Robinson+Cole

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Also admitted in Massachusetts

September 15, 2016

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

Re: **Notice of Exempt Modification – Facility Modification**
232 South Main Street, East Windsor, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas on at the 144-foot level of a 188-foot self-supporting lattice tower at 232 South Main Street in East Windsor (the "Property"). The tower and Property are owned by Balch Bridge Street Corporation. The Council approved Cellco's shared use of this tower in 1997. Cellco now intends to modify its facility by replacing nine (9) of its existing antennas with three (3) model SBNHH-1D65B, 700/1900 MHz antennas; three (3) model SBNHH-1D65B, 850 MHz antennas; and three (3) model SBNHH-1D65B, 2100 MHz antennas, all at the same 144-foot level on the tower. Cellco also intends to install nine (9) remote radio heads ("RRHs") and two (2) HYBRIFLEX™ 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 Robert Maynard, First Selectman for the Town of East Windsor. A copy of this letter is also being sent to Balch Bridge Street Corporation, owner of the Property and tower.

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 RRHs will be installed on its existing antenna mounting frames at the 144-foot level on the 188-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 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).

A copy of the Town Assessor's Parcel Map and property owner information is included in Attachment 4.

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Robert Maynard, Est Windsor First Selectman
Balch Bridge Street Corporation
Timothy Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

SBNHH-1D65B

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

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

Electrical Specifications

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

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	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, beampeak to 20° above beampeak, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

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

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground

Product Specifications

COMMSCOPE®

SBNHH-1D65B

Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, frontal	618.0 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Loading, lateral	197.0 N @ 150 km/h 44.3 lbf @ 150 km/h
Wind Loading, rear	728.0 N @ 150 km/h 163.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	180.0 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight, without mounting kit	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

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

Packed Dimensions

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

Regulatory Compliance/Certifications

Agency	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

Product Specifications

SBNHH-1D65B

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

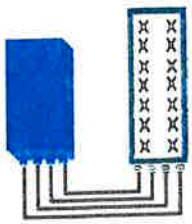
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

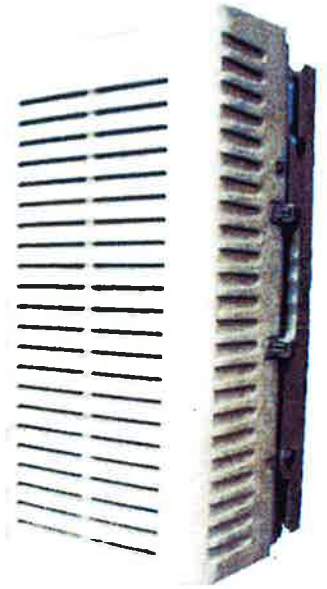
Can be switched between modes via SW w/o site visit

Alcatel·Lucent

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

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

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



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

The Alcatel-Lucent RRH2x60-1900A-4R is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

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

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

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

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

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

OPTIMIZED TCO

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

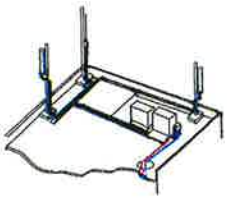
The Alcatel-Lucent RRH2x60-1900A-4R is a very cost-effective solution to deploy LTE MIMO.

EASY INSTALLATION

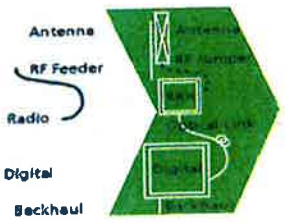
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-1900A-4R installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

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

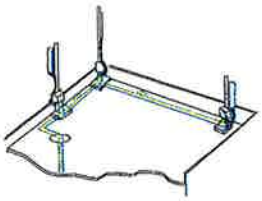
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-190A-4R is compact and weighs about 21 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-1900A-4R integrates two power amplifiers of 60W rating (at each antenna connector)
- RRH2x60-1900A-4R can operate WCDMA only, LTE only or a mix of WCDMA and LTE
- RRH2x60-1900A-4R offers the possibility for WCDMA (non MIMO) to operate the two radio chains independently (2 blocks of 20 MHz anywhere in the band)
- RRH2x60-1900A-4R is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO deployment and/or WCDMA and LTE simultaneous operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

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

Dimensions and weights

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

Electrical Data

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

RF Characteristics

- Supported spectrum: DL 1930-1990 / UL 1850-1910
- Frequency band: 3GPP band 2/25
- Output power: 2x60W at antenna connectors
- Technology supported: W-CDMA and LTE
- Instantaneous bandwidth: 20 MHz (MIMO) or 2x20 MHz (non MIMO)
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -124.8dBm for WCDMA and -105 dBm for LTE

Connectivity

- Two CPRI optical ports for 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 15km using SM fiber
- TMA/RETA: AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions: ETS300-019-1-4 class4.1E
- Ingress Protection: IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

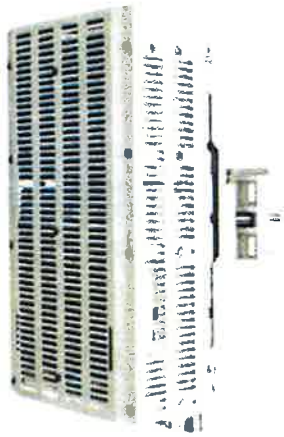
- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089
- Safety : IEC60950-1, EN 60825-1
- Regulatory: CE Mark-European Directive 2002/95/EC (RoHS), 2002/96/EC (WEEE), 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

B66A RRH 4X45 - PHYSICAL CHARACTERISTICS- TARGET 15.1

B4 RRH4x45-4R (AWS-Extension Band)	
Frequency Band	LR15.1 – B4 / LR16.1 B66 (AWS 1 and 3 only)
RF Output Power	2x90W/4x45W (SW configurable)
Operational range	2110-2180 MHz, DL/ 1710-1780 MHz UL
Instantaneous Bandwidth	70MHz
Configuration (HW readiness)	LTE: 2T2R, 2T4R, 4T4R
Carrier Bandwidths	5, 10, 15 and 20 MHz
Interfaces	2x CPRI Rate 7 Ports Antenna Connectors 4.3-10
AISG Support	AISG 2.0 for RET Internal Smart Bias T
Monitor Ports	NA (Spec An to replace ports)
Environmental	GR487 Compliance / GR3178 Compliance (with exceptions)
Mounting options	Pole/Wall
Connectors location	All bottom
External Alarms	4
Annual Return Rate (Target)	<2%
Operating Temperature	-40 C to +55 C (without solar load)

- Commercial Product Will include B66 support of AWS 1 and 3.
- Lower AWS 3 UL Not in 3GPP Band 66 Definition



Physical Dimensions – Not to Exceed		
	W/O Solar Shield	With Solar Shield
Dimensions HxWxD	H = 26in (H=660mm) W = 11.4in (W=290mm) D = 5.9in (D=150mm)	H = 26.6in (H=675mm) W = 12In (W=304mm) D = 6.8n (D=173mm)
Volume	29l	35.5l
Weight		64lbs / 29kg

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.

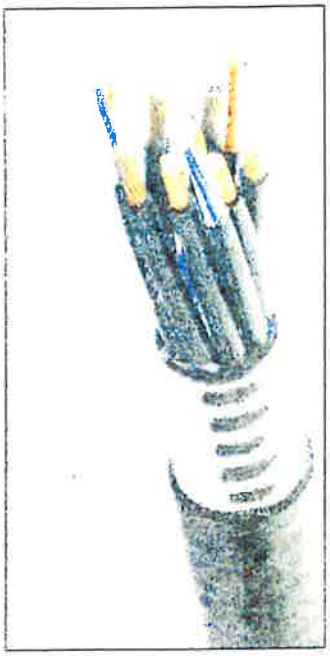


Figure 1: HYBRIFLEX Series

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-99-658 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)

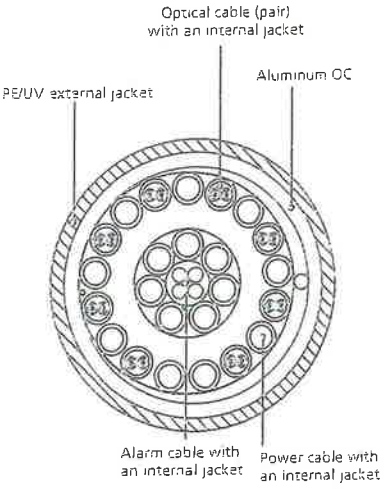


Figure 2: Construction Detail

- This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: East Windsor								
Tower Height: 188Ft.								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*AT&T	2	565	170	880	0.0151	0.5867	0.26%	
*AT&T	2	1077	170	1900	0.0288	1.0000	0.29%	
*AT&T	4	934	170	1900	0.0500	1.0000	0.50%	
*AT&T	1	647	170	880	0.0087	0.5867	0.15%	
*AT&T	1	1615	170	734	0.0216	0.4893	0.44%	
*MetroPCS CDMA	3	727	177	2135	0.0268	1.0000	0.27%	
*MetroPCS LTE	1	1200	177	2130	0.0148	1.0000	0.15%	
*Town	1	400	207	33	0.0036	0.2000	0.18%	
*T-Mobile	8	123	153	1945	0.0164	1.0000	0.16%	
*T-Mobile	2	694	153	2100	0.0231	1.0000	0.23%	
*Nextel	12	100	183	851	0.0138	0.5673	0.24%	
*Sprint	3	693	123	1900	0.0546	1.0000	0.55%	
*Sprint	1	390	123	850	0.0102	0.5667	0.18%	
*Sprint	2	693	123	2500	0.0364	1.0000	0.36%	
Verizon PCS	**1**	**7540**	**144**	**0.1307**	**1970**	**1.0000**	**13.07%**	
Verizon Cellular	**9**	**422**	**144**	**0.0659**	**869**	**0.5793**	**11.37%**	
Verizon AWS	**1**	**7400**	**144**	**0.1283**	**2145**	**1.0000**	**12.83%**	
Verizon 700	**1**	**2200**	**144**	**0.0381**	**746**	**0.4973**	**7.67%**	
								48.90%
* Source: Siting Council								

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

188-ft Existing ROHN Lattice Tower

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: East Windsor

232 South Main Street
East Windsor, CT

Centek Project No. 16001.21

~~Date: August 3, 2016~~

Rev 1: August 23, 2016

Prepared for:

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

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

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 East Windsor, CT.

The host tower is a 188-ft, three legged, tapered lattice tower originally designed and manufactured by ROHN dated September 30, 1996. The manufacturer's drawings and calculations were unavailable for use in this report. The tower geometry, structure member sizes and foundation information were all obtained from a structural analysis report prepared by URS Corporation, job no. 36931196.00000 (VZ5-049) dated November 18, 2010.

Antenna and appurtenance information were obtained from a combination of the aforementioned URS structural report, visual verification from grade by Centek personnel on July 25, 2016 and a RF data sheet provided by Verizon Wireless.

The tower is made of ten (10) tapered vertical sections consisting of ASTM A572-50 structural steel pipe legs. Diagonal lateral support bracing consists of ASTM A572-50/A36 structural steel angle shapes. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by bolted gusset connections. The width of the tower face is 6.58-ft at the top and 25.04-ft at the base.

Verizon proposes the removal of nine (9) panel antennas and the installation of nine (9) panel antennas, nine (9) remote radio heads and two (2) main distribution boxes on the existing boom gates. 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, proposed and future loads considered in this analysis consist of the following:

- AT&T (Existing):
  Antennas: Three (3) Kathrein 800-10121 panel antennas, four (4) Powerwave P65-17-XLH-RR panel antennas, two (2) Andrew SBNH-1D6565C panel antennas, six (6) TMA's, three (3) Ericsson RRUS-11 radio heads and one (1) surge arrestor mounted on three (3) 12-ft boom gates with a RAD center elevation of ±168-ft above the existing tower base.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables, one (1) fiber trunk and two (2) DC trunks running on a leg/face of the existing tower as specified in Section 3 of this report.
- T-MOBILE (Existing):
  Antennas: Three (3) RFS APX16DWV-16DWVS panel antennas, six (6) EMS RR90-17-02DP panel antennas and six (6) TMA's mounted on three (3) 13-ft T-Frames with a RAD center elevation of ±153-ft above the existing tower base.
  Coax Cables: Eighteen (18) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- SPRINT (Existing):
  Antennas: Three (3) RFS APXVSPP18 panel antennas and six (6) remote radio heads mounted on three (3) 12-ft boom gates with a RAD center elevation of ±124-ft above the existing tower base.
  Coax Cables: Three (3) 1-5/8" ∅ fiber cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remain):
  Antennas: Three (3) Antel BXA-70063-6CF panel antennas mounted on three (3) 12-ft boom gates with a RAD center elevation of ±144-ft above the existing tower base.
  Coax Cables: Fifteen (15) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remove):
  Antennas: Six (6) Antel WPA-80090-4CF panel antennas, three (3) Decibel 948F85T2E-M panel antennas and six (6) RFS FD9R6004-2C/3L diplexers mounted on three (3) 12-ft boom gates with a RAD center elevation of ±144-ft above the existing tower base.
- **VERIZON (PROPOSED):**
  Antennas: Nine (9) Andrew SBNHH-1D65B panel antennas, three (3) Alcatel-Lucent B13 RRH4x30-LTE remote radio heads, three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads and two (2) RFS DB-T1-6Z-8AB-0Z distribution box mounted on three (3) 12-ft boom gates with a RAD center elevation of ±144-ft above the existing tower base.
  Coax Cables: Two (2) 1-5/8" ∅ fiber cables running on the exterior of the existing tower.

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 or reinforcement drawings.
- 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 existing coax cables to be installed as indicated in 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:	Hartford; v = 80 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	East Windsor; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	Appendix-K wind speed controls.	
Load Cases:	Load Case 1; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	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 **95.6%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T7)	60.00'-80.00'	62.1%	**PASS**
Diagonal (T10)	0.00'-20.00'	95.6%	**PASS**

Foundation

The existing foundation consists of three (3) 4.5' square x 12' long reinforced concrete piers on three (3) 11.75' square x 2' thick reinforced concrete pads. Tower legs are connected to the three (3) piers by means of ten (10) 1" diameter ASTM A354 grade BC anchor bolts per leg embedded into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	**51 kips**
	Compression	**48 kips**
	Moment	**5294 kip-ft**
Leg	Shear	**28 kips**
	Uplift	**221 kips**
	Compression	**267 kips**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Pad and Pier (3)	Uplift	2.0	2.08	**PASS**

Note 1: FS denotes Factor of Safety.

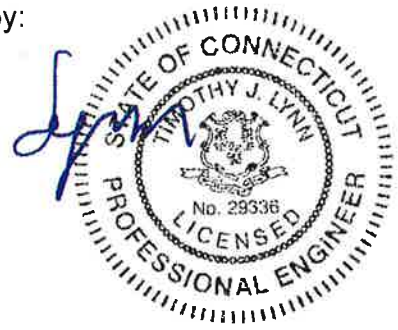
Conclusion

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

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

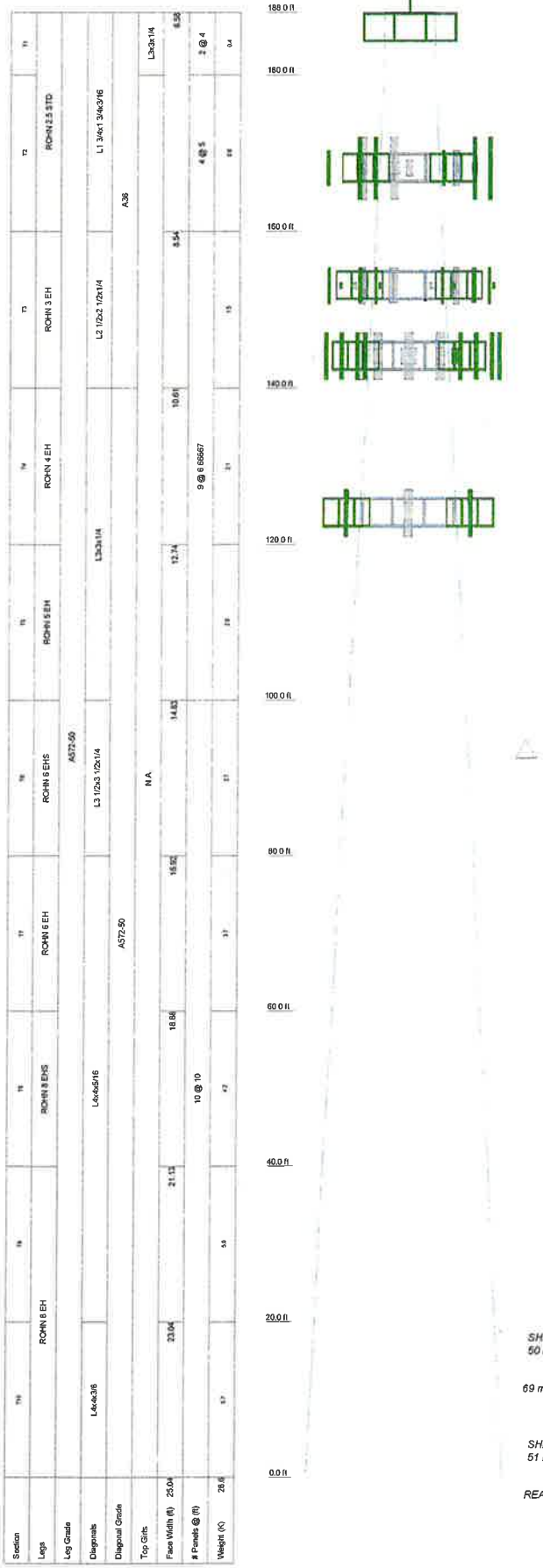
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

TnxTower Features:

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



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
BCD-87010	193.5	13-ft T-Frame (T-Mobile - Existing)	153
13' Platform w/rails	168	13-ft T-Frame (T-Mobile - Existing)	153
800-10121 (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	144
P65-17-XLH-RR (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	144
P65-17-XLH-RR (ATI - Existing)	168	BXA-70063/6CF (Verizon - Existing)	144
800-10121 (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	144
P65-17-XLH-RR (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	144
P65-17-XLH-RR (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	144
800-10121 (ATI - Existing)	168	BXA-70063/6CF (Verizon - Existing)	144
SBNH-1D6565C (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	144
SBNH-1D6565C (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	144
TT19-08BP111-001 TMA (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	144
RRUS-11 (ATI - Existing)	168	BXA-70063/6CF (Verizon - Existing)	144
DTMABP7819VG12A TMA (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	144
TT19-08BP111-001 TMA (ATI - Existing)	168	RRH2x60-PCS (Verizon - Proposed)	144
RRUS-11 (ATI - Existing)	168	RRH2x60-PCS (Verizon - Proposed)	144
DTMABP7819VG12A TMA (ATI - Existing)	168	RRH2x60-PCS (Verizon - Proposed)	144
TT19-08BP111-001 TMA (ATI - Existing)	168	RRH4x45/2x90-AWS (Verizon - Proposed)	144
RRUS-11 (ATI - Existing)	168	RRH4x45/2x90-AWS (Verizon - Proposed)	144
DTMABP7819VG12A TMA (ATI - Existing)	168	RRH4x45/2x90-AWS (Verizon - Proposed)	144
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	168	RRH4x30-B13 (Verizon - Proposed)	144
Rohn 6' x 12' Boom Gate (1) (ATI - Existing)	168	RRH4x30-B13 (Verizon - Proposed)	144
Rohn 6' x 12' Boom Gate (1) (ATI - Existing)	168	RRH4x30-B13 (Verizon - Proposed)	144
Rohn 6' x 12' Boom Gate (1) (ATI - Existing)	168	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	144
RR90-17-02DP (T-Mobile - Existing)	153	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	144
APX16DWV-16DWV-S-E-ACU (T-Mobile - Existing)	153	Rohn 6' x 12' Boom Gate (1) (Verizon - Existing)	144
		Rohn 6' x 12' Boom Gate (1) (Verizon - Existing)	144
		Rohn 6' x 12' Boom Gate (1) (Verizon - Existing)	144
RR90-17-02DP (T-Mobile - Existing)	153	APXVSPP18-C-A20 (Sprint - Existing)	124
RR90-17-02DP (T-Mobile - Existing)	153	FD-RRH 4x40 1900 (Sprint - Existing)	124
APX16DWV-16DWV-S-E-ACU (T-Mobile - Existing)	153	FD-RRH 4x40 1900 (Sprint - Existing)	124
RR90-17-02DP (T-Mobile - Existing)	153	FD-RRH 4x40 1900 (Sprint - Existing)	124
RR90-17-02DP (T-Mobile - Existing)	153	FD-RRH 2x50 800 (Sprint - Existing)	124
APX16DWV-16DWV-S-E-ACU (T-Mobile - Existing)	153	FD-RRH 2x50 800 (Sprint - Existing)	124
		FD-RRH 2x50 800 (Sprint - Existing)	124
RR90-17-02DP (T-Mobile - Existing)	153	Rohn 6' x 12' Boom Gate (1) (Sprint - Existing)	124
(2) TMA 10'x8"x3" (T-Mobile - Existing)	153	Rohn 6' x 12' Boom Gate (1) (Sprint - Existing)	124
(2) TMA 10'x8"x3" (T-Mobile - Existing)	153	Rohn 6' x 12' Boom Gate (1) (Sprint - Existing)	124
(2) TMA 10'x8"x3" (T-Mobile - Existing)	153	APXVSPP18-C-A20 (Sprint - Existing)	124
13-ft T-Frame (T-Mobile - Existing)	153	APXVSPP18-C-A20 (Sprint - Existing)	124

MATERIAL STRENGTH

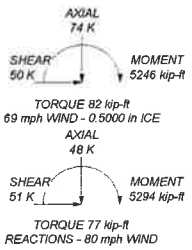
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 95.6%

MAX. CORNER REACTIONS AT BASE:
DOWN: 267 K
SHEAR: 25 K

UPLIFT: -221 K
SHEAR: 28 K



TORQUE 82 kip-ft
69 mph WIND - 0.5000 in ICE

TORQUE 77 kip-ft
REACTIONS - 80 mph WIND

Centek Engineering Inc.
63-2 North Branford Rd
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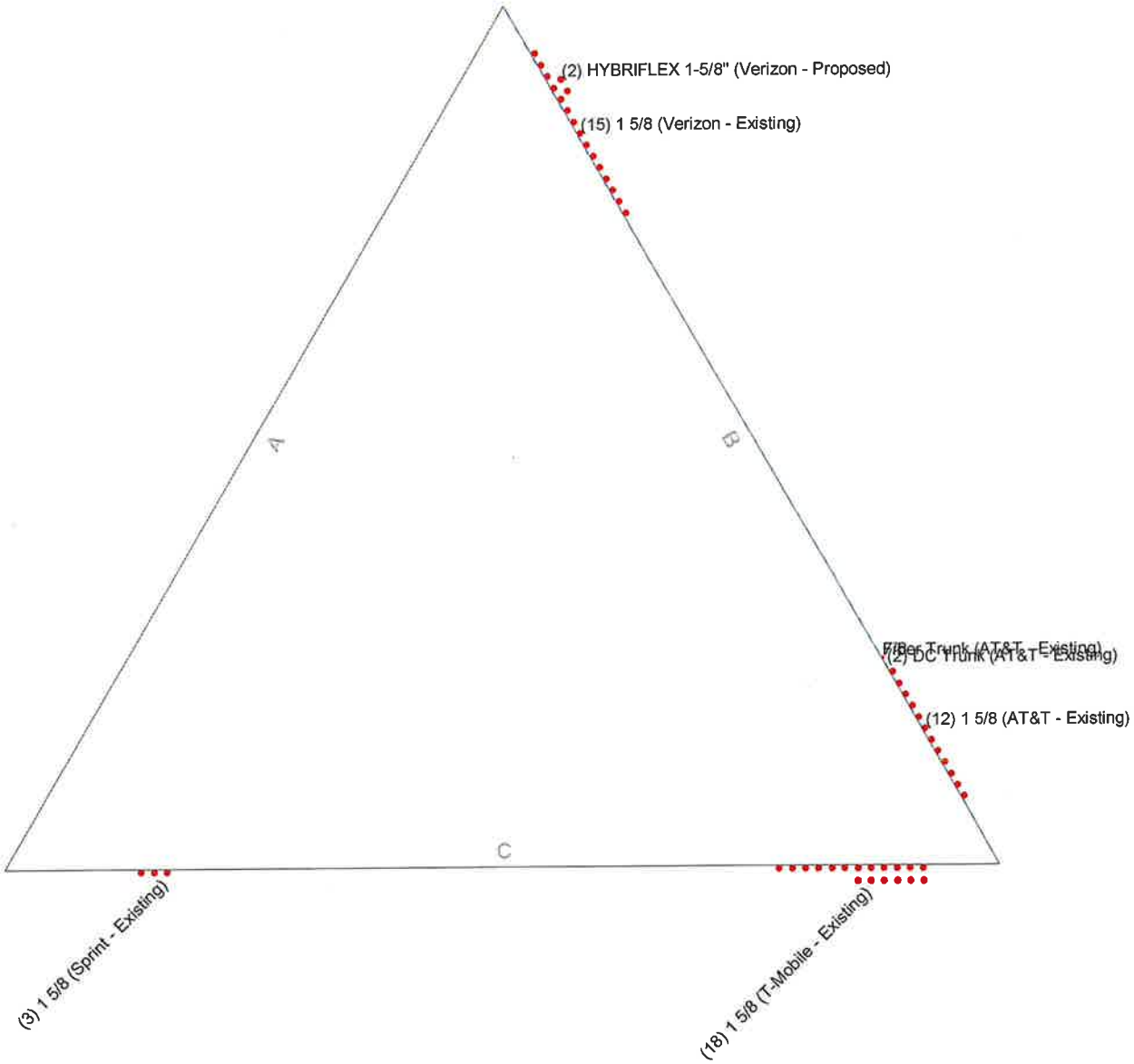
FAX: (203) 488-8587

Job: 16001.21 - East Windsor			
Project: 188-ft Lattice Tower - 232 South Main St. East Windsor, CT			
Client: Verizon Wireless	Drawn by: TJL	Appd:	
Code: TIA/EIA-222-F	Date: 08/03/16	Scale: NTS	
Path:		Dwg No. E-1	

Round Flat App In Face App Out Face



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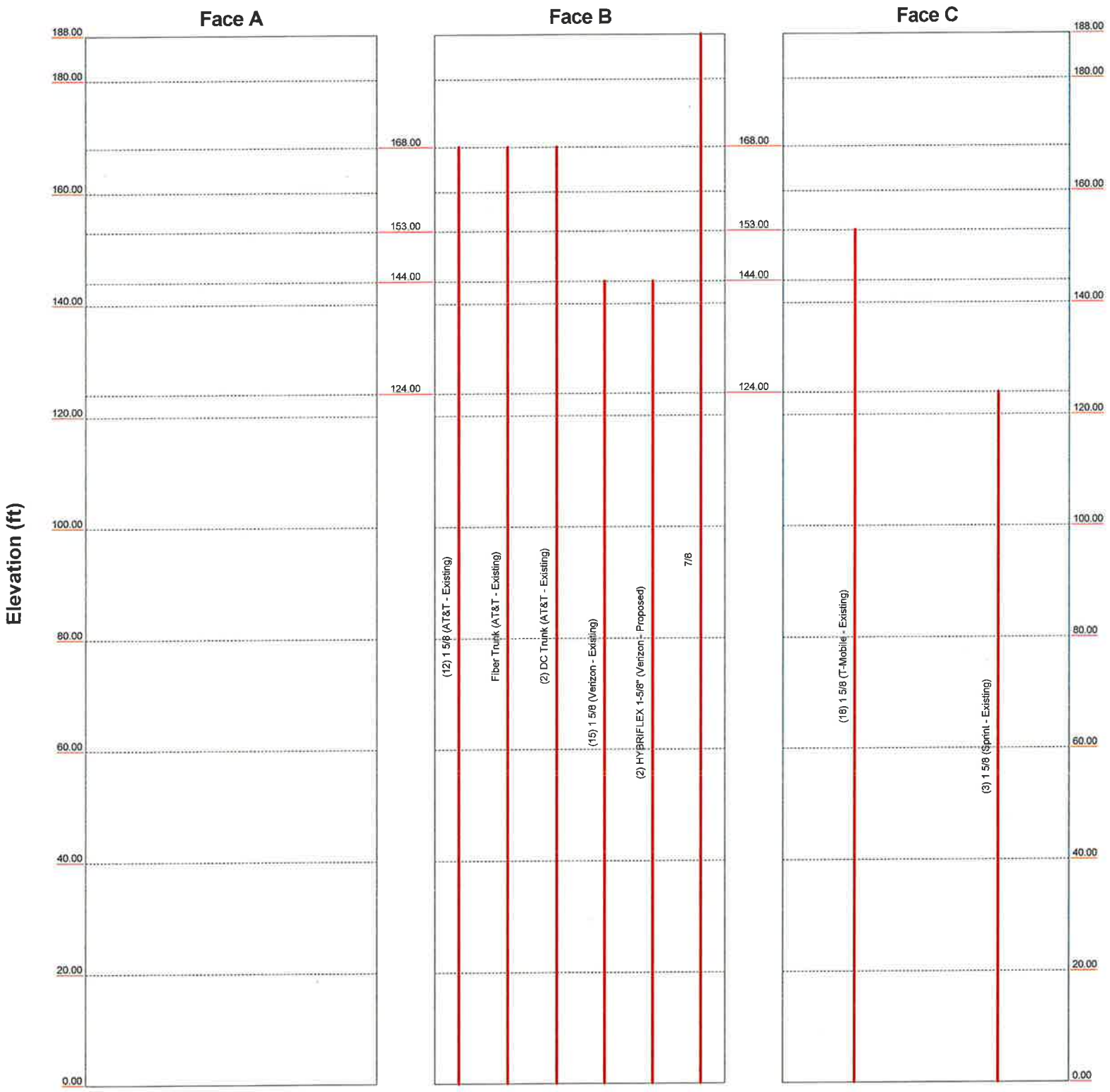
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 08/03/16	Scale: NTS	
Path:		Dwg No. E-7	

0' - 188'

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



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Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 08/03/16	Scale: NTS	
Path:		Dwg No. E-7	

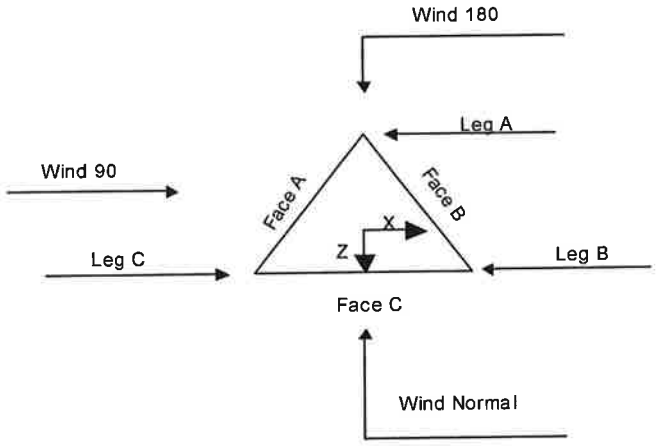
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 188.00 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 6.58 ft at the top and 25.04 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Fairfield County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	√ Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	√ Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	Use Azimuth Dish Coefficients	Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
√ Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	√ Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	188.00-180.00			6.58	1	8.00
T2	180.00-160.00			6.58	1	20.00
T3	160.00-140.00			8.54	1	20.00
T4	140.00-120.00			10.61	1	20.00
T5	120.00-100.00			12.74	1	20.00
T6	100.00-80.00			14.83	1	20.00
T7	80.00-60.00			16.92	1	20.00
T8	60.00-40.00			18.88	1	20.00
T9	40.00-20.00			21.13	1	20.00
T10	20.00-0.00			23.04	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	188.00-180.00	4.00	X Brace	No	No	0.0000	0.0000
T2	180.00-160.00	5.00	X Brace	No	No	0.0000	0.0000
T3	160.00-140.00	6.67	X Brace	No	No	0.0000	0.0000
T4	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T5	120.00-100.00	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	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T7	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T8	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T9	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T10	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 188.00-180.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 180.00-160.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T3 160.00-140.00	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T4 140.00-120.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A572-50 (50 ksi)
T5 120.00-100.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A572-50 (50 ksi)
T6 100.00-80.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T7 80.00-60.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T8 60.00-40.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T9 40.00-20.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T10 20.00-0.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Single Angle	L4x4x3/8	A572-50 (50 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 188.00-180.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Single Angle		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	Double Angle Stitch Bolt Spacing Redundants in

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft^2	in					in	in	in
T1 188.00-180.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000
T7 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000
T8 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000
T9 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000
T10 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
ft																	
T1 188.00-180.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T2 180.00-160.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T3 160.00-140.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T4 140.00-120.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T5 120.00-100.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T6 100.00-80.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T7 80.00-60.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T8 60.00-40.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T9 40.00-20.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
T10 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1	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 188.00-180.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 180.00-160.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

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 188.00-180.00	Flange	0.6250 A325N	4	0.6250 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T2 180.00-160.00	Flange	0.7500 A325N	4	0.6250 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T3 160.00-140.00	Flange	0.8750 A325N	4	0.6250 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T4 140.00-120.00	Flange	1.0000 A325N	4	0.6250 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T5 120.00-100.00	Flange	1.0000 A325N	6	0.7500 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T6 100.00-80.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.7500 A325X	2
T7 80.00-60.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.7500 A325X	2
T8 60.00-40.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.7500 A325X	2
T9 40.00-20.00	Flange	1.0000 A325N	8	0.7500 A325X	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.7500 A325X	2
T10 20.00-0.00	Flange	1.0000 A325N	10	0.7500 A325X	1	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.7500 A325X	2

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (AT&T - Existing)	B	Yes	Ar (CfAe)	168.00 - 0.00	0.0000	0.35	12	12	1.9800	1.9800		1.04
Fiber Trunk (AT&T - Existing)	B	Yes	Ar (CfAe)	168.00 - 0.00	0.0000	0.26	1	1	0.4000	0.4000		1.00
DC Trunk (AT&T - Existing)	B	Yes	Ar (CfAe)	168.00 - 0.00	0.0000	0.27	2	2	0.4000	0.4000		0.11
1 5/8 (T-Mobile - Existing)	C	Yes	Ar (CfAe)	153.00 - 0.00	0.0000	-0.35	18	12	1.9800	1.9800		1.04
1 5/8 (Sprint - Existing)	C	Yes	Ar (CfAe)	124.00 - 0.00	0.0000	0.35	3	3	1.9800	1.9800		1.04
1 5/8 (Verizon - Existing)	B	Yes	Ar (CfAe)	144.00 - 0.00	0.0000	-0.35	15	15	1.9800	1.9800		1.04
HYBRIFLEX 1-5/8" (Verizon - Proposed)	B	Yes	Ar (CfAe)	144.00 - 0.00	3.0000	-0.4	2	2	1.9800	1.9800		1.90
7/8	B	Yes	Ar (CfAe)	188.00 - 0.00	0.0000	0.26	1	1	1.1100	1.1100		0.54

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	188.00-180.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.740	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	180.00-160.00	A	0.000	0.000	0.000	0.000	0.00
		B	18.490	0.000	0.000	0.000	0.12
		C	0.000	0.000	0.000	0.000	0.00
T3	160.00-140.00	A	0.000	0.000	0.000	0.000	0.00
		B	54.670	0.000	0.000	0.000	0.36
		C	38.610	0.000	0.000	0.000	0.24
T4	140.00-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	99.550	0.000	0.000	0.000	0.67
		C	61.380	0.000	0.000	0.000	0.39
T5	120.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	99.550	0.000	0.000	0.000	0.67
		C	69.300	0.000	0.000	0.000	0.44
T6	100.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		B	99.550	0.000	0.000	0.000	0.67
		C	69.300	0.000	0.000	0.000	0.44
T7	80.00-60.00	A	0.000	0.000	0.000	0.000	0.00
		B	99.550	0.000	0.000	0.000	0.67
		C	69.300	0.000	0.000	0.000	0.44
T8	60.00-40.00	A	0.000	0.000	0.000	0.000	0.00
		B	99.550	0.000	0.000	0.000	0.67
		C	69.300	0.000	0.000	0.000	0.44
T9	40.00-20.00	A	0.000	0.000	0.000	0.000	0.00
		B	99.550	0.000	0.000	0.000	0.67
		C	69.300	0.000	0.000	0.000	0.44

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
T10	20.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	99.550	0.000	0.000	0.000	0.67
		C	69.300	0.000	0.000	0.000	0.44

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	188.00-180.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		1.407	0.000	0.000	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00
T2	180.00-160.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		29.223	0.533	0.000	0.000	0.30
		C		0.000	0.000	0.000	0.000	0.00
T3	160.00-140.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		84.670	1.333	0.000	0.000	0.88
		C		50.613	0.000	0.000	0.000	0.60
T4	140.00-120.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		152.217	1.333	0.000	0.000	1.60
		C		80.846	0.000	0.000	0.000	0.95
T5	120.00-100.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		152.217	1.333	0.000	0.000	1.60
		C		92.766	0.000	0.000	0.000	1.07
T6	100.00-80.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		152.217	1.333	0.000	0.000	1.60
		C		92.766	0.000	0.000	0.000	1.07
T7	80.00-60.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		152.217	1.333	0.000	0.000	1.60
		C		92.766	0.000	0.000	0.000	1.07
T8	60.00-40.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		152.217	1.333	0.000	0.000	1.60
		C		92.766	0.000	0.000	0.000	1.07
T9	40.00-20.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		152.217	1.333	0.000	0.000	1.60
		C		92.766	0.000	0.000	0.000	1.07
T10	20.00-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		152.217	1.333	0.000	0.000	1.60
		C		92.766	0.000	0.000	0.000	1.07

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	188.00-180.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.083	0.086	0.164
		C	0.000	0.000	0.000	0.000
T2	180.00-160.00	A	0.000	0.000	0.000	0.000
		B	0.000	1.192	1.296	2.086
		C	0.000	0.000	0.000	0.000
T3	160.00-140.00	A	0.000	0.000	0.000	0.000
		B	0.000	2.624	4.170	6.559
		C	0.000	1.182	1.963	2.955

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
T4	140.00-120.00	A	0.000	0.000	0.000	0.000
		B	0.000	4.424	8.605	13.272
		C	0.000	1.803	3.594	5.409
T5	120.00-100.00	A	0.000	0.000	0.000	0.000
		B	0.000	4.266	8.297	12.798
		C	0.000	2.070	4.126	6.209
T6	100.00-80.00	A	0.000	0.000	0.000	0.000
		B	0.000	3.026	6.866	10.590
		C	0.000	1.468	3.414	5.138
T7	80.00-60.00	A	0.000	0.000	0.000	0.000
		B	0.000	2.932	7.604	11.728
		C	0.000	1.423	3.781	5.690
T8	60.00-40.00	A	0.000	0.000	0.000	0.000
		B	0.000	2.862	7.421	11.447
		C	0.000	1.388	3.690	5.554
T9	40.00-20.00	A	0.000	0.000	0.000	0.000
		B	0.000	2.810	7.286	11.238
		C	0.000	1.363	3.623	5.453
T10	20.00-0.00	A	0.000	0.000	0.000	0.000
		B	0.000	2.772	7.189	11.088
		C	0.000	1.345	3.574	5.380

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	188.00-180.00	0.6667	0.1335	0.8143	0.1631
T2	180.00-160.00	9.2909	3.1245	9.2804	3.0865
T3	160.00-140.00	21.9172	8.8693	21.9887	8.2402
T4	140.00-120.00	22.1853	0.2144	22.4491	-1.0835
T5	120.00-100.00	22.2441	1.3894	22.6224	0.1006
T6	100.00-80.00	25.0319	1.4433	25.9968	-0.0103
T7	80.00-60.00	26.6259	1.5175	27.8968	-0.0370
T8	60.00-40.00	27.3112	1.5066	29.0799	-0.0869
T9	40.00-20.00	29.4860	1.5839	31.4249	-0.1353
T10	20.00-0.00	31.4144	1.6522	33.5095	-0.1784

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BCD-87010	C	None			0.0000	193.50	No Ice	2.90	2.90	0.03
							1/2" Ice	4.05	4.05	0.05
13' Platform w/rails	C	None			0.0000	186.00	No Ice	31.30	31.30	1.82
							1/2" Ice	40.20	40.20	2.45
800-10121	A	From Leg	4.00		0.0000	168.00	No Ice	5.46	3.29	0.05

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
(AT&T - Existing)			6.00 0.00			1/2" Ice	5.88	3.64	0.08
P65-17-XLH-RR (AT&T - Existing)	A	From Leg	4.00 -2.00 0.00	0.0000	168.00	No Ice 1/2" Ice	11.47 12.08	6.80 7.38	0.06 0.12
P65-17-XLH-RR (AT&T - Existing)	A	From Leg	4.00 -6.00 0.00	0.0000	168.00	No Ice 1/2" Ice	11.47 12.08	6.80 7.38	0.06 0.12
800-10121 (AT&T - Existing)	B	From Leg	4.00 6.00 0.00	0.0000	168.00	No Ice 1/2" Ice	5.46 5.88	3.29 3.64	0.05 0.08
P65-17-XLH-RR (AT&T - Existing)	B	From Leg	4.00 -2.00 0.00	0.0000	168.00	No Ice 1/2" Ice	11.47 12.08	6.80 7.38	0.06 0.12
P65-17-XLH-RR (AT&T - Existing)	B	From Leg	4.00 -6.00 0.00	0.0000	168.00	No Ice 1/2" Ice	11.47 12.08	6.80 7.38	0.06 0.12
800-10121 (AT&T - Existing)	C	From Leg	4.00 6.00 0.00	0.0000	168.00	No Ice 1/2" Ice	5.46 5.88	3.29 3.64	0.05 0.08
SBNH-1D6565C (AT&T - Existing)	C	From Leg	4.00 -2.00 0.00	0.0000	168.00	No Ice 1/2" Ice	11.41 12.03	7.70 8.29	0.06 0.13
SBNH-1D6565C (AT&T - Existing)	C	From Leg	4.00 -6.00 0.00	0.0000	168.00	No Ice 1/2" Ice	11.41 12.03	7.70 8.29	0.06 0.13
TT19-08BP111-001 TMA (AT&T - Existing)	A	From Leg	4.00 6.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.64 0.76	0.52 0.62	0.02 0.02
RRUS-11 (AT&T - Existing)	A	From Leg	4.00 -2.00 0.00	0.0000	168.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
DTMABP7819VG12A TMA (AT&T - Existing)	A	From Leg	4.00 -6.00 0.00	0.0000	168.00	No Ice 1/2" Ice	1.59 1.76	0.58 0.70	0.02 0.03
TT19-08BP111-001 TMA (AT&T - Existing)	B	From Leg	4.00 6.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.64 0.76	0.52 0.62	0.02 0.02
RRUS-11 (AT&T - Existing)	B	From Leg	4.00 -2.00 0.00	0.0000	168.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
DTMABP7819VG12A TMA (AT&T - Existing)	B	From Leg	4.00 -6.00 0.00	0.0000	168.00	No Ice 1/2" Ice	1.59 1.76	0.58 0.70	0.02 0.03
TT19-08BP111-001 TMA (AT&T - Existing)	C	From Leg	4.00 6.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.64 0.76	0.52 0.62	0.02 0.02
RRUS-11 (AT&T - Existing)	C	From Leg	4.00 -2.00 0.00	0.0000	168.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
DTMABP7819VG12A TMA (AT&T - Existing)	C	From Leg	4.00 -6.00 0.00	0.0000	168.00	No Ice 1/2" Ice	1.59 1.76	0.58 0.70	0.02 0.03
DC6-48-60-18-8F Surge Arrestor (AT&T - Existing)	A	From Leg	1.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	0.02 0.04
Rohn 6' x 12' Boom Gate (1)	A	From Leg	2.00	0.0000	168.00	No Ice	16.60	16.60	0.56

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
(AT&T - Existing)			0.00			1/2" Ice	19.80	19.80	0.70
			0.00						
Rohn 6' x 12' Boom Gate (1)	B	From Leg	2.00	0.0000	168.00	No Ice	16.60	16.60	0.56
(AT&T - Existing)			0.00			1/2" Ice	19.80	19.80	0.70
			0.00						
Rohn 6' x 12' Boom Gate (1)	C	From Leg	2.00	0.0000	168.00	No Ice	16.60	16.60	0.56
(AT&T - Existing)			0.00			1/2" Ice	19.80	19.80	0.70
			0.00						
RR90-17-02DP	A	From Leg	3.00	0.0000	153.00	No Ice	4.36	1.97	0.02
(T-Mobile - Existing)			6.00			1/2" Ice	4.77	2.31	0.04
			0.00						
APX16DWV-16DWV-S-E-A	A	From Leg	3.00	0.0000	153.00	No Ice	6.70	2.00	0.04
CU			-2.00			1/2" Ice	7.13	2.33	0.07
(T-Mobile - Existing)			0.00						
RR90-17-02DP	A	From Leg	3.00	0.0000	153.00	No Ice	4.36	1.97	0.02
(T-Mobile - Existing)			-6.00			1/2" Ice	4.77	2.31	0.04
			0.00						
RR90-17-02DP	B	From Leg	3.00	0.0000	153.00	No Ice	4.36	1.97	0.02
(T-Mobile - Existing)			6.00			1/2" Ice	4.77	2.31	0.04
			0.00						
APX16DWV-16DWV-S-E-A	B	From Leg	3.00	0.0000	153.00	No Ice	6.70	2.00	0.04
CU			-2.00			1/2" Ice	7.13	2.33	0.07
(T-Mobile - Existing)			0.00						
RR90-17-02DP	B	From Leg	3.00	0.0000	153.00	No Ice	4.36	1.97	0.02
(T-Mobile - Existing)			-6.00			1/2" Ice	4.77	2.31	0.04
			0.00						
RR90-17-02DP	C	From Leg	3.00	0.0000	153.00	No Ice	4.36	1.97	0.02
(T-Mobile - Existing)			6.00			1/2" Ice	4.77	2.31	0.04
			0.00						
APX16DWV-16DWV-S-E-A	C	From Leg	3.00	0.0000	153.00	No Ice	6.70	2.00	0.04
CU			-2.00			1/2" Ice	7.13	2.33	0.07
(T-Mobile - Existing)			0.00						
RR90-17-02DP	C	From Leg	3.00	0.0000	153.00	No Ice	4.36	1.97	0.02
(T-Mobile - Existing)			-6.00			1/2" Ice	4.77	2.31	0.04
			0.00						
(2) TMA 10"x8"x3"	A	From Leg	3.00	0.0000	153.00	No Ice	0.78	0.29	0.02
(T-Mobile - Existing)			-2.00			1/2" Ice	0.90	0.38	0.02
			0.00						
(2) TMA 10"x8"x3"	B	From Leg	3.00	0.0000	153.00	No Ice	0.78	0.29	0.02
(T-Mobile - Existing)			-2.00			1/2" Ice	0.90	0.38	0.02
			0.00						
(2) TMA 10"x8"x3"	C	From Leg	3.00	0.0000	153.00	No Ice	0.78	0.29	0.02
(T-Mobile - Existing)			-2.00			1/2" Ice	0.90	0.38	0.02
			0.00						
13-ft T-Frame	A	From Leg	2.00	0.0000	153.00	No Ice	11.70	11.70	0.53
(T-Mobile - Existing)			0.00			1/2" Ice	16.40	16.40	0.74
			0.00						
13-ft T-Frame	B	From Leg	2.00	0.0000	153.00	No Ice	11.70	11.70	0.53
(T-Mobile - Existing)			0.00			1/2" Ice	16.40	16.40	0.74
			0.00						
13-ft T-Frame	C	From Leg	2.00	0.0000	153.00	No Ice	11.70	11.70	0.53
(T-Mobile - Existing)			0.00			1/2" Ice	16.40	16.40	0.74
			0.00						
APXVSPP18-C-A20	A	From Leg	2.00	0.0000	124.00	No Ice	8.26	5.28	0.06
(Sprint - Existing)			0.00			1/2" Ice	8.81	5.74	0.11
			0.00						
APXVSPP18-C-A20	B	From Leg	2.00	0.0000	124.00	No Ice	8.26	5.28	0.06

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
(Sprint - Existing)			0.00 0.00			1/2" Ice	8.81	5.74	0.11
APXVSPP18-C-A20 (Sprint - Existing)	C	From Leg	2.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	8.26 8.81	5.28 5.74	0.06 0.11
FD-RRH 4x40 1900 (Sprint - Existing)	A	From Leg	2.00 0.00 -2.00	0.0000	124.00	No Ice 1/2" Ice	2.61 2.84	2.71 2.95	0.06 0.08
FD-RRH 4x40 1900 (Sprint - Existing)	B	From Leg	2.00 0.00 -2.00	0.0000	124.00	No Ice 1/2" Ice	2.61 2.84	2.71 2.95	0.06 0.08
FD-RRH 4x40 1900 (Sprint - Existing)	C	From Leg	2.00 0.00 -2.00	0.0000	124.00	No Ice 1/2" Ice	2.61 2.84	2.71 2.95	0.06 0.08
FD-RRH 2x50 800 (Sprint - Existing)	A	From Leg	2.00 0.00 2.00	0.0000	124.00	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 Leg	2.00 0.00 2.00	0.0000	124.00	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 Leg	2.00 0.00 2.00	0.0000	124.00	No Ice 1/2" Ice	2.40 2.61	2.25 2.46	0.06 0.09
Rohn 6' x 12' Boom Gate (1) (Sprint - Existing)	A	From Leg	2.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	16.60 19.80	16.60 19.80	0.56 0.70
Rohn 6' x 12' Boom Gate (1) (Sprint - Existing)	B	From Leg	2.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	16.60 19.80	16.60 19.80	0.56 0.70
Rohn 6' x 12' Boom Gate (1) (Sprint - Existing)	C	From Leg	2.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	16.60 19.80	16.60 19.80	0.56 0.70
SBNHH-1D65B (Verizon - Proposed)	A	From Leg	4.00 -6.00 0.00	0.0000	144.00	No Ice 1/2" Ice	8.33 8.88	5.34 5.79	0.04 0.09
SBNHH-1D65B (Verizon - Proposed)	A	From Leg	4.00 -4.00 0.00	0.0000	144.00	No Ice 1/2" Ice	8.33 8.88	5.34 5.79	0.04 0.09
BXA-70063/6CF (Verizon - Existing)	A	From Leg	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.01 0.05
SBNHH-1D65B (Verizon - Proposed)	A	From Leg	4.00 4.00 0.00	0.0000	144.00	No Ice 1/2" Ice	8.33 8.88	5.34 5.79	0.04 0.09
SBNHH-1D65B (Verizon - Proposed)	B	From Leg	4.00 -6.00 0.00	0.0000	144.00	No Ice 1/2" Ice	8.33 8.88	5.34 5.79	0.04 0.09
SBNHH-1D65B (Verizon - Proposed)	B	From Leg	4.00 -4.00 0.00	0.0000	144.00	No Ice 1/2" Ice	8.33 8.88	5.34 5.79	0.04 0.09
BXA-70063/6CF (Verizon - Existing)	B	From Leg	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.01 0.05
SBNHH-1D65B (Verizon - Proposed)	B	From Leg	4.00 4.00 0.00	0.0000	144.00	No Ice 1/2" Ice	8.33 8.88	5.34 5.79	0.04 0.09
SBNHH-1D65B	C	From Leg	4.00	0.0000	144.00	No Ice	8.33	5.34	0.04

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
(Verizon - Proposed)			-6.00 0.00			1/2" Ice	8.88	5.79	0.09
SBNHH-1D65B	C	From Leg	4.00	0.0000	144.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			-4.00 0.00			1/2" Ice	8.88	5.79	0.09
BXA-70063/6CF	C	From Leg	4.00	0.0000	144.00	No Ice	7.73	4.16	0.01
(Verizon - Existing)			0.00 0.00			1/2" Ice	8.27	4.60	0.05
SBNHH-1D65B	C	From Leg	4.00	0.0000	144.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			4.00 0.00			1/2" Ice	8.88	5.79	0.09
RRH2x60-PCS	A	From Leg	4.00	0.0000	144.00	No Ice	2.51	1.55	0.06
(Verizon - Proposed)			-4.00 0.00			1/2" Ice	2.73	1.74	0.07
RRH2x60-PCS	B	From Leg	4.00	0.0000	144.00	No Ice	2.51	1.55	0.06
(Verizon - Proposed)			-4.00 0.00			1/2" Ice	2.73	1.74	0.07
RRH2x60-PCS	C	From Leg	4.00	0.0000	144.00	No Ice	2.51	1.55	0.06
(Verizon - Proposed)			-4.00 0.00			1/2" Ice	2.73	1.74	0.07
RRH4x45/2x90-AWS	A	From Leg	4.00	0.0000	144.00	No Ice	3.01	1.91	0.08
(Verizon - Proposed)			4.00 0.00			1/2" Ice	3.26	2.13	0.10
RRH4x45/2x90-AWS	B	From Leg	4.00	0.0000	144.00	No Ice	3.01	1.91	0.08
(Verizon - Proposed)			4.00 0.00			1/2" Ice	3.26	2.13	0.10
RRH4x45/2x90-AWS	C	From Leg	4.00	0.0000	144.00	No Ice	3.01	1.91	0.08
(Verizon - Proposed)			4.00 0.00			1/2" Ice	3.26	2.13	0.10
RRH4x30-B13	A	From Leg	4.00	0.0000	144.00	No Ice	2.52	1.89	0.06
(Verizon - Proposed)			0.00 0.00			1/2" Ice	2.74	2.09	0.08
RRH4x30-B13	B	From Leg	4.00	0.0000	144.00	No Ice	2.52	1.89	0.06
(Verizon - Proposed)			0.00 0.00			1/2" Ice	2.74	2.09	0.08
RRH4x30-B13	C	From Leg	4.00	0.0000	144.00	No Ice	2.52	1.89	0.06
(Verizon - Proposed)			0.00 0.00			1/2" Ice	2.74	2.09	0.08
DB-T1-6Z-8AB-0Z	A	From Leg	1.00	0.0000	144.00	No Ice	5.60	2.33	0.04
(Verizon - Proposed)			0.00 0.00			1/2" Ice	5.92	2.56	0.08
DB-T1-6Z-8AB-0Z	B	From Leg	1.00	0.0000	144.00	No Ice	5.60	2.33	0.04
(Verizon - Proposed)			0.00 0.00			1/2" Ice	5.92	2.56	0.08
Rohn 6' x 12' Boom Gate (1)	A	From Leg	2.00	0.0000	144.00	No Ice	16.60	16.60	0.56
(Verizon - Existing)			0.00 0.00			1/2" Ice	19.80	19.80	0.70
Rohn 6' x 12' Boom Gate (1)	B	From Leg	2.00	0.0000	144.00	No Ice	16.60	16.60	0.56
(Verizon - Existing)			0.00 0.00			1/2" Ice	19.80	19.80	0.70
Rohn 6' x 12' Boom Gate (1)	C	From Leg	2.00	0.0000	144.00	No Ice	16.60	16.60	0.56
(Verizon - Existing)			0.00 0.00			1/2" Ice	19.80	19.80	0.70

Tower Pressures - No Ice

$G_H = 1.118$

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 188.00-180.00	184.00	1.634	27	54.557	A	5.913	3.833	3.833	39.33	0.000	0.000
					B	5.827	4.573		36.86	0.000	0.000
					C	5.913	3.833		39.33	0.000	0.000
T2 180.00-160.00	170.00	1.597	26	155.997	A	10.246	9.599	9.599	48.37	0.000	0.000
					B	8.950	28.089		25.92	0.000	0.000
					C	10.246	9.599		48.37	0.000	0.000
T3 160.00-140.00	150.00	1.541	25	197.341	A	14.160	11.687	11.687	45.22	0.000	0.000
					B	9.991	66.357		15.31	0.000	0.000
					C	12.197	50.297		18.70	0.000	0.000
T4 140.00-120.00	130.00	1.48	24	241.011	A	19.550	15.028	15.028	43.46	0.000	0.000
					B	10.945	114.578		11.97	0.000	0.000
					C	15.956	76.408		16.27	0.000	0.000
T5 120.00-100.00	110.00	1.411	23	284.984	A	22.226	18.577	18.577	45.53	0.000	0.000
					B	13.929	118.127		14.07	0.000	0.000
					C	18.100	87.877		17.53	0.000	0.000
T6 100.00-80.00	90.00	1.332	22	328.557	A	21.164	22.123	22.123	51.11	0.000	0.000
					B	14.298	121.673		16.27	0.000	0.000
					C	17.750	91.423		20.26	0.000	0.000
T7 80.00-60.00	70.00	1.24	20	369.055	A	26.500	22.119	22.119	45.49	0.000	0.000
					B	18.896	121.669		15.74	0.000	0.000
					C	22.719	91.419		19.38	0.000	0.000
T8 60.00-40.00	50.00	1.126	18	414.498	A	28.816	28.811	28.811	50.00	0.000	0.000
					B	21.395	128.361		19.24	0.000	0.000
					C	25.126	98.111		23.38	0.000	0.000
T9 40.00-20.00	30.00	1	16	456.091	A	31.276	28.794	28.794	47.93	0.000	0.000
					B	23.990	128.344		18.90	0.000	0.000
					C	27.653	98.094		22.90	0.000	0.000
T10 20.00-0.00	10.00	1	16	495.193	A	33.681	28.798	28.798	46.09	0.000	0.000
					B	26.492	128.348		18.60	0.000	0.000
					C	30.107	98.098		22.46	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.118$

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 188.00-180.00	184.00	1.634	20	0.5000	55.223	A	5.913	8.168	5.167	36.69	0.000	0.000
						B	5.749	9.492		33.90	0.000	0.000
						C	5.913	8.168		36.69	0.000	0.000
T2 180.00-160.00	170.00	1.597	20	0.5000	157.666	A	10.246	18.792	12.937	44.55	0.000	0.000
						B	8.694	46.824		23.30	0.000	0.000
						C	10.246	18.792		44.55	0.000	0.000
T3 160.00-140.00	150.00	1.541	19	0.5000	199.010	A	14.160	20.691	15.027	43.12	0.000	0.000
						B	8.935	102.737		13.46	0.000	0.000
						C	11.206	70.122		18.48	0.000	0.000

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
T4	130.00	1.48	18	0.5000	242.680	A	19.550	24.884	18.368	41.34	0.000	0.000
140.00-120.00						B	7.611	172.677		10.19	0.000	0.000
						C	14.140	103.927		15.56	0.000	0.000
T5	110.00	1.411	17	0.5000	286.653	A	22.226	29.325	21.916	42.51	0.000	0.000
120.00-100.00						B	10.761	177.276		11.66	0.000	0.000
						C	16.016	120.021		16.11	0.000	0.000
T6 100.00-80.00	90.00	1.332	16	0.5000	330.226	A	21.164	31.510	25.463	48.34	0.000	0.000
						B	11.907	180.701		13.22	0.000	0.000
						C	16.026	122.808		18.34	0.000	0.000
T7 80.00-60.00	70.00	1.24	15	0.5000	370.724	A	26.500	32.082	25.457	43.46	0.000	0.000
						B	16.105	181.367		12.89	0.000	0.000
						C	20.809	123.426		17.65	0.000	0.000
T8 60.00-40.00	50.00	1.126	14	0.5000	416.167	A	28.816	39.355	32.151	47.16	0.000	0.000
						B	18.703	188.710		15.50	0.000	0.000
						C	23.262	130.733		20.88	0.000	0.000
T9 40.00-20.00	30.00	1	12	0.5000	457.760	A	31.276	39.951	32.132	45.11	0.000	0.000
						B	21.371	189.358		15.25	0.000	0.000
						C	25.823	131.354		20.44	0.000	0.000
T10 20.00-0.00	10.00	1	12	0.5000	496.862	A	33.681	40.557	32.137	43.29	0.000	0.000
						B	23.926	190.002		15.02	0.000	0.000
						C	28.301	131.978		20.05	0.000	0.000

Tower Pressure - Service

$G_H = 1.118$

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	184.00	1.634	10	54.557	A	5.913	3.833	3.833	39.33	0.000	0.000
188.00-180.00					B	5.827	4.573		36.86	0.000	0.000
					C	5.913	3.833		39.33	0.000	0.000
T2	170.00	1.597	10	155.997	A	10.246	9.599	9.599	48.37	0.000	0.000
180.00-160.00					B	8.950	28.089		25.92	0.000	0.000
					C	10.246	9.599		48.37	0.000	0.000
T3	150.00	1.541	10	197.341	A	14.160	11.687	11.687	45.22	0.000	0.000
160.00-140.00					B	9.991	66.357		15.31	0.000	0.000
					C	12.197	50.297		18.70	0.000	0.000
T4	130.00	1.48	9	241.011	A	19.550	15.028	15.028	43.46	0.000	0.000
140.00-120.00					B	10.945	114.578		11.97	0.000	0.000
					C	15.956	76.408		16.27	0.000	0.000
T5	110.00	1.411	9	284.984	A	22.226	18.577	18.577	45.53	0.000	0.000
120.00-100.00					B	13.929	118.127		14.07	0.000	0.000
					C	18.100	87.877		17.53	0.000	0.000
T6	90.00	1.332	9	328.557	A	21.164	22.123	22.123	51.11	0.000	0.000
100.00-80.00					B	14.298	121.673		16.27	0.000	0.000
					C	17.750	91.423		20.26	0.000	0.000
T7 80.00-60.00	70.00	1.24	8	369.055	A	26.500	22.119	22.119	45.49	0.000	0.000
					B	18.896	121.669		15.74	0.000	0.000
					C	22.719	91.419		19.38	0.000	0.000
T8 60.00-40.00	50.00	1.126	7	414.498	A	28.816	28.811	28.811	50.00	0.000	0.000
					B	21.395	128.361		19.24	0.000	0.000
					C	25.126	98.111		23.38	0.000	0.000
T9 40.00-20.00	30.00	1	6	456.091	A	31.276	28.794	28.794	47.93	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
T10 20.00-0.00	10.00	1	6	495.193	B	23.990	128.344		18.90	0.000	0.000
					C	27.653	98.094		22.90	0.000	0.000
					A	33.681	28.798	28.798	46.09	0.000	0.000
					B	26.492	128.348		18.60	0.000	0.000
					C	30.107	98.098		22.46	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	0.00	0.43	A	0.179	2.669	0.586	1	1	8.161	0.67	83.74	B
188.00-180.00			B	0.191	2.628	0.589	1	1	8.519			
			C	0.179	2.669	0.586	1	1	8.161			
T2	0.12	0.81	A	0.127	2.857	0.578	1	1	15.796	1.87	93.33	B
180.00-160.00			B	0.237	2.476	0.599	1	1	25.768			
			C	0.127	2.857	0.578	1	1	15.796			
T3	0.61	1.47	A	0.131	2.843	0.579	1	1	20.925	3.12	156.04	B
160.00-140.00			B	0.387	2.091	0.646	1	1	52.880			
			C	0.317	2.253	0.621	1	1	43.439			
T4	1.06	2.09	A	0.143	2.796	0.58	1	1	28.273	4.68	233.93	B
140.00-120.00			B	0.521	1.874	0.708	1	1	92.105			
			C	0.383	2.098	0.645	1	1	65.232			
T5	1.11	2.60	A	0.143	2.797	0.58	1	1	33.009	4.75	237.55	B
120.00-100.00			B	0.463	1.952	0.68	1	1	94.197			
			C	0.372	2.122	0.641	1	1	74.388			
T6	1.11	2.67	A	0.132	2.84	0.579	1	1	33.970	4.69	234.30	B
100.00-80.00			B	0.414	2.037	0.657	1	1	94.280			
			C	0.332	2.214	0.626	1	1	75.009			
T7	1.11	3.73	A	0.132	2.84	0.579	1	1	39.303	4.64	232.20	B
80.00-60.00			B	0.381	2.103	0.644	1	1	97.249			
			C	0.309	2.272	0.619	1	1	79.287			
T8	1.11	4.18	A	0.139	2.812	0.58	1	1	45.522	4.56	228.16	B
60.00-40.00			B	0.361	2.146	0.637	1	1	103.106			
			C	0.297	2.303	0.615	1	1	85.472			
T9	1.11	4.99	A	0.132	2.84	0.579	1	1	47.943	4.23	211.35	B
40.00-20.00			B	0.334	2.209	0.627	1	1	104.447			
			C	0.276	2.363	0.609	1	1	87.369			
T10	1.11	5.65	A	0.126	2.861	0.578	1	1	50.330	4.40	219.77	B
20.00-0.00			B	0.313	2.263	0.62	1	1	106.051			
			C	0.259	2.411	0.604	1	1	89.376			
Sum Weight:	8.45	28.61						OTM	3185.28 kip-ft	37.60		

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	0.00	0.43	A	0.179	2.669	0.586	0.825	1	7.126	0.59	73.71	B
188.00-180.00			B	0.191	2.628	0.589	0.825	1	7.499			

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	0.179	2.669	0.586	0.825	1	7.126			
T2	0.12	0.81	A	0.127	2.857	0.578	0.825	1	14.003	1.75	87.66	B
180.00-160.00			B	0.237	2.476	0.599	0.825	1	24.202			
			C	0.127	2.857	0.578	0.825	1	14.003			
T3	0.61	1.47	A	0.131	2.843	0.579	0.825	1	18.446	3.02	150.88	B
160.00-140.00			B	0.387	2.091	0.646	0.825	1	51.132			
			C	0.317	2.253	0.621	0.825	1	41.305			
T4	1.06	2.09	A	0.143	2.796	0.58	0.825	1	24.852	4.58	229.06	B
140.00-120.00			B	0.521	1.874	0.708	0.825	1	90.190			
			C	0.383	2.098	0.645	0.825	1	62.439			
T5	1.11	2.60	A	0.143	2.797	0.58	0.825	1	29.119	4.63	231.41	B
120.00-100.00			B	0.463	1.952	0.68	0.825	1	91.759			
			C	0.372	2.122	0.641	0.825	1	71.220			
T6	1.11	2.67	A	0.132	2.84	0.579	0.825	1	30.266	4.56	228.08	B
100.00-80.00			B	0.414	2.037	0.657	0.825	1	91.777			
			C	0.332	2.214	0.626	0.825	1	71.903			
T7	1.11	3.73	A	0.132	2.84	0.579	0.825	1	34.666	4.49	224.31	B
80.00-60.00			B	0.381	2.103	0.644	0.825	1	93.942			
			C	0.309	2.272	0.619	0.825	1	75.311			
T8	1.11	4.18	A	0.139	2.812	0.58	0.825	1	40.479	4.40	219.87	B
60.00-40.00			B	0.361	2.146	0.637	0.825	1	99.362			
			C	0.297	2.303	0.615	0.825	1	81.075			
T9	1.11	4.99	A	0.132	2.84	0.579	0.825	1	42.470	4.06	202.86	B
40.00-20.00			B	0.334	2.209	0.627	0.825	1	100.249			
			C	0.276	2.363	0.609	0.825	1	82.530			
T10	1.11	5.65	A	0.126	2.861	0.578	0.825	1	44.435	4.20	210.16	B
20.00-0.00			B	0.313	2.263	0.62	0.825	1	101.415			
			C	0.259	2.411	0.604	0.825	1	84.107			
Sum Weight:	8.45	28.61						OTM	3072.04 kip-ft	36.28		

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 ft²	F K	w plf	Ctrl. Face
T1	0.00	0.43	A	0.179	2.669	0.586	0.8	1	6.978	0.58	72.28	B
188.00-180.00			B	0.191	2.628	0.589	0.8	1	7.353			
			C	0.179	2.669	0.586	0.8	1	6.978			
T2	0.12	0.81	A	0.127	2.857	0.578	0.8	1	13.747	1.74	86.84	B
180.00-160.00			B	0.237	2.476	0.599	0.8	1	23.978			
			C	0.127	2.857	0.578	0.8	1	13.747			
T3	0.61	1.47	A	0.131	2.843	0.579	0.8	1	18.092	3.00	150.15	B
160.00-140.00			B	0.387	2.091	0.646	0.8	1	50.882			
			C	0.317	2.253	0.621	0.8	1	41.000			
T4	1.06	2.09	A	0.143	2.796	0.58	0.8	1	24.364	4.57	228.37	B
140.00-120.00			B	0.521	1.874	0.708	0.8	1	89.916			
			C	0.383	2.098	0.645	0.8	1	62.040			
T5	1.11	2.60	A	0.143	2.797	0.58	0.8	1	28.564	4.61	230.53	B
120.00-100.00			B	0.463	1.952	0.68	0.8	1	91.411			
			C	0.372	2.122	0.641	0.8	1	70.768			
T6	1.11	2.67	A	0.132	2.84	0.579	0.8	1	29.737	4.54	227.19	B
100.00-80.00			B	0.414	2.037	0.657	0.8	1	91.420			
			C	0.332	2.214	0.626	0.8	1	71.459			
T7	1.11	3.73	A	0.132	2.84	0.579	0.8	1	34.003	4.46	223.18	B

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
80.00-60.00			B	0.381	2.103	0.644	0.8	1	93.469			
			C	0.309	2.272	0.619	0.8	1	74.743			
T8	1.11	4.18	A	0.139	2.812	0.58	0.8	1	39.759	4.37	218.69	B
60.00-40.00			B	0.361	2.146	0.637	0.8	1	98.827			
			C	0.297	2.303	0.615	0.8	1	80.447			
T9	1.11	4.99	A	0.132	2.84	0.579	0.8	1	41.688	4.03	201.64	B
40.00-20.00			B	0.334	2.209	0.627	0.8	1	99.649			
			C	0.276	2.363	0.609	0.8	1	81.838			
T10	1.11	5.65	A	0.126	2.861	0.578	0.8	1	43.593	4.18	208.79	B
20.00-0.00			B	0.313	2.263	0.62	0.8	1	100.752			
			C	0.259	2.411	0.604	0.8	1	83.354			
Sum Weight:	8.45	28.61						OTM	3055.86 kip-ft	36.09		

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 ft²	F K	w plf	Ctrl. Face
T1	0.00	0.43	A	0.179	2.669	0.586	0.85	1	7.274	0.60	75.14	B
188.00-180.00			B	0.191	2.628	0.589	0.85	1	7.645			
			C	0.179	2.669	0.586	0.85	1	7.274			
T2	0.12	0.81	A	0.127	2.857	0.578	0.85	1	14.259	1.77	88.47	B
180.00-160.00			B	0.237	2.476	0.599	0.85	1	24.426			
			C	0.127	2.857	0.578	0.85	1	14.259			
T3	0.61	1.47	A	0.131	2.843	0.579	0.85	1	18.800	3.03	151.62	B
160.00-140.00			B	0.387	2.091	0.646	0.85	1	51.382			
			C	0.317	2.253	0.621	0.85	1	41.610			
T4	1.06	2.09	A	0.143	2.796	0.58	0.85	1	25.341	4.60	229.76	B
140.00-120.00			B	0.521	1.874	0.708	0.85	1	90.464			
			C	0.383	2.098	0.645	0.85	1	62.838			
T5	1.11	2.60	A	0.143	2.797	0.58	0.85	1	29.675	4.65	232.28	B
120.00-100.00			B	0.463	1.952	0.68	0.85	1	92.107			
			C	0.372	2.122	0.641	0.85	1	71.673			
T6	1.11	2.67	A	0.132	2.84	0.579	0.85	1	30.795	4.58	228.97	B
100.00-80.00			B	0.414	2.037	0.657	0.85	1	92.135			
			C	0.332	2.214	0.626	0.85	1	72.347			
T7	1.11	3.73	A	0.132	2.84	0.579	0.85	1	35.328	4.51	225.44	B
80.00-60.00			B	0.381	2.103	0.644	0.85	1	94.414			
			C	0.309	2.272	0.619	0.85	1	75.879			
T8	1.11	4.18	A	0.139	2.812	0.58	0.85	1	41.200	4.42	221.05	B
60.00-40.00			B	0.361	2.146	0.637	0.85	1	99.897			
			C	0.297	2.303	0.615	0.85	1	81.703			
T9	1.11	4.99	A	0.132	2.84	0.579	0.85	1	43.251	4.08	204.07	B
40.00-20.00			B	0.334	2.209	0.627	0.85	1	100.849			
			C	0.276	2.363	0.609	0.85	1	83.221			
T10	1.11	5.65	A	0.126	2.861	0.578	0.85	1	45.277	4.23	211.54	B
20.00-0.00			B	0.313	2.263	0.62	0.85	1	102.077			
			C	0.259	2.411	0.604	0.85	1	84.860			
Sum Weight:	8.45	28.61						OTM	3088.21 kip-ft	36.47		

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	0.01	0.70	A	0.255	2.423	0.603	1	1	10.840	0.61	76.39	B
188.00-180.00			B	0.276	2.362	0.609	1	1	11.529			
			C	0.255	2.423	0.603	1	1	10.840			
T2	0.30	1.31	A	0.184	2.65	0.587	1	1	21.282	1.82	91.15	B
180.00-160.00			B	0.352	2.167	0.633	1	1	38.344			
			C	0.184	2.65	0.587	1	1	21.282			
T3	1.48	2.10	A	0.175	2.681	0.586	1	1	26.278	3.26	163.01	B
160.00-140.00			B	0.561	1.833	0.731	1	1	83.993			
			C	0.409	2.047	0.655	1	1	57.148			
T4	2.55	2.93	A	0.183	2.653	0.587	1	1	34.159	5.61	280.49	B
140.00-120.00			B	0.743	1.785	0.851	1	1	154.641			
			C	0.487	1.918	0.691	1	1	85.925			
T5	2.67	3.57	A	0.18	2.665	0.586	1	1	39.425	5.20	259.91	B
120.00-100.00			B	0.656	1.78	0.789	1	1	150.712			
			C	0.475	1.935	0.685	1	1	98.214			
T6	2.67	3.63	A	0.16	2.737	0.583	1	1	39.533	4.86	242.91	B
100.00-80.00			B	0.583	1.815	0.743	1	1	146.258			
			C	0.42	2.025	0.66	1	1	97.096			
T7	2.67	4.85	A	0.158	2.742	0.583	1	1	45.195	4.62	230.95	B
80.00-60.00			B	0.533	1.861	0.715	1	1	145.728			
			C	0.389	2.086	0.647	1	1	100.690			
T8	2.67	5.45	A	0.164	2.721	0.584	1	1	51.787	4.42	220.93	B
60.00-40.00			B	0.498	1.902	0.697	1	1	150.173			
			C	0.37	2.126	0.64	1	1	106.909			
T9	2.67	6.34	A	0.156	2.751	0.582	1	1	54.541	4.03	201.31	B
40.00-20.00			B	0.46	1.957	0.678	1	1	149.771			
			C	0.343	2.187	0.63	1	1	108.593			
T10	2.67	7.08	A	0.149	2.774	0.581	1	1	57.260	4.14	207.01	B
20.00-0.00			B	0.431	2.007	0.665	1	1	150.191			
			C	0.323	2.238	0.623	1	1	110.533			
Sum Weight:	20.38	37.96						OTM	3356.16 kip-ft	38.56		

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 ft²	F K	w plf	Ctrl. Face
T1	0.01	0.70	A	0.255	2.423	0.603	0.825	1	9.805	0.56	69.73	B
188.00-180.00			B	0.276	2.362	0.609	0.825	1	10.522			
			C	0.255	2.423	0.603	0.825	1	9.805			
T2	0.30	1.31	A	0.184	2.65	0.587	0.825	1	19.489	1.75	87.53	B
180.00-160.00			B	0.352	2.167	0.633	0.825	1	36.823			
			C	0.184	2.65	0.587	0.825	1	19.489			
T3	1.48	2.10	A	0.175	2.681	0.586	0.825	1	23.800	3.20	159.98	B
160.00-140.00			B	0.561	1.833	0.731	0.825	1	82.429			
			C	0.409	2.047	0.655	0.825	1	55.187			
T4	2.55	2.93	A	0.183	2.653	0.587	0.825	1	30.738	5.56	278.07	B
140.00-120.00			B	0.743	1.785	0.851	0.825	1	153.309			
			C	0.487	1.918	0.691	0.825	1	83.450			
T5	2.67	3.57	A	0.18	2.665	0.586	0.825	1	35.535	5.13	256.66	B
120.00-100.00			B	0.656	1.78	0.789	0.825	1	148.829			

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	0.475	1.935	0.685	0.825	1	95.412			
T6	2.67	3.63	A	0.16	2.737	0.583	0.825	1	35.829	4.79	239.45	B
100.00-80.00			B	0.583	1.815	0.743	0.825	1	144.174			
			C	0.42	2.025	0.66	0.825	1	94.292			
T7	2.67	4.85	A	0.158	2.742	0.583	0.825	1	40.558	4.53	226.48	B
80.00-60.00			B	0.533	1.861	0.715	0.825	1	142.910			
			C	0.389	2.086	0.647	0.825	1	97.049			
T8	2.67	5.45	A	0.164	2.721	0.584	0.825	1	46.744	4.32	216.12	B
60.00-40.00			B	0.498	1.902	0.697	0.825	1	146.900			
			C	0.37	2.126	0.64	0.825	1	102.838			
T9	2.67	6.34	A	0.156	2.751	0.582	0.825	1	49.068	3.93	196.28	B
40.00-20.00			B	0.46	1.957	0.678	0.825	1	146.031			
			C	0.343	2.187	0.63	0.825	1	104.074			
T10	2.67	7.08	A	0.149	2.774	0.581	0.825	1	51.366	4.02	201.24	B
20.00-0.00			B	0.431	2.007	0.665	0.825	1	146.004			
			C	0.323	2.238	0.623	0.825	1	105.580			
Sum Weight:	20.38	37.96						OTM	3290.05 kip-ft	37.79		

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	0.01	0.70	A	0.255	2.423	0.603	0.8	1	9.658	0.55	68.78	B
188.00-180.00			B	0.276	2.362	0.609	0.8	1	10.379			
			C	0.255	2.423	0.603	0.8	1	9.658			
T2	0.30	1.31	A	0.184	2.65	0.587	0.8	1	19.233	1.74	87.02	B
180.00-160.00			B	0.352	2.167	0.633	0.8	1	36.605			
			C	0.184	2.65	0.587	0.8	1	19.233			
T3	1.48	2.10	A	0.175	2.681	0.586	0.8	1	23.446	3.19	159.54	B
160.00-140.00			B	0.561	1.833	0.731	0.8	1	82.206			
			C	0.409	2.047	0.655	0.8	1	54.907			
T4	2.55	2.93	A	0.183	2.653	0.587	0.8	1	30.249	5.55	277.73	B
140.00-120.00			B	0.743	1.785	0.851	0.8	1	153.118			
			C	0.487	1.918	0.691	0.8	1	83.097			
T5	2.67	3.57	A	0.18	2.665	0.586	0.8	1	34.980	5.12	256.20	B
120.00-100.00			B	0.656	1.78	0.789	0.8	1	148.560			
			C	0.475	1.935	0.685	0.8	1	95.011			
T6	2.67	3.63	A	0.16	2.737	0.583	0.8	1	35.300	4.78	238.95	B
100.00-80.00			B	0.583	1.815	0.743	0.8	1	143.876			
			C	0.42	2.025	0.66	0.8	1	93.891			
T7	2.67	4.85	A	0.158	2.742	0.583	0.8	1	39.895	4.52	225.84	B
80.00-60.00			B	0.533	1.861	0.715	0.8	1	142.507			
			C	0.389	2.086	0.647	0.8	1	96.528			
T8	2.67	5.45	A	0.164	2.721	0.584	0.8	1	46.024	4.31	215.43	B
60.00-40.00			B	0.498	1.902	0.697	0.8	1	146.433			
			C	0.37	2.126	0.64	0.8	1	102.257			
T9	2.67	6.34	A	0.156	2.751	0.582	0.8	1	48.286	3.91	195.57	B
40.00-20.00			B	0.46	1.957	0.678	0.8	1	145.496			
			C	0.343	2.187	0.63	0.8	1	103.428			
T10	2.67	7.08	A	0.149	2.774	0.581	0.8	1	50.524	4.01	200.42	B
20.00-0.00			B	0.431	2.007	0.665	0.8	1	145.406			
			C	0.323	2.238	0.623	0.8	1	104.873			

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
Sum Weight:	20.38	37.96						OTM	3280.60 kip-ft	37.68		

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 188.00-180.00	0.01	0.70	A	0.255	2.423	0.603	0.85	1	9.953	0.57	70.68	B
			B	0.276	2.362	0.609	0.85	1	10.666			
			C	0.255	2.423	0.603	0.85	1	9.953			
T2 180.00-160.00	0.30	1.31	A	0.184	2.65	0.587	0.85	1	19.746	1.76	88.05	B
			B	0.352	2.167	0.633	0.85	1	37.040			
			C	0.184	2.65	0.587	0.85	1	19.746			
T3 160.00-140.00	1.48	2.10	A	0.175	2.681	0.586	0.85	1	24.154	3.21	160.41	B
			B	0.561	1.833	0.731	0.85	1	82.653			
			C	0.409	2.047	0.655	0.85	1	55.467			
T4 140.00-120.00	2.55	2.93	A	0.183	2.653	0.587	0.85	1	31.227	5.57	278.42	B
			B	0.743	1.785	0.851	0.85	1	153.499			
			C	0.487	1.918	0.691	0.85	1	83.804			
T5 120.00-100.00	2.67	3.57	A	0.18	2.665	0.586	0.85	1	36.091	5.14	257.13	B
			B	0.656	1.78	0.789	0.85	1	149.098			
			C	0.475	1.935	0.685	0.85	1	95.812			
T6 100.00-80.00	2.67	3.63	A	0.16	2.737	0.583	0.85	1	36.358	4.80	239.94	B
			B	0.583	1.815	0.743	0.85	1	144.472			
			C	0.42	2.025	0.66	0.85	1	94.692			
T7 80.00-60.00	2.67	4.85	A	0.158	2.742	0.583	0.85	1	41.220	4.54	227.12	B
			B	0.533	1.861	0.715	0.85	1	143.312			
			C	0.389	2.086	0.647	0.85	1	97.569			
T8 60.00-40.00	2.67	5.45	A	0.164	2.721	0.584	0.85	1	47.465	4.34	216.81	B
			B	0.498	1.902	0.697	0.85	1	147.368			
			C	0.37	2.126	0.64	0.85	1	103.420			
T9 40.00-20.00	2.67	6.34	A	0.156	2.751	0.582	0.85	1	49.850	3.94	197.00	B
			B	0.46	1.957	0.678	0.85	1	146.565			
			C	0.343	2.187	0.63	0.85	1	104.719			
T10 20.00-0.00	2.67	7.08	A	0.149	2.774	0.581	0.85	1	52.208	4.04	202.06	B
			B	0.431	2.007	0.665	0.85	1	146.602			
			C	0.323	2.238	0.623	0.85	1	106.288			
Sum Weight:	20.38	37.96						OTM	3299.49 kip-ft	37.90		

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 188.00-180.00	0.00	0.43	A	0.179	2.669	0.586	1	1	8.161	0.26	32.71	B
			B	0.191	2.628	0.589	1	1	8.519			
			C	0.179	2.669	0.586	1	1	8.161			

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	0.12	0.81	A	0.127	2.857	0.578	1	1	15.796	0.73	36.46	B
180.00-160.00			B	0.237	2.476	0.599	1	1	25.768			
			C	0.127	2.857	0.578	1	1	15.796			
T3	0.61	1.47	A	0.131	2.843	0.579	1	1	20.925	1.22	60.95	B
160.00-140.00			B	0.387	2.091	0.646	1	1	52.880			
			C	0.317	2.253	0.621	1	1	43.439			
T4	1.06	2.09	A	0.143	2.796	0.58	1	1	28.273	1.83	91.38	B
140.00-120.00			B	0.521	1.874	0.708	1	1	92.105			
			C	0.383	2.098	0.645	1	1	65.232			
T5	1.11	2.60	A	0.143	2.797	0.58	1	1	33.009	1.86	92.79	B
120.00-100.00			B	0.463	1.952	0.68	1	1	94.197			
			C	0.372	2.122	0.641	1	1	74.388			
T6	1.11	2.67	A	0.132	2.84	0.579	1	1	33.970	1.83	91.52	B
100.00-80.00			B	0.414	2.037	0.657	1	1	94.280			
			C	0.332	2.214	0.626	1	1	75.009			
T7	1.11	3.73	A	0.132	2.84	0.579	1	1	39.303	1.81	90.70	B
80.00-60.00			B	0.381	2.103	0.644	1	1	97.249			
			C	0.309	2.272	0.619	1	1	79.287			
T8	1.11	4.18	A	0.139	2.812	0.58	1	1	45.522	1.78	89.12	B
60.00-40.00			B	0.361	2.146	0.637	1	1	103.106			
			C	0.297	2.303	0.615	1	1	85.472			
T9	1.11	4.99	A	0.132	2.84	0.579	1	1	47.943	1.65	82.56	B
40.00-20.00			B	0.334	2.209	0.627	1	1	104.447			
			C	0.276	2.363	0.609	1	1	87.369			
T10	1.11	5.65	A	0.126	2.861	0.578	1	1	50.330	1.72	85.85	B
20.00-0.00			B	0.313	2.263	0.62	1	1	106.051			
			C	0.259	2.411	0.604	1	1	89.376			
Sum Weight:	8.45	28.61						OTM	1244.25 kip-ft	14.69		

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 ft²	F K	w plf	Ctrl. Face
T1	0.00	0.43	A	0.179	2.669	0.586	0.825	1	7.126	0.23	28.79	B
188.00-180.00			B	0.191	2.628	0.589	0.825	1	7.499			
			C	0.179	2.669	0.586	0.825	1	7.126			
T2	0.12	0.81	A	0.127	2.857	0.578	0.825	1	14.003	0.68	34.24	B
180.00-160.00			B	0.237	2.476	0.599	0.825	1	24.202			
			C	0.127	2.857	0.578	0.825	1	14.003			
T3	0.61	1.47	A	0.131	2.843	0.579	0.825	1	18.446	1.18	58.94	B
160.00-140.00			B	0.387	2.091	0.646	0.825	1	51.132			
			C	0.317	2.253	0.621	0.825	1	41.305			
T4	1.06	2.09	A	0.143	2.796	0.58	0.825	1	24.852	1.79	89.48	B
140.00-120.00			B	0.521	1.874	0.708	0.825	1	90.190			
			C	0.383	2.098	0.645	0.825	1	62.439			
T5	1.11	2.60	A	0.143	2.797	0.58	0.825	1	29.119	1.81	90.39	B
120.00-100.00			B	0.463	1.952	0.68	0.825	1	91.759			
			C	0.372	2.122	0.641	0.825	1	71.220			
T6	1.11	2.67	A	0.132	2.84	0.579	0.825	1	30.266	1.78	89.09	B
100.00-80.00			B	0.414	2.037	0.657	0.825	1	91.777			
			C	0.332	2.214	0.626	0.825	1	71.903			
T7	1.11	3.73	A	0.132	2.84	0.579	0.825	1	34.666	1.75	87.62	B
80.00-60.00			B	0.381	2.103	0.644	0.825	1	93.942			

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	0.309	2.272	0.619	0.825	1	75.311			
T8	1.11	4.18	A	0.139	2.812	0.58	0.825	1	40.479	1.72	85.89	B
60.00-40.00			B	0.361	2.146	0.637	0.825	1	99.362			
			C	0.297	2.303	0.615	0.825	1	81.075			
T9	1.11	4.99	A	0.132	2.84	0.579	0.825	1	42.470	1.58	79.24	B
40.00-20.00			B	0.334	2.209	0.627	0.825	1	100.249			
			C	0.276	2.363	0.609	0.825	1	82.530			
T10	1.11	5.65	A	0.126	2.861	0.578	0.825	1	44.435	1.64	82.10	B
20.00-0.00			B	0.313	2.263	0.62	0.825	1	101.415			
			C	0.259	2.411	0.604	0.825	1	84.107			
Sum Weight:	8.45	28.61						OTM	1200.01 kip-ft	14.17		

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 ft²	F K	w plf	Ctrl. Face
T1	0.00	0.43	A	0.179	2.669	0.586	0.8	1	6.978	0.23	28.23	B
188.00-180.00			B	0.191	2.628	0.589	0.8	1	7.353			
			C	0.179	2.669	0.586	0.8	1	6.978			
T2	0.12	0.81	A	0.127	2.857	0.578	0.8	1	13.747	0.68	33.92	B
180.00-160.00			B	0.237	2.476	0.599	0.8	1	23.978			
			C	0.127	2.857	0.578	0.8	1	13.747			
T3	0.61	1.47	A	0.131	2.843	0.579	0.8	1	18.092	1.17	58.65	B
160.00-140.00			B	0.387	2.091	0.646	0.8	1	50.882			
			C	0.317	2.253	0.621	0.8	1	41.000			
T4	1.06	2.09	A	0.143	2.796	0.58	0.8	1	24.364	1.78	89.21	B
140.00-120.00			B	0.521	1.874	0.708	0.8	1	89.916			
			C	0.383	2.098	0.645	0.8	1	62.040			
T5	1.11	2.60	A	0.143	2.797	0.58	0.8	1	28.564	1.80	90.05	B
120.00-100.00			B	0.463	1.952	0.68	0.8	1	91.411			
			C	0.372	2.122	0.641	0.8	1	70.768			
T6	1.11	2.67	A	0.132	2.84	0.579	0.8	1	29.737	1.77	88.75	B
100.00-80.00			B	0.414	2.037	0.657	0.8	1	91.420			
			C	0.332	2.214	0.626	0.8	1	71.459			
T7	1.11	3.73	A	0.132	2.84	0.579	0.8	1	34.003	1.74	87.18	B
80.00-60.00			B	0.381	2.103	0.644	0.8	1	93.469			
			C	0.309	2.272	0.619	0.8	1	74.743			
T8	1.11	4.18	A	0.139	2.812	0.58	0.8	1	39.759	1.71	85.42	B
60.00-40.00			B	0.361	2.146	0.637	0.8	1	98.827			
			C	0.297	2.303	0.615	0.8	1	80.447			
T9	1.11	4.99	A	0.132	2.84	0.579	0.8	1	41.688	1.58	78.77	B
40.00-20.00			B	0.334	2.209	0.627	0.8	1	99.649			
			C	0.276	2.363	0.609	0.8	1	81.838			
T10	1.11	5.65	A	0.126	2.861	0.578	0.8	1	43.593	1.63	81.56	B
20.00-0.00			B	0.313	2.263	0.62	0.8	1	100.752			
			C	0.259	2.411	0.604	0.8	1	83.354			
Sum Weight:	8.45	28.61						OTM	1193.69 kip-ft	14.10		

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	0.00	0.43	A	0.179	2.669	0.586	0.85	1	7.274	0.23	29.35	B
188.00-180.00			B	0.191	2.628	0.589	0.85	1	7.645			
			C	0.179	2.669	0.586	0.85	1	7.274			
T2	0.12	0.81	A	0.127	2.857	0.578	0.85	1	14.259	0.69	34.56	B
180.00-160.00			B	0.237	2.476	0.599	0.85	1	24.426			
			C	0.127	2.857	0.578	0.85	1	14.259			
T3	0.61	1.47	A	0.131	2.843	0.579	0.85	1	18.800	1.18	59.23	B
160.00-140.00			B	0.387	2.091	0.646	0.85	1	51.382			
			C	0.317	2.253	0.621	0.85	1	41.610			
T4	1.06	2.09	A	0.143	2.796	0.58	0.85	1	25.341	1.79	89.75	B
140.00-120.00			B	0.521	1.874	0.708	0.85	1	90.464			
			C	0.383	2.098	0.645	0.85	1	62.838			
T5	1.11	2.60	A	0.143	2.797	0.58	0.85	1	29.675	1.81	90.74	B
120.00-100.00			B	0.463	1.952	0.68	0.85	1	92.107			
			C	0.372	2.122	0.641	0.85	1	71.673			
T6	1.11	2.67	A	0.132	2.84	0.579	0.85	1	30.795	1.79	89.44	B
100.00-80.00			B	0.414	2.037	0.657	0.85	1	92.135			
			C	0.332	2.214	0.626	0.85	1	72.347			
T7	1.11	3.73	A	0.132	2.84	0.579	0.85	1	35.328	1.76	88.06	B
80.00-60.00			B	0.381	2.103	0.644	0.85	1	94.414			
			C	0.309	2.272	0.619	0.85	1	75.879			
T8	1.11	4.18	A	0.139	2.812	0.58	0.85	1	41.200	1.73	86.35	B
60.00-40.00			B	0.361	2.146	0.637	0.85	1	99.897			
			C	0.297	2.303	0.615	0.85	1	81.703			
T9	1.11	4.99	A	0.132	2.84	0.579	0.85	1	43.251	1.59	79.71	B
40.00-20.00			B	0.334	2.209	0.627	0.85	1	100.849			
			C	0.276	2.363	0.609	0.85	1	83.221			
T10	1.11	5.65	A	0.126	2.861	0.578	0.85	1	45.277	1.65	82.63	B
20.00-0.00			B	0.313	2.263	0.62	0.85	1	102.077			
			C	0.259	2.411	0.604	0.85	1	84.860			
Sum Weight:	8.45	28.61						OTM	1206.33 kip-ft	14.24		

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	13.56					
Bracing Weight	15.05					
Total Member Self-Weight	28.61			-0.10	-35.46	
Total Weight	48.31			-0.10	-35.46	
Wind 0 deg - No Ice		-0.06	-51.18	-5249.26	-25.72	76.99
Wind 30 deg - No Ice		24.93	-43.30	-4457.08	-2597.44	67.63
Wind 45 deg - No Ice		35.15	-35.20	-3624.86	-3652.26	56.65
Wind 60 deg - No Ice		42.91	-24.78	-2551.54	-4454.67	41.94
Wind 90 deg - No Ice		49.97	0.06	9.64	-5176.30	5.76
Wind 120 deg - No Ice		44.29	25.64	2632.91	-4576.49	-33.34
Wind 135 deg - No Ice		35.24	35.29	3638.42	-3666.03	-48.56
Wind 150 deg - No Ice		25.04	43.37	4466.61	-2614.31	-61.87
Wind 180 deg - No Ice		0.06	49.66	5119.63	-45.20	-74.03
Wind 210 deg - No Ice		-24.93	43.30	4456.87	2526.53	-67.63

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 225 deg - No Ice		-35.15	35.20	3624.65	3581.34	-56.65
Wind 240 deg - No Ice		-44.23	25.53	2616.04	4495.84	-43.65
Wind 270 deg - No Ice		-49.97	-0.06	-9.84	5105.39	-5.76
Wind 300 deg - No Ice		-42.98	-24.89	-2568.41	4393.49	32.08
Wind 315 deg - No Ice		-35.24	-35.29	-3638.63	3595.12	48.56
Wind 330 deg - No Ice		-25.04	-43.37	-4466.82	2543.40	61.87
Member Ice	9.35					
Total Weight Ice	74.05			3.09	-86.47	
Wind 0 deg - Ice		-0.05	-50.34	-5146.45	-79.02	81.82
Wind 30 deg - Ice		24.77	-43.00	-4403.74	-2622.16	70.56
Wind 45 deg - Ice		34.97	-35.01	-3586.17	-3669.65	57.97
Wind 60 deg - Ice		42.76	-24.69	-2527.46	-4469.50	41.50
Wind 90 deg - Ice		49.62	0.05	10.53	-5170.74	1.73
Wind 120 deg - Ice		43.57	25.21	2584.30	-4542.37	-39.37
Wind 135 deg - Ice		35.04	35.08	3602.88	-3680.18	-55.53
Wind 150 deg - Ice		24.85	43.04	4417.37	-2635.05	-68.83
Wind 180 deg - Ice		0.05	49.45	5077.07	-93.91	-80.04
Wind 210 deg - Ice		-24.77	43.00	4409.92	2449.22	-70.56
Wind 225 deg - Ice		-34.97	35.01	3592.35	3496.71	-57.97
Wind 240 deg - Ice		-43.52	25.13	2571.41	4361.99	-42.45
Wind 270 deg - Ice		-49.62	-0.05	-4.36	4997.81	-1.73
Wind 300 deg - Ice		-42.80	-24.77	-2540.35	4304.01	38.53
Wind 315 deg - Ice		-35.04	-35.08	-3596.70	3507.24	55.53
Wind 330 deg - Ice		-24.85	-43.04	-4411.19	2462.12	68.83
Total Weight	48.31			-0.10	-35.46	
Wind 0 deg - Service		-0.02	-19.99	-2050.70	3.57	30.08
Wind 30 deg - Service		9.74	-16.92	-1741.25	-1001.01	26.42
Wind 45 deg - Service		13.73	-13.75	-1416.17	-1413.05	22.13
Wind 60 deg - Service		16.76	-9.68	-996.90	-1726.49	16.38
Wind 90 deg - Service		19.52	0.02	3.56	-2008.38	2.25
Wind 120 deg - Service		17.30	10.02	1028.27	-1774.08	-13.02
Wind 135 deg - Service		13.77	13.79	1421.05	-1418.43	-18.97
Wind 150 deg - Service		9.78	16.94	1744.56	-1007.60	-24.17
Wind 180 deg - Service		0.02	19.40	1999.65	-4.04	-28.92
Wind 210 deg - Service		-9.74	16.92	1740.76	1000.54	-26.42
Wind 225 deg - Service		-13.73	13.75	1415.67	1412.57	-22.13
Wind 240 deg - Service		-17.28	9.97	1021.68	1769.80	-17.05
Wind 270 deg - Service		-19.52	-0.02	-4.05	2007.90	-2.25
Wind 300 deg - Service		-16.79	-9.72	-1003.49	1729.82	12.53
Wind 315 deg - Service		-13.77	-13.79	-1421.55	1417.95	18.97
Wind 330 deg - Service		-9.78	-16.94	-1745.06	1007.13	24.17

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

Comb. No.	Description
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
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	188 - 180	Leg	Max Tension	5	0.26	-0.11	0.06
			Max. Compression	24	-2.00	-0.03	-0.02
			Max. Mx	6	-0.95	0.28	0.01
			Max. My	2	-0.99	-0.00	-0.28
			Max. Vy	6	0.21	-0.14	-0.00
			Max. Vx	2	-0.21	-0.00	0.13
		Diagonal	Max Tension	4	0.64	0.00	0.00
			Max. Compression	2	-0.68	0.00	0.00
			Max. Mx	29	0.52	0.01	0.00
			Max. My	20	-0.45	0.01	0.00
			Max. Vy	25	-0.01	0.01	-0.00
			Max. Vx	20	0.00	0.00	0.00
		Top Girt	Max Tension	7	0.07	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
			Max. Compression	10	-0.11	0.00	0.00
			Max. Mx	18	-0.03	-0.04	0.00
			Max. My	20	-0.03	0.00	0.00
			Max. Vy	18	0.03	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
T2	180 - 160	Leg	Max Tension	5	8.18	-0.47	0.00
			Max. Compression	24	-12.54	-0.07	0.01
			Max. Mx	10	4.77	1.10	0.00
			Max. My	9	-0.87	-0.02	1.10
			Max. Vy	10	-0.85	-0.58	0.00
			Max. Vx	9	-0.82	-0.02	-0.53
		Diagonal	Max Tension	17	2.62	0.00	0.00
			Max. Compression	17	-2.60	0.00	0.00
			Max. Mx	23	1.07	0.01	-0.00
			Max. My	27	-2.03	0.01	0.00
			Max. Vy	23	0.01	0.01	-0.00
			Max. Vx	27	-0.00	0.00	0.00
T3	160 - 140	Leg	Max Tension	10	25.63	-0.84	0.07
			Max. Compression	24	-34.08	0.84	0.04
			Max. Mx	15	24.39	1.56	-0.04
			Max. My	11	-4.42	-0.03	-1.52
			Max. Vy	15	-0.91	-0.84	-0.02
			Max. Vx	11	0.96	-0.03	0.95
		Diagonal	Max Tension	17	4.98	0.00	0.00
			Max. Compression	17	-5.06	0.00	0.00
			Max. Mx	24	3.43	0.04	0.00
			Max. My	27	-2.93	0.02	0.01
			Max. Vy	24	-0.02	0.04	0.00
			Max. Vx	27	-0.00	0.00	0.00
T4	140 - 120	Leg	Max Tension	5	52.95	-0.64	-0.04
			Max. Compression	7	-65.52	0.55	0.03
			Max. Mx	15	33.85	-1.10	-0.04
			Max. My	3	-4.46	-0.04	-1.01
			Max. Vy	15	-0.53	-0.64	-0.04
			Max. Vx	3	-0.53	-0.03	-0.56
		Diagonal	Max Tension	17	6.88	0.00	0.00
			Max. Compression	34	-7.03	0.00	0.00
			Max. Mx	24	4.66	0.07	0.01
			Max. My	27	-5.97	0.03	0.01
			Max. Vy	22	0.03	0.06	-0.01
			Max. Vx	27	-0.00	0.00	0.00
T5	120 - 100	Leg	Max Tension	5	82.89	-0.24	-0.02
			Max. Compression	24	-99.84	0.46	0.07
			Max. Mx	15	62.13	-0.61	-0.03
			Max. My	3	-6.41	-0.03	-0.70
			Max. Vy	15	-0.11	-0.61	-0.03
			Max. Vx	11	0.16	-0.03	0.70
		Diagonal	Max Tension	34	8.22	0.00	0.00
			Max. Compression	34	-8.17	0.00	0.00
			Max. Mx	22	5.46	0.08	-0.01
			Max. My	27	-7.27	0.04	0.02
			Max. Vy	22	0.04	0.08	-0.01
			Max. Vx	27	-0.00	0.00	0.00
T6	100 - 80	Leg	Max Tension	5	109.39	-0.41	-0.07
			Max. Compression	24	-130.48	0.60	0.09
			Max. Mx	32	99.06	-0.77	-0.09
			Max. My	3	-8.14	-0.06	-0.79
			Max. Vy	32	0.11	-0.77	-0.09
			Max. Vx	2	0.17	-0.25	-0.73
		Diagonal	Max Tension	34	9.75	0.00	0.00
			Max. Compression	34	-9.76	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
			Max. Mx	24	6.54	0.13	0.01
			Max. My	27	-8.30	0.06	0.03
			Max. Vy	22	0.05	0.13	-0.02
			Max. Vx	27	-0.00	0.00	0.00
T7	80 - 60	Leg	Max Tension	5	137.69	-0.44	-0.06
			Max. Compression	24	-164.01	0.38	0.06
			Max. Mx	32	126.42	-1.10	-0.07
			Max. My	3	-9.64	-0.06	-0.73
			Max. Vy	32	0.15	-1.10	-0.07
			Max. Vx	2	0.15	-0.26	-0.67
		Diagonal	Max Tension	34	10.79	0.00	0.00
			Max. Compression	34	-10.69	0.00	0.00
			Max. Mx	24	7.09	0.21	0.02
			Max. My	27	-9.40	0.10	0.04
			Max. Vy	22	0.07	0.20	-0.02
			Max. Vx	27	-0.01	0.00	0.00
T8	60 - 40	Leg	Max Tension	5	163.66	-1.05	-0.06
			Max. Compression	24	-195.93	-1.03	0.04
			Max. Mx	32	151.13	-2.37	-0.05
			Max. My	3	-11.39	-0.06	-1.13
			Max. Vy	30	0.34	1.85	0.04
			Max. Vx	3	0.18	-0.06	-1.13
		Diagonal	Max Tension	34	11.11	0.00	0.00
			Max. Compression	34	-10.73	0.00	0.00
			Max. Mx	22	6.16	0.23	-0.03
			Max. My	27	-8.98	0.13	0.04
			Max. Vy	22	0.08	0.22	-0.03
			Max. Vx	27	-0.01	0.00	0.00
T9	40 - 20	Leg	Max Tension	5	189.75	-0.95	-0.04
			Max. Compression	24	-228.67	-3.25	0.08
			Max. Mx	27	178.50	-5.80	0.17
			Max. My	20	-20.73	-1.70	-0.99
			Max. Vy	32	0.86	-5.80	-0.08
			Max. Vx	3	-0.15	-0.07	-0.98
		Diagonal	Max Tension	34	13.59	0.00	0.00
			Max. Compression	34	-12.81	0.00	0.00
			Max. Mx	22	6.47	0.26	-0.03
			Max. My	27	-11.61	0.20	0.04
			Max. Vy	22	0.09	0.26	-0.03
			Max. Vx	27	-0.01	0.00	0.00
T10	20 - 0	Leg	Max Tension	5	215.17	-0.97	-0.05
			Max. Compression	24	-261.68	-0.00	-0.00
			Max. Mx	30	-234.52	5.92	0.02
			Max. My	3	-16.18	-0.14	-2.14
			Max. Vy	32	-1.07	-5.80	-0.08
			Max. Vx	3	-0.34	-0.14	-2.14
		Diagonal	Max Tension	34	15.86	0.00	0.00
			Max. Compression	34	-14.93	0.00	0.00
			Max. Mx	22	4.62	0.40	-0.04
			Max. My	27	-13.72	0.32	0.06
			Max. Vy	22	0.11	0.40	-0.04
			Max. Vx	27	-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	30	259.05	22.34	-11.74
	Max. H_x	13	256.61	27.40	-14.65
	Max. H_z	21	-205.42	-27.96	15.84
	Min. Vert	5	-221.26	-24.41	12.98
	Min. H_x	22	-212.97	-29.10	15.72
	Min. H_z	13	256.61	27.40	-14.65
Leg B	Max. Vert	24	266.58	-21.53	-13.51
	Max. H_x	32	-206.64	28.14	17.25
	Max. H_z	33	-199.15	26.62	18.05
	Min. Vert	15	-219.20	23.57	14.46
	Min. H_x	7	260.23	-26.61	-16.26
	Min. H_z	8	247.02	-24.41	-16.61
Leg A	Max. Vert	19	262.90	1.94	25.33
	Max. H_x	32	142.27	4.42	10.41
	Max. H_z	2	258.82	1.79	31.15
	Min. Vert	10	-220.62	-1.70	-27.67
	Min. H_x	7	-105.63	-4.47	-13.61
	Min. H_z	27	-210.32	-1.80	-33.06

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	48.31	0.00	0.00	-0.10	-35.46	0.00
Dead+Wind 0 deg - No Ice	48.31	-0.06	-51.18	-5263.32	-25.92	77.12
Dead+Wind 30 deg - No Ice	48.31	24.93	-43.30	-4468.97	-2604.50	67.74
Dead+Wind 45 deg - No Ice	48.31	35.15	-35.20	-3634.50	-3662.09	56.74
Dead+Wind 60 deg - No Ice	48.31	42.91	-24.78	-2558.31	-4466.62	42.00
Dead+Wind 90 deg - No Ice	48.31	49.97	0.06	9.68	-5190.15	5.76
Dead+Wind 120 deg - No Ice	48.31	44.29	25.64	2639.92	-4588.75	-33.41
Dead+Wind 135 deg - No Ice	48.31	35.24	35.29	3648.12	-3675.90	-48.64
Dead+Wind 150 deg - No Ice	48.31	25.04	43.37	4478.54	-2621.40	-61.97
Dead+Wind 180 deg - No Ice	48.31	0.06	49.66	5133.37	-45.45	-74.14
Dead+Wind 210 deg - No Ice	48.31	-24.93	43.30	4468.89	2533.18	-67.74
Dead+Wind 225 deg - No Ice	48.31	-35.15	35.20	3634.44	3590.86	-56.74
Dead+Wind 240 deg - No Ice	48.31	-44.23	25.53	2623.12	4507.82	-43.72
Dead+Wind 270 deg - No Ice	48.31	-49.97	-0.06	-9.86	5119.06	-5.76
Dead+Wind 300 deg - No Ice	48.31	-42.98	-24.89	-2575.34	4405.24	32.14
Dead+Wind 315 deg - No Ice	48.31	-35.24	-35.29	-3648.45	3604.69	48.64
Dead+Wind 330 deg - No Ice	48.31	-25.04	-43.37	-4478.85	2550.12	61.97
Dead+Ice+Temp	74.05	-0.00	-0.00	3.11	-86.65	-0.00
Dead+Wind 0 deg+Ice+Temp	74.05	-0.05	-50.34	-5165.80	-79.45	82.07
Dead+Wind 30 deg+Ice+Temp	74.05	24.77	-43.00	-4420.25	-2632.09	70.79
Dead+Wind 45 deg+Ice+Temp	74.05	34.97	-35.01	-3599.59	-3683.48	58.16
Dead+Wind 60 deg+Ice+Temp	74.05	42.76	-24.69	-2536.89	-4486.29	41.64
Dead+Wind 90 deg+Ice+Temp	74.05	49.62	0.05	10.59	-5190.13	1.74
Dead+Wind 120 deg+Ice+Temp	74.05	43.57	25.21	2593.98	-4559.43	-39.48
Dead+Wind 135 deg+Ice+Temp	74.05	35.04	35.08	3616.39	-3694.04	-55.69
Dead+Wind 150 deg+Ice+Temp	74.05	24.85	43.04	4433.95	-2645.03	-69.04
Dead+Wind 180 deg+Ice+Temp	74.05	0.05	49.45	5096.20	-94.40	-80.28
Dead+Wind 210 deg+Ice+Temp	74.05	-24.77	43.00	4426.60	2458.30	-70.79
Dead+Wind 225 deg+Ice+Temp	74.05	-34.97	35.01	3605.95	3509.76	-58.16
Dead+Wind 240 deg+Ice+Temp	74.05	-43.52	25.13	2581.15	4378.31	-42.59
Dead+Wind 270 deg+Ice+Temp	74.05	-49.62	-0.05	-4.36	5016.56	-1.74
Dead+Wind 300 deg+Ice+Temp	74.05	-42.80	-24.77	-2549.97	4320.14	38.64
Dead+Wind 315 deg+Ice+Temp	74.05	-35.04	-35.08	-3610.31	3520.35	55.69

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+Ice+Temp	74.05	-24.85	-43.04	-4427.85	2471.27	69.04
Dead+Wind 0 deg - Service	48.31	-0.02	-19.99	-2056.06	-31.75	30.12
Dead+Wind 30 deg - Service	48.31	9.74	-16.92	-1745.78	-1039.02	26.46
Dead+Wind 45 deg - Service	48.31	13.73	-13.75	-1419.82	-1452.16	22.17
Dead+Wind 60 deg - Service	48.31	16.76	-9.68	-999.42	-1766.44	16.41
Dead+Wind 90 deg - Service	48.31	19.52	0.02	3.72	-2049.08	2.24
Dead+Wind 120 deg - Service	48.31	17.30	10.02	1031.18	-1814.15	-13.05
Dead+Wind 135 deg - Service	48.31	13.77	13.79	1425.01	-1457.55	-19.00
Dead+Wind 150 deg - Service	48.31	9.78	16.94	1749.39	-1045.63	-24.20
Dead+Wind 180 deg - Service	48.31	0.02	19.40	2005.17	-39.38	-28.96
Dead+Wind 210 deg - Service	48.31	-9.74	16.92	1745.59	967.89	-26.46
Dead+Wind 225 deg - Service	48.31	-13.73	13.75	1419.63	1381.04	-22.16
Dead+Wind 240 deg - Service	48.31	-17.28	9.97	1024.58	1739.22	-17.07
Dead+Wind 270 deg - Service	48.31	-19.52	-0.02	-3.92	1977.98	-2.24
Dead+Wind 300 deg - Service	48.31	-16.79	-9.72	-1006.05	1699.15	12.56
Dead+Wind 315 deg - Service	48.31	-13.77	-13.79	-1425.23	1386.44	19.00
Dead+Wind 330 deg - Service	48.31	-9.78	-16.94	-1749.61	974.51	24.20

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	-48.31	0.00	0.00	48.31	0.00	0.000%
2	-0.06	-48.31	-51.18	0.06	48.31	51.18	0.000%
3	24.93	-48.31	-43.30	-24.93	48.31	43.30	0.000%
4	35.15	-48.31	-35.20	-35.15	48.31	35.20	0.000%
5	42.91	-48.31	-24.78	-42.91	48.31	24.78	0.000%
6	49.97	-48.31	0.06	-49.97	48.31	-0.06	0.000%
7	44.29	-48.31	25.64	-44.29	48.31	-25.64	0.000%
8	35.24	-48.31	35.29	-35.24	48.31	-35.29	0.000%
9	25.04	-48.31	43.37	-25.04	48.31	-43.37	0.000%
10	0.06	-48.31	49.66	-0.06	48.31	-49.66	0.000%
11	-24.93	-48.31	43.30	24.93	48.31	-43.30	0.000%
12	-35.15	-48.31	35.20	35.15	48.31	-35.20	0.000%
13	-44.23	-48.31	25.53	44.23	48.31	-25.53	0.000%
14	-49.97	-48.31	-0.06	49.97	48.31	0.06	0.000%
15	-42.98	-48.31	-24.89	42.98	48.31	24.89	0.000%
16	-35.24	-48.31	-35.29	35.24	48.31	35.29	0.000%
17	-25.04	-48.31	-43.37	25.04	48.31	43.37	0.000%
18	0.00	-74.05	0.00	0.00	74.05	0.00	0.000%
19	-0.05	-74.05	-50.34	0.05	74.05	50.34	0.000%
20	24.77	-74.05	-43.00	-24.77	74.05	43.00	0.000%
21	34.97	-74.05	-35.01	-34.97	74.05	35.01	0.000%
22	42.76	-74.05	-24.69	-42.76	74.05	24.69	0.000%
23	49.62	-74.05	0.05	-49.62	74.05	-0.05	0.000%
24	43.57	-74.05	25.21	-43.57	74.05	-25.21	0.000%
25	35.04	-74.05	35.08	-35.04	74.05	-35.08	0.000%
26	24.85	-74.05	43.04	-24.85	74.05	-43.04	0.000%
27	0.05	-74.05	49.45	-0.05	74.05	-49.45	0.000%
28	-24.77	-74.05	43.00	24.77	74.05	-43.00	0.000%
29	-34.97	-74.05	35.01	34.97	74.05	-35.01	0.000%
30	-43.52	-74.05	25.13	43.52	74.05	-25.13	0.000%
31	-49.62	-74.05	-0.05	49.62	74.05	0.05	0.000%
32	-42.80	-74.05	-24.77	42.80	74.05	24.77	0.000%
33	-35.04	-74.05	-35.08	35.04	74.05	35.08	0.000%
34	-24.85	-74.05	-43.04	24.85	74.05	43.04	0.000%
35	-0.02	-48.31	-19.99	0.02	48.31	19.99	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
36	9.74	-48.31	-16.92	-9.74	48.31	16.92	0.000%
37	13.73	-48.31	-13.75	-13.73	48.31	13.75	0.000%
38	16.76	-48.31	-9.68	-16.76	48.31	9.68	0.000%
39	19.52	-48.31	0.02	-19.52	48.31	-0.02	0.000%
40	17.30	-48.31	10.02	-17.30	48.31	-10.02	0.000%
41	13.77	-48.31	13.79	-13.77	48.31	-13.79	0.000%
42	9.78	-48.31	16.94	-9.78	48.31	-16.94	0.000%
43	0.02	-48.31	19.40	-0.02	48.31	-19.40	0.000%
44	-9.74	-48.31	16.92	9.74	48.31	-16.92	0.000%
45	-13.73	-48.31	13.75	13.73	48.31	-13.75	0.000%
46	-17.28	-48.31	9.97	17.28	48.31	-9.97	0.000%
47	-19.52	-48.31	-0.02	19.52	48.31	0.02	0.000%
48	-16.79	-48.31	-9.72	16.79	48.31	9.72	0.000%
49	-13.77	-48.31	-13.79	13.77	48.31	13.79	0.000%
50	-9.78	-48.31	-16.94	9.78	48.31	16.94	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
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	188 - 180	4.398	40	0.1948	0.0382
T2	180 - 160	4.070	40	0.1942	0.0382
T3	160 - 140	3.255	40	0.1835	0.0370
T4	140 - 120	2.503	40	0.1638	0.0343
T5	120 - 100	1.835	40	0.1389	0.0295
T6	100 - 80	1.262	40	0.1142	0.0231
T7	80 - 60	0.806	40	0.0865	0.0175
T8	60 - 40	0.468	40	0.0615	0.0132
T9	40 - 20	0.230	40	0.0382	0.0087
T10	20 - 0	0.073	40	0.0196	0.0041

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
193.50	BCD-87010	40	4.398	0.1948	0.0382	492803
186.00	13' Platform w/rails	40	4.316	0.1948	0.0382	492803
168.00	800-10121	40	3.577	0.1892	0.0377	121674
153.00	RR90-17-02DP	40	2.983	0.1774	0.0362	60788
144.00	SBNHH-1D65B	40	2.647	0.1683	0.0350	58298
124.00	APXVSPP18-C-A20	40	1.961	0.1439	0.0306	52929

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	188 - 180	11.148	7	0.4932	0.1076
T2	180 - 160	10.318	7	0.4916	0.1076
T3	160 - 140	8.256	7	0.4645	0.1043

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T4	140 - 120	6.351	7	0.4147	0.0969
T5	120 - 100	4.657	7	0.3518	0.0835
T6	100 - 80	3.206	7	0.2892	0.0649
T7	80 - 60	2.049	7	0.2193	0.0488
T8	60 - 40	1.191	7	0.1558	0.0367
T9	40 - 20	0.586	7	0.0967	0.0241
T10	20 - 0	0.187	7	0.0497	0.0112

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
193.50	BCD-87010	7	11.148	0.4932	0.1076	193250
186.00	13' Platform w/rails	7	10.941	0.4931	0.1076	193250
168.00	800-10121	7	9.071	0.4790	0.1061	48101
153.00	RR90-17-02DP	7	7.566	0.4491	0.1023	24044
144.00	SBNHH-1D65B	7	6.715	0.4261	0.0988	23144
124.00	APXVSPP18-C-A20	7	4.978	0.3645	0.0867	21005

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	188	Leg	A325N	0.6250	4	0.03	13.50	0.003 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	0.64	5.10	0.125 ✔	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	0.11	4.12	0.028 ✔	1.333	Bolt Shear
T2	180	Leg	A325N	0.7500	4	0.41	19.44	0.021 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2.62	5.10	0.513 ✔	1.333	Member Bearing
T3	160	Leg	A325N	0.8750	4	3.25	26.46	0.123 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	5.06	6.44	0.785 ✔	1.333	Bolt Shear
T4	140	Leg	A325N	1.0000	4	8.55	34.56	0.247 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	7.03	6.44	1.091 ✔	1.333	Bolt Shear
T5	120	Leg	A325N	1.0000	6	10.45	34.56	0.302 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	8.22	9.14	0.899 ✔	1.333	Member Bearing
T6	100	Leg	A325N	1.0000	8	11.86	34.56	0.343 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	9.75	9.14	1.067 ✔	1.333	Member Bearing
T7	80	Leg	A325N	1.0000	8	15.46	34.56	0.447 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	10.79	9.28	1.163 ✔	1.333	Bolt Shear
T8	60	Leg	A325N	1.0000	8	18.89	34.56	0.547 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	11.11	9.28	1.197 ✔	1.333	Bolt Shear
T9	40	Leg	A325N	1.0000	8	22.08	34.56	0.639 ✔	1.333	Bolt Tension

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
		Diagonal	A325X	0.7500	1	13.59	11.43	1.189 ✔	1.333	Member Bearing
T10	20	Leg	A325N	1.0000	10	20.30	34.56	0.587 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.7500	1	15.86	13.25	1.197 ✔	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	188 - 180	ROHN 2.5 STD	8.00	4.00	50.7 K=1.00	24.247	1.7040	-2.00	41.32	0.048 ✔
T2	180 - 160	ROHN 2.5 STD	20.03	5.01	63.4 K=1.00	22.123	1.7040	-12.54	37.70	0.333 ✔
T3	160 - 140	ROHN 3 EH	20.04	6.68	70.5 K=1.00	20.840	3.0159	-34.08	62.85	0.542 ✔
T4	140 - 120	ROHN 4 EH	20.04	6.68	54.3 K=1.00	23.670	4.4074	-65.52	104.32	0.628 ✔
T5	120 - 100	ROHN 5 EH	20.04	6.68	43.6 K=1.00	25.320	6.1120	-99.84	154.75	0.645 ✔
T6	100 - 80	ROHN 6 EHS	20.04	10.02	54.0 K=1.00	23.712	6.7133	-130.47	159.18	0.820 ✔
T7	80 - 60	ROHN 6 EH	20.03	10.02	54.8 K=1.00	23.592	8.4049	-164.01	198.29	0.827 ✔
T8	60 - 40	ROHN 8 EHS	20.04	10.02	41.2 K=1.00	25.665	9.7193	-195.93	249.44	0.785 ✔
T9	40 - 20	ROHN 8 EH	20.03	10.02	41.8 K=1.00	25.583	12.7627	-228.67	326.51	0.700 ✔
T10	20 - 0	ROHN 8 EH	20.03	10.02	41.8 K=1.00	25.582	12.7627	-261.68	326.50	0.801 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	188 - 180	L1 3/4x1 3/4x3/16	7.70	3.59	125.4 K=1.00	9.489	0.6211	-0.68	5.89	0.116 ✔
T2	180 - 160	L1 3/4x1 3/4x3/16	9.69	4.73	165.1 K=1.00	5.475	0.6211	-2.60	3.40	0.765 ✔
T3	160 - 140	L2 1/2x2 1/2x1/4	12.24	6.03	147.4 K=1.00	6.869	1.1900	-5.06	8.17	0.619

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T4	140 - 120	L3x3x1/4	14.07	6.90	139.9 K=1.00	7.629	1.4400	-7.03	10.99	0.640 ✓
T5	120 - 100	L3x3x1/4	15.94	7.77	157.6 K=1.00	6.015	1.4400	-8.17	8.66	0.943 ✓
T6	100 - 80	L3 1/2x3 1/2x1/4	19.21	9.45	163.4 K=1.00	5.591	1.6900	-9.76	9.45	1.032 ✓
T7	80 - 60	L4x4x5/16	20.93	10.30	156.2 K=1.00	6.120	2.4000	-10.69	14.69	0.728 ✓
T8	60 - 40	L4x4x5/16	22.87	11.21	170.1 K=1.00	5.160	2.4000	-10.32	12.38	0.834 ✓
T9	40 - 20	L4x4x5/16	24.68	12.07	183.2 K=1.00	4.452	2.4000	-11.95	10.68	1.119 ✓
T10	20 - 0	L4x4x3/8	25.58	12.54	190.9 K=1.00	4.097	2.8600	-14.93	11.72	1.274 ✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	188 - 180	L3x3x1/4	6.58	6.11	123.9 K=1.00	9.720	1.4400	-0.11	14.00	0.008 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	188 - 180	ROHN 2.5 STD	8.00	4.00	50.7	30.000	1.7040	0.26	51.12	0.005 ✓
T2	180 - 160	ROHN 2.5 STD	20.03	5.01	63.4	30.000	1.7040	8.18	51.12	0.160 ✓
T3	160 - 140	ROHN 3 EH	20.04	6.68	70.5	30.000	3.0159	25.63	90.48	0.283 ✓
T4	140 - 120	ROHN 4 EH	20.04	6.68	54.3	30.000	4.4074	52.95	132.22	0.400 ✓
T5	120 - 100	ROHN 5 EH	20.04	6.68	43.6	30.000	6.1120	82.89	183.36	0.452 ✓
T6	100 - 80	ROHN 6 EHS	20.04	10.02	54.0	30.000	6.7133	109.39	201.40	0.543 ✓
T7	80 - 60	ROHN 6 EH	20.03	10.02	54.8	30.000	8.4049	137.69	252.15	0.546 ✓

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 $\frac{P}{P_a}$
T8	60 - 40	ROHN 8 EHS	20.04	10.02	41.2	30.000	9.7193	163.66	291.58	0.561 ✔
T9	40 - 20	ROHN 8 EH	20.03	10.02	41.8	30.000	12.7627	189.75	382.88	0.496 ✔
T10	20 - 0	ROHN 8 EH	20.03	10.02	41.8	30.000	12.7627	215.17	382.88	0.562 ✔

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	188 - 180	L1 3/4x1 3/4x3/16	7.70	3.59	82.9	29.000	0.3604	0.64	10.45	0.061 ✔
T2	180 - 160	L1 3/4x1 3/4x3/16	9.69	4.73	108.3	29.000	0.3604	2.62	10.45	0.250 ✔
T3	160 - 140	L2 1/2x2 1/2x1/4	12.24	6.03	96.0	29.000	0.7519	4.98	21.80	0.228 ✔
T4	140 - 120	L3x3x1/4	14.07	6.90	90.6	32.500	0.9394	6.88	30.53	0.225 ✔
T5	120 - 100	L3x3x1/4	15.94	7.77	102.0	32.500	0.9159	8.22	29.77	0.276 ✔
T6	100 - 80	L3 1/2x3 1/2x1/4	19.21	9.45	105.5	32.500	1.1034	9.75	35.86	0.272 ✔
T7	80 - 60	L4x4x5/16	20.93	10.30	101.0	32.500	1.5949	10.79	51.84	0.208 ✔
T8	60 - 40	L4x4x5/16	22.87	11.21	109.8	32.500	1.5949	11.11	51.84	0.214 ✔
T9	40 - 20	L4x4x5/16	24.68	12.07	118.1	32.500	1.5949	13.59	51.84	0.262 ✔
T10	20 - 0	L4x4x3/8	26.50	13.00	128.1	32.500	1.8989	15.86	61.71	0.257 ✔

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	188 - 180	L3x3x1/4	6.58	6.11	81.8	29.000	0.9628	0.07	27.92	0.003 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	188 - 180	Leg	ROHN 2.5 STD	2	-2.00	55.08	3.6	Pass
T2	180 - 160	Leg	ROHN 2.5 STD	20	-12.54	50.25	24.9	Pass
T3	160 - 140	Leg	ROHN 3 EH	47	-34.08	83.78	40.7	Pass
T4	140 - 120	Leg	ROHN 4 EH	68	-65.52	139.06	47.1	Pass
T5	120 - 100	Leg	ROHN 5 EH	89	-99.84	206.28	48.4	Pass
T6	100 - 80	Leg	ROHN 6 EHS	110	-130.47	212.19	61.5	Pass
T7	80 - 60	Leg	ROHN 6 EH	125	-164.01	264.32	62.1	Pass
T8	60 - 40	Leg	ROHN 8 EHS	140	-195.93	332.51	58.9	Pass
T9	40 - 20	Leg	ROHN 8 EH	155	-228.67	435.24	52.5	Pass
T10	20 - 0	Leg	ROHN 8 EH	170	-261.68	435.22	60.1	Pass
T1	188 - 180	Diagonal	L1 3/4x1 3/4x3/16	11	-0.68	7.86	8.7 9.4 (b)	Pass
T2	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	25	-2.60	4.53	57.4	Pass
T3	160 - 140	Diagonal	L2 1/2x2 1/2x1/4	52	-5.06	10.90	46.4 58.9 (b)	Pass
T4	140 - 120	Diagonal	L3x3x1/4	73	-7.03	14.64	48.0 81.8 (b)	Pass
T5	120 - 100	Diagonal	L3x3x1/4	94	-8.17	11.55	70.8	Pass
T6	100 - 80	Diagonal	L3 1/2x3 1/2x1/4	115	-9.76	12.60	77.5 80.0 (b)	Pass
T7	80 - 60	Diagonal	L4x4x5/16	130	-10.69	19.58	54.6 87.3 (b)	Pass
T8	60 - 40	Diagonal	L4x4x5/16	145	-10.32	16.51	62.5 89.8 (b)	Pass
T9	40 - 20	Diagonal	L4x4x5/16	160	-11.95	14.24	83.9 89.2 (b)	Pass
T10	20 - 0	Diagonal	L4x4x3/8	181	-14.93	15.62	95.6	Pass
T1	188 - 180	Top Girt	L3x3x1/4	4	-0.11	18.66	0.6 2.1 (b)	Pass
						Summary		
						Leg (T7)	62.1	Pass
						Diagonal (T10)	95.6	Pass
						Top Girt (T1)	2.1	Pass
						Bolt Checks	89.8	Pass
						RATING =	**95.6**	**Pass**

Element Map

Section No.	Section Elevation ft	Component Type	Element List
T1	188.00-180.00	Leg	1-3
		Diagonal	7-18
		Top Girt	4-6
T2	180.00-160.00	Leg	19-21
		Diagonal	22-45
T3	160.00-140.00	Leg	46-48
		Diagonal	49-66
T4	140.00-120.00	Leg	67-69
		Diagonal	70-87
T5	120.00-100.00	Leg	88-90
		Diagonal	91-108
T6	100.00-80.00	Leg	109-111
		Diagonal	112-123
T7	80.00-60.00	Leg	124-126

Section No.	Section Elevation ft	Component Type	Element List
		Diagonal	127-138
T8	60.00-40.00	Leg	139-141
		Diagonal	142-153
T9	40.00-20.00	Leg	154-156
		Diagonal	157-168
T10	20.00-0.00	Leg	169-171
		Diagonal	172-183
			Total number of elements: 183

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Subject: Anchor Bolt Analysis

Location: East Windsor, CT

Rev. 0: 8/3/16

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 16001.21

Tower Anchor Bolt Analysis

Max Leg Reactions:

Uplift = $Uplift := 221 \cdot kips$ (User Input)

Shear = $Shear := 28 \cdot kips$ (User Input)

Compression = $Compression := 267 \cdot kips$ (User Input)

Anchor Bolt Data:

ASTM A354 Gr. BC

Number of Anchor Bolts = $N := 10$ (User Input)

Bolt Ultimate Strength = $F_u := 93.75ksi$ (User Input)

Bolt Yield Strength = $F_y := 125ksi$ (User Input)

Diameter of Bolts = $D := 1.00in$ (User Input)

Threads per Inch = $n := 8$ (User Input)

Coefficient of Friction = $\mu := 0.55$ (User Input)

Anchor Bolt Area:

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 = 0.606 \cdot in^2$ (AISC 13th Ed. pg. 7-83)

Check Anchor Bolt Area:

Based on the ASCE 10-97 Design of Latticed Steel Transmission Structures

Required Area = $A_{s1} := \frac{Uplift}{F_y} + \frac{Shear}{\mu \cdot .85 \cdot F_y} = 2.2 \cdot in^2$

$A_{s2} := \left[\frac{Shear - (0.3 \cdot Compression)}{\mu \cdot .85 \cdot F_y} \right] = -0.892 \cdot in^2$

Provided Area = $A_{sprovided} := A_n \cdot N = 6.1 \cdot in^2$

$Condition1 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right)$

Condition1 = "OK"

$Condition2 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right)$

Condition2 = "OK"

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Subject:		Foundation Analysis
Location:		East Windsor, CT
Rev. 0: 8/3/16		Prepared by: T.J.L. Checked by: C.F.C. Job No. 16001.21

Foundation Analysis

Input Data:

Max. Reactions at Tower Leg:

Shear =	Shear := 28·kips	(User Input)
Compression =	Comp := 267·kips	(User Input)
Uplift =	Uplift := 221·kips	(User Input)

Foundation Properties:

Pier Height =	$P_H := 12 \cdot ft$	(User Input)
Pier Width Top =	$P_{w1} := 4.5 \cdot ft$	(User Input)
Pier Width Botttom =	$P_{w2} := 4.5 \cdot ft$	(User Input)
Pier Projection Above Grade =	$P_P := 0.5 \cdot ft$	(User Input)
Pad Width =	$Pd_w := 11.75 \cdot ft$	(User Input)
Pad Thickness =	$Pd_t := 2.0 \cdot ft$	(User Input)
Depth Below Grade =	H := 13.5·ft	(User Input)

Subgrade Properties:

Concrete Unit Weight =	$\gamma c := 150 \cdot pcf$	(User Input)
Water Unit Weight =	$\gamma w := 62.4 \cdot pcf$	(User Input)
Soil Unit Weight =	$\gamma s := 100 \cdot pcf$	(User Input)
Uplift Angle =	$\psi := 30.0 \cdot deg$	(User Input)
Soil Bearing Capacity =	$BC_{soil} := 4000 \cdot psf$	(User Input)
Coefficient of Friction =	$\mu := 0.45$	(User Input)

Calculated Data:

Volume of the Concrete Pad = $V_{pad} := Pd_w^2 \cdot Pd_t = 276.125 \cdot ft^3$

Volume of the Concrete Pier = $V_{pier} := \frac{P_H}{3} \cdot \left(P_{w1}^2 + P_{w2}^2 + \sqrt{P_{w1}^2 \cdot P_{w2}^2} \right) = 243 \cdot ft^3$

Total Volume of Concrete = $V_{Conc} := V_{pad} + V_{pier} = 519 \cdot ft^3$

Resisting Pyramid Base 1 = $B_1 := Pd_w^2 = 138.063\, ft^2$

Resisting Pyramid Base 2 = $B_2 := \left[2 \cdot \tan(\psi) \cdot \left(H - Pd_t \right) + Pd_w \right]^2 = 626.454\, ft^2$

Volume of Soil = $V_{Soil} := \left[\frac{\left(H - Pd_t \right)}{3} \cdot \left(B_1 + B_2 + \sqrt{B_1 \cdot B_2} \right) \right] - V_{pier} = 3815 \cdot ft^3$

Mass of Concrete = $Mass_{Conc} := V_{Conc} \cdot \gamma c = 77.9 \cdot kips$

Mass of Soil = $Mass_{Soil} := V_{Soil} \cdot \gamma s = 381.5 \cdot kips$

Total Mass = $Total_{mass} := Mass_{Conc} + Mass_{Soil} = 459.368 \cdot kips$

Check Uplift:

Required Factor of Safety = $F_S := 2$

$ActualFS := \frac{Total_{mass}}{Uplift} = 2.08$

$Uplift\_Check := if\left(\frac{Total_{mass}}{Uplift} \geq F_S, "OK", "Overstressed" \right)$

Uplift_Check = "OK"

Check Sliding:

Sliding Resistance = $S_R := \mu \cdot \left(Mass_{Conc} \right) = 35.041 \cdot kips$

$Sliding\_Check := if\left(Shear \leq S_R, "OK", "No Good" \right)$

Sliding_Check = "OK"

Check Bearing:

Cross Sectional Area of Pad = $A_{pad} := Pd_w^{\,2} = 138\,ft^2$

Section Modulus of Pad = $S_{pad} := \frac{(Pd_w)^3}{6} = 270\cdot ft^3$

$$Bearing := \frac{Comp + Mass_{Conc}}{A_{pad}} + \frac{Shear\cdot(H + P_P)}{S_{pad}} = 3.95\cdot ksf$$

$Bearing\_Check := if(Bearing \le BC_{soil}, "OK", "No Good")$

Bearing_Check = "OK"

SITE NAME	E WINDSOR CT				ECP - CELL #				B	31
LATITUDE	41-87-70.42 N				LONGITUDE				72-61-09.23 W	
AWS carrier add, TRDU to RRH upgrade, RET antenna upgrade. 700 60W RRH will use both low band ports on the AWS and PCS SBNHH antenna. Tilts must be set t o the same for both low band ports.					SAVE BUTTON					
					STRUCTURE TYPE				LATTICE	
700 Mhz - LTE Current Config	**ALPHA**				**BETA**				**GAMMA**	
EQUIPMENT TYPE	eNodeB				eNodeB				eNodeB	
ANTENNA TYPE	BXA-70063-6CF-2-750MHZ				BXA-70063-6CF-2-750MHZ				BXA-70063-6CF-5-750MHZ	
QTY OF ANTENNAS PER FACE	skeep as placeholder				skeep as placeholder				skeep as placeholder	
ORIENTATION (DEG)	40				170				290	
DOWN TILT (MECH/DEG)	0				0				0	
RAD CTR (FT AGL)	140				140				140	
TMA - QTY / MODEL										
DIPLEXER - QTY / MODEL										
700 Mhz - LTE Future Config	**ALPHA**				**BETA**				**GAMMA**	
EQUIPMENT TYPE	eNodeB				eNodeB				eNodeB	
ANTENNA TYPE	SBNHH-1D65B-A1M				SBNHH-1D65B-A1M				SBNHH-1D65B-A1M	
QTY OF ANTENNAS PER FACE	same as AWS/PCS				same as AWS/PCS				same as AWS/PCS	
ORIENTATION (DEG)	40				170				290	
DOWN TILT (MECH/DEG)	4 electrical				5 electrical				6 electrical	
RAD CTR (FT AGL)	140				140				140	
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										
850 Cellular - Current Config	**ALPHA**				**BETA**				**GAMMA**	
EQUIPMENT TYPE	4.0B				4.0B				4.0B	
ANTENNA TYPE	WPA-80090/4CF				WPA-80090/4CF				WPA-80090/4CF	
QTY OF ANTENNAS PER FACE	2				2				2	
ORIENTATION (DEG)	30				150				270	
DOWN TILT (MECH/DEG)	0				0				0	
RAD CTR (FT AGL)	140				140				140	
TMA - QTY / MODEL										
DIPLEXER - QTY / MODEL	1	FD9R6004-2C_3L			1	FD9R6004-2C_3L			1	FD9R6004-2C_3L
850 Cellular - Future Config	**ALPHA**				**BETA**				**GAMMA**	
EQUIPMENT TYPE	4.0B				4.0B				4.0B	
ANTENNA TYPE	SBNHH-1D65B-A1M				SBNHH-1D65B-A1M				SBNHH-1D65B-A1M	
QTY OF ANTENNAS PER FACE	1				1				1	
ORIENTATION (DEG)	30				150				270	
DOWN TILT (MECH/DEG)	0 electrical				0 electrical				0 electrical	
RAD CTR (FT AGL)	140				140				140	
TMA - QTY / MODEL										
DIPLEXER - QTY / MODEL	0	FD9R6004-2C_3L			0	FD9R6004-2C_3L			0	FD9R6004-2C_3L
DIPLEX WITH LTE CABLE										
1900 PCS - Current Config	**ALPHA**				**BETA**				**GAMMA**	
EQUIPMENT TYPE	PCS Modcell 4.0				PCS Modcell 4.0				PCS Modcell 4.0	
ANTENNA TYPE	948F85T2E-M_2				948F85T2E-M_2				948F85T2E-M_2	
QTY OF ANTENNAS PER FACE	1				1				1	
ORIENTATION (DEG)	30				150				270	
DOWN TILT (MECH/DEG)	0				0				0	
RAD CTR (FT AGL)	144				144				144	
TMA - QTY / MODEL										
DIPLEXER - QTY / MODEL	1	FD9R6004-2C_3L			1	FD9R6004-2C_3L			1	FD9R6004-2C_3L
1900 PCS - Future Config	**ALPHA**				**BETA**				**GAMMA**	
EQUIPMENT TYPE	1900 MHz BBU				1900 MHz BBU				1900 MHz BBU	
ANTENNA TYPE	SBNHH-1D65B-A1M				SBNHH-1D65B-A1M				SBNHH-1D65B-A1M	
QTY OF ANTENNAS PER FACE	1				1				1	
ORIENTATION (DEG)	30				150				270	
DOWN TILT (MECH/DEG)	2 electrical				4 electrical				3 electrical	
RAD CTR (FT AGL)	144				144				144	
TMA - QTY / MODEL										
DIPLEX WITH CELLULAR CABLE	NO				NO				NO	
RRH - QTY/MODEL	1	ALU RH_2X90-PCS			1	ALU RH_2X90-PCS			1	ALU RH_2X90-PCS
SECTOR DISTRIBUTION BOX										
MAIN DISTRIBUTION BOX										

AWS - LTE ANTENNA ADD	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	2100 MHz BBU		2100 MHz BBU		2100 MHz BBU	
ANTENNA TYPE	SBNHH-1D65B-A1M		SBNHH-1D65B-A1M		SBNHH-1D65B-A1M	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		290	
DOWN TILT (MECH/ELEC)	2 electrical		4 electrical		3 electrical	
RAD CTR (FT AGL)	140		140		140	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X90-AWS	1	ALU RH_2X90-AWS	1	ALU RH_2X90-AWS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX	2		DB-T1-6Z-8AB-0Z			

NUMBER OF CABLE'S NEEDED						ESTIMATED CABLE LENGTH			
MAINLINE SIZE		TOTAL # OF MAINLINES			15	MAINLINE (FT)			
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS			48	TOP JUMPER (FT)			12
Equipment Cable Ordering		MAIN CABLE #	15	+	0	TOP JUMPER #	24	+	24
FIBER LINE SIZE	1 5/8"	TOTAL # OF FIBER LINES			2	FIBER LINE MODEL #			B158-1-08U8-S8J1
JUMPER SIZE	5/8"	TOTAL # OF TOP JUMPERS			9	TOP JUMPER MODEL #			B058-1-08U1-S1J1
Fiber Cable Ordering		FIBER CABLE #	0	+	2	TOP JUMPER #	0	+	3

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular A-Band	PCS F / AWS-Band	700 Mhz C - Bloc	Cellular (Watts)	20
TX - 869-880,890-891.5 MHz	TX - 1970-1975 / 2145-2155	TX - 746-757	PCS (Watts)	16
RX - 824-835,845-846.5 MHz	RX - 1890-1895 / 1745-1755	RX - 776-787	LTE (Watts)	40

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared By: Mark Brauer	Alex Restrepo	MB	10/16/2015

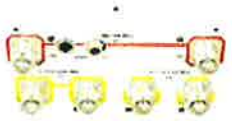
Product Specifications

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

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.

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.

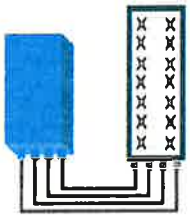
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

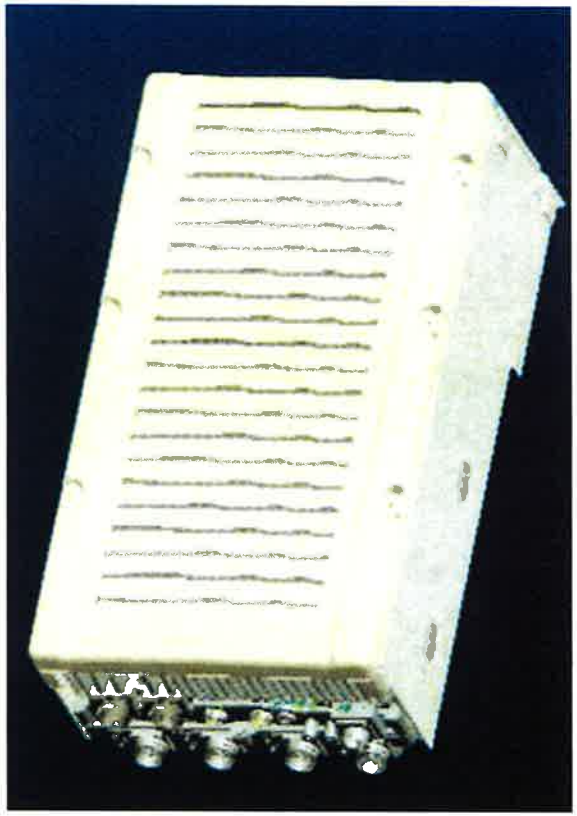
Alcatel·Lucent

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

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

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



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

Alcatel·Lucent

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 [Lwad]	*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.

ATTACHMENT 4

Town of East Windsor

Geographic Information System (GIS)

Revised date July 2012
Date Printed: 9/14/2016

MAP DISCLAIMER - NOTICE OF LIABILITY

This map is for assessment purposes only. It is not for legal description or conveyances. All information is subject to verification by any user. The Town of East Windsor and its mapping contractors assume no legal responsibility for the information contained herein.

Approximate Scale: 1 inch = 1000 feet

0 1,000 Feet

N
W E
S

Connecticut Water Company
93 West Main Street
Clinton, CT 06413-1600

Office: 860.669.8636
Customer Service: 800.286.5700

ConnecticutWater

September 13, 2016

Anthony Befera, Manager-Real Estate
Cellco Partnership d/b/a Verizon Wireless
99 East River Drive, 9th Floor
East Hartford, CT 06108

Re: Cellco Partnership d/b/a Verizon Wireless Telecommunication Facility at:
1111 Enfield Avenue, Enfield, CT

Dear Mr. Befera:

We, the Connecticut Water Company, the owners of the above referenced property, do hereby authorize you or your authorized agents to file all necessary applications with the Town of Enfield for the proposed wireless telecommunication facility at the above-referenced location.

Sincerely,

Cindy Gaudino
Manager Source Protection
& Real Estate
Connecticut Water Company

13854670-v1

Town of East Windsor
Property Listing Report

Parcel ID 012 05 084 -01

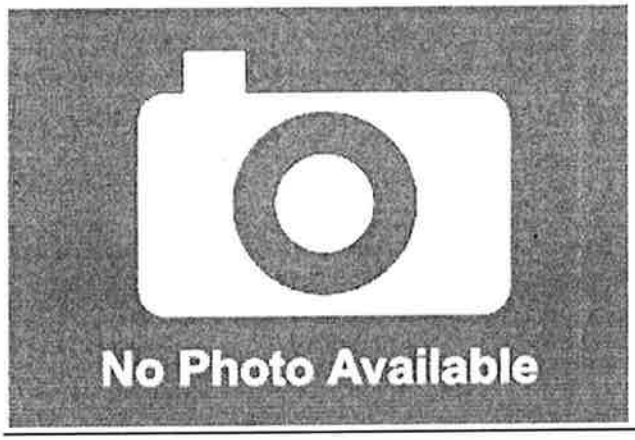
Account

Property Information

Owner	BALCH BRIDGE STREET CORP
Address	232 SOUTH MAIN ST
Mailing Address	12920 S E 38TH ST BELLEVUE , WA 980060000
Land Use	- Industrial Vacant Land
Land Class	Industrial
Previous MBL	

Census Tract	
Neighborhood	40
Zoning	M-1
Acreage	0
Utilities	
Lot Setting/ Desc	/

Photo



PARCEL VALUATIONS (Assessed value = 70% of Appraised Value)

	Appraised	Assessed
Buildings		
Outbuildings		
Improvements		
Extras		
Land		
Total	462000	323400
Previous		

Construction Details

Stories	
Building Style	
Building Use	
Building Condition	
Total Rooms	
Bedrooms	0
Full Bathrooms	
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	
Roof Cover	

EXTERIOR WALLS:	
Primary	
Secondary	
INTERIOR WALLS:	
Primary	
Secondary	
FLOORS:	
Primary	
Secondary	
HEATING/AC:	
Heating Type	
Heating Fuel	
AC Type	

BUILDING AREA:

Effective Building Area	
Gross Building Area	
Total Living Area	

SALES HISTORY:

Sale Date	12/01/1979
Sale Price	0
Book/ Page	0115/0840

Report Created On 9/14/2016