68	9.03	70.25	-15.68	0.000%
45	-12.71	-70.25	12.72	12.71	70.25	-12.72	0.000%
46	-16.22	-70.25	9.36	16.22	70.25	-9.36	0.000%
47	-18.10	-70.25	-0.02	18.10	70.25	0.02	0.000%
48	-15.50	-70.25	-8.96	15.50	70.25	8.96	0.000%
49	-12.73	-70.25	-12.74	12.73	70.25	12.74	0.000%
50	-9.06	-70.25	-15.69	9.06	70.25	15.69	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	0.00000076
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	0.00000101
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000075
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	0.00000078
20	Yes	4	0.00000001	0.00000114
21	Yes	4	0.00000001	0.00000120
22	Yes	4	0.00000001	0.00000122
23	Yes	4	0.00000001	0.00000124
24	Yes	4	0.00000001	0.00000074
25	Yes	4	0.00000001	0.00000095
26	Yes	4	0.00000001	0.00000118
27	Yes	4	0.00000001	0.00000122
28	Yes	4	0.00000001	0.00000112
29	Yes	4	0.00000001	0.00000088
30	Yes	4	0.00000001	0.00000079
31	Yes	4	0.00000001	0.00000127
32	Yes	4	0.00000001	0.00000125
33	Yes	4	0.00000001	0.00000126
34	Yes	4	0.00000001	0.00000123
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
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	195 - 175	3.476	46	0.1416	0.0308
T2	175 - 155	2.879	46	0.1370	0.0208
T3	155 - 135	2.291	46	0.1269	0.0152
T4	135 - 115	1.766	35	0.1121	0.0162
T5	115 - 95	1.301	35	0.0956	0.0167
T6	95 - 75	0.916	35	0.0770	0.0156
T7	75 - 55	0.603	35	0.0596	0.0134
T8	55 - 40	0.353	35	0.0437	0.0101
T9	40 - 20	0.199	35	0.0317	0.0066
T10	20 - 0	0.065	35	0.0151	0.0032

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
190.00	15-ft Triangular Mount	46	3.327	0.1407	0.0284	676993
180.00	Pirod 15' T-Frame Sector Mount (1)	46	3.028	0.1385	0.0236	225666
175.00	DC6-48-60-18-8F Surge Arrestor	46	2.879	0.1370	0.0208	210270
173.00	800 10121	46	2.819	0.1362	0.0198	287025
172.00	Pirod 12' T-Frame Sector Mount (1)	46	2.789	0.1359	0.0192	360355
160.00	Pirod 15' T-Frame Sector Mount (1)	46	2.434	0.1300	0.0158	80825
145.00	Pirod 15' T-Frame Sector Mount (1)	35	2.021	0.1198	0.0161	74260
80.00	GPS	35	0.675	0.0638	0.0140	70030

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 175	11.186	13	0.4507	0.0999
T2	175 - 155	9.280	13	0.4385	0.0673
T3	155 - 135	7.401	2	0.4078	0.0583
T4	135 - 115	5.703	2	0.3608	0.0617
T5	115 - 95	4.199	2	0.3084	0.0608
T6	95 - 75	2.956	2	0.2484	0.0557
T7	75 - 55	1.946	2	0.1921	0.0474
T8	55 - 40	1.139	2	0.1407	0.0356
T9	40 - 20	0.642	2	0.1020	0.0232
T10	20 - 0	0.211	7	0.0486	0.0111

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
190.00	15-ft Triangular Mount	13	10.711	0.4485	0.0922	312100
180.00	Pirod 15' T-Frame Sector Mount (1)	13	9.759	0.4428	0.0765	104033
175.00	DC6-48-60-18-8F Surge Arrestor	13	9.280	0.4385	0.0673	101885
173.00	800 10121	2	9.090	0.4364	0.0640	160093
172.00	Pirod 12' T-Frame Sector Mount (1)	2	8.994	0.4353	0.0623	267257
160.00	Pirod 15' T-Frame Sector Mount (1)	2	7.859	0.4174	0.0551	26390
145.00	Pirod 15' T-Frame Sector Mount (1)	2	6.527	0.3855	0.0610	23407
80.00	GPS	2	2.178	0.2056	0.0497	21740

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	195	Leg	A325N	1.1250	4	4.41	43.74	0.101 ✔	1.333	Bolt Tension
T2	175	Leg	A325N	1.1250	6	8.80	43.74	0.201 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.8750	1	7.31	7.14	1.024 ✔	1.333	Member Bearing
T3	155	Leg	A325N	1.1250	6	15.47	43.74	0.354 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.8750	1	8.78	11.89	0.738 ✔	1.333	Member Bearing
T4	135	Leg	A325N	1.1250	6	22.31	43.74	0.510 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.8750	1	8.20	9.52	0.862 ✔	1.333	Member Bearing
T5	115	Leg	A325N	1.1250	8	21.12	43.74	0.483 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	8.40	16.49	0.509 ✔	1.333	Bolt Shear
T6	95	Leg	A325N	1.1250	8	25.14	43.74	0.575 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	8.91	13.59	0.656 ✔	1.333	Member Bearing
T7	75	Leg	A325N	1.2500	8	28.92	54.00	0.536 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	9.60	10.88	0.883 ✔	1.333	Member Bearing
T8	55	Leg	A325N	1.2500	8	31.77	54.00	0.588 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	9.89	10.88	0.910 ✔	1.333	Member Bearing
T9	40	Leg	A325N	1.2500	8	35.10	54.00	0.650 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	11.02	13.59	0.810 ✔	1.333	Member Bearing
T10	20	Leg	A449	1.3750	8	38.39	51.45	0.746 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	14.67	16.31	0.899 ✔	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	195 - 175	3	20.01	3.33	53.4 K=1.00	23.819	7.0686	-22.22	168.37	0.132 ✓
T2	175 - 155	3 3/4	20.03	6.68	85.5 K=1.00	17.895	11.0447	-61.84	197.65	0.313 ✓
T3	155 - 135	4	20.03	6.68	80.1 K=1.00	18.986	12.5664	-107.71	238.58	0.451 ✓
T4	135 - 115	4 1/4	20.03	6.68	75.4 K=1.00	19.913	14.1863	-152.90	282.48	0.541 ✓
T5	115 - 95	4 1/4	20.03	6.68	75.4 K=1.00	19.913	14.1863	-192.71	282.48	0.682 ✓
T6	95 - 75	4 1/2	20.03	6.68	71.2 K=1.00	20.709	15.9043	-230.00	329.36	0.698 ✓
T7	75 - 55	4 3/4	20.03	6.68	67.5 K=1.00	21.400	17.7205	-266.06	379.22	0.702 ✓
T8	55 - 40	4 3/4	15.03	5.01	50.6 K=1.00	24.255	17.7205	-294.14	429.82	0.684 ✓
T9	40 - 20	4 3/4	20.03	6.68	67.5 K=1.00	21.400	17.7205	-327.48	379.22	0.864 ✓
T10	20 - 0	5	20.03	6.68	64.1 K=1.00	22.004	19.6350	-361.71	432.05	0.837 ✓

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 $\frac{P}{P_a}$
T1	195 - 175	1 1/4	6.79	3.30	95.0 K=0.75	13.596	1.2272	-5.05	16.68	0.303 ✓
T2	175 - 155	L2 1/2x2 1/2x3/16	10.16	4.94	119.9 K=1.00	10.299	0.9020	-7.40	9.29	0.797 ✓
T3	155 - 135	L2 1/2x2 1/2x5/16	11.74	5.72	140.4 K=1.00	7.576	1.4600	-8.84	11.06	0.799 ✓
T4	135 - 115	L3x3x1/4	13.44	6.56	132.9 K=1.00	8.455	1.4400	-8.00	12.18	0.657 ✓
T5	115 - 95	L3x3x3/8	15.21	7.43	151.8 K=1.00	6.481	2.1100	-8.40	13.67	0.615 ✓
T6	95 - 75	L3 1/2x3 1/2x5/16	17.03	8.32	144.8 K=1.00	7.125	2.0900	-8.99	14.89	0.603 ✓
T7	75 - 55	L4x4x1/4	18.88	9.24	139.5 K=1.00	7.674	1.9400	-9.71	14.89	0.653 ✓
T8	55 - 40	L4x4x1/4	19.89	9.70	146.5 K=1.00	6.962	1.9400	-9.96	13.51	0.738 ✓
T9	40 - 20	L4x4x5/16	22.19	10.90	165.3 K=1.00	5.464	2.4000	-11.84	13.11	0.903 ✓
T10	20 - 0	L4x4x3/8	23.47	11.52	175.5 K=1.00	4.849	2.8600	-14.04	13.87	1.012 ✓

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 $\frac{P}{P_a}$
T1	195 - 175	1 1/4	5.00	4.75	127.7 K=0.70	9.160	1.2272	-0.14	11.24	0.013 ✔

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 $\frac{P}{P_a}$
T1	195 - 175	1 1/4	6.00	5.75	154.6 K=0.70	6.251	1.2272	-0.34	7.67	0.044 ✔

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	195 - 175	3	20.01	3.33	53.4	30.000	7.0686	17.65	212.06	0.083 ✔
T2	175 - 155	3 3/4	20.03	6.68	85.5	30.000	11.0447	52.79	331.34	0.159 ✔
T3	155 - 135	4	20.03	6.68	80.1	30.000	12.5664	92.84	376.99	0.246 ✔
T4	135 - 115	4 1/4	20.03	6.68	75.4	30.000	14.1863	133.85	425.59	0.315 ✔
T5	115 - 95	4 1/4	20.03	6.68	75.4	30.000	14.1863	168.97	425.59	0.397 ✔
T6	95 - 75	4 1/2	20.03	6.68	71.2	30.000	15.9043	201.14	477.13	0.422 ✔
T7	75 - 55	4 3/4	20.03	6.68	67.5	30.000	17.7205	231.34	531.62	0.435 ✔
T8	55 - 40	4 3/4	15.03	5.01	50.6	30.000	17.7205	254.16	531.62	0.478 ✔
T9	40 - 20	4 3/4	20.03	6.68	67.5	30.000	17.7205	280.80	531.62	0.528 ✔
T10	20 - 0	5	20.03	6.68	64.1	30.000	19.6350	307.14	589.05	0.521 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	195 - 175	1 1/4	6.79	3.30	126.7	21.600	1.2272	5.01	26.51	0.189 ✓
T2	175 - 155	L2 1/2x2 1/2x3/16	10.16	4.94	78.6	21.600	0.9020	7.31	19.48	0.375 ✓
T3	155 - 135	L2 1/2x2 1/2x5/16	11.74	5.72	92.6	21.600	1.4600	8.78	31.54	0.278 ✓
T4	135 - 115	L3x3x1/4	12.30	5.99	79.3	21.600	1.4400	8.20	31.10	0.264 ✓
T5	115 - 95	L3x3x3/8	15.21	7.43	99.8	21.600	2.1100	8.28	45.58	0.182 ✓
T6	95 - 75	L3 1/2x3 1/2x5/16	17.03	8.32	94.3	21.600	2.0900	8.91	45.14	0.197 ✓
T7	75 - 55	L4x4x1/4	18.88	9.24	90.3	21.600	1.9400	9.60	41.90	0.229 ✓
T8	55 - 40	L4x4x1/4	19.89	9.70	94.7	21.600	1.9400	9.89	41.90	0.236 ✓
T9	40 - 20	L4x4x5/16	21.56	10.58	104.0	21.600	2.4000	11.02	51.84	0.213 ✓
T10	20 - 0	L4x4x3/8	24.11	11.84	117.2	21.600	2.8600	14.67	61.78	0.237 ✓

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 $\frac{P}{P_a}$
T1	195 - 175	1 1/4	5.00	4.75	182.4	21.600	1.2272	0.12	26.51	0.004 ✓

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 $\frac{P}{P_a}$
T1	195 - 175	1 1/4	6.00	5.75	220.8	21.600	1.2272	0.30	26.51	0.011 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	195 - 175	Leg	3	1	-22.22	224.43	9.9	Pass
T2	175 - 155	Leg	3 3/4	46	-61.84	263.47	23.5	Pass
T3	155 - 135	Leg	4	67	-107.71	318.03	33.9	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P_{allow} K	% Capacity	Pass Fail
T4	135 - 115	Leg	4 1/4	88	-152.90	376.55	40.6	Pass
T5	115 - 95	Leg	4 1/4	109	-192.71	376.55	51.2	Pass
T6	95 - 75	Leg	4 1/2	132	-230.00	439.04	52.4	Pass
T7	75 - 55	Leg	4 3/4	153	-266.06	505.50	52.6	Pass
T8	55 - 40	Leg	4 3/4	174	-294.14	572.94	51.3	Pass
T9	40 - 20	Leg	4 3/4	195	-327.48	505.50	64.8	Pass
T10	20 - 0	Leg	5	216	-361.71	575.93	62.8	Pass
T1	195 - 175	Diagonal	1 1/4	11	-5.05	22.24	22.7	Pass
T2	175 - 155	Diagonal	L2 1/2x2 1/2x3/16	50	-7.40	12.38	59.8	Pass
							76.9 (b)	
T3	155 - 135	Diagonal	L2 1/2x2 1/2x5/16	71	-8.84	14.74	60.0	Pass
T4	135 - 115	Diagonal	L3x3x1/4	95	-8.00	16.23	49.3	Pass
							64.6 (b)	
T5	115 - 95	Diagonal	L3x3x3/8	116	-8.40	18.23	46.1	Pass
T6	95 - 75	Diagonal	L3 1/2x3 1/2x5/16	137	-8.99	19.85	45.3	Pass
							49.2 (b)	
T7	75 - 55	Diagonal	L4x4x1/4	158	-9.71	19.84	49.0	Pass
							66.2 (b)	
T8	55 - 40	Diagonal	L4x4x1/4	180	-9.96	18.00	55.3	Pass
							68.3 (b)	
T9	40 - 20	Diagonal	L4x4x5/16	201	-11.84	17.48	67.7	Pass
T10	20 - 0	Diagonal	L4x4x3/8	228	-14.04	18.48	75.9	Pass
T1	195 - 175	Top Girt	1 1/4	6	-0.14	14.98	1.0	Pass
T1	195 - 175	Bottom Girt	1 1/4	9	-0.34	10.23	3.3	Pass
							Summary	
						Leg (T9)	64.8	Pass
						Diagonal (T2)	76.9	Pass
						Top Girt (T1)	1.0	Pass
						Bottom Girt (T1)	3.3	Pass
						Bolt Checks	76.9	Pass
						RATING =	**76.9**	**Pass**

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Subject:	FOUNDATION ANALYSIS
Location:	Northford, CT
Rev. 0: 9/10/15	Prepared by: T.J.L. Checked by: C.F.C. Job No. 15001.103

Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 6988 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 61 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 70 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 367 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 311 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 195 \cdot ft$	(User Input)	
Tower Width =	$W_t := 23.5 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 2$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 6.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 2.5 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 34 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 4.0 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 3.0 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.00 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 60$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.00 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 34$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.00 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 34$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.3$	(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:

Pier Reinforcement Bar Area =
$$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785 \cdot in^2$$

Pad Top Reinforcement Bar Area =
$$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.785 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =
$$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.785 \cdot in^2$$

Coefficient of Lateral Soil Pressure =
$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$$

Load Factor =
$$LF := \begin{cases} 1.333 & \text{if } H_t \le 700 \cdot ft \\ 1.7 & \text{if } H_t \ge 1200 \cdot ft \\ 1.333 + \left(\frac{H_t - 700ft}{1200ft - 700ft}\right) \cdot 0.4 & \text{otherwise} \end{cases} = 1.333$$

Stability of Footing:

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

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

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.26 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.26 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.16 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.71 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 2.5$

$A_p := W_f \cdot T_p = 85$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 145.35 \cdot kip$

Weight of Concrete Pad = $WT_{pad} := \left(W_f^2 \cdot T_f\right) \cdot \gamma_c = 433.5 \cdot kip$

Weight of Concrete Piers = $WT_{pier} := 3 \cdot \left[\left(L_p \cdot \frac{d_p^2 \cdot \pi}{4}\right) \cdot \gamma_c\right] = 12.723 \cdot kip$

Total Weight of Concrete = $WT_c := WT_{pad} + WT_{pier} = 446 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left(W_f^2 - 3 \cdot \frac{d_p^2 \cdot \pi}{4}\right) \cdot (L_p - L_{pag} - n) \cdot \gamma_s = 477 \cdot kip$

Weight of Soil Back Face = $WT_{s2} := \left[\frac{\tan(\Phi_s) \cdot (D_f)^2}{2} \cdot W_f\right] \cdot \gamma_s = 42 \cdot kip$

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

$X_t := if(Pos_t, X_{t1}, X_{t2}) = 6.824$

$X_{off} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 3.392$

Resisting Moment = $M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \left[W_f + \frac{\tan(\Phi_s) \cdot (L_p - L_{pag})}{3}\right] = 17280 \cdot ki$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 7384.5 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.34$

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

$OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$

OverTurning_Moment_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 993 \cdot kip$

Area of the Mat = $A_{mat} := W_f^{\,2} = 1.156 \times 10^{3}$

Section Modulus of Mat = $S := \frac{W_f^{\,3}}{6} = 6550.67 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.986 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < q_s, "Okay", "No Good")$

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.268 \cdot ksf$

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

$Min\_Pressure\_Check = "No Good"$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 9.984$

Distance to Kern = $X_k := \frac{W_f}{6} = 5.667$ Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 7.438$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 2.036 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 2.036 \cdot ksf$

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

$Pressure\_Check = "Okay"$

Concrete Bearing Capacity:

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

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^{\,2}}{4} = 1.687 \times 10^{3} \cdot kips$ (ACI-2008 10.14)

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

$Bearing\_Check = "Okay"$

Shear Strength of Concrete:

Beam Shear:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - \frac{d_{bbot}}{2} = 26.5 \cdot in$

$FL := \frac{C_t}{W_f^2} = 0.3175 \cdot ksf$

$V_{req} := LF \cdot FL \cdot \left(X_t - 0.5 \cdot d_p - d\right) \cdot W_f = 44.833 \cdot kip$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 1007 \cdot kip$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if\left(V_{req} < V_{Avail}, "Okay", "No\ Good"\right)$

Beam_Shear_Check = "Okay"

Punching Shear:

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

Critical Perimeter of Punching Shear =

$b_o := \left(d_p + d\right) \cdot \pi = 16.4$

Required Shear Strength =

$V_{req} := LF \cdot FL \cdot \left[W_f^2 - \left(d_p + d\right)^2 \cdot \frac{\pi}{4}\right] = 480.2 \cdot kips$

Available Shear Strength =

$V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 969 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if\left(V_{req} < V_{Avail}, "Okay", "No\ Good"\right)$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

$M_u := 1400 \cdot kips \cdot ft$

Design Moment = $M_n := \frac{LF \cdot M_u}{\phi_m} = 2073.56 \cdot kips \cdot ft$

$$\beta := \begin{cases} 0.85 \text{ if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 \text{ if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right] \cdot 0.5\right] \text{ otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$d := T_f - Cvr_{pad} - d_{bbot} = 26 \cdot in$

$A_s := \frac{M_n}{(f_y \cdot d)} = 15.95 \cdot in^2$

$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot W_f} = 0.92 \cdot in$

$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 16.238 \cdot in^2$

$\rho := \frac{A_s}{W_f \cdot d} = 0.00153$

Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$$As := \rho \cdot W_f \cdot d = 16.238 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 26.7 \cdot in^2$$

$$Pad\_Reinforcement\_Bot := if(As_{prov} > As, "Okay", "No Good")$$

Pad_Reinforcement_Bot = "Okay"

$$As := \rho_{sh} \cdot (W_f \cdot T_f) = 22 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} + A_{bbot} \cdot NB_{bot} = 53.4 \cdot in^2$$

$$Pad\_Reinforcement := if(As_{prov} > As, "Okay", "No Good")$$

Pad_Reinforcement = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 11.15 \cdot in$$

Spacing or Cover Dimension =

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

Transverse Reinforcement Index =

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

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot c} \cdot d_{bbot} = 35.6 \cdot in$$

Minimum Development Length =

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

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 60 \cdot in$$

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

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier =

$$A_p := \frac{\pi \cdot d_p^2}{4} = 1017.88 \cdot in^2$$

$$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 5.09 \cdot in^2 \qquad \text{(ACI-2008 10.8.4 \& 10.9.1)}$$

$$A_{sprov} := NB_{pier} \cdot A_{bpier} = 47.12 \cdot in^2$$

$$Steel\_Area\_Check := if\left(A_{sprov} > A_{smin}, "Okay", "No Good"\right)$$

Steel_Area_Check = "Okay"

Bar Spacing In Pier =

$$B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 0.885 \cdot in$$

Diameter of Reinforcement Cage =

$$Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 30 \cdot in$$

Maximum Moment in Pier =

$$M_p := \left[S_t \cdot \left(L_p + \frac{A_{BP}}{2}\right)\right] \cdot LF = 4228.3 \cdot in \cdot kips$$

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

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

$$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) = (36 \;\; 60 \;\; 8 \;\; 489.2 \;\; 4228.3)$$

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

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) := \phi P'_n\left(D, N, n, P_u, M_{xu}\right)^T$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = (1934 \;\; 16716 \;\; -29.1 \;\; 0)$$

$$Axial\_Load\_Check := if\left(\phi P_n \geq P_u, "Okay", "No Good"\right)$$

Axial_Load_Check = "Okay"

$$Bending\_Check := if\left(\phi M_{xn} \geq M_{xu}, "Okay", "No Good"\right)$$

Bending_Check = "Okay"

SITE NAME	NORTHFORD CT	ECP & CELL #	2	0174
Note: PCS carrier add. Connect LTE-700 RRH Rx only ports to AWS SBNHH low band ports.		LATITUDE	41-22-04.99 N	
		LONGITUDE	72-48-37.99 W	
		STRUCTURE TYPE	Lattice	

700 MHz LTE - CURRENT CONFIG	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	LTE-700U eNodeB		LTE-700U eNodeB		LTE-700U eNodeB	
ANTENNA TYPE	BXA-70063-6CF-2-750MHZ		BXA-70063-6CF-2-750MHZ		BXA-70063-6CF-8-750MHZ	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		260	
DOWN TILT (MECH/DEG)	2		2		3	
RAD CTR (FT AGL)	145		145		145	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL						
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

700 MHz LTE - FUTURE CONFIG	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	LTE-700U BBU+RRH		LTE-700U BBU+RRH		LTE-700U BBU+RRH	
ANTENNA TYPE	SBNHH-1D65B_PORT 1 - +45_04DT_0725		SBNHH-1D65B_PORT 1 - +45_04DT_0725		SBNHH-1D65B_PORT 1 - +45_06DT_0725	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		260	
DOWN TILT (MECH/DEG)	0		0		4	
RAD CTR (FT AGL)	145		145		145	
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						
MAIN DISTRIBUTION BOX	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	LNX-6513DS-VTM_00DT_0850		LNX-6513DS-VTM_00DT_0850		LNX-6513DS-VTM_06DT_0850	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		260	
DOWN TILT (MECH/DEG)	0		0		5	
RAD CTR (FT AGL)	145		145		145	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L

850 MHz CELLULAR - FUTURE CONFIG	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B	
ANTENNA TYPE	LNX-6513DS-VTM_00DT_0850		LNX-6513DS-VTM_00DT_0850		LNX-6513DS-VTM_06DT_0850	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		260	
DOWN TILT (MECH/DEG)	0		0		5	
RAD CTR (FT AGL)	145		145		145	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL			2	FD9R6004/2C-3L		

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-171085-8BF-EDIN-2		BXA-171085-8BF-EDIN-2		BXA-171085-8BF-EDIN-2	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		2	
RAD CTR (FT AGL)	145		145		145	
TMA - QTY / MODEL						
DIPLEX WITH CELLULAR CABLE	YES		YES		YES	
RRH - QTY / MODEL						
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

1900 MHz PCS - FUTURE CONFIG	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	LTE-PCS BBU+RRH		LTE-PCS BBU+RRH		LTE-PCS BBU+RRH	
ANTENNA TYPE	SBNHH-1D65B_PORT 3 - +45_04DT_1920		SBNHH-1D65B_PORT 3 - +45_04DT_1920		SBNHH-1D65B_PORT 3 - +45_06DT_1920	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		260	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	145		145		145	
TMA - QTY / MODEL						
DIPLEX WITH CELLULAR CABLE	NO		YES		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						

2100 MHz AWS - CURRENT CONFIG	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	LTE-AWS BBU+RRH		LTE-AWS BBU+RRH		LTE-AWS BBU+RRH	
ANTENNA TYPE	SBNHH-1D65B_PORT 2 - +45_04DT_2130		SBNHH-1D65B_PORT 2 - +45_04DT_2130		SBNHH-1D65B_PORT 2 - +45_06DT_2130	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	145		145		145	
TMA - QTY / MODEL						
DIPLEX WITH LTE-700 CABLE						
RRH - QTY / MODEL	1	ALU RH_2X40-AWS	1	ALU RH_2X40-AWS	1	ALU RH_2X40-AWS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX	1		DB-T1-6Z-8AB-0Z			
2100 MHz AWS - FUTURE CONFIG	**ALPHA**		**BETA**		**GAMMA**	
EQUIPMENT TYPE	LTE-AWS BBU+RRH		LTE-AWS BBU+RRH		LTE-AWS BBU+RRH	
ANTENNA TYPE	SBNHH-1D65B_PORT 3 - +45_04DT_2110		SBNHH-1D65B_PORT 3 - +45_04DT_2110		SBNHH-1D65B_PORT 3 - +45_02DT_1920	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		260	
DOWN TILT (MECH/DEG)	0		0		4	
RAD CTR (FT AGL)	145		145		145	
TMA - QTY / MODEL						
DIPLEX WITH LTE-700 CABLE						
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			

NUMBER OF CABLES NEEDED				FIBER LINES MODEL NUMBER				
TOTAL # FIBER LINES	2	TOTAL # OF MAINLINES	11	FIBER LINE MODEL #			HB158-1-08U8-S8J18	
TOTAL # TOP JUMPERS	9	TOTAL # OF TOP JUMPERS	24	FIBER TOP JUMPER MODEL #			HB114-1-08U4-S4J18	
EQUIPMENT CABLE ORDERING		MAIN CABLE #	12	+	-1	TOP JUMPER #	24	+ 0

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/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: Jaime Laredo	Alex Restrepo	JL	7/27/2015

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

Andrew® Tri-band Antenna, 698–896 and 2 x 1710–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.

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

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS, dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2360 MHz | 698 – 896 MHz

Mechanical Specifications

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Product Specifications

SBNHH-1D65B

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.4 km/h | 150.0 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	1828.0 mm | 72.0 in
Width	301.0 mm | 11.9 in
Net Weight	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male
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

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

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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.

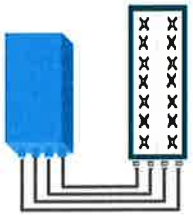
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

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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.) Volume in L Weight in kg (ib) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) 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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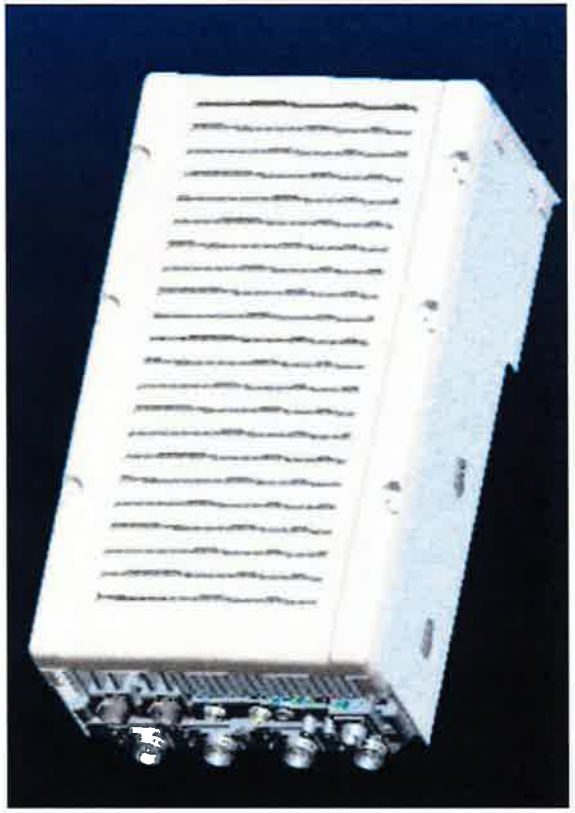
NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

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.)

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VZW Network Equipment Reporting Form (NERF)

Vendor	Alcatel-Lucent		Model		B66a RRH 4Tx/4Rx 4x45W or 2x 90W (SW selectable)		Function	RRH for distributed architecture with a CPRI interface between digital and RF processing components. The RRH has 4 Tx ports and 4 Rx ports. Can be SW configured for 2 Tx with 90W rf per port or 4 Tx with 45W rf per port. The RRH has passive cooling only.		
*1)Equipment Configuration	*2)Heat Release @50°F Intake Temp [W]		*3)Airflow Rate @ 100% Activity Rate [cfm]		*4)Dimensions [in]		Non-Thermal Data			
	100% Activity	50% Activity	Nominal (70°F)	Max (95°F)	External (WxDxH)	Clear (F/R/S)	Installed Weight [lb]	*5)Sound @ Nominal [L_{WAd}]	*6)Name Plate [W]	
Minimum			N/A Convection cooled	N/A Convection cooled	w/o Solar Shield W = 11.4in D = 6.7in H = 25.2in (W=290mm) (D=170mm) (H=640mm)	Front: 12" Rear: 7.5" Right: 12" Left: 12" Top: 12" Bottom: 24"				
Typical			N/A Convection cooled	N/A Convection cooled	with Solar Shield W = 12in D = 7.6in H = 25.8in (W=304mm) (D=193mm) (H=655mm)		62lb 72 lb(w mounting brackets)	N/A Convection cooled		
Full	825W (add 60W for AISG)	TBD	N/A Convection cooled	N/A Convection cooled	N/A			N/A Convection cooled		

*7)Equipment EC-Class	N/A Convection cooled	*10)Fan Speed	N/A Convection cooled	*13)Fan Hot-Swap	N/A Convection cooled	*16)Environ. Tests	N/A Convection cooled	*18)Temp. Rise [°F]	N/A Convection cooled
*8)Non-Optimal EC-Class	N/A Convection cooled	*11)Fan Logic	N/A Convection cooled	*14)Shut-Down	N/A Convection cooled	*17)Allow. Max [°F]	N/A Convection cooled	*19)Rec. Max [°F]	N/A Convection cooled
*9)Exhaust Openings	N/A Convection cooled	*12)Fan Alarm	N/A Convection cooled	*15)Temp. Access	N/A Convection cooled	*17)Allow. Min [°F]	N/A Convection cooled	*19)Rec. Min [°F]	N/A Convection cooled

Power Reporting					
Power Input	-48V	No. Power Supplies	N/A (Customer provided power plant)	Number of Inputs per Power Supply	1
*24)Maximum Demand (total system in Watts)	825W (add 60W for AISG)	Maximum Input (each power supply in Watts)	N/A (Customer provided power plant)	Maximum Output (each power supply in Watts)	58W (to AISG port, 29V/2A)
Power Supply Connection Type	DC entry via Conduit Box	Power Supply Make & Model	N/A (Customer provided power plant)		
Input Protection	no input fuse	Input Protection Make & Model	N/A (Customer provided power plant)		
Redundancy Scheme	N/A				
Nominal Voltage	-48VDC	Maximum Voltage	-57V	Minimum Voltage	-38V
*25)Max Current at Nominal Voltage	17.2A (add 1.2A if AISG port loaded 2A*29V)	*25)Max Current at Maximum Voltage	14.5A (add 1A if AISG port loaded 2A*29V)	*25)Max Current at Minimum Voltage	21.7A (add 1.5A if AISG port loaded 2A*29V)

Return completed forms to Engineering and Operations Support (EOS)

Richard.damiano@verizonwireless.com

Product Data Sheet DB-B1 and DB-T1 Series

DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

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

Features/Benefits

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

Technical Specifications

Mechanical Specifications

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

Electrical Specifications

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

* This data is provisional and subject to change.

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