Robinson+Cole

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Also admitted in Massachusetts

June 8, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
57 Cook Drive, Montville, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 169-foot level on an existing 190-foot monopole tower at 57 Cook Drive in Montville, Connecticut (the "Property"). The tower is owned by Wireless Solutions. The Council approved Cellco's shared use of this tower in 1998. Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model SBNHH-1D65B, 850/2100 MHz antennas and three (3) model SBNHH-1D65B, 1900 MHz antennas, all at the same 169-foot level on the tower. Cellco also intends to add six (6) remote radio heads ("RRHs"), one (1) each behind its 1900 MHz and 2100 MHz antennas 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 Ronald K. McDaniel, Mayor for the Town of Montville. A copy of this letter is also being sent to Robert W. and Karen A. Kingsborough, the owners of the Property.

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. The replacement antennas and RRHs will be installed on Cellco's existing antenna platform at the 169-foot level on the 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 with Cellco's modified facility is included in Attachment 2.

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Ronald K. McDaniel, Montville Mayor
Robert W. and Karen A. Kingsborough
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

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

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

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	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	1695–1880	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	1695 – 2360 MHz | 698 – 896 MHz
Performance Note	Outdoor usage

Product Specifications

SBNHH-1D65B

Mechanical Specifications

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

Dimensions

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

Remote Electrical Tilt (RET) Information

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

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.

* 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.

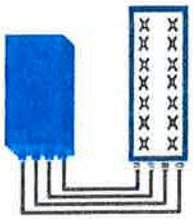
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

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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

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

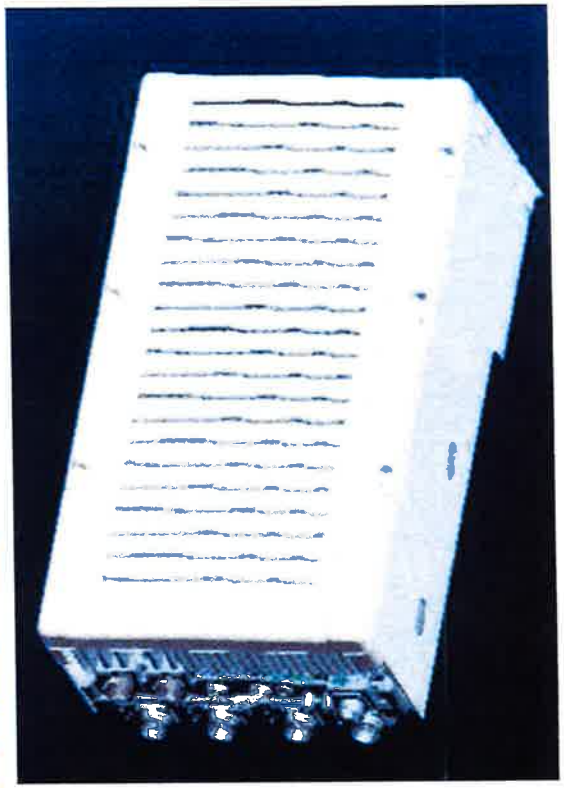
		RRH2x60
RF Output Power		2x60W
Instantaneous Bandwidth		20MHz
Transmitter		2 TX
Receiver	1900 HW version	2 Branch RX – LA6.0.1
	1900A HW version	4 Branch RX – LR13.3
Features		AISG 2.0 for RET/TMA
		Internal Smart Bias-T
Power		-48VDC
CPRI Ports		2 CPRI Rate 3 Ports
External Alarms		4 External User Alarms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

** Not a Verizon Wireless deployed product

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

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



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

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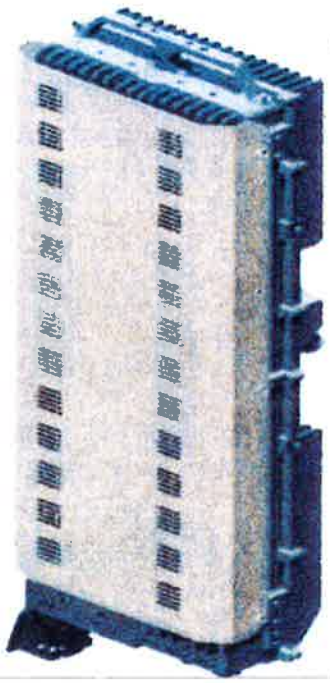
ALCATEL-LUCENT WIRELESS PRODUCT DATASHEET

RRH2X60-AWS FOR BAND 4 APPLICATIONS

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



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

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

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

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

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

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

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

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

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

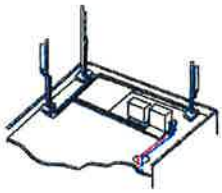
The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

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

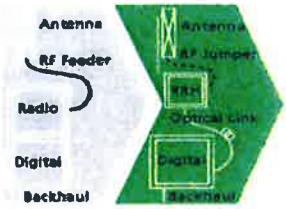
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

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

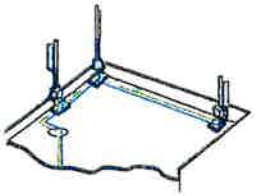
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control
- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

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

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

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

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

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

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

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

Alcatel·Lucent

AT THE SPEED OF IDEAS™

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

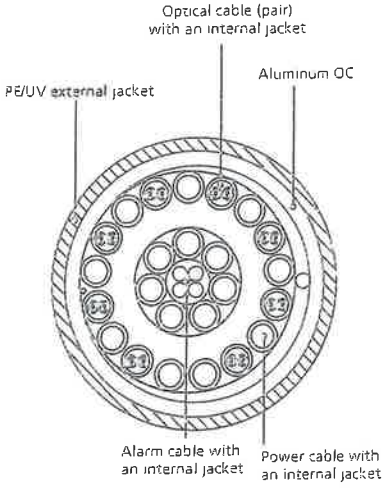


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Montville 4								
Tower Height: 190Ft.								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*AT&T UMTS	2	565	180	0.0125	880	0.5867	2.14%	
*AT&T UMTS	2	875	180	0.0194	1900	1.0000	1.94%	
*AT&T GSM	1	283	180	0.0031	880	0.5867	0.54%	
*AT&T GSM	4	525	180	0.0233	1900	1.0000	2.33%	
*AT&T LTE	1	1615	180	0.0179	734	0.4893	3.66%	
*Clearwire	6	285.76	120	0.0428	2500	1.0000	4.28%	
*Nextel	12	100	134	0.0240	851	0.5673	4.24%	
*Sprint CDMA/LTE	4	693	151	0.0437	1900	1.0000	4.37%	
*Sprint CDMA/LTE	1	390	151	0.0062	850	0.5667	1.09%	
*T-Mobile	8	157	192	0.0123	1935	1.0000	1.23%	
Verizon PCS	**11**	**391**	**169**	**0.0541**	**1970**	**1.0000**	**5.41%**	
Verizon Cellular	**9**	**375**	**169**	**0.0425**	**869**	**0.5793**	**7.33%**	
Verizon AWS	**1**	**1750**	**169**	**0.0220**	**2145**	**1.0000**	**2.20%**	
Verizon 700	**1**	**1050**	**169**	**0.0132**	**746**	**0.4973**	**2.66%**	
								43.42%
* Source: Siting Council								

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

190-ft Existing Guyed Lattice Tower

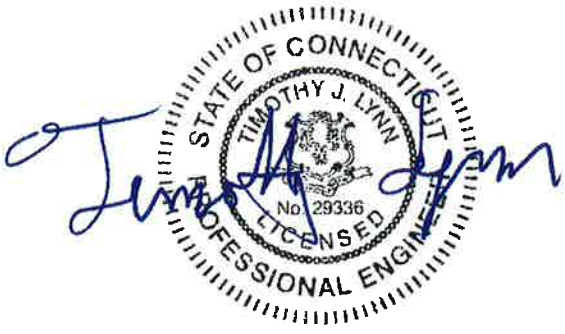
Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Montville 4

57 Cook Drive,
Montville, CT

Centek Project No. 15001.044

Date: May 6, 2015



Prepared for:

Verizon Wireless
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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 installation/modification proposed by Verizon Wireless on the existing guyed lattice tower located in Montville, Connecticut.

The host tower is a 190-ft, three face, guyed steel lattice tower originally designed and manufactured by UNR-ROHN. The tower was extended by 10-ft to its current height of 190-ft in 2002 per UHN-ROHN drawing no. C020301. The tower geometry, structure member sizes and foundation design information were obtained from UNR-ROHN design drawing B971656, job no. 35489PH dated March, 1997. Subsequent tower reinforcement material information was obtained from MetroPCS construction drawings prepared by Fullerton Engineering Consultants, dated November 12, 2010; a previous Reinforcement Design prepared by this office Centek Job No. 11001.CO27, marked Revision #1, dated May 25, 2012; and a Structural Analysis Report with Modification Plan for AT&T prepared by Hudson Design Group, Revision 3 dated March 14, 2013.

Antenna and appurtenance information was taken from a combination of a Mapping Report by Hudson Design Group, dated December 13, 2012; a Structural Analysis Report with Modification Plan for AT&T prepared by Hudson Design Group, Revision 3 dated March 14, 2013; a Structural Analysis Report for T-Mobile prepared by Atlantis Group, dated February 14, 2014; and a RF data sheet from Verizon Wireless.

The tower consists of eleven (11) vertical sections constructed of steel pipe legs conforming to ASTM A572-50. Diagonal and horizontal lateral support bracing consists of a combination of steel angle and steel pipe construction conforming to ASTM A36 and ASTM A53-B-42. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 3.42-ft at throughout its length with the exception of a 5'-0" high tapered base section.

Verizon Wireless proposes the removal of six (6) existing panel antennas and the installation of six (6) panel antennas, nine (9) RRH's and two (2) distribution boxes mounted to the three (3) existing 15-ft Valmont T-frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing and proposed loads considered in the analysis consist of the following:

- T-MOBILE (Existing):
  Antennas: Six (6) AIR21 panel antennas and three (3) KRY112 TMA's mounted on three(3) 10-ft Boom Gates with a RAD center elevation of ±188.0-ft above the existing tower base.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and one (1) 1-5/8" ∅ Hybriflex fiber line running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 20' by 3" ∅ Omni-directional (whip) antenna mounted with an elevation of ±188.75-ft above the tower base.
  Coax Cable: One (1) 7/8" coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- UNKNOWN (Existing):
  Antenna: One (1) 6' by 3" ∅ Omni-directional (whip) antenna mounted with an elevation of ±180.0-ft above the tower base.
  Coax Cable: One (1) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- AT&T (Existing):
  Antennas: Six (6) Powerwave 7770 panel antennas, six (6) TMA's, six (6) diplexers, one (1) SBNH-1D6565C panel antenna, one (1) AM-X-CD-16-65-00T panel antenna, one (1) P65-17-XLH-RR panel antenna, six (6) RRH's, and one (1) DC6-48-60-18-8F Surge Arrestor mounted on three (3) 12-ft Boom Gates with a RAD center elevation of ±178.75-ft above the existing tower base.
  Coax Cables: Twelve (12) 1-1/4" ∅ coax cables, one (1) fiber line, and two (2) DC power cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 6-ft 4-Bay Dipole antenna mounted with an elevation of ±155.5-ft above the tower base.
  Coax Cable: One (1) 1-1/4" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- SPRINT (Existing):
  Antennas: Six (6) APXVSPP18-C-A20 panel antennas and six (6) RRH's mounted on three (3) 12-ft Boom Gates with a RAD center elevation of ±150.0-ft above the existing tower base.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables and one (1) 1-5/8" ∅ Hybriflex fiber line running on a leg/face of the existing tower as specified in Section 3 of this report.
- METROPCS:
  Antennas: Six (6) Kathrein 800-10504 panel antennas and six (6) RCU's and one (1) GPS antenna mounted on three (3) 12-ft T-Frames with a RAD center elevation of ±130-ft above the existing tower base.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the face of the existing tower as specified in Section 3 of this report.
- CLEARWIRE (Existing):
  Antennas: Three (3) Argus LLPX310R panel antennas and three (3) RRH's mounted on 6-ft T-Frames with a RAD center elevation of 120-ft above grade level.
  Coax Cables: Six (6) 5/16" ∅ and three (3) 1/2" ∅ coax cables running on the exterior of the existing tower within one (1) 2" flex conduit as specified in Section 3 of this report.
- UNKNOWN (EXISTING):
  Antenna: One (1) Decibel DB408 8-Bay Dipole antenna mounted on a 3' Standoff with an elevation of ±126-ft above the tower base.
  Coax Cable: One (1) 1-1/4" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- UNKNOWN (Existing):
  Antenna: Two (2) PD220 antennas mounted on 3'-6" Standoffs with an elevation of ±121-ft above the tower base.
  Coax Cable: Two (2) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) Folded Dipole antenna on a 6' x 3" Pipe Mount with an elevation of ±111-ft above the tower base.
  Coax Cable: One (1) 1-1/4" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 2' by 2" ∅ Omni-directional (whip) antenna mounted on a 2' Stand-off with an elevation of ±106-ft above the tower base.
  Coax Cable: Two (2) 1/2" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remain):
  Antennas: Six (6) Antel LPA 80080/4CF panel antennas mounted on three (3) 15-ft T-Frames with a RAD center elevation of ±169-ft above the existing tower base.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to be Removed):
  Antennas: Three (3) Antel BXA70063/6CF-2 and three (3) Antel BXA-171085-8BF panel antennas with a RAD center elevation of ±169.0-ft above the existing tower base.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the face of the existing tower as specified in Section 3 of this report.
- **VERIZON (Proposed):**
  Antennas: Six (6) Andrew SBNHH-1D65B panel antennas, three (3) Alcatel-Lucent RRH2x60-700 remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads, three (3) Alcatel-Lucent RRH2x60-AWS remote radio heads and two (2) RFS DB-T1-6Z-8AB-0Z main distribution boxes mounted on three (3) 15-ft T-Frames with a RAD center elevation of ±169-ft above the existing tower base.
  Coax Cables: Two (2) 1-5/8" ∅ Hybriflex fiber cables running on the face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

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

Analysis

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

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

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC[1] and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

Tower Loading

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

Basic Wind Speed:	New London; v = 85 mph (fastest mile) Montville; v = 115 mph (3 second gust) equivalent to v = 95 mph (fastest mile) *Appendix-K wind speed controls.*	*[Section 16 of TIA/EIA-222-F-96]* *[Appendix K of the 2005 CT Building Code Supplement]*
Load Cases:	Load Case 1; 95 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; 82 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 82 mph wind speed velocity represents 75% of the wind pressure generated by the 95 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 2, per tnxTower "Section Capacity Table", this tower was found to be at **99.2%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T7)	60'-0"-80'-0"	92.6%	**PASS**
Diagonal (T8)	40'-0"-60'-0"	61.0%	**PASS**
Guy C @ 140-ft radius (T2)	160'-0"	99.2%	**PASS**

Base Foundation and Guy Anchors

The existing tower foundation consists of a 2.5-ft ∅ reinforced concrete pedestal with a 7.0-ft square reinforced concrete pad bearing directly on the existing sub grade. Additionally, guy wire loading is transferred to three (3) 9.0-ft long by 5.0-ft wide by 2.0-ft thick reinforced concrete anchor support blocks at a 140-ft radius from the center of the existing tower and three (3) 12.0-ft long by 6.0-ft wide by 4.0-ft thick reinforced concrete anchor support blocks at a 88-ft radius from the center of the existing tower. The sub-grade conditions used as the basis for the foundation analysis were derived from a geo-technical study report for a proposed lattice tower within proximity of the subject guyed tower. The geo-technical report was prepared by Clarence Welti Associates, Inc., dated April 18, 2001.

- The worst case tower base and guy anchor reactions developed from the governing Load Case 2 were used in the verification of the anchorage foundations:

Tower Guy Reactions		
Vector	**Proposed Reactions Guy Anchor C @ Radius of 88-ft**	**Proposed Reactions Guy Anchor C @ Radius of 140-ft**
Horizontal (In Plane of GW)	**36 kips**	**37 kips**
Horizontal (Out of Plane of GW)	**1 kips**	**1 kips**
Vertical	**36 kips**	**42 kips**
Resultant Force at end of Guy Wire	**51 kips**	**56 kips**
Tower Base Reactions		
Vector	**Proposed Reaction**	
Horizontal Shear	**4.0 kips**	
Axial Compression	**198 kips**	
Moment	**0 kip-ft**	

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinf. Conc. Anchor Block (C) at 88-ft radius.	Uplift	2.0	2.56	**PASS**
	Sliding	2.0	3.3	**PASS**
Reinf. Conc. Anchor Block (C) at 140-ft radius.	Uplift	2.0	3.16	**PASS**
	Sliding	2.0	2.4	**PASS**
		Allowable	**Proposed**	
Base Foundation	Bearing	6.0 ksf	4.76 ksf	**PASS**
	Overturning	2.0	34.61	**PASS**
	Sliding	2.0	28.85	**PASS**

Note 1: FS denotes 'Factor of Safety'.

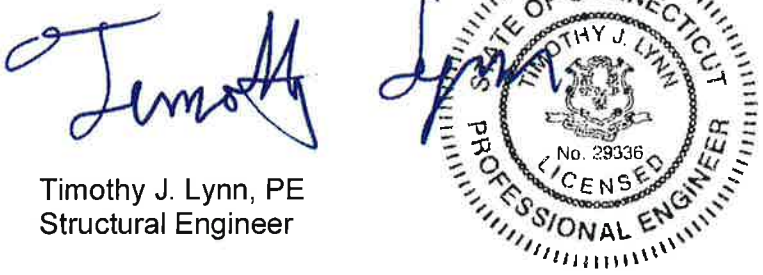
Conclusion

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

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.

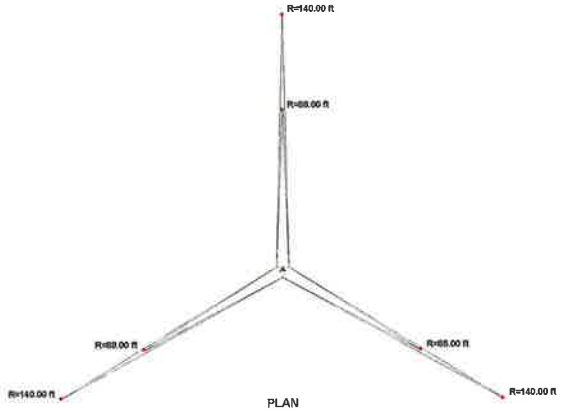
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower and RISATower, 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.

Section	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs				P3x.3				P2.5x.276		ROHN 2.5 EH w/plate	P2.5x.276
Leg Grade							A572-50				
Diagonals	N.A.	ROHN TS1.5x11 ga		ROHN TS1.5x16 ga	L1 3/4x1 3/4x3/16	ROHN TS1.5x16 ga	L2x2x1/4	ROHN TS1.5x11 ga	L2x2x1/4	L2x2x1/4	
Diagonal Grade	N.A.	A53-B-42		A53-B-42	A36	A53-B-42	A36	A53-B-42	A36	A36	
Top Girts	L3x3x1/2	ROHN TS1.5x11 ga		ROHN TS1.5x16 ga		ROHN TS1.5x11 ga	L3x2x1/4	ROHN TS1.5x11 ga	L3x2x1/4	L2x2x1/4	
Mid Girts	L3x3x1/2						N.A.				
Bottom Girts	L3x3x1/2	ROHN TS1.5x11 ga		ROHN TS1.5x16 ga	ROHN TS1.5x11 ga	ROHN TS1.5x16 ga	L2x2x1/4	ROHN TS1.5x11 ga	L2x2x1/4	L2x2x1/4	
Sec. Horizontals				N.A.			L2x2x1/4	N.A.		N.A.	
Face Width (ft)											3.417
# Panels @ (ft)	A	6 @ 2.38368				64 @ 2.41276					5 @ 2.56667
Weight (K)	13.1	0.4		0.7	1.8	0.8	3.3	1.5	0.8	3.3	0.9



PLAN

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
20' x 3" Dia Omni	188.75	DB-T1-6Z-8AB-0Z (Verizon)	169
Rohn 6'x10' Boom Gate (T-Mobile)	188	DB-T1-6Z-8AB-0Z (Verizon)	169
Rohn 6'x10' Boom Gate (T-Mobile)	188	Pirod 15' T-Frame Sector Mount (1) (Verizon)	169
(2) AIR21 (T-Mobile)	188	Pirod 15' T-Frame Sector Mount (1) (Verizon)	169
(2) AIR21 (T-Mobile)	188	LPA-80080-4CF (Verizon)	169
(2) AIR21 (T-Mobile)	188	Pirod 15' T-Frame Sector Mount (1) (Verizon)	169
KRY 112 TMA (T-Mobile)	188	4 Bay Dipole	150.5
KRY 112 TMA (T-Mobile)	188	3'-6" Standoff	151
KRY 112 TMA (T-Mobile)	188	Rohn 6'x15' Boom Gate (Sprint)	150.5
Rohn 6'x10' Boom Gate (T-Mobile)	188	Rohn 6'x15' Boom Gate (Sprint)	150.5
6' x 3" Dia Omni	180	Rohn 6'x15' Boom Gate (Sprint)	150.5
(2) 7770.00 (ATT)	178.75	FD-RRH 2x50 800 (Sprint)	150
(2) 7770.00 (ATT)	178.75	FD-RRH 2x50 800 (Sprint)	150
(2) 7770.00 (ATT)	178.75	FD-RRH 2x50 800 (Sprint)	150
SBNH-1D6565C (ATT)	178.75	FD-RRH 4x40 1900 (Sprint)	150
AM-X-CD-16-65-00T-RET(72") (ATT)	178.75	FD-RRH 4x40 1900 (Sprint)	150
P65-17-XLH-RR (ATT)	178.75	FD-RRH 4x40 1900 (Sprint)	150
(2) TT19-08BP111-001 TMA (ATT)	178.75	APXVSPP18-C-A20 (Sprint)	150
(2) TT19-08BP111-001 TMA (ATT)	178.75	APXVSPP18-C-A20 (Sprint)	150
(2) TT19-08BP111-001 TMA (ATT)	178.75	APXVSPP18-C-A20 (Sprint)	150
(2) Diplexer (ATT)	178.75	Splice Box (MetroPCS)	130
(2) Diplexer (ATT)	178.75	Andrew QT 5F12-2-72 (MetroPCS)	130
(2) Diplexer (ATT)	178.75	Andrew QT 5F12-2-72 (MetroPCS)	130
(2) RRUS-11 (ATT)	178.75	Andrew QT 5F12-2-72 (MetroPCS)	130
(2) RRUS-11 (ATT)	178.75	GPS (MetroPCS)	130
(2) RRUS-11 (ATT)	178.75	(2) 800-10504 (MetroPCS)	130
OC6-48-60-18-8F Surge Arrestor (ATT)	178.75	(2) 800-10504 (MetroPCS)	130
6' Standoff	178	(2) 800-10504 (MetroPCS)	130
3' Standoff	178	(2) 860 10025 RCU (MetroPCS)	130
Rohn 6'x15' Boom Gate (ATT)	177.5	(2) 860 10025 RCU (MetroPCS)	130
Rohn 6'x15' Boom Gate (ATT)	177.5	(2) 860 10025 RCU (MetroPCS)	130
Rohn 6'x15' Boom Gate (ATT)	177.5	DB408	126
SBNHH-1D65B (Verizon)	169	3' Standoff	122.5
SBNHH-1D65B (Verizon)	169	PD220	121
LPA-80080-4CF (Verizon)	169	PD220	121
LPA-80080-4CF (Verizon)	169	LLPX310R (Clearwire)	120
SBNHH-1D65B (Verizon)	169	LLPX310R (Clearwire)	120
SBNHH-1D65B (Verizon)	169	LLPX310R (Clearwire)	120
LPA-80080-4CF (Verizon)	169	RRU (Clearwire)	120
LPA-80080-4CF (Verizon)	169	RRU (Clearwire)	120
SBNHH-1D65B (Verizon)	169	RRU (Clearwire)	120
SBNHH-1D65B (Verizon)	169	Splice Box (Clearwire)	120
LPA-80080-4CF (Verizon)	169	6-ft T-Frame (Clearwire)	120
RRH2x60-AWS (Verizon)	169	6-ft T-Frame (Clearwire)	120
RRH2x60-AWS (Verizon)	169	6-ft T-Frame (Clearwire)	120
RRH2x60-AWS (Verizon)	169	Folded Dipole	111
RRH2x60-PCS (Verizon)	169	6'x3" Pipe Mount	111
RRH2x60-PCS (Verizon)	169	3'-6" Standoff	110
RRH2x60-PCS (Verizon)	169	3'-6" Standoff	110
RRH2x60-07-U (Verizon)	169	2'x2" Omni	106
RRH2x60-07-U (Verizon)	169	2' Standoff	105
RRH2x60-07-U (Verizon)	169		

SYMBOL LIST

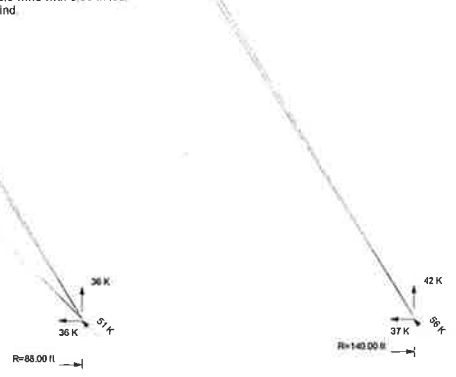
MARK	SIZE	MARK	SIZE
A	3 @ 1.44444		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A53-B-42	42 ksi	63 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 95 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 82 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 99.2%



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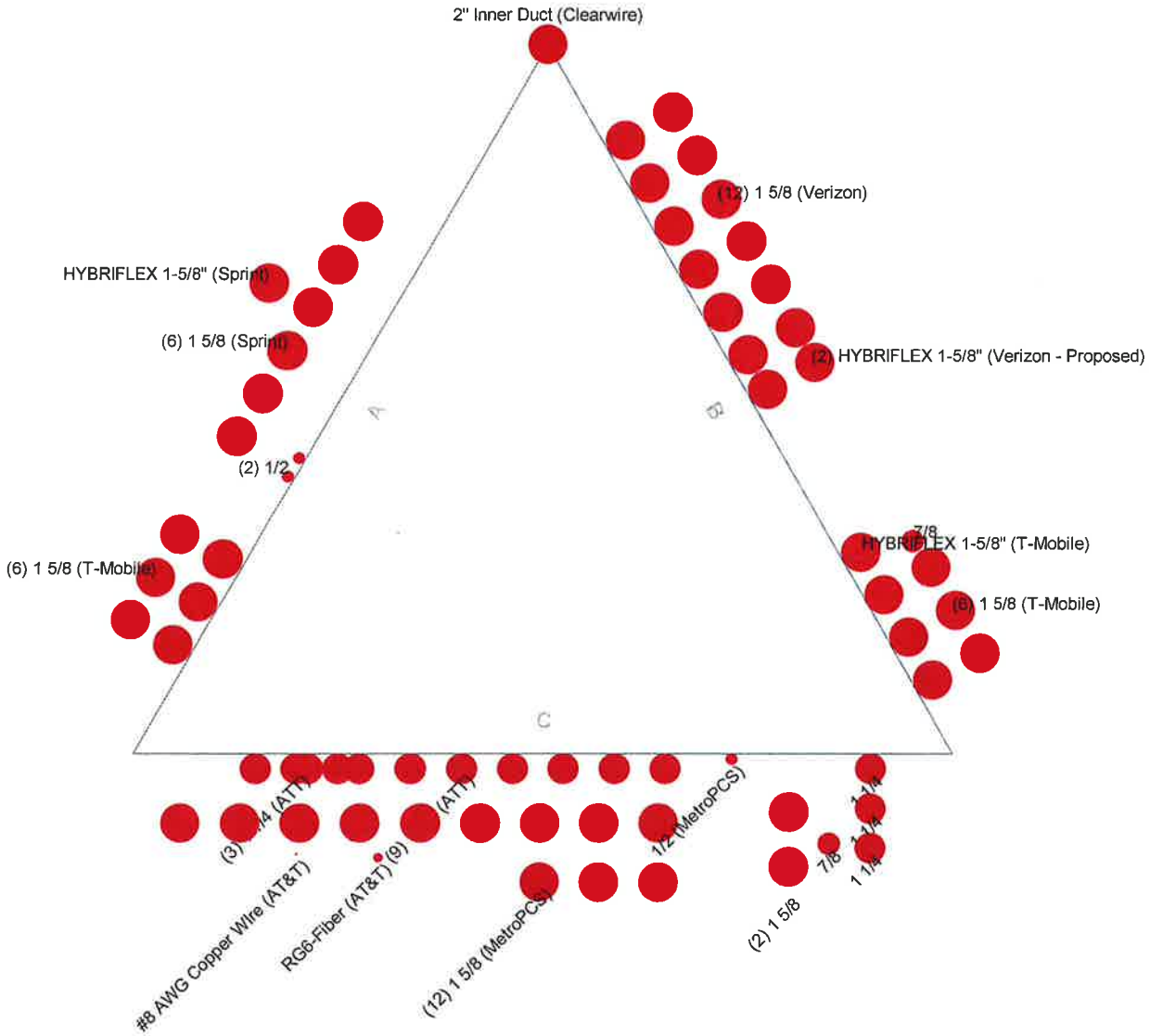
Job:	15001.044 - Montville 4
Project:	193' Guyed Lattice Tower - 57 Cook Road, Montville, CT
Client: Verizon Wireless	Drawn by: TJL / Appd:
Code: TIA/EIA-222-F	Date: 05/05/15 / Scale: NTS
Path:	Dwg No. E-1

Round Flat App In Face App Out Face



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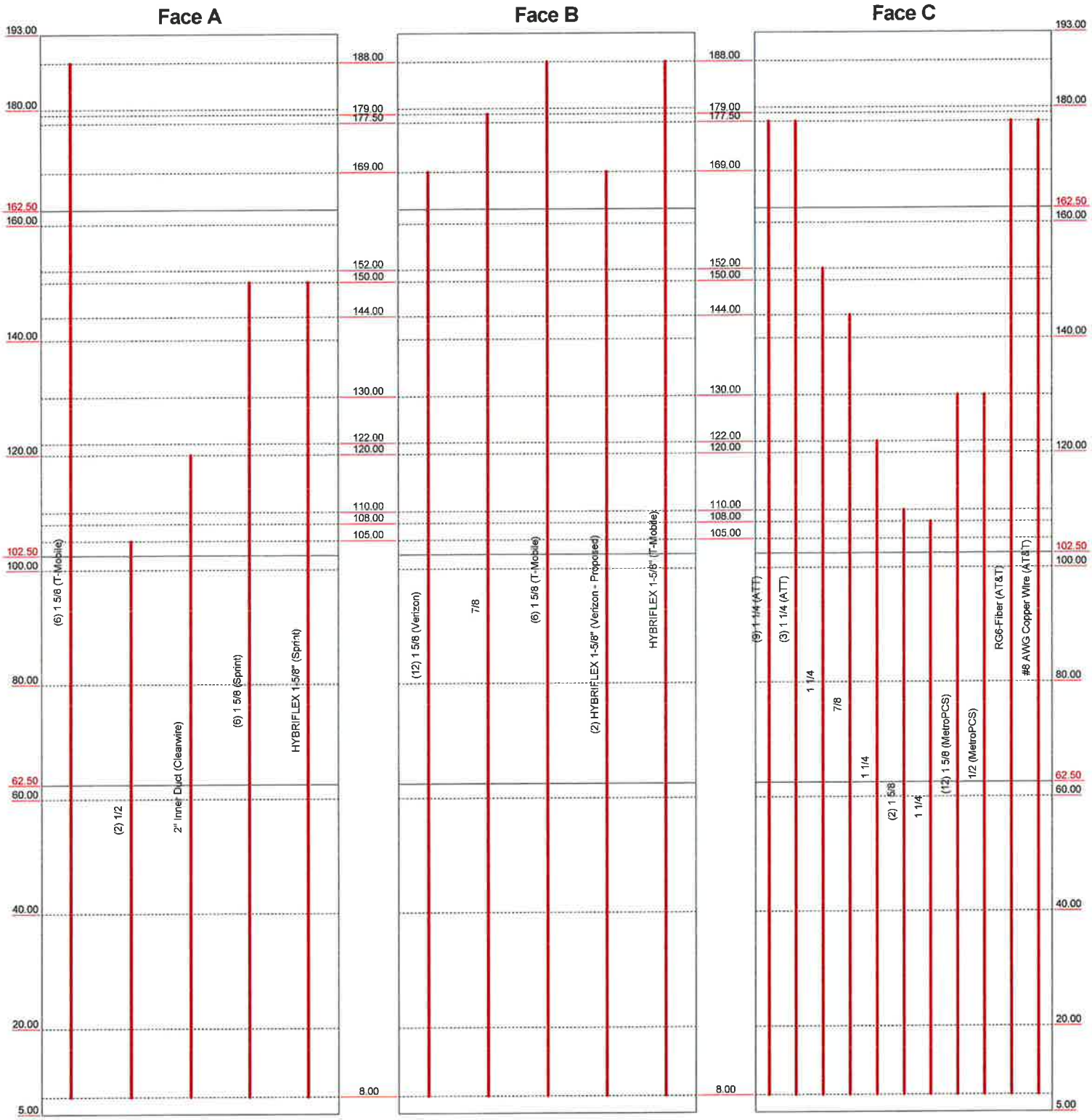
Job:	***15001.044 - Montville 4***		
Project:	***193' Guyed Lattice Tower - 57 Cook Road, Montville,***		
Client: Verizon Wireless		Drawn by: TJL	App'd:
Code: TIA/EIA-222-F		Date: 05/05/15	Scale: NTS
Path:			Dwg No. E-7

5' - 193'

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



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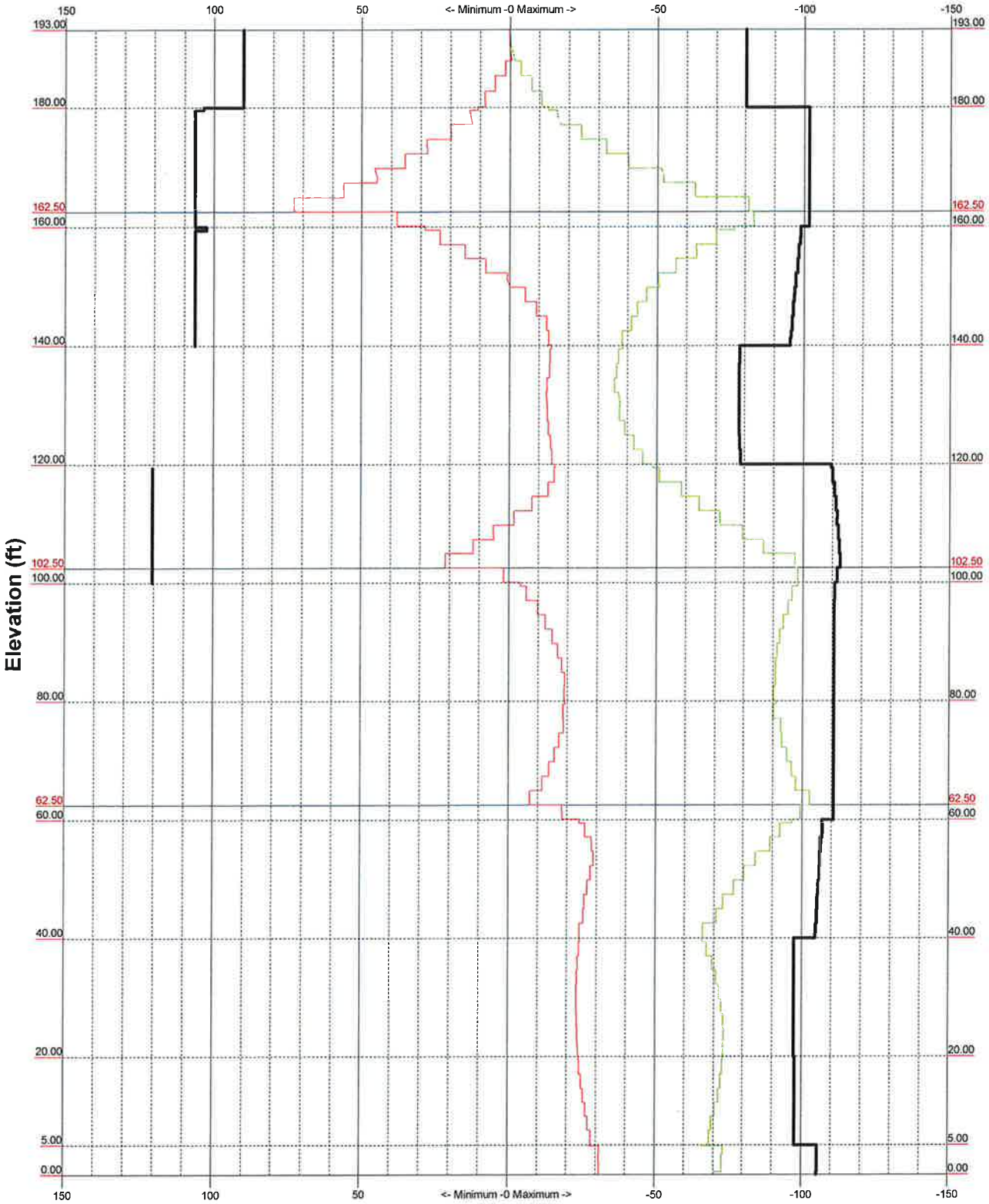
Phone: (203) 488-0580
FAX: (203) 488-8587

Job:	***15001.044 - Montville 4***		
Project:	***193' Guyed Lattice Tower - 57 Cook Road, Montville,***		
Client: Verizon Wireless		Drawn by: TJL	App'd:
Code: TIA/EIA-222-F		Date: 05/05/15	Scale: NTS
Path:			Dwg No. E-7

TIA/EIA-222-F - 95 mph/82 mph 0.5000 in Ice

Leg Capacity ——— **Leg Compression (K)**



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Job: ***15001.044 - Montville 4***			
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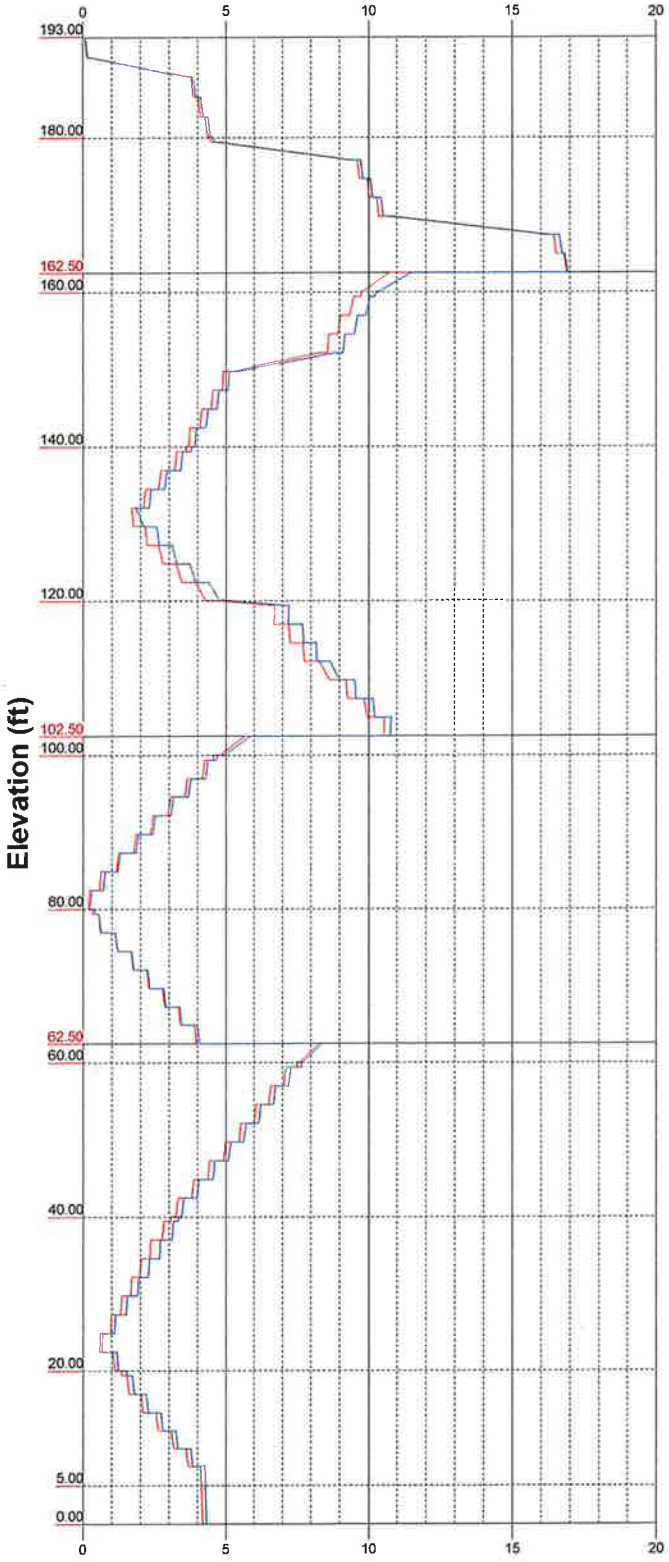
Code: TIA/EIA-222-F	Date: 05/05/15	Scale: NTS	
Path:		Dwg No. E-3	

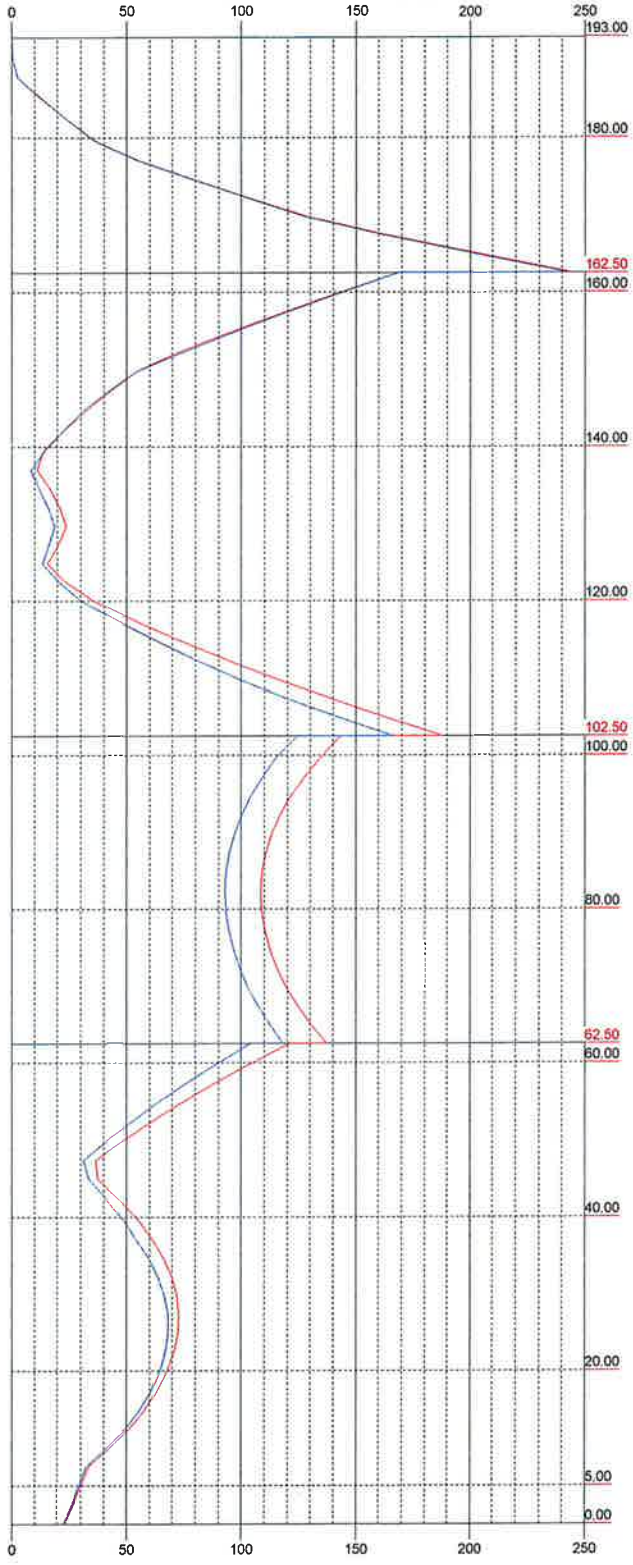
Vx Vz

Mx Mz

Global Mast Shear (K)



Global Mast Moment (kip-ft)



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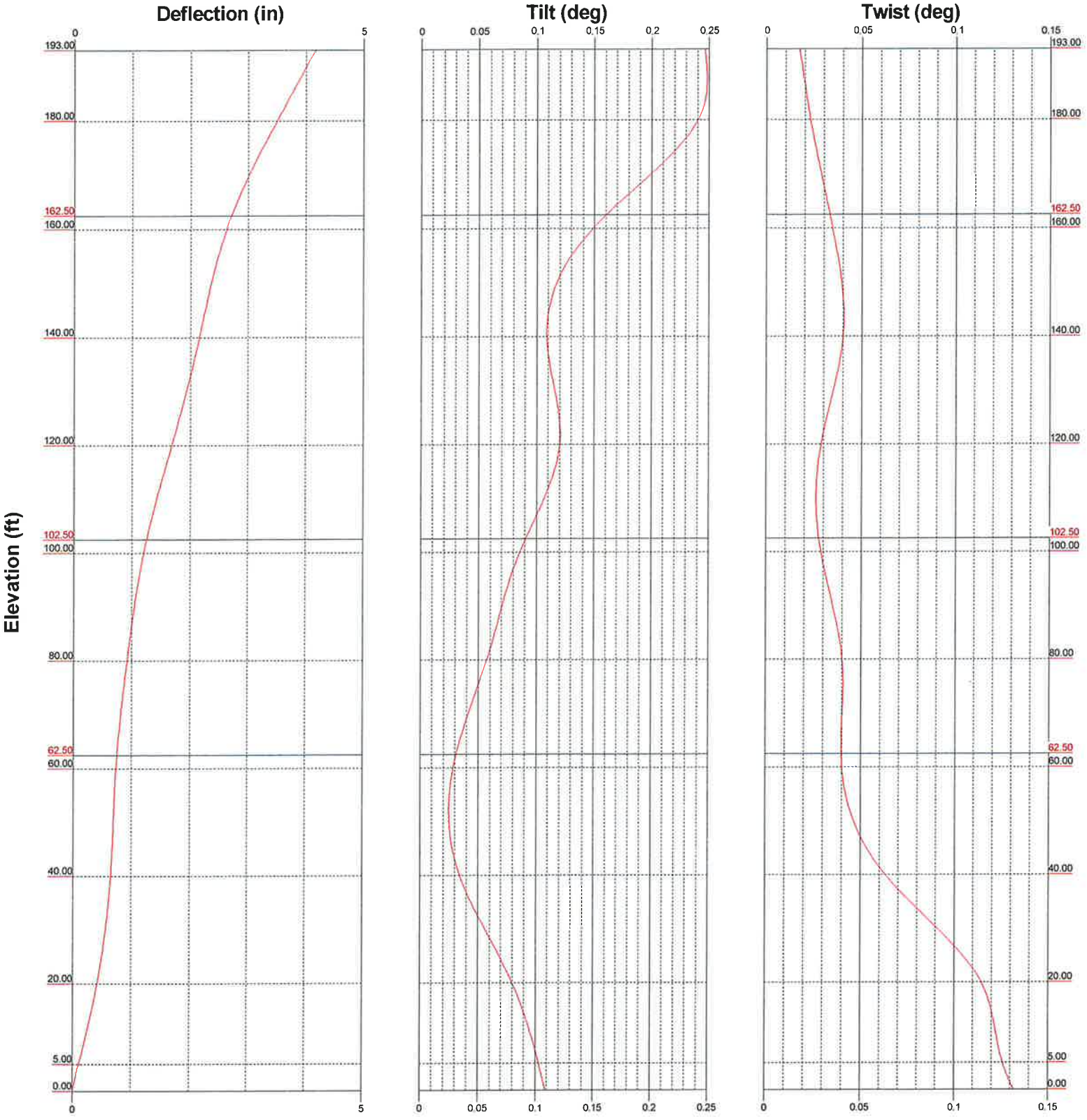
Job: ***15001.044 - Montville 4***		
Project: ***193' Guyed Lattice Tower - 57 Cook Road, Montville,***		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 05/05/15	Scale: NTS
Path:		Dwg No. E-4

TIA/EIA-222-F - Service - 50 mph

Maximum Values



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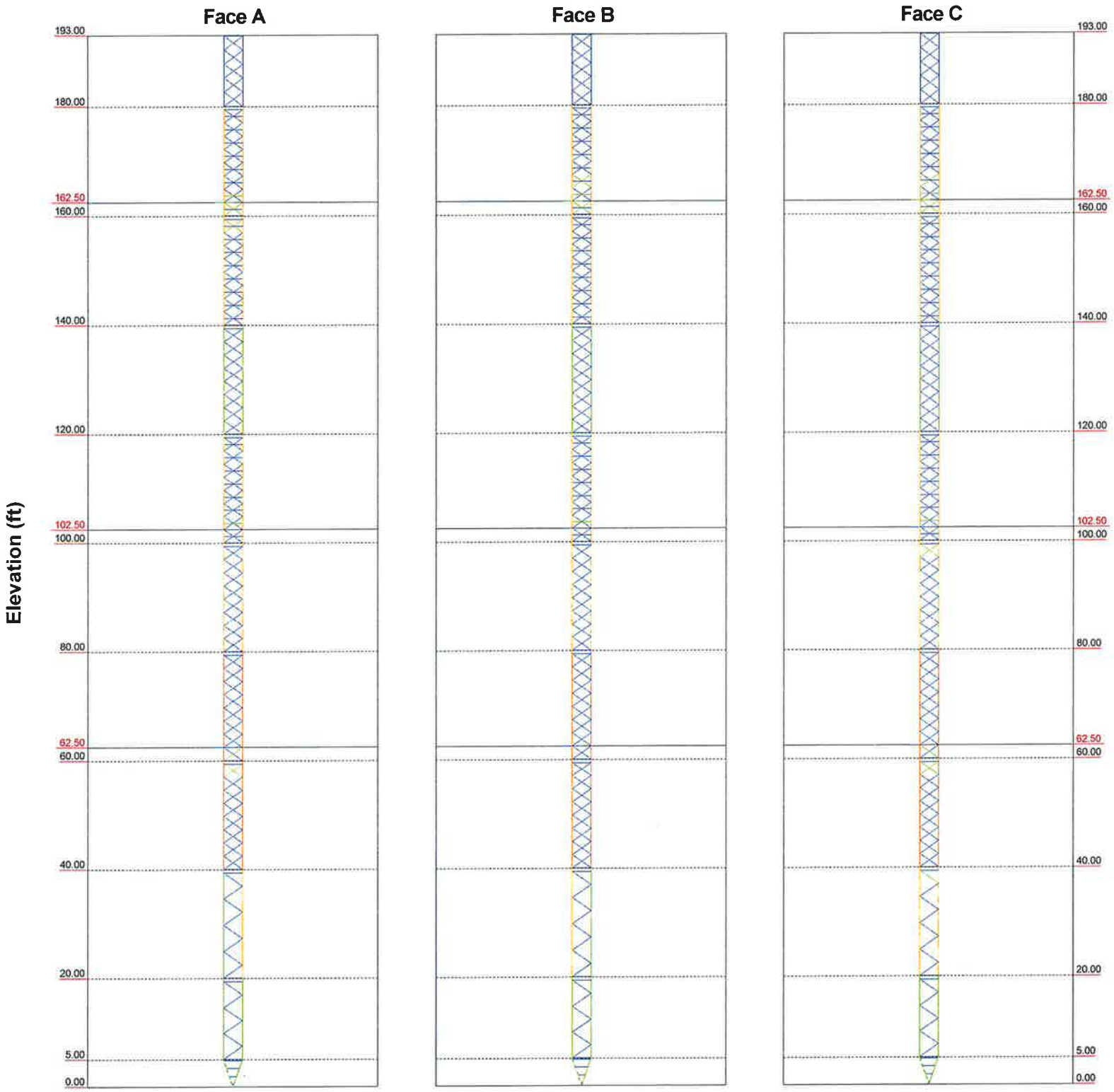
Job: ***15001.044 - Montville 4***		
Project: ***193' Guyed Lattice Tower - 57 Cook Road, Montville,***		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 05/05/15	Scale: NTS
Path:		Dwg No. E-5

0' - 193'

> 100% | 90%-100% | 75%-90% | 50%-75% | < 50% Overstress



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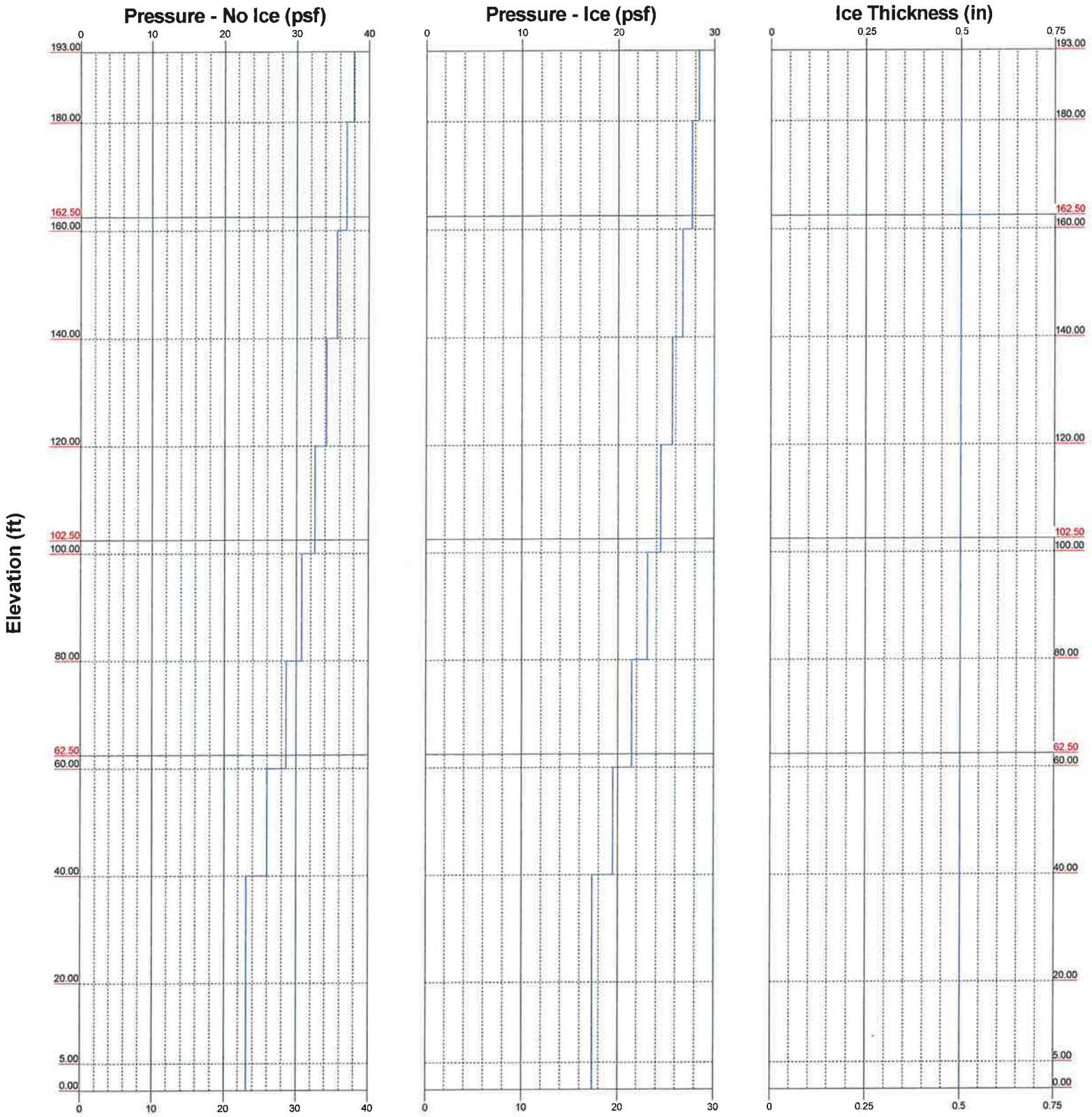
Job: **15001.044 - Montville 4**		
Project: ***193' Guyed Lattice Tower - 57 Cook Road, Montville,***		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 05/05/15	Scale: NTS
Path:		Dwg No. E-8

Wind Pressures and Ice Thickness

TIA/EIA-222-F - 95 mph/82 mph 0.5000 in Ice



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Job: ***15001.044 - Montville 4***		
Project: ***193' Guyed Lattice Tower - 57 Cook Road, Montville,***		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 05/05/15	Scale: NTS
Path:		Dwg No. E-9

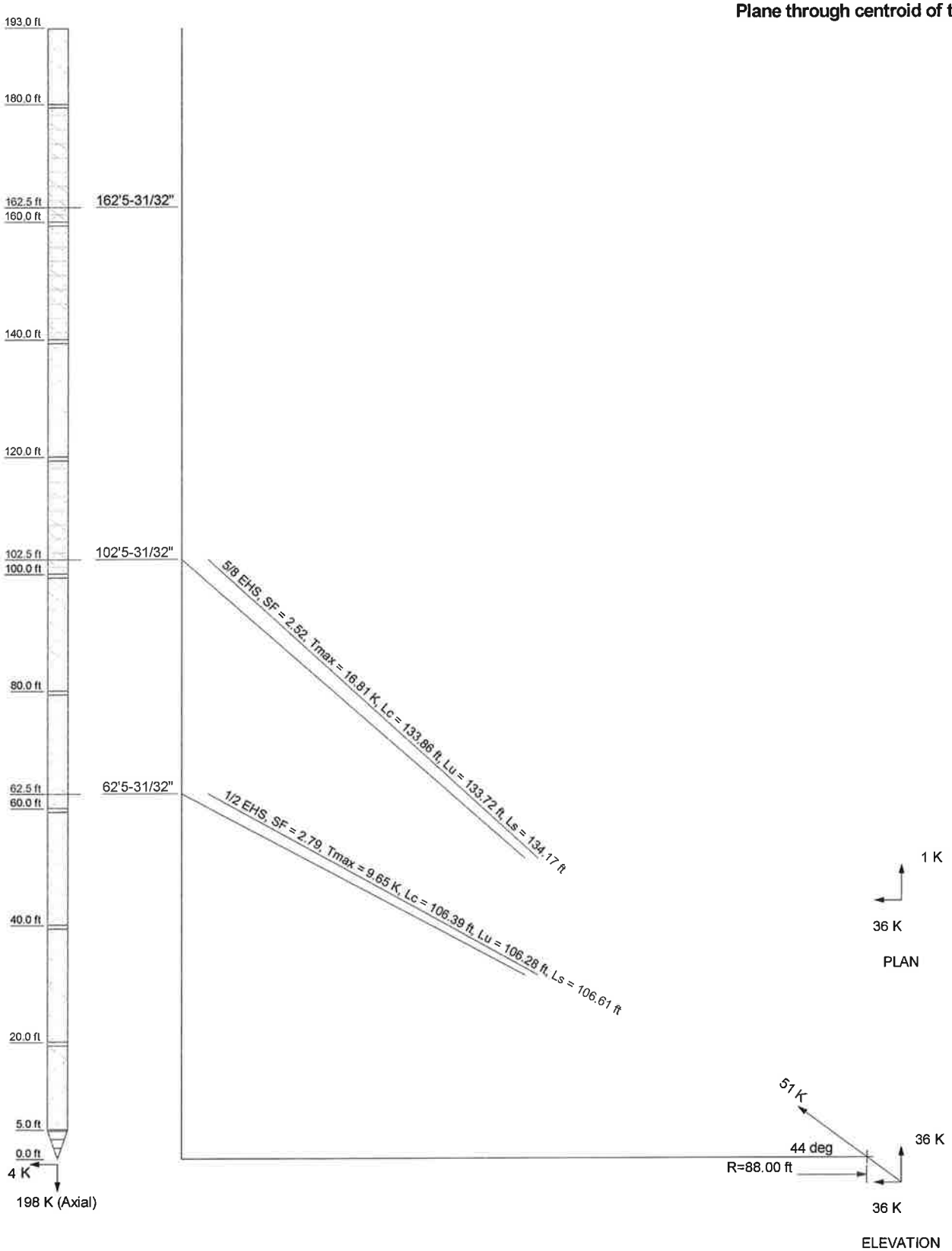
Guy Tensions and Tower Reactions

TIA/EIA-222-F - 95 mph/82 mph 0.5000 in Ice

Maximum Values

Anchor 'C'@88 ft Azimuth 240 deg Elev 0 ft

Plane through centroid of tower



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Job: *15001.044 - Montville 4*			
Project: *193' Guyed Lattice Tower - 57 Cook Road, Montville,*			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 05/05/15	Scale: NTS	
Path:		Dwg No. E-6	

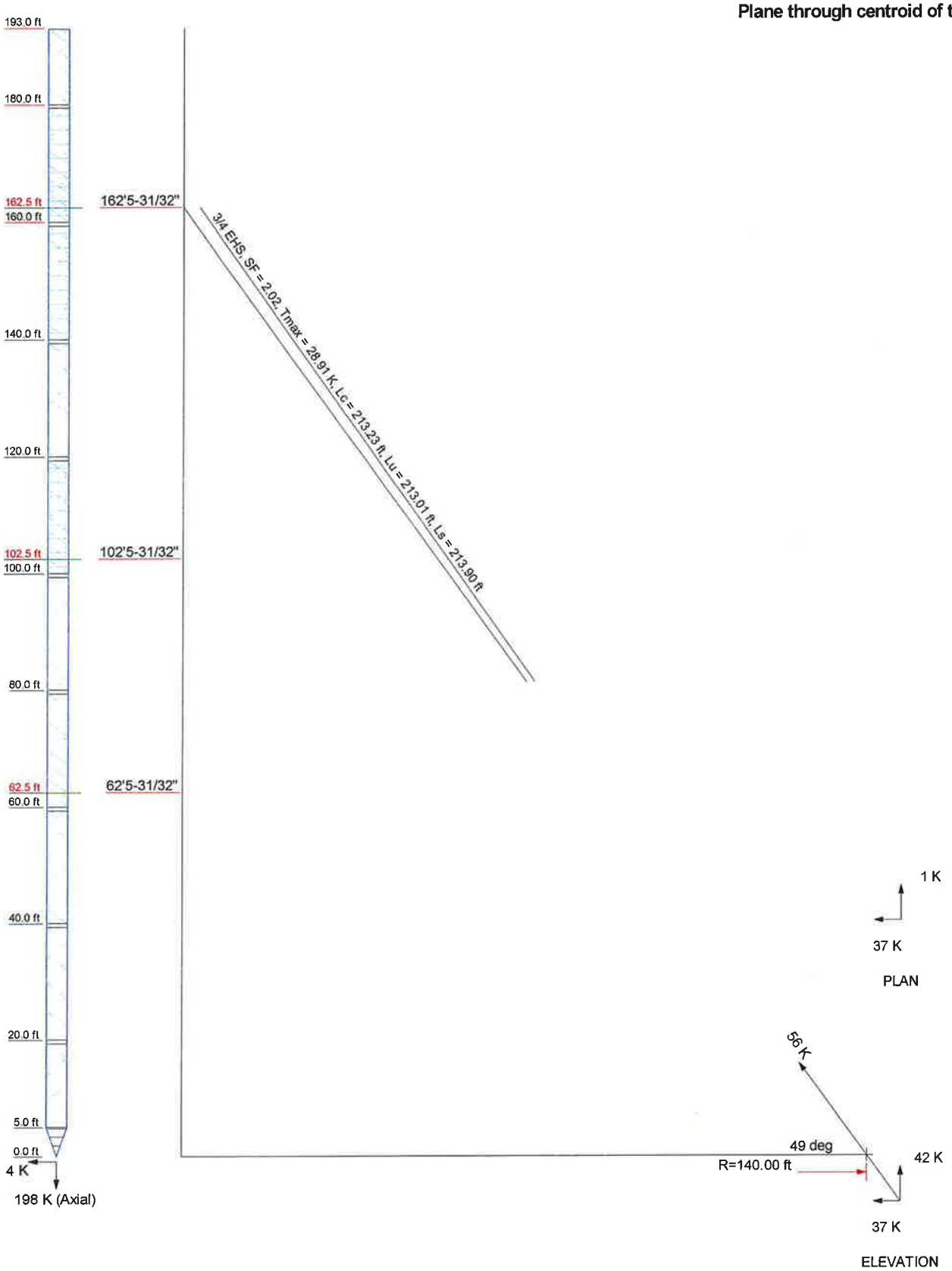
Guy Tensions and Tower Reactions

TIA/EIA-222-F - 95 mph/82 mph 0.5000 in Ice

Maximum Values

Anchor 'C'@140 ft Azimuth 240 deg Elev 0 ft

Plane through centroid of tower



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	Project: ***193' Guyed Lattice Tower - 57 Cook Road, Montville,***		
	Client: Verizon Wireless	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 05/05/15	Scale: NTS
	Path:		Dwg No. E-6

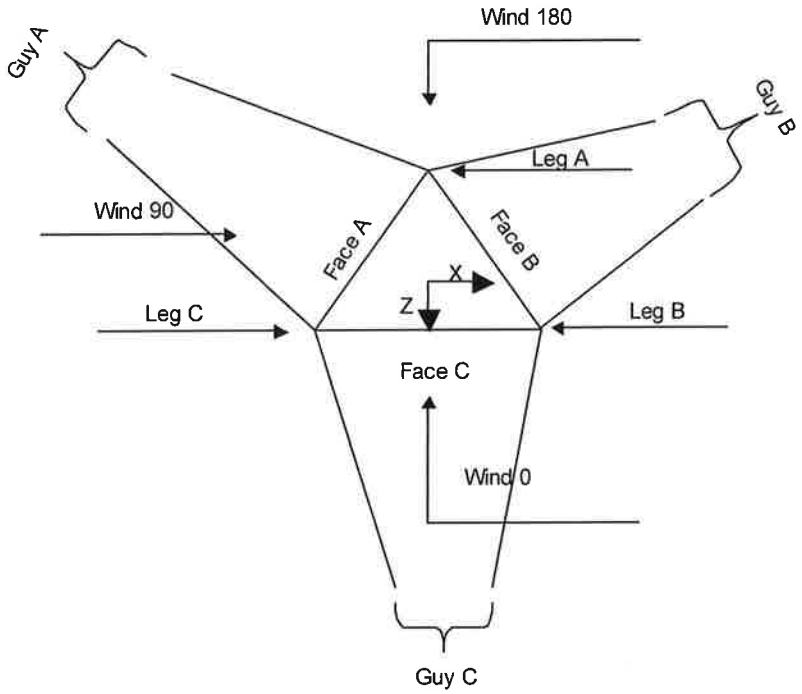
Tower Input Data

The main tower is a 3x guyed tower with an overall height of 193.00 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 3.42 ft at the top and tapered at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 95 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 82 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Pressures are calculated at each section.
Safety factor used in guy design is 2.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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



Face Guyed

Tower Section Geometry

Tower Section	*Tower Elevation*	*Assembly Database*	*Description*	*Section Width*	*Number of Sections*	*Section Length*
	ft			*ft*		*ft*
T1	193.00-180.00			3.42	1	13.00
T2	180.00-160.00			3.42	1	20.00
T3	160.00-140.00			3.42	1	20.00
T4	140.00-120.00			3.42	1	20.00
T5	120.00-100.00			3.42	1	20.00
T6	100.00-80.00			3.42	1	20.00
T7	80.00-60.00			3.42	1	20.00
T8	60.00-40.00			3.42	1	20.00
T9	40.00-20.00			3.42	1	20.00
T10	20.00-5.00			3.42	1	15.00
T11	5.00-0.00			3.42	1	5.00

Tower Section Geometry (cont'd)

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
T1	193.00-180.00	2.57	X Brace	No	No	1.0000	1.0000
T2	180.00-160.00	2.41	X Brace	No	Yes	7.3750	1.0000
T3	160.00-140.00	2.41	X Brace	No	Yes	7.3750	1.0000
T4	140.00-120.00	2.41	CX Brace	No	No	7.3750	1.0000
T5	120.00-100.00	2.41	X Brace	No	Yes	7.3750	1.0000
T6	100.00-80.00	2.41	CX Brace	No	No	7.3750	1.0000
T7	80.00-60.00	2.41	X Brace	No	No	7.3750	1.0000
T8	60.00-40.00	2.41	CX Brace	No	No	7.3750	1.0000
T9	40.00-20.00	2.41	K Brace Left	No	No	7.3750	1.0000
T10	20.00-5.00	2.38	K Brace Left	No	No	7.3750	1.0000
T11	5.00-0.00	1.44	X Brace	No	Yes	2.0000	6.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 193.00-180.00	Pipe	P2.5x.276	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T2 180.00-160.00	Pipe	ROHN 2.5 EH w/plate	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T3 160.00-140.00	Pipe	ROHN 2.5 EH w/plate	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T4 140.00-120.00	Pipe	P2.5x.276	A572-50 (50 ksi)	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)
T5 120.00-100.00	Pipe	P3x.3	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T6 100.00-80.00	Pipe	P3x.3	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T7 80.00-60.00	Pipe	P3x.3	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T8 60.00-40.00	Pipe	P3x.3	A572-50 (50 ksi)	Pipe	ROHN TS1.5x11 ga	A36 (36 ksi)
T9 40.00-20.00	Pipe	P3x.3	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T10 20.00-5.00	Pipe	P3x.3	A572-50 (50 ksi)	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)
T11 5.00-0.00	Pipe	P3x.3	A572-50 (50 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 193.00-180.00	Single Angle	L2x2x1/4	A36 (36 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T2 180.00-160.00	Single Angle	L2x2x1/4	A36 (36 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T3 160.00-140.00	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)
T4 140.00-120.00	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)
T5 120.00-100.00	Single Angle	L2x2x1/4	A36 (36 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T6 100.00-80.00	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T7 80.00-60.00	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)
T8 60.00-40.00	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)
T9 40.00-20.00	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T10 20.00-5.00	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x11 ga	A53-B-42 (42 ksi)
T11 5.00-0.00	Single Angle	L3x3x1/2	A36 (36 ksi)	Equal Angle	L3x3x1/2	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T11 5.00-0.00	2	Single Angle	L3x3x1/2	A36 (36 ksi)	Single Angle		A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T2 180.00-160.00	Equal Angle	L2x2x1/4	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)
T3 160.00-140.00	Equal Angle	L2x2x1/4	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)
T5 120.00-100.00	Equal Angle	L2x2x1/4	A36 (36 ksi)	Solid Round		A572-50 (50 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
T1 193.00-180.00	0.28	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 180.00-160.00	0.07	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 160.00-140.00	0.07	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 140.00-120.00	0.07	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 120.00-100.00	0.07	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 100.00-80.00	0.07	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 80.00-60.00	0.07	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 60.00-40.00	0.07	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 40.00-20.00	0.07	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 20.00-5.00	0.07	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000
T11 5.00-0.00	0.07	0.3750	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 193.00-180.00	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 20.00-5.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T11 5.00-0.00	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 193.00-180.00	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 20.00-5.00	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
T11 5.00-0.00	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 193.00-180.00	Flange	0.7500 A325N	4	0.6250 A325N	2	0.6250 A325N	2	0.6250 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 180.00-160.00	Flange	0.7500 A325N	4	0.6250 A325N	2	0.6250 A325N	2	0.6250 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1
T3 160.00-140.00	Flange	0.7500 A325N	4	0.6250 A325X	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1
T4 140.00-120.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 120.00-100.00	Flange	0.7500 A325N	4	0.6250 A325N	2	0.6250 A325N	2	0.6250 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1
T6 100.00-80.00	Flange	0.7500 A325N	4	0.5000 A490X	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 80.00-60.00	Flange	0.7500 A325N	4	0.6250 A325X	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 60.00-40.00	Flange	0.7500 A325N	4	0.5000 A325X	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 40.00-20.00	Flange	0.7500 A325N	4	0.6250 A490X	1	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 20.00-5.00	Flange	0.7500 A325N	4	0.5000 A490X	1	0.5000 A325N	1	0.6250 A490X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T11 5.00-0.00	Flange	0.7500 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Guy Data

Guy Elevation ft	Guy Grade		Guy Size	Initial Tension K	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
162.496	EHS	A	3/4	5.83	10%	19000	1.155	213.04	140.00	0.0000	0.00	100%
		B	3/4	5.83	10%	19000	1.155	213.04	140.00	0.0000	0.00	100%
		C	3/4	5.83	10%	19000	1.155	213.04	140.00	0.0000	0.00	100%
102.496	EHS	A	5/8	4.24	10%	21000	0.813	133.74	88.00	0.0000	0.00	100%
		B	5/8	4.24	10%	21000	0.813	133.74	88.00	0.0000	0.00	100%
		C	5/8	4.24	10%	21000	0.813	133.74	88.00	0.0000	0.00	100%
62.4961	EHS	A	1/2	2.69	10%	21000	0.517	106.30	88.00	0.0000	0.00	100%
		B	1/2	2.69	10%	21000	0.517	106.30	88.00	0.0000	0.00	100%
		C	1/2	2.69	10%	21000	0.517	106.30	88.00	0.0000	0.00	100%

Guy Data(cont'd)

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
162.496	Torque Arm	6.83	0.0000	Channel	A36 (36 ksi)	Channel	C15x50
102.496	Torque Arm	6.83	0.0000	Channel	A36 (36 ksi)	Channel	C15x33.9
62.4961	Torque Arm	6.83	0.0000	Channel	A36 (36 ksi)	Channel	C12x25

Guy Data (cont'd)

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
162.50	A572-50 (50 ksi)	Solid Round				A36 (36 ksi)	Channel	
102.50	A572-50 (50 ksi)	Solid Round				A36 (36 ksi)	Channel	
62.50	A572-50 (50 ksi)	Solid Round				A36 (36 ksi)	Channel	

Guy Data (cont'd)

Guy Elevation ft	Cable Weight A K	Cable Weight B K	Cable Weight C K	Cable Weight D K	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
162.496	0.25	0.25	0.25		4.43 3.6 sec/pulse	4.43 3.6 sec/pulse	4.43 3.6 sec/pulse	
102.496	0.11	0.11	0.11		1.70 2.3 sec/pulse	1.70 2.3 sec/pulse	1.70 2.3 sec/pulse	
62.4961	0.05	0.05	0.05		1.08 1.8 sec/pulse	1.08 1.8 sec/pulse	1.08 1.8 sec/pulse	

Guy Data (cont'd)

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm K_x	Torque Arm K_y	Pull Off K_x	Pull Off K_y	Diagonal K_x	Diagonal K_y
162.496	No	No	1	1	1	1	1	1
102.496	No	No	1	1	1	1	1	1
62.4961	No	No	1	1	1	1	1	1

Guy Data (cont'd)

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
162.496	0.8750 A325N	4	0.0000	1	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
102.496	0.8750 A325N	4	0.0000	1	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
62.4961	0.8750 A325N	4	0.0000	1	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
162.496	A	81.25	30	22	0.5000
	B	81.25	30	22	0.5000
	C	81.25	30	22	0.5000
102.496	A	51.25	26	20	0.5000
	B	51.25	26	20	0.5000
	C	51.25	26	20	0.5000
62.4961	A	31.25	23	17	0.5000

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
	B	31.25	23	17	0.5000
	C	31.25	23	17	0.5000

Guy-Mast Forces (Excluding Wind) - No Ice

Guy Elevation ft	Guy Location	Chord Angle °	Guy Tension Top / Bottom K	F_x K	F_y K	F_z K	M_x kip-ft	M_y kip-ft	M_z kip-ft
162.496	A	49.6461	6.02 5.83	-0.09	4.64	-3.83	-9.15	13.29	-15.84
	A	49.6461	6.02 5.83	0.09	4.64	-3.83	-9.15	-13.29	15.84
	B	49.6461	6.02 5.83	3.37	4.64	1.83	18.30	13.29	0.00
	B	49.6461	6.02 5.83	3.27	4.64	2.00	-9.15	-13.29	-15.84
	C	49.6461	6.02 5.83	-3.27	4.64	2.00	-9.15	13.29	15.84
	C	49.6461	6.02 5.83	-3.37	4.64	1.83	18.30	-13.29	0.00
			Sum:	0.00	27.82	0.00	-0.00	0.00	0.00
102.496	A	49.9703	4.32 4.24	-0.11	3.33	-2.75	-6.58	9.62	-11.39
	A	49.9703	4.32 4.24	0.11	3.33	-2.75	-6.58	-9.62	11.39
	B	49.9703	4.32 4.24	2.44	3.33	1.28	13.15	9.62	0.00
	B	49.9703	4.32 4.24	2.33	3.33	1.47	-6.58	-9.62	-11.39
	C	49.9703	4.32 4.24	-2.33	3.33	1.47	-6.58	9.62	11.39
	C	49.9703	4.32 4.24	-2.44	3.33	1.28	13.15	-9.62	0.00
			Sum:	0.00	20.00	0.00	-0.00	0.00	0.00
62.4961	A	35.9758	2.72 2.69	-0.09	1.62	-2.19	-3.19	7.65	-5.53
	A	35.9758	2.72 2.69	0.09	1.62	-2.19	-3.19	-7.65	5.53
	B	35.9758	2.72 2.69	1.94	1.62	1.02	6.38	7.65	0.00
	B	35.9758	2.72 2.69	1.85	1.62	1.17	-3.19	-7.65	-5.53
	C	35.9758	2.72 2.69	-1.85	1.62	1.17	-3.19	7.65	5.53
	C	35.9758	2.72 2.69	-1.94	1.62	1.02	6.38	-7.65	0.00
			Sum:	0.00	9.70	0.00	-0.00	0.00	0.00

Guy-Mast Forces (Excluding Wind) - Ice

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top / Bottom	F_x	F_y	F_z	M_x	M_y	M_z
			K						
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
162.496	A	49.6461	8.25	-0.13	6.37	-5.24	-12.57	18.15	-21.77
			7.94						
	A	49.6461	8.25	0.13	6.37	-5.24	-12.57	-18.15	21.77
			7.94						
	B	49.6461	8.25	4.60	6.37	2.51	25.14	18.15	0.00
			7.94						
	B	49.6461	8.25	4.47	6.37	2.73	-12.57	-18.15	-21.77
			7.94						
	C	49.6461	8.25	-4.47	6.37	2.73	-12.57	18.15	21.77
			7.94						
	C	49.6461	8.25	-4.60	6.37	2.51	25.14	-18.15	0.00
			7.94						
			Sum:	0.00	38.23	0.00	-0.00	0.00	0.00
102.496	A	49.9703	6.01	-0.15	4.64	-3.81	-9.16	13.33	-15.87
			5.86						
	A	49.9703	6.01	0.15	4.64	-3.81	-9.16	-13.33	15.87
			5.86						
	B	49.9703	6.01	3.38	4.64	1.78	18.32	13.33	0.00
			5.86						
	B	49.9703	6.01	3.23	4.64	2.04	-9.16	-13.33	-15.87
			5.86						
	C	49.9703	6.01	-3.23	4.64	2.04	-9.16	13.33	15.87
			5.86						
	C	49.9703	6.01	-3.38	4.64	1.78	18.32	-13.33	0.00
			5.86						
			Sum:	0.00	27.86	0.00	-0.00	0.00	0.00
62.4961	A	35.9758	3.82	-0.12	2.28	-3.06	-4.50	10.68	-7.79
			3.75						
	A	35.9758	3.82	0.12	2.28	-3.06	-4.50	-10.68	7.79
			3.75						
	B	35.9758	3.82	2.71	2.28	1.42	9.00	10.68	0.00
			3.75						
	B	35.9758	3.82	2.59	2.28	1.63	-4.50	-10.68	-7.79
			3.75						
	C	35.9758	3.82	-2.59	2.28	1.63	-4.50	10.68	7.79
			3.75						
	C	35.9758	3.82	-2.71	2.28	1.42	9.00	-10.68	0.00
			3.75						
			Sum:	0.00	13.68	0.00	-0.00	0.00	0.00

Guy-Mast Forces (Excluding Wind) - Service

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top / Bottom	F_x	F_y	F_z	M_x	M_y	M_z
			K						
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
162.496	A	49.6461	6.02	-0.09	4.64	-3.83	-9.15	13.29	-15.84
			5.83						
	A	49.6461	6.02	0.09	4.64	-3.83	-9.15	-13.29	15.84
			5.83						
	B	49.6461	6.02	3.37	4.64	1.83	18.30	13.29	0.00
			5.83						
	B	49.6461	6.02	3.27	4.64	2.00	-9.15	-13.29	-15.84

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F_x	F_y	F_z	M_x	M_y	M_z
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
			5.83						
	C	49.6461	6.02	-3.27	4.64	2.00	-9.15	13.29	15.84
			5.83						
	C	49.6461	6.02	-3.37	4.64	1.83	18.30	-13.29	0.00
			5.83						
			Sum:	0.00	27.82	0.00	-0.00	0.00	0.00
102.496	A	49.9703	4.32	-0.11	3.33	-2.75	-6.58	9.62	-11.39
			4.24						
	A	49.9703	4.32	0.11	3.33	-2.75	-6.58	-9.62	11.39
			4.24						
	B	49.9703	4.32	2.44	3.33	1.28	13.15	9.62	0.00
			4.24						
	B	49.9703	4.32	2.33	3.33	1.47	-6.58	-9.62	-11.39
			4.24						
	C	49.9703	4.32	-2.33	3.33	1.47	-6.58	9.62	11.39
			4.24						
	C	49.9703	4.32	-2.44	3.33	1.28	13.15	-9.62	0.00
			4.24						
			Sum:	0.00	20.00	0.00	-0.00	0.00	0.00
62.4961	A	35.9758	2.72	-0.09	1.62	-2.19	-3.19	7.65	-5.53
			2.69						
	A	35.9758	2.72	0.09	1.62	-2.19	-3.19	-7.65	5.53
			2.69						
	B	35.9758	2.72	1.94	1.62	1.02	6.38	7.65	0.00
			2.69						
	B	35.9758	2.72	1.85	1.62	1.17	-3.19	-7.65	-5.53
			2.69						
	C	35.9758	2.72	-1.85	1.62	1.17	-3.19	7.65	5.53
			2.69						
	C	35.9758	2.72	-1.94	1.62	1.02	6.38	-7.65	0.00
			2.69						
			Sum:	0.00	9.70	0.00	-0.00	0.00	0.00

Guy-Tensioning Information

Guy Elevation		H	V	Temperature At Time Of Tensioning: 0 F Initial Tension	0 F Intercept	20 F Initial Tension	20 F Intercept	40 F Initial Tension	40 F Intercept	60 F Initial Tension	60 F Intercept	80 F Initial Tension	80 F Intercept	100 F Initial Tension	100 F Intercept	120 F Initial Tension	120 F Intercept
ft		ft	ft	K	ft	K	ft	K	ft	K	ft	K	ft	K	ft	K	ft
162.496	A	138.07	162.50	6.824	3.79	6.490	3.98	6.159	4.20	5.830	4.43	5.505	4.69	5.183	4.97	4.867	5.29
	B	138.07	162.50	6.824	3.79	6.490	3.98	6.159	4.20	5.830	4.43	5.505	4.69	5.183	4.97	4.867	5.29
	C	138.07	162.50	6.824	3.79	6.490	3.98	6.159	4.20	5.830	4.43	5.505	4.69	5.183	4.97	4.867	5.29
102.496	A	86.10	102.50	5.024	1.44	4.761	1.51	4.500	1.60	4.240	1.70	3.981	1.81	3.724	1.93	3.468	2.07
	B	86.10	102.50	5.024	1.44	4.761	1.51	4.500	1.60	4.240	1.70	3.981	1.81	3.724	1.93	3.468	2.07
	C	86.10	102.50	5.024	1.44	4.761	1.51	4.500	1.60	4.240	1.70	3.981	1.81	3.724	1.93	3.468	2.07
62.4961	A	86.10	62.50	3.480	0.84	3.215	0.90	2.952	0.98	2.690	1.08	2.430	1.20	2.173	1.34	1.920	1.51
	B	86.10	62.50	3.480	0.84	3.215	0.90	2.952	0.98	2.690	1.08	2.430	1.20	2.173	1.34	1.920	1.51
	C	86.10	62.50	3.480	0.84	3.215	0.90	2.952	0.98	2.690	1.08	2.430	1.20	2.173	1.34	1.920	1.51

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (T-Mobile)	A	Yes	Ar (CfAe)	188.00 - 8.00	0.0000	-0.3	6	3	0.5000	1.9800		1.04
1/2	A	Yes	Ar (CfAe)	105.00 - 8.00	0.0000	-0.1	2	2	0.5000 0.5800	0.5800		0.25
1 5/8 (Verizon)	B	Yes	Ar (CfAe)	169.00 - 8.00	0.0000	-0.2	12	6	0.5000 0.7500	1.9800		1.04
7/8	B	Yes	Ar (CfAe)	179.00 - 8.00	3.0000	0.25	1	1	1.1100	1.1100		0.54
1 1/4 (ATT)	C	Yes	Ar (CfAe)	177.50 - 8.00	0.0000	0.1	9	9	1.0000 1.5500	1.5500		0.66
1 1/4 (ATT)	C	Yes	Ar (CfAe)	177.50 - 8.00	0.0000	0.3	3	3	0.5000	1.5500		0.66
1 1/4	C	Yes	Ar (CfAe)	152.00 - 8.00	0.0000	-0.4	1	1	1.5500	1.5500		0.66
7/8	C	Yes	Ar (CfAe)	144.00 - 8.00	4.0000	-0.35	1	1	1.1100	1.1100		0.54
1 1/4	C	Yes	Ar (CfAe)	122.00 - 8.00	2.0000	-0.4	1	1	1.5500	1.5500		0.66
1 5/8	C	Yes	Ar (CfAe)	110.00 - 8.00	2.0000	-0.3	2	1	1.9800 0.7500	1.9800		1.04
1 1/4	C	Yes	Ar (CfAe)	108.00 - 8.00	4.0000	-0.4	1	1	1.5500	1.5500		0.66
1 5/8 (T-Mobile)	B	Yes	Ar (CfAe)	188.00 - 8.00	0.0000	0.35	6	3	0.5000 0.7500	1.9800		1.04
2" Inner Duct (Clearwire)	A	No	Ar (Leg)	120.00 - 8.00	0.0000	0	1	1	2.0000 1.5000	2.0000		1.00
1 5/8 (MetroPCS)	C	Yes	Ar (CfAe)	130.00 - 8.00	2.5000	0.15	12	9	1.0000	1.9800		1.04
1/2 (MetroPCS)	C	Yes	Ar (CfAe)	130.00 - 8.00	0.0000	-0.23	1	1	0.5800	0.5800		0.25
1 5/8 (Sprint)	A	Yes	Ar (CfAe)	150.00 - 8.00	2.5000	0.05	6	6	0.5000 1.0000	1.9800		1.04
RG6-Fiber (AT&T)	C	Yes	Ar (CfAe)	177.50 - 8.00	5.0000	0.2	1	1	0.5000	0.5000		1.00
#8 AWG Copper WIre (AT&T)	C	Yes	Ar (CfAe)	177.50 - 8.00	5.0000	0.3	1	1	0.2500	0.1285		0.05
HYBRIFLEX 1-5/8" (Verizon - Proposed)	B	Yes	Ar (CfAe)	169.00 - 8.00	0.0000	0	2	1	0.5000 0.7500	1.9800		1.90
HYBRIFLEX 1-5/8" (Sprint)	A	Yes	Ar (CfAe)	150.00 - 8.00	5.0000	0.08	1	1	1.9800	1.9800		1.90
HYBRIFLEX 1-5/8" (T-Mobile)	B	Yes	Ar (CfAe)	188.00 - 8.00	0.0000	0.23	1	1	1.9800	1.9800		1.90

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	193.00-180.00	A	3.960	0.000	0.000	0.000	0.05
		B	5.280	0.000	0.000	0.000	0.07
		C	0.000	0.000	0.000	0.000	0.00
T2	180.00-160.00	A	9.900	0.000	0.000	0.000	0.12
		B	25.352	0.000	0.000	0.000	0.32
		C	28.042	0.000	0.000	0.000	0.16
T3	160.00-140.00	A	21.450	0.000	0.000	0.000	0.21
		B	38.150	0.000	0.000	0.000	0.50
		C	33.968	0.000	0.000	0.000	0.19

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
T4	140.00-120.00	A	33.000	0.000	0.000	0.000	0.29
		B	38.150	0.000	0.000	0.000	0.50
		C	52.072	0.000	0.000	0.000	0.33
T5	120.00-100.00	A	36.817	0.000	0.000	0.000	0.31
		B	41.483	0.000	0.000	0.000	0.50
		C	72.414	0.000	0.000	0.000	0.50
T6	100.00-80.00	A	38.267	0.000	0.000	0.000	0.32
		B	41.483	0.000	0.000	0.000	0.50
		C	75.614	0.000	0.000	0.000	0.53
T7	80.00-60.00	A	38.267	0.000	0.000	0.000	0.32
		B	41.483	0.000	0.000	0.000	0.50
		C	75.614	0.000	0.000	0.000	0.53
T8	60.00-40.00	A	38.267	0.000	0.000	0.000	0.32
		B	41.483	0.000	0.000	0.000	0.50
		C	75.614	0.000	0.000	0.000	0.53
T9	40.00-20.00	A	38.267	0.000	0.000	0.000	0.32
		B	41.483	0.000	0.000	0.000	0.50
		C	75.614	0.000	0.000	0.000	0.53
T10	20.00-5.00	A	22.960	0.000	0.000	0.000	0.19
		B	24.890	0.000	0.000	0.000	0.30
		C	45.368	0.000	0.000	0.000	0.32
T11	5.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	193.00-180.00	A	0.500	1.987	3.307	0.000	0.000	0.12
		B		3.973	3.307	0.000	0.000	0.15
		C		0.000	0.000	0.000	0.000	0.00
T2	180.00-160.00	A	0.500	4.967	8.267	0.000	0.000	0.30
		B		17.744	17.567	0.000	0.000	0.76
		C		11.271	35.729	0.000	0.000	0.51
T3	160.00-140.00	A	0.500	9.933	18.600	0.000	0.000	0.50
		B		23.383	28.933	0.000	0.000	1.18
		C		16.134	40.833	0.000	0.000	0.62
T4	140.00-120.00	A	0.500	14.900	28.933	0.000	0.000	0.69
		B		23.383	28.933	0.000	0.000	1.18
		C		24.872	60.700	0.000	0.000	1.03
T5	120.00-100.00	A	0.500	20.558	29.383	0.000	0.000	0.75
		B		28.383	28.933	0.000	0.000	1.18
		C		36.681	80.567	0.000	0.000	1.50
T6	100.00-80.00	A	0.500	22.533	30.733	0.000	0.000	0.78
		B		28.383	28.933	0.000	0.000	1.18
		C		41.714	80.567	0.000	0.000	1.57
T7	80.00-60.00	A	0.500	22.533	30.733	0.000	0.000	0.78
		B		28.383	28.933	0.000	0.000	1.18
		C		41.714	80.567	0.000	0.000	1.57
T8	60.00-40.00	A	0.500	22.533	30.733	0.000	0.000	0.78
		B		28.383	28.933	0.000	0.000	1.18
		C		41.714	80.567	0.000	0.000	1.57
T9	40.00-20.00	A	0.500	22.533	30.733	0.000	0.000	0.78
		B		28.383	28.933	0.000	0.000	1.18
		C		41.714	80.567	0.000	0.000	1.57
T10	20.00-5.00	A	0.500	13.520	18.440	0.000	0.000	0.47

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
		B		17.030	17.360	0.000	0.000	0.71
		C		25.029	48.340	0.000	0.000	0.94
T11	5.00-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

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	193.00-180.00	A	0.000	0.492	0.737	0.984
		B	0.000	0.677	0.982	1.354
		C	0.000	0.000	0.000	0.000
T2	180.00-160.00	A	0.000	1.631	2.441	3.263
		B	0.000	4.353	6.251	8.706
		C	0.000	5.794	6.914	11.588
T3	160.00-140.00	A	0.268	3.874	4.931	6.559
		B	0.477	7.103	8.770	12.027
		C	0.425	7.735	7.809	13.096
T4	140.00-120.00	A	4.452	9.856	0.000	0.000
		B	5.147	11.764	0.000	0.000
		C	7.025	19.242	0.000	0.000
T5	120.00-100.00	A	0.000	5.540	8.256	11.081
		B	0.000	6.449	9.406	12.899
		C	0.000	14.454	17.854	28.908
T6	100.00-80.00	A	4.713	10.853	0.000	0.000
		B	5.147	11.764	0.000	0.000
		C	10.202	27.496	0.000	0.000
T7	80.00-60.00	A	0.437	4.945	4.989	6.893
		B	0.477	5.360	5.449	7.472
		C	0.945	12.527	10.799	17.464
T8	60.00-40.00	A	4.713	10.853	0.000	0.000
		B	5.147	11.764	0.000	0.000
		C	10.202	27.496	0.000	0.000
T9	40.00-20.00	A	2.575	5.929	0.000	0.000
		B	2.812	6.427	0.000	0.000
		C	5.573	15.022	0.000	0.000
T10	20.00-5.00	A	1.627	3.747	0.000	0.000
		B	1.777	4.061	0.000	0.000
		C	3.522	9.493	0.000	0.000
T11	5.00-0.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	193.00-180.00	0.4100	0.6103	0.3519	0.2688
T2	180.00-160.00	0.0730	1.9317	0.1531	1.4541

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T3	160.00-140.00	-0.0681	0.5894	0.1233	0.7476
T4	140.00-120.00	-1.0805	1.5951	-0.5542	1.8767
T5	120.00-100.00	-0.8287	1.9869	-0.2673	1.8884
T6	100.00-80.00	-0.8456	2.5940	-0.2414	2.6643
T7	80.00-60.00	-0.8148	2.4903	-0.2212	2.5787
T8	60.00-40.00	-0.8456	2.5940	-0.2414	2.6643
T9	40.00-20.00	-0.9165	2.8405	-0.3405	3.0855
T10	20.00-5.00	-0.8563	2.6523	-0.3141	2.8739
T11	5.00-0.00	0.0000	0.0000	0.0000	0.0000

Discrete Tower Loads

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
Rohn 6'x10' Boom Gate (T-Mobile)	A	From Leg	2.00 0.00 0.00	0.0000	188.00	No Ice 1/2" Ice	14.00 20.00	9.00 12.00	0.51 0.72
Rohn 6'x10' Boom Gate (T-Mobile)	B	From Leg	2.00 0.00 0.00	0.0000	188.00	No Ice 1/2" Ice	14.00 20.00	9.00 12.00	0.51 0.72
Rohn 6'x10' Boom Gate (T-Mobile)	C	From Leg	2.00 0.00 0.00	0.0000	188.00	No Ice 1/2" Ice	14.00 20.00	9.00 12.00	0.51 0.72
(2) AIR21 (T-Mobile)	A	From Leg	3.00 0.00 0.00	0.0000	188.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
(2) AIR21 (T-Mobile)	B	From Leg	3.00 0.00 0.00	0.0000	188.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
(2) AIR21 (T-Mobile)	C	From Leg	3.00 0.00 0.00	0.0000	188.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
KRY 112 TMA (T-Mobile)	A	From Leg	3.00 0.00 0.00	0.0000	188.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	0.03 0.03
KRY 112 TMA (T-Mobile)	B	From Leg	3.00 0.00 0.00	0.0000	188.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	0.03 0.03
KRY 112 TMA (T-Mobile)	C	From Leg	3.00 0.00 0.00	0.0000	188.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	0.03 0.03
Rohn 6'x15' Boom Gate (ATT)	A	From Leg	2.00 0.00 0.00	0.0000	177.50	No Ice 1/2" Ice	17.50 23.50	9.00 12.00	0.51 0.72
Rohn 6'x15' Boom Gate (ATT)	B	From Leg	2.00 0.00 0.00	0.0000	177.50	No Ice 1/2" Ice	17.50 23.50	9.00 12.00	0.51 0.72
Rohn 6'x15' Boom Gate (ATT)	C	From Leg	2.00 0.00 0.00	0.0000	177.50	No Ice 1/2" Ice	17.50 23.50	9.00 12.00	0.51 0.72
(2) 7770.00	A	From Leg	4.75	0.0000	178.75	No Ice	5.88	2.93	0.04

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
(ATT)			0.00 0.00			1/2" Ice	6.31	3.27	0.07
(2) 7770.00	B	From Leg	4.75	0.0000	178.75	No Ice	5.88	2.93	0.04
(ATT)			0.00 0.00			1/2" Ice	6.31	3.27	0.07
(2) 7770.00	C	From Leg	4.75	0.0000	178.75	No Ice	5.88	2.93	0.04
(ATT)			0.00 0.00			1/2" Ice	6.31	3.27	0.07
SBNH-1D6565C	A	From Leg	4.75	0.0000	178.75	No Ice	11.41	7.70	0.06
(ATT)			0.00 0.00			1/2" Ice	12.03	8.29	0.13
AM-X-CD-16-65-00T-RET(72")	B	From Leg	4.75	0.0000	178.75	No Ice	8.26	4.64	0.05
(ATT)			0.00 0.00			1/2" Ice	8.81	5.09	0.10
P65-17-XLH-RR	C	From Leg	4.75	0.0000	178.75	No Ice	11.47	6.80	0.06
(ATT)			0.00 0.00			1/2" Ice	12.08	7.38	0.12
(2) TT19-08BP111-001 TMA	A	From Leg	4.75	0.0000	178.75	No Ice	0.64	0.52	0.02
(ATT)			0.00 0.00			1/2" Ice	0.76	0.62	0.02
(2) TT19-08BP111-001 TMA	B	From Leg	4.75	0.0000	178.75	No Ice	0.64	0.52	0.02
(ATT)			0.00 0.00			1/2" Ice	0.76	0.62	0.02
(2) TT19-08BP111-001 TMA	C	From Leg	4.75	0.0000	178.75	No Ice	0.64	0.52	0.02
(ATT)			0.00 0.00			1/2" Ice	0.76	0.62	0.02
(2) Diplexer	A	From Leg	4.75	0.0000	178.75	No Ice	0.35	0.12	0.01
(ATT)			0.00 0.00			1/2" Ice	0.43	0.17	0.01
(2) Diplexer	B	From Leg	4.75	0.0000	178.75	No Ice	0.35	0.12	0.01
(ATT)			0.00 0.00			1/2" Ice	0.43	0.17	0.01
(2) Diplexer	C	From Leg	4.75	0.0000	178.75	No Ice	0.35	0.12	0.01
(ATT)			0.00 0.00			1/2" Ice	0.43	0.17	0.01
(2) RRUS-11	A	From Leg	4.00	0.0000	178.75	No Ice	0.00	1.25	0.05
(ATT)			0.00 0.00			1/2" Ice	0.00	1.41	0.07
(2) RRUS-11	B	From Leg	4.00	0.0000	178.75	No Ice	0.00	1.25	0.05
(ATT)			0.00 0.00			1/2" Ice	0.00	1.41	0.07
(2) RRUS-11	C	From Leg	4.00	0.0000	178.75	No Ice	0.00	1.25	0.05
(ATT)			0.00 0.00			1/2" Ice	0.00	1.41	0.07
DC6-48-60-18-8F Surge Arrestor	A	From Leg	4.00	0.0000	178.75	No Ice	2.23	2.23	0.02
(ATT)			0.00 0.00			1/2" Ice	2.45	2.45	0.04
Pirod 15' T-Frame Sector Mount (1)	A	From Leg	2.00	0.0000	169.00	No Ice	15.00	15.00	0.50
(Verizon)			0.00 0.00			1/2" Ice	20.60	20.60	0.65
Pirod 15' T-Frame Sector Mount (1)	B	From Leg	2.00	0.0000	169.00	No Ice	15.00	15.00	0.50
(Verizon)			0.00 0.00			1/2" Ice	20.60	20.60	0.65
Pirod 15' T-Frame Sector Mount (1)	C	From Leg	2.00	0.0000	169.00	No Ice	15.00	15.00	0.50
(Verizon)			0.00 0.00			1/2" Ice	20.60	20.60	0.65
LPA-80080-4CF	A	From Leg	3.00	0.0000	169.00	No Ice	2.62	6.06	0.01

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
(Verizon)			-6.00 0.00			1/2" Ice	2.92	6.45	0.05
SBNHH-1D65B	A	From Leg	3.00	0.0000	169.00	No Ice	8.33	5.34	0.04
(Verizon)			-4.00 0.00			1/2" Ice	8.88	5.79	0.09
SBNHH-1D65B	A	From Leg	3.00	0.0000	169.00	No Ice	8.33	5.34	0.04
(Verizon)			4.00 0.00			1/2" Ice	8.88	5.79	0.09
LPA-80080-4CF	A	From Leg	3.00	0.0000	169.00	No Ice	2.62	6.06	0.01
(Verizon)			6.00 0.00			1/2" Ice	2.92	6.45	0.05
LPA-80080-4CF	B	From Leg	3.00	0.0000	169.00	No Ice	2.62	6.06	0.01
(Verizon)			-6.00 0.00			1/2" Ice	2.92	6.45	0.05
SBNHH-1D65B	B	From Leg	3.00	0.0000	169.00	No Ice	8.33	5.34	0.04
(Verizon)			-4.00 0.00			1/2" Ice	8.88	5.79	0.09
SBNHH-1D65B	B	From Leg	3.00	0.0000	169.00	No Ice	8.33	5.34	0.04
(Verizon)			4.00 0.00			1/2" Ice	8.88	5.79	0.09
LPA-80080-4CF	B	From Leg	3.00	0.0000	169.00	No Ice	2.62	6.06	0.01
(Verizon)			6.00 0.00			1/2" Ice	2.92	6.45	0.05
LPA-80080-4CF	C	From Leg	3.00	0.0000	169.00	No Ice	2.62	6.06	0.01
(Verizon)			-6.00 0.00			1/2" Ice	2.92	6.45	0.05
SBNHH-1D65B	C	From Leg	3.00	0.0000	169.00	No Ice	8.33	5.34	0.04
(Verizon)			-4.00 0.00			1/2" Ice	8.88	5.79	0.09
SBNHH-1D65B	C	From Leg	3.00	0.0000	169.00	No Ice	8.33	5.34	0.04
(Verizon)			4.00 0.00			1/2" Ice	8.88	5.79	0.09
LPA-80080-4CF	C	From Leg	3.00	0.0000	169.00	No Ice	2.62	6.06	0.01
(Verizon)			6.00 0.00			1/2" Ice	2.92	6.45	0.05
RRH2x60-AWS	A	From Leg	3.00	0.0000	169.00	No Ice	3.78	2.07	0.06
(Verizon)			-4.00 0.00			1/2" Ice	4.09	2.35	0.08
RRH2x60-AWS	B	From Leg	3.00	0.0000	169.00	No Ice	3.78	2.07	0.06
(Verizon)			-4.00 0.00			1/2" Ice	4.09	2.35	0.08
RRH2x60-AWS	C	From Leg	3.00	0.0000	169.00	No Ice	3.78	2.07	0.06
(Verizon)			-4.00 0.00			1/2" Ice	4.09	2.35	0.08
RRH2x60-PCS	A	From Leg	3.00	0.0000	169.00	No Ice	0.00	1.55	0.06
(Verizon)			4.00 0.00			1/2" Ice	0.00	1.74	0.07
RRH2x60-PCS	B	From Leg	3.00	0.0000	169.00	No Ice	0.00	1.55	0.06
(Verizon)			4.00 0.00			1/2" Ice	0.00	1.74	0.07
RRH2x60-PCS	C	From Leg	3.00	0.0000	169.00	No Ice	0.00	1.55	0.06
(Verizon)			4.00 0.00			1/2" Ice	0.00	1.74	0.07
RRH2x60-07-U	A	From Leg	3.00	0.0000	169.00	No Ice	2.45	1.63	0.05
(Verizon)			0.00 0.00			1/2" Ice	2.67	1.83	0.07
RRH2x60-07-U	B	From Leg	3.00	0.0000	169.00	No Ice	2.45	1.63	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*
(Verizon)			0.00 0.00			1/2" Ice	2.67	1.83	0.07
RRH2x60-07-U (Verizon)	C	From Leg	3.00 0.00 0.00	0.0000	169.00	No Ice 1/2" Ice	2.45 2.67	1.63 1.83	0.05 0.07
DB-T1-6Z-8AB-0Z (Verizon)	A	From Leg	1.50 0.00 0.00	0.0000	169.00	No Ice 1/2" Ice	0.00 0.00	2.33 2.56	0.04 0.08
DB-T1-6Z-8AB-0Z (Verizon)	B	From Leg	1.50 0.00 0.00	0.0000	169.00	No Ice 1/2" Ice	0.00 0.00	2.33 2.56	0.04 0.08
Rohn 6'x15' Boom Gate (Sprint)	A	From Leg	2.00 0.00 0.00	0.0000	150.50	No Ice 1/2" Ice	17.50 23.50	9.00 12.00	0.51 0.72
Rohn 6'x15' Boom Gate (Sprint)	B	From Leg	2.00 0.00 0.00	0.0000	150.50	No Ice 1/2" Ice	17.50 23.50	9.00 12.00	0.51 0.72
Rohn 6'x15' Boom Gate (Sprint)	C	From Leg	2.00 0.00 0.00	0.0000	150.50	No Ice 1/2" Ice	17.50 23.50	9.00 12.00	0.51 0.72
APXVSPP18-C-A20 (Sprint)	A	From Leg	3.00 -6.00 0.00	0.0000	150.00	No Ice 1/2" Ice	8.26 8.81	5.28 5.74	0.06 0.11
APXVSPP18-C-A20 (Sprint)	A	From Leg	3.00 -6.00 0.00	0.0000	150.00	No Ice 1/2" Ice	8.26 8.81	5.28 5.74	0.06 0.11
APXVSPP18-C-A20 (Sprint)	A	From Leg	3.00 -6.00 0.00	0.0000	150.00	No Ice 1/2" Ice	8.26 8.81	5.28 5.74	0.06 0.11
FD-RRH 4x40 1900 (Sprint)	A	From Leg	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	2.61 2.84	2.71 2.95	0.06 0.08
FD-RRH 4x40 1900 (Sprint)	B	From Leg	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	2.61 2.84	2.71 2.95	0.06 0.08
FD-RRH 4x40 1900 (Sprint)	C	From Leg	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	2.61 2.84	2.71 2.95	0.06 0.08
FD-RRH 2x50 800 (Sprint)	A	From Leg	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	2.40 2.61	2.25 2.46	0.06 0.09
FD-RRH 2x50 800 (Sprint)	B	From Leg	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	2.40 2.61	2.25 2.46	0.06 0.09
FD-RRH 2x50 800 (Sprint)	C	From Leg	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	2.40 2.61	2.25 2.46	0.06 0.09
(2) 800-10504 (MetroPCS)	A	From Leg	4.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice	3.66 4.01	2.26 2.59	0.02 0.04
(2) 800-10504 (MetroPCS)	B	From Leg	4.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice	3.66 4.01	2.26 2.59	0.02 0.04
(2) 800-10504 (MetroPCS)	C	From Leg	4.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice	3.66 4.01	2.26 2.59	0.02 0.04
(2) 860 10025 RCU	A	From Leg	4.00	0.0000	130.00	No Ice	0.16	0.13	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(MetroPCS)			0.00			1/2" Ice	0.22	0.19	0.00
			0.00						
(2) 860 10025 RCU	B	From Leg	4.00	0.0000	130.00	No Ice	0.16	0.13	0.00
(MetroPCS)			0.00			1/2" Ice	0.22	0.19	0.00
			0.00						
(2) 860 10025 RCU	C	From Leg	4.00	0.0000	130.00	No Ice	0.16	0.13	0.00
(MetroPCS)			0.00			1/2" Ice	0.22	0.19	0.00
			0.00						
Splice Box	A	From Leg	4.00	0.0000	130.00	No Ice	0.16	0.13	0.00
(MetroPCS)			0.00			1/2" Ice	0.22	0.19	0.00
			0.00						
Andrew QT SF12-2-72	A	From Leg	2.00	0.0000	130.00	No Ice	16.30	16.30	0.39
(MetroPCS)			0.00			1/2" Ice	20.60	20.60	0.55
			0.00						
Andrew QT SF12-2-72	B	From Leg	2.00	0.0000	130.00	No Ice	16.30	16.30	0.39
(MetroPCS)			0.00			1/2" Ice	20.60	20.60	0.55
			0.00						
Andrew QT SF12-2-72	C	From Leg	2.00	0.0000	130.00	No Ice	16.30	16.30	0.39
(MetroPCS)			0.00			1/2" Ice	20.60	20.60	0.55
			0.00						
GPS	C	From Leg	4.00	0.0000	130.00	No Ice	1.00	1.00	0.01
(MetroPCS)			0.00			1/2" Ice	1.50	1.50	0.01
			0.00						
LLPX310R	A	From Leg	2.00	0.0000	120.00	No Ice	4.83	1.95	0.03
(Clearwire)			0.00			1/2" Ice	5.18	2.21	0.05
			0.00						
LLPX310R	B	From Leg	2.00	0.0000	120.00	No Ice	4.83	1.95	0.03
(Clearwire)			0.00			1/2" Ice	5.18	2.21	0.05
			0.00						
LLPX310R	C	From Leg	2.00	0.0000	120.00	No Ice	4.83	1.95	0.03
(Clearwire)			0.00			1/2" Ice	5.18	2.21	0.05
			0.00						
RRU	A	From Leg	1.00	0.0000	120.00	No Ice	1.80	0.78	0.03
(Clearwire)			0.00			1/2" Ice	2.00	0.92	0.04
			0.00						
RRU	B	From Leg	1.00	0.0000	120.00	No Ice	1.80	0.78	0.03
(Clearwire)			0.00			1/2" Ice	2.00	0.92	0.04
			0.00						
RRU	C	From Leg	1.00	0.0000	120.00	No Ice	1.80	0.78	0.03
(Clearwire)			0.00			1/2" Ice	2.00	0.92	0.04
			0.00						
Splice Box	A	From Leg	0.00	0.0000	120.00	No Ice	1.05	0.70	0.02
(Clearwire)			0.00			1/2" Ice	1.21	0.85	0.02
			0.00						
6-ft T-Frame	A	From Leg	1.00	0.0000	120.00	No Ice	13.60	13.60	0.38
(Clearwire)			0.00			1/2" Ice	17.50	17.50	0.53
			0.00						
6-ft T-Frame	B	From Leg	1.00	0.0000	120.00	No Ice	13.60	13.60	0.38
(Clearwire)			0.00			1/2" Ice	17.50	17.50	0.53
			0.00						
6-ft T-Frame	C	From Leg	1.00	0.0000	120.00	No Ice	13.60	13.60	0.38
(Clearwire)			0.00			1/2" Ice	17.50	17.50	0.53
			0.00						
20' x 3" Dia Omni	B	From Leg	4.75	0.0000	188.75	No Ice	6.00	6.00	0.05
			0.00			1/2" Ice	8.03	8.03	0.09
			0.00						
6' Standoff	B	From Leg	3.00	0.0000	178.00	No Ice	4.80	4.80	0.10

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
			0.00			1/2" Ice	6.40	6.40	0.14
			0.00						
6' x 3" Dia Omni	A	From Leg	4.75	0.0000	180.00	No Ice	1.77	1.77	0.02
			0.00			1/2" Ice	2.13	2.13	0.03
			0.00						
3' Standoff	A	From Leg	1.50	0.0000	178.00	No Ice	2.40	2.40	0.05
			0.00			1/2" Ice	3.20	3.20	0.07
			0.00						
4 Bay Dipole	B	From Leg	4.75	0.0000	155.50	No Ice	1.65	1.65	0.02
			0.00			1/2" Ice	2.61	2.61	0.03
			0.00						
3'-6" Standoff	B	From Leg	2.00	0.0000	151.00	No Ice	2.40	2.40	0.05
			0.00			1/2" Ice	3.20	3.20	0.07
			0.00						
DB408	B	From Leg	4.75	0.0000	126.00	No Ice	1.65	1.65	0.02
			0.00			1/2" Ice	2.61	2.61	0.03
			0.00						
3' Standoff	B	From Leg	1.50	0.0000	122.50	No Ice	3.00	3.00	0.05
			0.00			1/2" Ice	4.00	4.00	0.07
			0.00						
PD220	A	From Leg	4.00	0.0000	121.00	No Ice	3.08	3.08	0.02
			0.00			1/2" Ice	5.30	5.30	0.05
			0.00						
3'-6" Standoff	A	From Leg	2.00	0.0000	110.00	No Ice	2.40	2.40	0.05
			0.00			1/2" Ice	3.20	3.20	0.07
			0.00						
PD220	B	From Leg	4.00	0.0000	121.00	No Ice	3.08	3.08	0.02
			0.00			1/2" Ice	5.30	5.30	0.05
			0.00						
3'-6" Standoff	B	From Leg	2.00	0.0000	110.00	No Ice	2.40	2.40	0.05
			0.00			1/2" Ice	3.20	3.20	0.07
			0.00						
Folded Dipole	C	From Leg	1.50	0.0000	111.00	No Ice	1.20	1.20	0.03
			0.00			1/2" Ice	2.40	2.40	0.04
			0.00						
6'x3" Pipe Mount	C	From Leg	1.00	0.0000	111.00	No Ice	1.77	1.77	0.03
			0.00			1/2" Ice	2.13	2.13	0.05
			0.00						
2' Standoff	B	From Leg	1.00	0.0000	105.00	No Ice	0.60	0.60	0.01
			0.00			1/2" Ice	0.80	0.80	0.02
			0.00						
2'x2" Omni	B	From Leg	2.00	0.0000	106.00	No Ice	0.30	0.30	0.02
			0.00			1/2" Ice	0.43	0.43	0.02
			0.00						

Tower Pressures - No Ice

$G_H = 1.116$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	186.50	1.64	38	47.536	A	7.226	10.189	6.229	35.77	0.000	0.000
193.00-180.00					B	6.980	11.509		33.69	0.000	0.000
					C	7.962	6.229		43.89	0.000	0.000
T2	170.00	1.597	37	73.132	A	13.294	19.483	9.583	29.24	0.000	0.000
180.00-160.00					B	9.484	34.936		21.57	0.000	0.000
					C	8.821	37.625		20.63	0.000	0.000
T3	150.00	1.541	36	73.132	A	9.745	31.560	9.583	23.20	0.000	0.000
160.00-140.00					B	5.906	48.051		17.76	0.000	0.000
					C	6.867	43.921		18.87	0.000	0.000
T4	130.00	1.48	34	73.132	A	0.067	46.705	9.583	20.49	0.000	0.000
140.00-120.00					B	0.067	51.160		18.71	0.000	0.000
					C	0.067	63.204		15.15	0.000	0.000
T5	110.00	1.411	33	74.173	A	7.223	48.483	11.667	20.94	0.000	0.000
120.00-100.00					B	6.072	53.150		19.70	0.000	0.000
					C	0.000	84.081		13.88	0.000	0.000
T6	90.00	1.332	31	74.173	A	0.067	53.653	11.667	21.72	0.000	0.000
100.00-80.00					B	0.067	56.436		20.65	0.000	0.000
					C	0.067	85.512		13.63	0.000	0.000
T7 80.00-60.00	70.00	1.24	29	74.173	A	4.005	50.278	11.667	21.49	0.000	0.000
					B	3.546	53.454		20.47	0.000	0.000
					C	0.000	87.117		13.39	0.000	0.000
T8 60.00-40.00	50.00	1.126	26	74.173	A	0.067	53.653	11.667	21.72	0.000	0.000
					B	0.067	56.436		20.65	0.000	0.000
					C	0.067	85.512		13.63	0.000	0.000
T9 40.00-20.00	30.00	1	23	74.173	A	0.067	51.966	11.667	22.42	0.000	0.000
					B	0.067	54.945		21.21	0.000	0.000
					C	0.067	86.315		13.51	0.000	0.000
T10 20.00-5.00	12.50	1	23	55.630	A	0.067	33.722	8.750	25.90	0.000	0.000
					B	0.067	35.502		24.60	0.000	0.000
					C	0.067	54.236		16.11	0.000	0.000
T11 5.00-0.00	2.50	1	23	10.084	A	1.598	3.135	3.135	66.24	0.000	0.000
					B	1.598	3.135		66.24	0.000	0.000
					C	1.598	3.135		66.24	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.116$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	186.50	1.64	28	0.5000	48.619	A	10.285	13.820	8.396	34.83	0.000	0.000
193.00-180.00						B	9.915	15.622		32.88	0.000	0.000
						C	7.962	12.325		41.38	0.000	0.000
T2	170.00	1.597	28	0.5000	74.798	A	20.739	24.129	12.917	28.79	0.000	0.000
180.00-160.00						B	24.596	34.185		21.97	0.000	0.000
						C	39.876	26.271		19.53	0.000	0.000
T3	150.00	1.541	27	0.5000	74.798	A	26.717	27.647	12.917	23.76	0.000	0.000
160.00-140.00						B	31.582	37.868		18.60	0.000	0.000
						C	42.413	29.988		17.84	0.000	0.000
T4	130.00	1.48	26	0.5000	74.798	A	29.000	32.293	12.917	21.07	0.000	0.000
140.00-120.00						B	29.000	38.869		19.03	0.000	0.000
						C	60.767	32.880		13.79	0.000	0.000
T5	110.00	1.411	24	0.5000	75.840	A	33.781	37.767	15.000	20.96	0.000	0.000
120.00-100.00						B	31.513	44.683		19.69	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
						C	67.137	44.976		13.38	0.000	0.000
T6 100.00-80.00	90.00	1.332	23	0.5000	75.840	A	30.800	40.778	15.000	20.96	0.000	0.000
						B	29.000	45.718		20.08	0.000	0.000
						C	80.634	43.316		12.10	0.000	0.000
T7 80.00-60.00	70.00	1.24	21	0.5000	75.840	A	32.834	39.035	15.000	20.87	0.000	0.000
						B	30.456	44.470		20.02	0.000	0.000
						C	72.097	50.634		12.22	0.000	0.000
T8 60.00-40.00	50.00	1.126	20	0.5000	75.840	A	30.800	40.778	15.000	20.96	0.000	0.000
						B	29.000	45.718		20.08	0.000	0.000
						C	80.634	43.316		12.10	0.000	0.000
T9 40.00-20.00	30.00	1	17	0.5000	75.840	A	30.800	39.326	15.000	21.39	0.000	0.000
						B	29.000	44.678		20.36	0.000	0.000
						C	80.634	49.414		11.53	0.000	0.000
T10 20.00-5.00	12.50	1	17	0.5000	56.880	A	18.507	27.132	11.250	24.65	0.000	0.000
						B	17.427	30.327		23.56	0.000	0.000
						C	48.407	32.894		13.84	0.000	0.000
T11 5.00-0.00	2.50	1	17	0.5000	10.524	A	1.598	4.585	4.031	65.21	0.000	0.000
						B	1.598	4.585		65.21	0.000	0.000
						C	1.598	4.585		65.21	0.000	0.000

Tower Pressure - Service

$G_H = 1.116$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	186.50	1.64	10	47.536	A	7.226	10.189	6.229	35.77	0.000	0.000
193.00-180.00					B	6.980	11.509		33.69	0.000	0.000
					C	7.962	6.229		43.89	0.000	0.000
T2	170.00	1.597	10	73.132	A	13.294	19.483	9.583	29.24	0.000	0.000
180.00-160.00					B	9.484	34.936		21.57	0.000	0.000
					C	8.821	37.625		20.63	0.000	0.000
T3	150.00	1.541	10	73.132	A	9.745	31.560	9.583	23.20	0.000	0.000
160.00-140.00					B	5.906	48.051		17.76	0.000	0.000
					C	6.867	43.921		18.87	0.000	0.000
T4	130.00	1.48	9	73.132	A	0.067	46.705	9.583	20.49	0.000	0.000
140.00-120.00					B	0.067	51.160		18.71	0.000	0.000
					C	0.067	63.204		15.15	0.000	0.000
T5	110.00	1.411	9	74.173	A	7.223	48.483	11.667	20.94	0.000	0.000
120.00-100.00					B	6.072	53.150		19.70	0.000	0.000
					C	0.000	84.081		13.88	0.000	0.000
T6	90.00	1.332	9	74.173	A	0.067	53.653	11.667	21.72	0.000	0.000
100.00-80.00					B	0.067	56.436		20.65	0.000	0.000
					C	0.067	85.512		13.63	0.000	0.000
T7 80.00-60.00	70.00	1.24	8	74.173	A	4.005	50.278	11.667	21.49	0.000	0.000
					B	3.546	53.454		20.47	0.000	0.000
					C	0.000	87.117		13.39	0.000	0.000
T8 60.00-40.00	50.00	1.126	7	74.173	A	0.067	53.653	11.667	21.72	0.000	0.000
					B	0.067	56.436		20.65	0.000	0.000
					C	0.067	85.512		13.63	0.000	0.000
T9 40.00-20.00	30.00	1	6	74.173	A	0.067	51.966	11.667	22.42	0.000	0.000
					B	0.067	54.945		21.21	0.000	0.000
					C	0.067	86.315		13.51	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 20.00-5.00	12.50	1	6	55.630	A	0.067	33.722	8.750	25.90	0.000	0.000
					B	0.067	35.502		24.60	0.000	0.000
					C	0.067	54.236		16.11	0.000	0.000
T11 5.00-0.00	2.50	1	6	10.084	A	1.598	3.135	3.135	66.24	0.000	0.000
					B	1.598	3.135		66.24	0.000	0.000
					C	1.598	3.135		66.24	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	0.13	0.77	A	0.366	2.134	0.638	1	1	13.731	1.27	97.95	B
193.00-180.00			B	0.389	2.086	0.647	1	1	14.429			
			C	0.299	2.3	0.615	1	1	11.796			
T2	0.60	1.51	A	0.448	1.976	0.672	1	1	26.396	2.80	139.85	C
180.00-160.00		TA 1.03	B	0.607	1.8	0.758	1	1	35.971			
			C	0.635	1.786	0.776	1	1	38.008			
T3	0.90	1.48	A	0.565	1.83	0.733	1	1	32.868	3.31	165.26	B
160.00-140.00			B	0.738	1.783	0.848	1	1	46.635			
			C	0.694	1.776	0.816	1	1	42.705			
T4	1.12	0.85	A	0.64	1.785	0.779	1	1	36.432	4.32	215.83	C
140.00-120.00			B	0.7	1.776	0.82	1	1	42.030			
			C	0.865	1.879	0.952	1	1	60.221			
T5	1.31	1.58	A	0.751	1.788	0.858	1	1	48.805	5.40*	269.82	C
120.00-100.00		TA 0.69	B	0.798	1.815	0.895	1	1	53.648			
			C	1	2.1	1	1	1	84.081			
T6	1.35	0.81	A	0.724	1.779	0.838	1	1	45.003	5.10*	254.78	C
100.00-80.00			B	0.762	1.793	0.866	1	1	48.938			
			C	1	2.1	1	1	1	85.579			
T7	1.35	1.08	A	0.732	1.781	0.843	1	1	46.397	4.74*	237.13	C
80.00-60.00		TA 0.51	B	0.768	1.796	0.871	1	1	50.114			
			C	1	2.1	1	1	1	87.117			
T8	1.35	1.01	A	0.724	1.779	0.838	1	1	45.003	4.31*	215.40	C
60.00-40.00			B	0.762	1.793	0.866	1	1	48.938			
			C	1	2.1	1	1	1	85.579			
T9	1.35	0.72	A	0.702	1.776	0.821	1	1	42.729	3.83*	191.28	C
40.00-20.00			B	0.742	1.784	0.851	1	1	46.800			
			C	1	2.1	1	1	1	86.382			
T10	0.81	0.63	A	0.607	1.8	0.758	1	1	25.634	2.87*	191.28	C
20.00-5.00			B	0.639	1.785	0.778	1	1	27.706			
			C	0.976	2.052	1	1	1	54.303			
T11 5.00-0.00	0.00	0.37	A	0.469	1.943	0.682	1	1	3.737	0.19	37.45	C
			B	0.469	1.943	0.682	1	1	3.737			
			C	0.469	1.943	0.682	1	1	3.737			
Sum Weight:	10.26	13.10			*$2A_g$ limit					38.12		

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	0.13	0.77	A	0.366	2.134	0.638	0.8	1	12.286	1.15	88.47	B
193.00-180.00			B	0.389	2.086	0.647	0.8	1	13.033			
			C	0.299	2.3	0.615	0.8	1	10.204			
T2	0.60	1.51	A	0.448	1.976	0.672	0.8	1	23.737	2.67	133.36	C
180.00-160.00		TA 1.03	B	0.607	1.8	0.758	0.8	1	34.074			
			C	0.635	1.786	0.776	0.8	1	36.243			
T3	0.90	1.48	A	0.565	1.83	0.733	0.8	1	30.919	3.22	161.07	B
160.00-140.00			B	0.738	1.783	0.848	0.8	1	45.453			
			C	0.694	1.776	0.816	0.8	1	41.332			
T4	1.12	0.85	A	0.64	1.785	0.779	0.8	1	36.418	4.32	215.79	C
140.00-120.00			B	0.7	1.776	0.82	0.8	1	42.017			
			C	0.865	1.879	0.952	0.8	1	60.208			
T5	1.31	1.58	A	0.751	1.788	0.858	0.8	1	47.361	5.40*	269.82	C
120.00-100.00		TA 0.69	B	0.798	1.815	0.895	0.8	1	52.433			
			C	1	2.1	1	0.8	1	84.081			
T6	1.35	0.81	A	0.724	1.779	0.838	0.8	1	44.989	5.10*	254.78	C
100.00-80.00			B	0.762	1.793	0.866	0.8	1	48.925			
			C	1	2.1	1	0.8	1	85.566			
T7	1.35	1.08	A	0.732	1.781	0.843	0.8	1	45.596	4.74*	237.13	C
80.00-60.00		TA 0.51	B	0.768	1.796	0.871	0.8	1	49.405			
			C	1	2.1	1	0.8	1	87.117			
T8	1.35	1.01	A	0.724	1.779	0.838	0.8	1	44.989	4.31*	215.40	C
60.00-40.00			B	0.762	1.793	0.866	0.8	1	48.925			
			C	1	2.1	1	0.8	1	85.566			
T9	1.35	0.72	A	0.702	1.776	0.821	0.8	1	42.716	3.83*	191.28	C
40.00-20.00			B	0.742	1.784	0.851	0.8	1	46.787			
			C	1	2.1	1	0.8	1	86.368			
T10	0.81	0.63	A	0.607	1.8	0.758	0.8	1	25.620	2.87*	191.28	C
20.00-5.00			B	0.639	1.785	0.778	0.8	1	27.692			
			C	0.976	2.052	1	0.8	1	54.289			
T11 5.00-0.00	0.00	0.37	A	0.469	1.943	0.682	0.8	1	3.418	0.17	34.25	C
			B	0.469	1.943	0.682	0.8	1	3.418			
			C	0.469	1.943	0.682	0.8	1	3.418			
Sum Weight:	10.26	13.10			*$2A_g$ limit					37.76		

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	0.13	0.77	A	0.366	2.134	0.638	0.85	1	12.647	1.18	90.84	B
193.00-180.00			B	0.389	2.086	0.647	0.85	1	13.382			
			C	0.299	2.3	0.615	0.85	1	10.602			
T2	0.60	1.51	A	0.448	1.976	0.672	0.85	1	24.402	2.70	134.98	C
180.00-160.00		TA 1.03	B	0.607	1.8	0.758	0.85	1	34.549			
			C	0.635	1.786	0.776	0.85	1	36.684			
T3	0.90	1.48	A	0.565	1.83	0.733	0.85	1	31.406	3.24	162.12	B
160.00-140.00			B	0.738	1.783	0.848	0.85	1	45.749			
			C	0.694	1.776	0.816	0.85	1	41.675			
T4	1.12	0.85	A	0.64	1.785	0.779	0.85	1	36.422	4.32	215.80	C
140.00-120.00			B	0.7	1.776	0.82	0.85	1	42.020			
			C	0.865	1.879	0.952	0.85	1	60.211			
T5	1.31	1.58	A	0.751	1.788	0.858	0.85	1	47.722	5.40*	269.82	C
120.00-100.00		TA 0.69	B	0.798	1.815	0.895	0.85	1	52.737			

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	1	2.1	1	0.85	1	84.081			
T6	1.35	0.81	A	0.724	1.779	0.838	0.85	1	44.993	5.10*	254.78	C
100.00-80.00			B	0.762	1.793	0.866	0.85	1	48.928			
			C	1	2.1	1	0.85	1	85.569			
T7	1.35	1.08	A	0.732	1.781	0.843	0.85	1	45.796	4.74*	237.13	C
80.00-60.00		TA 0.51	B	0.768	1.796	0.871	0.85	1	49.582			
			C	1	2.1	1	0.85	1	87.117			
T8	1.35	1.01	A	0.724	1.779	0.838	0.85	1	44.993	4.31*	215.40	C
60.00-40.00			B	0.762	1.793	0.866	0.85	1	48.928			
			C	1	2.1	1	0.85	1	85.569			
T9	1.35	0.72	A	0.702	1.776	0.821	0.85	1	42.719	3.83*	191.28	C
40.00-20.00			B	0.742	1.784	0.851	0.85	1	46.790			
			C	1	2.1	1	0.85	1	86.372			
T10	0.81	0.63	A	0.607	1.8	0.758	0.85	1	25.623	2.87*	191.28	C
20.00-5.00			B	0.639	1.785	0.778	0.85	1	27.696			
			C	0.976	2.052	1	0.85	1	54.293			
T11 5.00-0.00	0.00	0.37	A	0.469	1.943	0.682	0.85	1	3.498	0.18	35.05	C
			B	0.469	1.943	0.682	0.85	1	3.498			
			C	0.469	1.943	0.682	0.85	1	3.498			
Sum Weight:	10.26	13.10			*2A_g limit					37.85		

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	0.29	1.14	A	0.496	1.906	0.695	1	1	19.894	1.25	95.88	B
193.00-180.00			B	0.525	1.869	0.711	1	1	21.017			
			C	0.417	2.031	0.659	1	1	16.082			
T2	1.58	2.22	A	0.6	1.804	0.754	1	1	38.921	3.84	192.01	C
180.00-160.00		TA 1.21	B	0.786	1.806	0.885	1	1	54.848			
			C	0.884	1.903	0.969	1	1	65.328			
T3	2.31	2.18	A	0.727	1.78	0.839	1	1	49.924	4.39	219.73	C
160.00-140.00			B	0.929	1.967	1	1	1	69.451			
			C	0.968	2.036	1	1	1	72.401			
T4	2.91	1.25	A	0.819	1.832	0.912	1	1	58.466	4.28*	214.05	C
140.00-120.00			B	0.907	1.935	0.99	1	1	67.476			
			C	1	2.1	1	1	1	93.647			
T5	3.44	2.32	A	0.943	1.992	1	1	1	71.548	4.14*	206.91	C
120.00-100.00		TA 0.88	B	1	2.1	1	1	1	76.195			
			C	1	2.1	1	1	1	112.113			
T6	3.54	1.23	A	0.944	1.993	1	1	1	71.579	3.91*	195.38	C
100.00-80.00			B	0.985	2.07	1	1	1	74.718			
			C	1	2.1	1	1	1	123.950			
T7	3.54	1.60	A	0.948	1.999	1	1	1	71.869	3.64*	181.84	C
80.00-60.00		TA 0.67	B	0.988	2.075	1	1	1	74.926			
			C	1	2.1	1	1	1	122.731			
T8	3.54	1.42	A	0.944	1.993	1	1	1	71.579	3.30*	165.18	C
60.00-40.00			B	0.985	2.07	1	1	1	74.718			
			C	1	2.1	1	1	1	123.950			
T9	3.54	1.02	A	0.925	1.961	1	1	1	70.126	2.93*	146.69	C
40.00-20.00			B	0.972	2.043	1	1	1	73.679			
			C	1	2.1	1	1	1	130.048			
T10	2.12	0.86	A	0.802	1.818	0.898	1	1	42.880	2.20*	146.69	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
20.00-5.00			B	0.84	1.851	0.929	1	1	45.616			
			C	1	2.1	1	1	1	81.301			
T11 5.00-0.00	0.00	0.47	A	0.587	1.812	0.746	1	1	5.018	0.18	35.18	C
			B	0.587	1.812	0.746	1	1	5.018			
			C	0.587	1.812	0.746	1	1	5.018			
Sum Weight:	26.82	18.51			*$2A_g$ limit					34.06		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.29	1.14	A	0.496	1.906	0.695	0.8	1	17.837	1.13	86.83	B
193.00-180.00			B	0.525	1.869	0.711	0.8	1	19.034			
			C	0.417	2.031	0.659	0.8	1	14.490			
T2	1.58	2.22	A	0.6	1.804	0.754	0.8	1	34.773	3.37	168.57	C
180.00-160.00		TA 1.21	B	0.786	1.806	0.885	0.8	1	49.929			
			C	0.884	1.903	0.969	0.8	1	57.353			
T3	2.31	2.18	A	0.727	1.78	0.839	0.8	1	44.581	3.88	193.99	C
160.00-140.00			B	0.929	1.967	1	0.8	1	63.134			
			C	0.968	2.036	1	0.8	1	63.918			
T4	2.91	1.25	A	0.819	1.832	0.912	0.8	1	52.666	4.28*	214.05	C
140.00-120.00			B	0.907	1.935	0.99	0.8	1	61.676			
			C	1	2.1	1	0.8	1	81.494			
T5	3.44	2.32	A	0.943	1.992	1	0.8	1	64.792	4.14*	206.91	C
120.00-100.00		TA 0.88	B	1	2.1	1	0.8	1	69.893			
			C	1	2.1	1	0.8	1	98.685			
T6	3.54	1.23	A	0.944	1.993	1	0.8	1	65.419	3.91*	195.38	C
100.00-80.00			B	0.985	2.07	1	0.8	1	68.918			
			C	1	2.1	1	0.8	1	107.823			
T7	3.54	1.60	A	0.948	1.999	1	0.8	1	65.303	3.64*	181.84	C
80.00-60.00		TA 0.67	B	0.988	2.075	1	0.8	1	68.835			
			C	1	2.1	1	0.8	1	108.311			
T8	3.54	1.42	A	0.944	1.993	1	0.8	1	65.419	3.30*	165.18	C
60.00-40.00			B	0.985	2.07	1	0.8	1	68.918			
			C	1	2.1	1	0.8	1	107.823			
T9	3.54	1.02	A	0.925	1.961	1	0.8	1	63.966	2.93*	146.69	C
40.00-20.00			B	0.972	2.043	1	0.8	1	67.879			
			C	1	2.1	1	0.8	1	113.921			
T10	2.12	0.86	A	0.802	1.818	0.898	0.8	1	39.179	2.20*	146.69	C
20.00-5.00			B	0.84	1.851	0.929	0.8	1	42.130			
			C	1	2.1	1	0.8	1	71.620			
T11 5.00-0.00	0.00	0.47	A	0.587	1.812	0.746	0.8	1	4.698	0.16	32.94	C
			B	0.587	1.812	0.746	0.8	1	4.698			
			C	0.587	1.812	0.746	0.8	1	4.698			
Sum Weight:	26.82	18.51			*$2A_g$ limit					32.95		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.29	1.14	A	0.496	1.906	0.695	0.85	1	18.351	1.16	89.09	B
193.00-180.00			B	0.525	1.869	0.711	0.85	1	19.530			
			C	0.417	2.031	0.659	0.85	1	14.888			
T2	1.58	2.22	A	0.6	1.804	0.754	0.85	1	35.810	3.49	174.43	C
180.00-160.00		TA 1.21	B	0.786	1.806	0.885	0.85	1	51.159			
			C	0.884	1.903	0.969	0.85	1	59.347			
T3	2.31	2.18	A	0.727	1.78	0.839	0.85	1	45.916	4.01	200.43	C
160.00-140.00			B	0.929	1.967	1	0.85	1	64.713			
			C	0.968	2.036	1	0.85	1	66.039			
T4	2.91	1.25	A	0.819	1.832	0.912	0.85	1	54.116	4.28*	214.05	C
140.00-120.00			B	0.907	1.935	0.99	0.85	1	63.126			
			C	1	2.1	1	0.85	1	84.532			
T5	3.44	2.32	A	0.943	1.992	1	0.85	1	66.481	4.14*	206.91	C
120.00-100.00		TA 0.88	B	1	2.1	1	0.85	1	71.468			
			C	1	2.1	1	0.85	1	102.042			
T6	3.54	1.23	A	0.944	1.993	1	0.85	1	66.959	3.91*	195.38	C
100.00-80.00			B	0.985	2.07	1	0.85	1	70.368			
			C	1	2.1	1	0.85	1	111.855			
T7	3.54	1.60	A	0.948	1.999	1	0.85	1	66.944	3.64*	181.84	C
80.00-60.00		TA 0.67	B	0.988	2.075	1	0.85	1	70.358			
			C	1	2.1	1	0.85	1	111.916			
T8	3.54	1.42	A	0.944	1.993	1	0.85	1	66.959	3.30*	165.18	C
60.00-40.00			B	0.985	2.07	1	0.85	1	70.368			
			C	1	2.1	1	0.85	1	111.855			
T9	3.54	1.02	A	0.925	1.961	1	0.85	1	65.506	2.93*	146.69	C
40.00-20.00			B	0.972	2.043	1	0.85	1	69.329			
			C	1	2.1	1	0.85	1	117.953			
T10	2.12	0.86	A	0.802	1.818	0.898	0.85	1	40.104	2.20*	146.69	C
20.00-5.00			B	0.84	1.851	0.929	0.85	1	43.002			
			C	1	2.1	1	0.85	1	74.040			
T11 5.00-0.00	0.00	0.47	A	0.587	1.812	0.746	0.85	1	4.778	0.17	33.50	C
			B	0.587	1.812	0.746	0.85	1	4.778			
			C	0.587	1.812	0.746	0.85	1	4.778			
Sum Weight:	26.82	18.51			*$2A_g$ limit					33.22		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.13	0.77	A	0.366	2.134	0.638	1	1	13.731	0.35	27.13	B
193.00-180.00			B	0.389	2.086	0.647	1	1	14.429			
			C	0.299	2.3	0.615	1	1	11.796			
T2	0.60	1.51	A	0.448	1.976	0.672	1	1	26.396	0.77	38.74	C
180.00-160.00		TA 1.03	B	0.607	1.8	0.758	1	1	35.971			
			C	0.635	1.786	0.776	1	1	38.008			
T3	0.90	1.48	A	0.565	1.83	0.733	1	1	32.868	0.92	45.78	B
160.00-140.00			B	0.738	1.783	0.848	1	1	46.635			
			C	0.694	1.776	0.816	1	1	42.705			
T4	1.12	0.85	A	0.64	1.785	0.779	1	1	36.432	1.20	59.79	C
140.00-120.00			B	0.7	1.776	0.82	1	1	42.030			
			C	0.865	1.879	0.952	1	1	60.221			
T5	1.31	1.58	A	0.751	1.788	0.858	1	1	48.805	1.49*	74.74	C
120.00-100.00		TA 0.69	B	0.798	1.815	0.895	1	1	53.648			

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	1	2.1	1	1	1	84.081			
T6	1.35	0.81	A	0.724	1.779	0.838	1	1	45.003	1.41*	70.58	C
100.00-80.00			B	0.762	1.793	0.866	1	1	48.938			
			C	1	2.1	1	1	1	85.579			
T7	1.35	1.08	A	0.732	1.781	0.843	1	1	46.397	1.31*	65.69	C
80.00-60.00		TA 0.51	B	0.768	1.796	0.871	1	1	50.114			
			C	1	2.1	1	1	1	87.117			
T8	1.35	1.01	A	0.724	1.779	0.838	1	1	45.003	1.19*	59.67	C
60.00-40.00			B	0.762	1.793	0.866	1	1	48.938			
			C	1	2.1	1	1	1	85.579			
T9	1.35	0.72	A	0.702	1.776	0.821	1	1	42.729	1.06*	52.99	C
40.00-20.00			B	0.742	1.784	0.851	1	1	46.800			
			C	1	2.1	1	1	1	86.382			
T10	0.81	0.63	A	0.607	1.8	0.758	1	1	25.634	0.79*	52.99	C
20.00-5.00			B	0.639	1.785	0.778	1	1	27.706			
			C	0.976	2.052	1	1	1	54.303			
T11 5.00-0.00	0.00	0.37	A	0.469	1.943	0.682	1	1	3.737	0.05	10.37	C
			B	0.469	1.943	0.682	1	1	3.737			
			C	0.469	1.943	0.682	1	1	3.737			
Sum Weight:	10.26	13.10			*$2A_g$ limit					10.56		

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	0.13	0.77	A	0.366	2.134	0.638	0.8	1	12.286	0.32	24.51	B
193.00-180.00			B	0.389	2.086	0.647	0.8	1	13.033			
			C	0.299	2.3	0.615	0.8	1	10.204			
T2	0.60	1.51	A	0.448	1.976	0.672	0.8	1	23.737	0.74	36.94	C
180.00-160.00		TA 1.03	B	0.607	1.8	0.758	0.8	1	34.074			
			C	0.635	1.786	0.776	0.8	1	36.243			
T3	0.90	1.48	A	0.565	1.83	0.733	0.8	1	30.919	0.89	44.62	B
160.00-140.00			B	0.738	1.783	0.848	0.8	1	45.453			
			C	0.694	1.776	0.816	0.8	1	41.332			
T4	1.12	0.85	A	0.64	1.785	0.779	0.8	1	36.418	1.20	59.77	C
140.00-120.00			B	0.7	1.776	0.82	0.8	1	42.017			
			C	0.865	1.879	0.952	0.8	1	60.208			
T5	1.31	1.58	A	0.751	1.788	0.858	0.8	1	47.361	1.49*	74.74	C
120.00-100.00		TA 0.69	B	0.798	1.815	0.895	0.8	1	52.433			
			C	1	2.1	1	0.8	1	84.081			
T6	1.35	0.81	A	0.724	1.779	0.838	0.8	1	44.989	1.41*	70.58	C
100.00-80.00			B	0.762	1.793	0.866	0.8	1	48.925			
			C	1	2.1	1	0.8	1	85.566			
T7	1.35	1.08	A	0.732	1.781	0.843	0.8	1	45.596	1.31*	65.69	C
80.00-60.00		TA 0.51	B	0.768	1.796	0.871	0.8	1	49.405			
			C	1	2.1	1	0.8	1	87.117			
T8	1.35	1.01	A	0.724	1.779	0.838	0.8	1	44.989	1.19*	59.67	C
60.00-40.00			B	0.762	1.793	0.866	0.8	1	48.925			
			C	1	2.1	1	0.8	1	85.566			
T9	1.35	0.72	A	0.702	1.776	0.821	0.8	1	42.716	1.06*	52.99	C
40.00-20.00			B	0.742	1.784	0.851	0.8	1	46.787			
			C	1	2.1	1	0.8	1	86.368			
T10	0.81	0.63	A	0.607	1.8	0.758	0.8	1	25.620	0.79*	52.99	C

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
20.00-5.00			B	0.639	1.785	0.778	0.8	1	27.692			
			C	0.976	2.052	1	0.8	1	54.289			
T11 5.00-0.00	0.00	0.37	A	0.469	1.943	0.682	0.8	1	3.418	0.05	9.49	C
			B	0.469	1.943	0.682	0.8	1	3.418			
			C	0.469	1.943	0.682	0.8	1	3.418			
Sum Weight:	10.26	13.10			*2A_g limit					10.46		

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	0.13	0.77	A	0.366	2.134	0.638	0.85	1	12.647	0.33	25.16	B
193.00-180.00			B	0.389	2.086	0.647	0.85	1	13.382			
			C	0.299	2.3	0.615	0.85	1	10.602			
T2	0.60	1.51	A	0.448	1.976	0.672	0.85	1	24.402	0.75	37.39	C
180.00-160.00		TA 1.03	B	0.607	1.8	0.758	0.85	1	34.549			
			C	0.635	1.786	0.776	0.85	1	36.684			
T3	0.90	1.48	A	0.565	1.83	0.733	0.85	1	31.406	0.90	44.91	B
160.00-140.00			B	0.738	1.783	0.848	0.85	1	45.749			
			C	0.694	1.776	0.816	0.85	1	41.675			
T4	1.12	0.85	A	0.64	1.785	0.779	0.85	1	36.422	1.20	59.78	C
140.00-120.00			B	0.7	1.776	0.82	0.85	1	42.020			
			C	0.865	1.879	0.952	0.85	1	60.211			
T5	1.31	1.58	A	0.751	1.788	0.858	0.85	1	47.722	1.49*	74.74	C
120.00-100.00		TA 0.69	B	0.798	1.815	0.895	0.85	1	52.737			
			C	1	2.1	1	0.85	1	84.081			
T6	1.35	0.81	A	0.724	1.779	0.838	0.85	1	44.993	1.41*	70.58	C
100.00-80.00			B	0.762	1.793	0.866	0.85	1	48.928			
			C	1	2.1	1	0.85	1	85.569			
T7	1.35	1.08	A	0.732	1.781	0.843	0.85	1	45.796	1.31*	65.69	C
80.00-60.00		TA 0.51	B	0.768	1.796	0.871	0.85	1	49.582			
			C	1	2.1	1	0.85	1	87.117			
T8	1.35	1.01	A	0.724	1.779	0.838	0.85	1	44.993	1.19*	59.67	C
60.00-40.00			B	0.762	1.793	0.866	0.85	1	48.928			
			C	1	2.1	1	0.85	1	85.569			
T9	1.35	0.72	A	0.702	1.776	0.821	0.85	1	42.719	1.06*	52.99	C
40.00-20.00			B	0.742	1.784	0.851	0.85	1	46.790			
			C	1	2.1	1	0.85	1	86.372			
T10	0.81	0.63	A	0.607	1.8	0.758	0.85	1	25.623	0.79*	52.99	C
20.00-5.00			B	0.639	1.785	0.778	0.85	1	27.696			
			C	0.976	2.052	1	0.85	1	54.293			
T11 5.00-0.00	0.00	0.37	A	0.469	1.943	0.682	0.85	1	3.498	0.05	9.71	C
			B	0.469	1.943	0.682	0.85	1	3.498			
			C	0.469	1.943	0.682	0.85	1	3.498			
Sum Weight:	10.26	13.10			*2A_g limit					10.49		

Force Totals (Does not include forces on guys)

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Torques kip-ft
Leg Weight	5.55			
Bracing Weight	7.51			
Total Member Self-Weight	13.06			
Gusset Weight	0.04			
Guy Weight	2.46			
Total Weight	38.02			
Wind 0 deg - No Ice		0.06	-62.54	-4.09
Wind 30 deg - No Ice		31.04	-53.96	-1.88
Wind 60 deg - No Ice		53.63	-31.15	0.83
Wind 90 deg - No Ice		61.98	-0.06	3.33
Wind 120 deg - No Ice		53.87	31.22	4.95
Wind 150 deg - No Ice		30.94	53.90	5.21
Wind 180 deg - No Ice		-0.06	62.19	4.10
Wind 210 deg - No Ice		-31.04	53.96	1.88
Wind 240 deg - No Ice		-53.93	31.32	-0.86
Wind 270 deg - No Ice		-61.98	0.06	-3.33
Wind 300 deg - No Ice		-53.57	-31.04	-4.93
Wind 330 deg - No Ice		-30.94	-53.90	-5.21
Member Ice	5.40			
Gusset Ice	0.02			
Guy Ice	1.92			
Total Weight Ice	67.53			
Wind 0 deg - Ice		0.05	-56.13	-0.92
Wind 30 deg - Ice		27.57	-47.91	0.82
Wind 60 deg - Ice		47.47	-27.55	2.33
Wind 90 deg - Ice		55.06	-0.05	3.25
Wind 120 deg - Ice		48.38	28.02	3.33
Wind 150 deg - Ice		27.49	47.86	2.43
Wind 180 deg - Ice		-0.05	55.01	0.93
Wind 210 deg - Ice		-27.57	47.91	-0.82
Wind 240 deg - Ice		-48.43	28.10	-2.42
Wind 270 deg - Ice		-55.06	0.05	-3.25
Wind 300 deg - Ice		-47.42	-27.47	-3.26
Wind 330 deg - Ice		-27.49	-47.86	-2.43
Total Weight	38.02			
Wind 0 deg - Service		0.02	-17.33	-1.13
Wind 30 deg - Service		8.60	-14.95	-0.52
Wind 60 deg - Service		14.85	-8.63	0.23
Wind 90 deg - Service		17.17	-0.02	0.92
Wind 120 deg - Service		14.92	8.65	1.37
Wind 150 deg - Service		8.57	14.93	1.44
Wind 180 deg - Service		-0.02	17.23	1.13
Wind 210 deg - Service		-8.60	14.95	0.52
Wind 240 deg - Service		-14.94	8.68	-0.24
Wind 270 deg - Service		-17.17	0.02	-0.92
Wind 300 deg - Service		-14.84	-8.60	-1.37
Wind 330 deg - Service		-8.57	-14.93	-1.44

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice+Guy

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

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	193 - 180	Leg	Max Tension	8	10.62	0.08	0.41
			Max. Compression	19	-13.10	0.23	0.14
			Max. Mx	10	-10.42	-0.40	0.15
			Max. My	2	-12.79	-0.08	-0.42
			Max. Vy	11	-1.72	-0.25	-0.03
			Max. Vx	2	-1.82	-0.06	-0.27
		Diagonal	Max Tension	4	2.21	0.00	0.00
			Max. Compression	10	-2.34	0.00	0.00
			Max. Mx	15	0.59	0.03	-0.00
			Max. My	4	-1.64	0.00	-0.01
			Max. Vy	15	0.02	0.03	-0.00
			Max. Vx	4	-0.00	0.00	0.00
		Top Girt	Max Tension	6	0.11	0.00	0.00
			Max. Compression	12	-0.10	0.00	0.00
			Max. Mx	14	0.00	-0.01	0.00
			Max. My	16	0.00	0.00	0.00
			Max. Vy	14	0.01	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. Vx	16	-0.00	0.00	0.00
		Bottom Girt	Max Tension	8	0.76	0.00	0.00
			Max. Compression	6	-0.72	0.00	0.00
			Max. Mx	14	0.05	-0.01	0.00
			Max. My	13	0.04	0.00	0.00
			Max. Vy	14	0.01	0.00	0.00
			Max. Vx	13	-0.00	0.00	0.00
T2	180 - 160	Leg	Max Tension	4	73.00	-0.01	0.01
			Max. Compression	6	-82.96	-1.47	-0.76
			Max. Mx	5	-3.80	-4.59	-0.48
			Max. My	3	-3.80	-2.00	4.24
			Max. Vy	12	4.62	1.65	0.82
			Max. Vx	8	-5.26	0.21	-1.87
		Diagonal	Max Tension	8	8.12	0.03	-0.02
			Max. Compression	7	-10.00	-0.08	0.04
			Max. Mx	7	1.47	-0.19	-0.03
			Max. My	7	-6.14	-0.07	0.08
			Max. Vy	20	-0.09	0.00	0.00
			Max. Vx	7	0.04	0.00	0.00
		Secondary Horizontal	Max Tension	4	5.12	0.00	0.00
			Max. Compression	2	-4.64	0.00	0.00
			Max. Mx	14	0.31	-0.01	0.00
			Max. My	13	1.24	0.00	0.00
			Max. Vy	14	0.01	0.00	0.00
			Max. Vx	13	-0.00	0.00	0.00
		Top Girt	Max Tension	10	0.65	0.00	0.00
			Max. Compression	4	-0.67	0.00	0.00
			Max. Mx	14	0.00	-0.01	0.00
			Max. My	2	-0.35	0.00	-0.00
			Max. Vy	14	0.01	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
		Bottom Girt	Max Tension	15	6.81	0.00	0.00
			Max. Compression	8	-5.40	0.00	0.00
			Max. Mx	14	0.46	-0.01	0.00
			Max. My	2	-2.01	0.00	-0.00
			Max. Vy	14	0.01	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
		Guy A	Bottom Tension	22	28.60		
			Top Tension	22	28.90		
			Top Cable Vert	22	22.20		
			Top Cable Norm	22	18.51		
			Top Cable Tan	22	0.05		
			Bot Cable Vert	22	-21.46		
			Bot Cable Norm	22	18.90		
			Bot Cable Tan	22	0.36		
		Guy B	Bottom Tension	26	28.58		
			Top Tension	26	28.89		
			Top Cable Vert	26	22.18		
			Top Cable Norm	26	18.50		
			Top Cable Tan	26	0.05		
			Bot Cable Vert	26	-21.45		
			Bot Cable Norm	26	18.89		
			Bot Cable Tan	26	0.36		
		Guy C	Bottom Tension	16	28.60		
			Top Tension	16	28.91		
			Top Cable Vert	16	22.20		
			Top Cable Norm	16	18.52		
			Top Cable Tan	16	0.05		
			Bot Cable Vert	16	-21.46		
			Bot Cable Norm	16	18.90		

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Bot Cable Tan	16	0.36		
		Torque Arm Top	Max Tension	16	19.78	0.00	0.00
			Max. Compression	3	-9.62	0.00	0.00
			Max. Mx	16	-0.01	-75.70	0.00
			Max. My	2	-8.03	-61.51	-0.00
			Max. Vy	16	22.26	-75.70	0.00
			Max. Vx	2	-0.00	-61.51	-0.00
T3	160 - 140	Leg	Max Tension	4	28.54	-1.19	0.77
			Max. Compression	6	-76.38	1.69	0.87
			Max. Mx	19	-76.00	1.69	0.90
			Max. My	15	-68.87	0.17	-1.94
			Max. Vy	12	4.62	1.27	0.63
			Max. Vx	8	-5.24	0.16	-1.43
		Diagonal	Max Tension	8	5.21	0.00	0.00
			Max. Compression	2	-6.51	0.04	-0.00
			Max. Mx	6	2.08	-0.07	0.01
			Max. My	2	-4.73	0.04	-0.01
			Max. Vy	19	-0.04	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	17	1.77	0.00	0.00
			Max. Compression	6	-1.32	0.00	0.00
			Max. Mx	14	0.43	-0.01	0.00
			Max. My	2	1.32	0.00	-0.00
			Max. Vy	14	0.01	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
		Top Girt	Max Tension	20	0.80	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	0.27	0.00	0.00
			Max. My	2	0.72	0.00	0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max. Vx	2	-0.00	0.00	0.00
		Bottom Girt	Max Tension	6	0.62	0.00	0.00
			Max. Compression	8	-0.11	0.00	0.00
			Max. Mx	14	0.22	0.00	0.00
			Max. My	26	0.42	0.00	-0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
T4	140 - 120	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	15	-48.28	0.02	-0.29
			Max. Mx	24	-29.02	-0.65	-0.19
			Max. My	21	-28.66	-0.03	0.71
			Max. Vy	24	-1.97	-0.49	-0.13
			Max. Vx	21	2.18	-0.02	0.53
		Diagonal	Max Tension	4	1.96	0.00	0.00
			Max. Compression	23	-2.67	0.00	0.00
			Max. Mx	15	1.18	0.01	0.00
			Max. My	19	0.24	0.00	-0.00
			Max. Vy	15	-0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Top Girt	Max Tension	18	0.87	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	0.38	0.00	0.00
			Max. My	26	0.60	0.00	-0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
		Bottom Girt	Max Tension	16	0.95	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	0.40	0.00	0.00
			Max. My	20	0.72	0.00	-0.00
			Max. Vy	14	-0.01	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. Vx	20	0.00	0.00	0.00
T5	120 - 100	Leg	Max Tension	8	21.32	-0.01	-0.38
			Max. Compression	15	-98.14	-0.00	1.81
			Max. Mx	11	-23.30	3.97	-0.98
			Max. My	13	-23.12	1.22	3.95
			Max. Vy	9	3.80	1.81	-0.83
			Max. Vx	15	3.91	-0.00	2.36
		Diagonal	Max Tension	4	4.16	0.01	-0.01
			Max. Compression	10	-6.05	0.00	0.00
			Max. Mx	22	-0.73	0.13	-0.01
			Max. My	11	-4.57	0.01	-0.03
			Max. Vy	22	-0.06	0.13	-0.01
			Max. Vx	11	-0.02	0.01	-0.03
		Secondary Horizontal	Max Tension	21	4.79	0.00	0.00
			Max. Compression	2	-2.67	0.00	0.00
			Max. Mx	14	0.78	-0.01	0.00
			Max. My	20	1.48	0.00	0.00
			Max. Vy	14	0.01	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Top Girt	Max Tension	15	1.18	0.00	0.00
			Max. Compression	8	-0.33	0.00	0.00
			Max. Mx	14	0.33	-0.01	0.00
			Max. My	13	0.45	0.00	0.00
			Max. Vy	14	0.01	0.00	0.00
			Max. Vx	13	-0.00	0.00	0.00
		Bottom Girt	Max Tension	2	3.45	0.00	0.00
			Max. Compression	8	-1.91	0.00	0.00
			Max. Mx	14	0.63	-0.01	0.00
			Max. My	19	0.07	0.00	-0.00
			Max. Vy	14	0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Guy A	Bottom Tension	7	16.73		
			Top Tension	7	16.81		
			Top Cable Vert	7	12.90		
			Top Cable Norm	7	10.77		
			Top Cable Tan	7	0.01		
			Bot Cable Vert	7	-12.71		
			Bot Cable Norm	7	10.87		
			Bot Cable Tan	7	0.12		
		Guy B	Bottom Tension	13	16.71		
			Top Tension	13	16.79		
			Top Cable Vert	13	12.89		
			Top Cable Norm	13	10.76		
			Top Cable Tan	13	0.01		
			Bot Cable Vert	13	-12.70		
			Bot Cable Norm	13	10.86		
			Bot Cable Tan	13	0.12		
		Guy C	Bottom Tension	3	16.50		
			Top Tension	3	16.58		
			Top Cable Vert	3	12.73		
			Top Cable Norm	3	10.62		
			Top Cable Tan	3	0.01		
			Bot Cable Vert	3	-12.54		
			Bot Cable Norm	3	10.73		
			Bot Cable Tan	3	0.12		
		Torque Arm Top	Max Tension	9	11.64	0.00	0.00
			Max. Compression	9	-5.88	0.00	0.00
			Max. Mx	9	-0.02	-43.03	-0.00
			Max. My	7	-2.78	-22.72	0.00
			Max. Vy	9	12.65	-43.03	-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. Vx	7	0.00	-22.72	0.00
T6	100 - 80	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	15	-98.10	-0.01	0.70
			Max. Mx	12	-4.29	0.94	0.38
			Max. My	8	-4.01	0.01	-1.02
			Max. Vy	12	2.54	0.94	0.38
			Max. Vx	8	-2.77	0.01	-1.02
		Diagonal	Max Tension	5	2.15	0.00	0.00
			Max. Compression	5	-2.76	0.00	0.00
			Max. Mx	23	-1.42	0.00	0.00
			Max. My	19	-0.37	0.00	-0.00
			Max. Vy	23	-0.00	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Top Girt	Max Tension	23	0.65	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	0.37	0.00	0.00
			Max. My	19	0.65	0.00	0.00
			Max. Vy	14	0.00	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Bottom Girt	Max Tension	15	0.51	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	0.26	0.00	0.00
			Max. My	19	0.51	0.00	-0.00
			Max. Vy	14	0.00	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
T7	80 - 60	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	15	-102.49	-0.00	0.78
			Max. Mx	11	-40.03	2.36	-0.36
			Max. My	13	-39.99	0.93	2.25
			Max. Vy	6	-3.92	-1.94	-0.96
			Max. Vx	2	4.27	-0.05	2.16
		Diagonal	Max Tension	6	4.24	0.00	0.00
			Max. Compression	12	-5.61	0.01	-0.02
			Max. Mx	22	-0.49	0.08	-0.01
			Max. My	11	-4.81	0.00	-0.02
			Max. Vy	22	-0.04	0.08	-0.01
			Max. Vx	11	-0.01	0.00	0.00
		Top Girt	Max Tension	23	1.00	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	0.50	0.00	0.00
			Max. My	19	0.99	0.00	-0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Bottom Girt	Max Tension	6	2.09	0.00	0.00
			Max. Compression	12	-0.71	0.00	0.00
			Max. Mx	14	0.59	0.00	0.00
			Max. My	19	0.47	0.00	0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Guy A	Bottom Tension	7	9.57		
			Top Tension	7	9.60		
			Top Cable Vert	7	5.66		
			Top Cable Norm	7	7.75		
			Top Cable Tan	7	0.00		
			Bot Cable Vert	7	-5.57		
			Bot Cable Norm	7	7.78		
			Bot Cable Tan	7	0.05		
		Guy B	Bottom Tension	11	9.62		
			Top Tension	11	9.65		
			Top Cable Vert	11	5.69		
			Top Cable Norm	11	7.80		

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Top Cable Tan	11	0.00		
			Bot Cable Vert	11	-5.60		
			Bot Cable Norm	11	7.82		
			Bot Cable Tan	11	0.05		
		Guy C	Bottom Tension	5	9.61		
			Top Tension	5	9.65		
			Top Cable Vert	5	5.69		
			Top Cable Norm	5	7.79		
			Top Cable Tan	5	0.00		
			Bot Cable Vert	5	-5.59		
			Bot Cable Norm	5	7.82		
			Bot Cable Tan	5	0.05		
		Torque Arm Top	Max Tension	11	8.87	0.00	0.00
			Max. Compression	11	-4.60	0.00	0.00
			Max. Mx	11	0.06	-18.72	0.00
			Max. My	6	-3.74	-14.49	0.00
			Max. Vy	11	5.52	-18.72	0.00
			Max. Vx	6	0.00	-14.49	0.00
T8	60 - 40	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	15	-96.51	-0.01	1.66
			Max. Mx	6	-77.85	-1.61	-0.81
			Max. My	2	-78.49	-0.03	1.80
			Max. Vy	6	-3.95	-1.61	-0.81
			Max. Vx	2	4.31	-0.03	1.80
		Diagonal	Max Tension	5	3.46	0.00	0.00
			Max. Compression	11	-4.79	0.00	0.00
			Max. Mx	23	-3.23	0.01	0.00
			Max. My	19	-0.83	0.00	-0.00
			Max. Vy	23	-0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Top Girt	Max Tension	2	0.93	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	0.53	0.00	0.00
			Max. My	19	0.85	0.00	-0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Bottom Girt	Max Tension	13	1.23	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	0.54	0.00	0.00
			Max. My	6	0.14	0.00	0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max. Vx	6	-0.00	0.00	0.00
T9	40 - 20	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-73.46	0.08	0.16
			Max. Mx	19	-65.32	-0.95	-0.34
			Max. My	15	-65.54	0.03	1.00
			Max. Vy	11	1.71	0.86	-0.13
			Max. Vx	2	1.55	-0.03	0.87
		Diagonal	Max Tension	5	2.71	0.00	0.00
			Max. Compression	11	-3.09	0.00	0.00
			Max. Mx	26	-0.05	0.00	0.00
			Max. My	19	-0.56	0.00	-0.00
			Max. Vy	26	-0.00	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Top Girt	Max Tension	11	0.99	0.00	0.00
			Max. Compression	5	-0.70	0.00	0.00
			Max. Mx	14	0.12	0.00	0.00
			Max. My	18	-0.61	0.00	0.00
			Max. Vy	14	0.00	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Bottom Girt	Max Tension	18	0.38	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	12	-0.17	0.00	0.00
			Max. Mx	14	0.13	0.00	0.00
			Max. My	18	0.18	0.00	0.00
			Max. Vy	14	0.00	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
T10	20 - 5	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	16	-73.14	0.09	-0.39
			Max. Mx	26	-66.47	1.40	0.76
			Max. My	22	-66.35	-0.04	-1.59
			Max. Vy	18	7.76	-1.37	0.83
			Max. Vx	22	8.62	-0.04	-1.59
		Diagonal	Max Tension	13	3.34	0.00	0.00
			Max. Compression	3	-2.98	0.00	0.00
			Max. Mx	18	2.12	0.01	0.00
			Max. My	19	-0.01	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Top Girt	Max Tension	12	0.73	0.00	0.00
			Max. Compression	6	-0.22	0.00	0.00
			Max. Mx	14	0.17	0.00	0.00
			Max. My	6	0.35	0.00	0.00
			Max. Vy	14	-0.01	0.00	0.00
			Max. Vx	6	-0.00	0.00	0.00
		Bottom Girt	Max Tension	15	4.26	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	23	4.25	0.00	0.00
			Max. My	6	3.09	0.00	0.00
			Max. Vy	23	-0.01	0.00	0.00
			Max. Vx	6	-0.00	0.00	0.00
T11	5 - 0	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	15	-73.22	0.16	-0.04
			Max. Mx	19	-66.15	-1.76	-0.01
			Max. My	4	-35.69	-1.25	-0.30
			Max. Vy	15	17.61	-1.64	-0.11
			Max. Vx	11	0.98	-1.56	-0.27
		Top Girt	Max Tension	15	11.55	0.21	-0.08
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	7	9.84	0.42	-0.12
			Max. My	23	11.37	0.21	-0.16
			Max. Vy	12	-0.13	0.38	-0.10
			Max. Vx	26	-0.03	0.28	-0.08
		Bottom Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-3.15	0.72	-0.30
			Max. Mx	6	-2.93	0.89	-0.37
			Max. My	6	-2.93	0.89	-0.37
			Max. Vy	6	-2.18	0.89	-0.37
			Max. Vx	6	0.68	0.15	-0.13
		Mid Girt	Max Tension	2	0.11	0.00	0.00
			Max. Compression	26	-0.65	0.00	0.00
			Max. Mx	17	-0.44	-0.01	0.00
			Max. My	18	-0.48	0.00	-0.00
			Max. Vy	17	0.01	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Mast	Max. Vert	15	197.51	-0.00	1.41
	Max. H_x	12	124.12	3.31	1.92
	Max. H_z	2	171.38	-0.00	2.69
	Max. M_x	1	0.00	0.00	0.01
	Max. M_z	1	0.00	0.00	0.01
	Max. Torsion	1	0.00	0.00	0.01
	Min. Vert	1	93.07	0.00	0.01
	Min. H_x	4	124.21	-3.31	1.91
	Min. H_z	8	124.38	-0.01	-3.79
	Min. M_x	1	0.00	0.00	0.01
	Min. M_z	1	0.00	0.00	0.01
	Min. Torsion	1	0.00	0.00	0.01
Guy C @ 140 ft Elev 0 ft Azimuth 240 deg	Max. Vert	10	-0.61	-0.29	0.17
	Max. H_x	10	-0.61	-0.29	0.17
	Max. H_z	16	-42.16	-31.84	19.16
	Min. Vert	16	-42.16	-31.84	19.16
	Min. H_x	18	-41.98	-32.37	17.93
	Min. H_z	10	-0.61	-0.29	0.17
Guy B @ 140 ft Elev 0 ft Azimuth 120 deg	Max. Vert	6	-0.61	0.29	0.17
	Max. H_x	24	-41.95	32.35	17.91
	Max. H_z	26	-42.03	31.75	19.10
	Min. Vert	26	-42.03	31.75	19.10
	Min. H_x	6	-0.61	0.29	0.17
	Min. H_z	6	-0.61	0.29	0.17
Guy A @ 140 ft Elev 0 ft Azimuth 0 deg	Max. Vert	2	-0.61	-0.00	-0.33
	Max. H_x	24	-21.97	1.12	-19.08
	Max. H_z	2	-0.61	-0.00	-0.33
	Min. Vert	22	-42.15	0.67	-37.15
	Min. H_x	18	-21.87	-1.12	-18.99
	Min. H_z	22	-42.15	0.67	-37.15
Guy C @ 88 ft Elev 0 ft Azimuth 240 deg	Max. Vert	10	-0.38	-0.19	0.11
	Max. H_x	10	-0.38	-0.19	0.11
	Max. H_z	3	-35.55	-31.29	18.42
	Min. Vert	3	-35.55	-31.29	18.42
	Min. H_x	5	-35.42	-31.52	17.81
	Min. H_z	10	-0.38	-0.19	0.11
Guy B @ 88 ft Elev 0 ft Azimuth 120 deg	Max. Vert	6	-0.38	0.19	0.11
	Max. H_x	11	-35.45	31.54	17.83
	Max. H_z	13	-35.54	31.29	18.40
	Min. Vert	13	-35.54	31.29	18.40
	Min. H_x	6	-0.38	0.19	0.11
	Min. H_z	6	-0.38	0.19	0.11
Guy A @ 88 ft Elev 0 ft Azimuth 0 deg	Max. Vert	2	-0.37	-0.00	-0.22
	Max. H_x	24	-17.61	0.84	-17.93
	Max. H_z	2	-0.37	-0.00	-0.22
	Min. Vert	9	-35.61	0.31	-36.36
	Min. H_x	18	-17.60	-0.84	-17.92
	Min. H_z	9	-35.61	0.31	-36.36

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	93.07	-0.00	-0.01	0.00	0.00	0.00
Dead+Wind 0 deg - No Ice+Guy	171.38	0.00	-2.69	0.00	0.00	0.00
Dead+Wind 30 deg - No Ice+Guy	156.56	1.94	-2.49	0.00	0.00	0.00
Dead+Wind 60 deg - No Ice+Guy	124.21	3.31	-1.91	0.00	0.00	0.00
Dead+Wind 90 deg - No Ice+Guy	155.85	3.15	-0.44	0.00	0.00	0.00
Dead+Wind 120 deg - No Ice+Guy	170.75	2.35	1.33	0.00	0.00	0.00
Dead+Wind 150 deg - No Ice+Guy	156.09	1.20	2.91	0.00	0.00	0.00
Dead+Wind 180 deg - No Ice+Guy	124.38	0.01	3.79	0.00	0.00	0.00
Dead+Wind 210 deg - No Ice+Guy	156.36	-1.19	2.90	0.00	0.00	0.00
Dead+Wind 240 deg - No Ice+Guy	171.00	-2.35	1.33	0.00	0.00	0.00
Dead+Wind 270 deg - No Ice+Guy	155.98	-3.15	-0.45	0.00	0.00	0.00
Dead+Wind 300 deg - No Ice+Guy	124.12	-3.31	-1.92	0.00	0.00	0.00
Dead+Wind 330 deg - No Ice+Guy	156.42	-1.94	-2.49	0.00	0.00	0.00
Dead+Ice+Temp+Guy	129.30	0.00	-0.05	0.00	0.00	0.00
Dead+Wind 0 deg+Ice+Temp+Guy	197.51	0.00	-1.41	0.00	0.00	0.00
Dead+Wind 30 deg+Ice+Temp+Guy	185.89	1.36	-1.40	0.00	0.00	0.00
Dead+Wind 60 deg+Ice+Temp+Guy	165.66	2.18	-1.29	0.00	0.00	0.00
Dead+Wind 90 deg+Ice+Temp+Guy	185.48	1.87	-0.54	0.00	0.00	0.00
Dead+Wind 120 deg+Ice+Temp+Guy	197.16	1.20	0.64	0.00	0.00	0.00
Dead+Wind 150 deg+Ice+Temp+Guy	185.64	0.51	1.80	0.00	0.00	0.00
Dead+Wind 180 deg+Ice+Temp+Guy	165.80	0.01	2.46	0.00	0.00	0.00
Dead+Wind 210 deg+Ice+Temp+Guy	185.85	-0.50	1.80	0.00	0.00	0.00
Dead+Wind 240 deg+Ice+Temp+Guy	197.35	-1.20	0.64	0.00	0.00	0.00
Dead+Wind 270 deg+Ice+Temp+Guy	185.58	-1.86	-0.54	0.00	0.00	0.00
Dead+Wind 300 deg+Ice+Temp+Guy	165.58	-2.18	-1.30	0.00	0.00	0.00
Dead+Wind 330 deg+Ice+Temp+Guy	185.78	-1.35	-1.40	0.00	0.00	0.00
Dead+Wind 0 deg - Service+Guy	93.71	-0.00	-1.16	0.00	0.00	0.00
Dead+Wind 30 deg - Service+Guy	93.78	0.57	-1.00	0.00	0.00	0.00
Dead+Wind 60 deg -	93.86	0.99	-0.58	0.00	0.00	0.00

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
Service+Guy						
Dead+Wind 90 deg - Service+Guy	93.77	1.14	-0.01	0.00	0.00	0.00
Dead+Wind 120 deg - Service+Guy	93.70	0.99	0.56	0.00	0.00	0.00
Dead+Wind 150 deg - Service+Guy	93.77	0.57	0.97	0.00	0.00	0.00
Dead+Wind 180 deg - Service+Guy	93.87	-0.00	1.12	0.00	0.00	0.00
Dead+Wind 210 deg - Service+Guy	93.77	-0.57	0.97	0.00	0.00	0.00
Dead+Wind 240 deg - Service+Guy	93.70	-1.00	0.56	0.00	0.00	0.00
Dead+Wind 270 deg - Service+Guy	93.77	-1.14	-0.01	0.00	0.00	0.00
Dead+Wind 300 deg - Service+Guy	93.86	-0.99	-0.58	0.00	0.00	0.00
Dead+Wind 330 deg - Service+Guy	93.78	-0.57	-1.00	0.00	0.00	0.00

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	-38.02	0.00	0.00	38.02	-0.00	0.002%
2	0.06	-38.20	-66.34	-0.06	38.20	66.34	0.003%
3	32.94	-38.02	-57.25	-32.94	38.02	57.25	0.002%
4	56.92	-37.83	-33.05	-56.92	37.83	33.05	0.003%
5	65.77	-38.02	-0.06	-65.77	38.02	0.06	0.002%
6	57.16	-38.20	33.12	-57.16	38.20	-33.12	0.003%
7	32.83	-38.02	57.19	-32.83	38.02	-57.19	0.002%
8	-0.06	-37.83	65.99	0.06	37.83	-65.99	0.002%
9	-32.94	-38.02	57.25	32.94	38.02	-57.25	0.002%
10	-57.22	-38.20	33.22	57.22	38.20	-33.22	0.003%
11	-65.77	-38.02	0.06	65.77	38.02	-0.06	0.002%
12	-56.86	-37.83	-32.94	56.86	37.83	32.94	0.003%
13	-32.83	-38.02	-57.19	32.83	38.02	57.19	0.002%
14	0.00	-67.53	0.00	0.00	67.53	0.00	0.001%
15	0.05	-67.88	-63.23	-0.05	67.88	63.22	0.003%
16	31.12	-67.53	-54.05	-31.12	67.53	54.05	0.002%
17	53.61	-67.18	-31.10	-53.62	67.18	31.10	0.003%
18	62.15	-67.53	-0.05	-62.15	67.53	0.05	0.002%
19	54.53	-67.88	31.57	-54.53	67.88	-31.57	0.002%
20	31.04	-67.53	54.00	-31.03	67.53	-54.00	0.002%
21	-0.05	-67.18	62.11	0.05	67.18	-62.11	0.002%
22	-31.12	-67.53	54.05	31.12	67.53	-54.05	0.002%
23	-54.58	-67.88	31.65	54.58	67.88	-31.65	0.002%
24	-62.15	-67.53	0.05	62.15	67.53	-0.05	0.002%
25	-53.57	-67.18	-31.02	53.57	67.18	31.01	0.001%
26	-31.04	-67.53	-54.00	31.04	67.53	54.00	0.002%
27	0.02	-38.07	-18.38	-0.02	38.07	18.38	0.003%
28	9.12	-38.02	-15.86	-9.12	38.02	15.86	0.002%
29	15.77	-37.97	-9.15	-15.77	37.97	9.15	0.003%
30	18.22	-38.02	-0.02	-18.22	38.02	0.02	0.002%
31	15.83	-38.07	9.17	-15.83	38.07	-9.17	0.002%
32	9.10	-38.02	15.84	-9.09	38.02	-15.84	0.002%
33	-0.02	-37.97	18.28	0.02	37.97	-18.28	0.003%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
34	-9.12	-38.02	15.86	9.12	38.02	-15.86	0.002%
35	-15.85	-38.07	9.20	15.85	38.07	-9.20	0.003%
36	-18.22	-38.02	0.02	18.22	38.02	-0.02	0.002%
37	-15.75	-37.97	-9.13	15.75	37.97	9.12	0.003%
38	-9.10	-38.02	-15.84	9.10	38.02	15.84	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	8	0.00000001	0.00003342
2	Yes	23	0.00004061	0.00008305
3	Yes	23	0.00003327	0.00005736
4	Yes	19	0.00009151	0.00006195
5	Yes	23	0.00003303	0.00007620
6	Yes	23	0.00004030	0.00009841
7	Yes	23	0.00003310	0.00006380
8	Yes	18	0.00007403	0.00004812
9	Yes	23	0.00003323	0.00005725
10	Yes	23	0.00004047	0.00008647
11	Yes	23	0.00003304	0.00007348
12	Yes	17	0.00008056	0.00005972
13	Yes	23	0.00003315	0.00006208
14	Yes	6	0.00000001	0.00005626
15	Yes	23	0.00005505	0.00009839
16	Yes	23	0.00004632	0.00006800
17	Yes	16	0.00009109	0.00007694
18	Yes	23	0.00004619	0.00008367
19	Yes	24	0.00003089	0.00006243
20	Yes	23	0.00004627	0.00007019
21	Yes	16	0.00005054	0.00004888
22	Yes	23	0.00004635	0.00006719
23	Yes	24	0.00003098	0.00005947
24	Yes	23	0.00004610	0.00008022
25	Yes	16	0.00000001	0.00005506
26	Yes	23	0.00004615	0.00006869
27	Yes	13	0.00000001	0.00007909
28	Yes	13	0.00000001	0.00005614
29	Yes	11	0.00000001	0.00009751
30	Yes	13	0.00000001	0.00005686
31	Yes	13	0.00000001	0.00008056
32	Yes	13	0.00000001	0.00005651
33	Yes	11	0.00000001	0.00009471
34	Yes	13	0.00000001	0.00005427
35	Yes	13	0.00000001	0.00007716
36	Yes	13	0.00000001	0.00005542
37	Yes	11	0.00000001	0.00009654
38	Yes	13	0.00000001	0.00005682

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	193 - 180	4.167	27	0.2460	0.0183
T2	180 - 160	3.501	27	0.2397	0.0220
T3	160 - 140	2.619	27	0.1509	0.0319
T4	140 - 120	2.153	33	0.1098	0.0402
T5	120 - 100	1.681	33	0.1228	0.0280
T6	100 - 80	1.199	33	0.0872	0.0268
T7	80 - 60	0.923	33	0.0577	0.0391
T8	60 - 40	0.737	37	0.0266	0.0411
T9	40 - 20	0.651	37	0.0361	0.0636
T10	20 - 5	0.422	37	0.0792	0.1123
T11	5 - 0	0.112	37	0.1025	0.1278

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
188.75	20' x 3" Dia Omni	27	3.948	0.2475	0.0195	145599
188.00	Rohn 6'x10' Boom Gate	27	3.909	0.2476	0.0197	145599
180.00	6' x 3" Dia Omni	27	3.501	0.2397	0.0220	47008
178.75	(2) 7770.00	27	3.438	0.2364	0.0223	38257
178.00	6' Standoff	27	3.400	0.2342	0.0225	33853
177.50	Rohn 6'x15' Boom Gate	27	3.375	0.2325	0.0227	31284
169.00	Pirod 15' T-Frame Sector Mount (1)	27	2.972	0.1950	0.0253	12812
162.50	Guy	27	2.707	0.1623	0.0300	8907
155.50	4 Bay Dipole	33	2.487	0.1339	0.0353	10790
151.00	3'-6" Standoff	33	2.379	0.1214	0.0382	17221
150.50	Rohn 6'x15' Boom Gate	33	2.368	0.1203	0.0385	18432
150.00	APXVSPP18-C-A20	33	2.357	0.1193	0.0388	19821
130.00	(2) 800-10504	33	1.930	0.1178	0.0327	46652
126.00	DB408	33	1.833	0.1215	0.0306	55677
122.50	3' Standoff	33	1.745	0.1231	0.0291	68530
121.00	PD220	33	1.707	0.1231	0.0284	81476
120.00	LLPX310R	33	1.681	0.1228	0.0280	98773
111.00	Folded Dipole	33	1.449	0.1113	0.0258	39013
110.00	3'-6" Standoff	33	1.423	0.1093	0.0257	33850
106.00	2'x2" Omni	33	1.327	0.1004	0.0257	22133
105.00	2' Standoff	33	1.304	0.0981	0.0258	20370
102.50	Guy	33	1.249	0.0924	0.0262	17206
62.50	Guy	37	0.753	0.0291	0.0406	28566

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	193 - 180	32.797	15	1.6149	0.1314
T2	180 - 160	28.400	15	1.5954	0.1447
T3	160 - 140	22.136	2	1.2891	0.1901
T4	140 - 120	17.870	2	1.1433	0.2182
T5	120 - 100	13.790	2	1.1119	0.1533
T6	100 - 80	10.014	2	0.8666	0.1561

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T7	80 - 60	7.341	2	0.6062	0.2340
T8	60 - 40	5.340	2	0.3762	0.2484
T9	40 - 20	3.985	6	0.3556	0.3253
T10	20 - 5	2.314	6	0.4834	0.4850
T11	5 - 0	0.601	6	0.5598	0.4942

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
188.75	20' x 3" Dia Omni	15	31.353	1.6210	0.1349	41099
188.00	Rohn 6'x10' Boom Gate	15	31.099	1.6214	0.1355	41099
180.00	6' x 3" Dia Omni	15	28.400	1.5954	0.1447	13359
178.75	(2) 7770.00	15	27.982	1.5841	0.1466	10851
178.00	6' Standoff	15	27.731	1.5763	0.1479	9591
177.50	Rohn 6'x15' Boom Gate	15	27.565	1.5707	0.1488	8857
169.00	Pirod 15' T-Frame Sector Mount (1)	15	24.807	1.4411	0.1667	3608
162.50	Guy	15	22.842	1.3279	0.1833	2504
155.50	4 Bay Dipole	2	21.076	1.2319	0.2021	2960
151.00	3'-6" Standoff	2	20.096	1.1904	0.2125	4484
150.50	Rohn 6'x15' Boom Gate	2	19.991	1.1866	0.2135	4756
150.00	APXVSPP18-C-A20	2	19.887	1.1831	0.2144	5063
130.00	(2) 800-10504	2	15.839	1.1406	0.1893	17000
126.00	DB408	2	15.019	1.1362	0.1738	22063
122.50	3' Standoff	2	14.301	1.1254	0.1610	18927
121.00	PD220	2	13.994	1.1180	0.1562	15262
120.00	LLPX310R	2	13.790	1.1119	0.1533	13288
111.00	Folded Dipole	2	11.990	1.0208	0.1412	5185
110.00	3'-6" Standoff	2	11.797	1.0077	0.1414	4842
106.00	2'x2" Omni	2	11.049	0.9523	0.1447	3827
105.00	2' Standoff	2	10.869	0.9380	0.1459	3637
102.50	Guy	2	10.430	0.9020	0.1501	3259
62.50	Guy	2	5.548	0.3940	0.2468	4076

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	193	Leg	A325N	0.7500	4	0.00	19.44	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	2	1.17	6.44	0.181 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.6250	2	0.05	6.44	0.008 ✔	1.333	Bolt Shear
		Bottom Girt	A325N	0.6250	2	0.38	6.44	0.059 ✔	1.333	Bolt Shear
T2	180	Leg	A325N	0.7500	4	2.65	19.42	0.137 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	2	5.00	6.44	0.776 ✔	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	5.12	6.44	0.795 ✔	1.333	Bolt Shear

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
		Top Girt	A325N	0.6250	2	0.33	6.44	0.052 ✔	1.333	Bolt Shear
		Bottom Girt	A325N	0.6250	2	3.40	6.44	0.528 ✔	1.333	Bolt Shear
		Torque Arm Top@162.496	A325N	0.8750	4	4.94	12.63	0.392 ✔	1.333	Bolt Shear
T3	160	Leg	A325N	0.7500	4	7.14	19.25	0.371 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	6.51	9.20	0.708 ✔	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	1.77	6.44	0.275 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	0.80	4.12	0.193 ✔	1.333	Bolt Shear
		Bottom Girt	A325N	0.5000	1	0.62	4.12	0.149 ✔	1.333	Bolt Shear
T4	140	Leg	A325N	0.7500	4	0.00	19.41	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	2.67	4.12	0.649 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	0.87	4.12	0.212 ✔	1.333	Bolt Shear
		Bottom Girt	A325N	0.5000	1	0.95	4.12	0.230 ✔	1.333	Bolt Shear
T5	120	Leg	A325N	0.7500	4	0.00	19.38	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	2	3.03	6.44	0.470 ✔	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	4.79	6.44	0.744 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.6250	2	0.59	6.44	0.092 ✔	1.333	Bolt Shear
		Bottom Girt	A325N	0.6250	2	1.73	6.44	0.268 ✔	1.333	Bolt Shear
		Torque Arm Top@102.496	A325N	0.8750	4	2.91	12.63	0.231 ✔	1.333	Bolt Shear
T6	100	Leg	A325N	0.7500	4	0.00	19.38	0.000 ✔	1.333	Bolt Tension
		Diagonal	A490X	0.5000	1	2.15	3.20	0.671 ✔	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	0.65	3.20	0.202 ✔	1.333	Member Bearing
		Bottom Girt	A325N	0.5000	1	0.51	3.20	0.160 ✔	1.333	Member Bearing
T7	80	Leg	A325N	0.7500	4	0.00	19.44	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	4.24	6.12	0.694 ✔	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	1.00	4.12	0.242 ✔	1.333	Bolt Shear
		Bottom Girt	A325N	0.5000	1	2.09	4.12	0.508 ✔	1.333	Bolt Shear
		Torque Arm Top@62.4961	A325N	0.8750	4	2.22	12.63	0.176 ✔	1.333	Bolt Shear
T8	60	Leg	A325N	0.7500	4	0.00	19.31	0.000 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.5000	1	4.79	5.89	0.813 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	0.93	4.12	0.227 ✔	1.333	Bolt Shear
		Bottom Girt	A325N	0.5000	1	1.23	4.12	0.298 ✔	1.333	Bolt Shear
T9	40	Leg	A325N	0.7500	4	0.00	19.42	0.000 ✔	1.333	Bolt Tension
		Diagonal	A490X	0.6250	1	2.71	4.11	0.659 ✔	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	0.99	3.20	0.311 ✔	1.333	Member Bearing
		Bottom Girt	A325N	0.5000	1	0.38	3.20	0.120 ✔	1.333	Member Bearing
T10	20	Leg	A325N	0.7500	4	0.00	19.43	0.000 ✔	1.333	Bolt Tension
		Diagonal	A490X	0.5000	1	3.34	6.62	0.505 ✔	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	0.73	4.12	0.176 ✔	1.333	Bolt Shear

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
		Bottom Girt	A490X	0.6250	1	4.26	8.51	0.501 ✔	1.333	Member Bearing
T11	5	Leg	A325N	0.7500	4	0.00	17.11	0.000 ✔	1.333	Bolt Tension

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T K	Allowable T_a K	Required S.F.	Actual S.F.
T2	162.50 (A) (594)	3/4 EHS	5.83	58.30	28.90	29.15	2.000	2.017 ✔
	162.50 (A) (595)	3/4 EHS	5.83	58.30	28.90	29.15	2.000	2.017 ✔
	162.50 (B) (590)	3/4 EHS	5.83	58.30	28.89	29.15	2.000	2.018 ✔
	162.50 (B) (591)	3/4 EHS	5.83	58.30	28.81	29.15	2.000	2.024 ✔
	162.50 (C) (586)	3/4 EHS	5.83	58.30	28.83	29.15	2.000	2.022 ✔
	162.50 (C) (587)	3/4 EHS	5.83	58.30	28.91	29.15	2.000	2.017 ✔
T5	102.50 (A) (606)	5/8 EHS	4.24	42.40	16.61	21.20	2.000	2.553 ✔
	102.50 (A) (607)	5/8 EHS	4.24	42.40	16.81	21.20	2.000	2.523 ✔
	102.50 (B) (602)	5/8 EHS	4.24	42.40	16.79	21.20	2.000	2.525 ✔
	102.50 (B) (603)	5/8 EHS	4.24	42.40	16.45	21.20	2.000	2.577 ✔
	102.50 (C) (598)	5/8 EHS	4.24	42.40	16.44	21.20	2.000	2.579 ✔
	102.50 (C) (599)	5/8 EHS	4.24	42.40	16.58	21.20	2.000	2.557 ✔
T7	62.50 (A) (618)	1/2 EHS	2.69	26.90	9.41	13.45	2.000	2.860 ✔
	62.50 (A) (619)	1/2 EHS	2.69	26.90	9.60	13.45	2.000	2.803 ✔
	62.50 (B) (614)	1/2 EHS	2.69	26.90	9.65	13.45	2.000	2.787 ✔
	62.50 (B) (615)	1/2 EHS	2.69	26.90	9.18	13.45	2.000	2.931 ✔
	62.50 (C) (610)	1/2 EHS	2.69	26.90	9.38	13.45	2.000	2.869 ✔
	62.50 (C) (611)	1/2 EHS	2.69	26.90	9.65	13.45	2.000	2.789 ✔

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	Mast Stability Index	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	193 - 180	P2.5x.276	13.00	2.57	33.3 K=1.00	1.00	26.731	2.2535	-13.10	60.24	0.217 ✓
T2	180 - 160	ROHN 2.5 EH w/plate	20.00	1.21	16.0 K=1.00	1.00	28.709	2.6593	-82.96	76.35	1.087 ✓
T3	160 - 140	ROHN 2.5 EH w/plate	20.00	1.21	16.0 K=1.00	0.97	27.869	2.6593	-76.00	74.11	1.025 ✓
T4	140 - 120	P2.5x.276	20.00	2.41	31.3 K=1.00	0.97	26.198	2.2535	-48.28	59.04	0.818 ✓
T5	120 - 100	P3x.3	20.00	1.21	12.7 K=1.00	0.95	27.700	3.0159	-98.10	83.54	1.174 ✓
T6	100 - 80	P3x.3	20.00	2.41	25.5 K=1.00	0.99	27.545	3.0159	-98.10	83.07	1.181 ✓
T7	80 - 60	P3x.3	20.00	2.41	25.5 K=1.00	0.99	27.537	3.0159	-102.49	83.05	1.234 ✓
T8	60 - 40	P3x.3	20.00	2.41	25.5 K=1.00	0.96	26.539	3.0159	-96.51	80.04	1.206 ✓
T9	40 - 20	P3x.3	20.00	2.41	51.0 K=2.00	1.00	24.201	3.0159	-73.46	72.99	1.006 ✓
T10	20 - 5	P3x.3	15.00	2.38	50.3 K=2.00	1.00	24.297	3.0159	-73.14	73.28	0.998 ✓
T11	5 - 0	P3x.3	5.38	1.55	16.4 K=1.00	0.91	26.212	3.0159	-73.22	79.05	0.926 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	193 - 180	L2x2x1/4	4.27	1.77	70.8 K=1.30	16.345	0.9380	-2.34	15.33	0.152 ✓
T2	180 - 160	L2x2x1/4	4.18	1.73	69.9 K=1.31	16.446	0.9380	-10.00	15.43	0.648 ✓
T3	160 - 140	L2x2x1/4	4.18	1.81	71.6 K=1.29	16.258	0.9380	-6.51	15.25	0.427 ✓
T4	140 - 120	ROHN TS1.5x11 ga	4.18	3.89	95.3 K=1.00	14.702	0.5202	-2.67	7.65	0.350 ✓
T5	120 - 100	L2x2x1/4	4.18	1.70	69.1 K=1.33	16.522	0.9380	-6.05	15.50	0.390 ✓
T6	100 - 80	ROHN TS1.5x16 ga	4.18	3.83	90.0 K=1.00	15.552	0.2627	-2.76	4.09	0.676 ✓
T7	80 - 60	L1 3/4x1 3/4x3/16	4.18	1.78	76.6 K=1.23	15.732	0.6211	-5.61	9.77	0.574 ✓
T8	60 - 40	ROHN TS1.5x11 ga	4.18	3.83	93.7 K=1.00	13.754	0.5202	-4.79	7.16	0.669 ✓
T9	40 - 20	ROHN TS1.5x16 ga	4.18	3.83	90.0 K=1.00	15.552	0.2627	-3.09	4.09	0.755 ✓
T10	20 - 5	ROHN TS1.5x11 ga	4.17	3.81	93.4 K=1.00	15.015	0.5202	-2.98	7.81	0.382 ✓

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 $\frac{P}{P_a}$

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T2	180 - 160	L2x2x1/4	3.42	2.91	89.2 K=1.00	14.299	0.9380	-4.64	13.41	0.346 ✔
T3	160 - 140	L2x2x1/4	3.42	2.91	89.2 K=1.00	14.299	0.9380	-1.32	13.41	0.099 ✔
T5	120 - 100	L2x2x1/4	3.42	2.85	88.1 K=1.57	14.426	0.9380	-2.67	13.53	0.197 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	193 - 180	L2x2x1/4	3.42	2.75	102.2 K=1.21	12.697	0.9380	-0.10	11.91	0.008 ✔
T2	180 - 160	L2x2x1/4	3.42	2.75	102.2 K=1.21	12.697	0.9380	-0.67	11.91	0.056 ✔
T5	120 - 100	L2x2x1/4	3.42	2.70	101.4 K=1.22	12.799	0.9380	-0.33	12.01	0.027 ✔
T9	40 - 20	ROHN TS1.5x16 ga	3.42	3.13	73.5 K=1.00	17.993	0.2627	-0.70	4.73	0.148 ✔
T10	20 - 5	ROHN TS1.5x11 ga	3.42	3.13	76.6 K=1.00	17.559	0.5202	-0.22	9.13	0.024 ✔

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	193 - 180	L2x2x1/4	3.42	2.75	102.2 K=1.21	12.697	0.9380	-0.72	11.91	0.060 ✔
T2	180 - 160	L2x2x1/4	3.42	2.75	102.2 K=1.21	12.697	0.9380	-5.40	11.91	0.453 ✔
T3	160 - 140	ROHN TS1.5x11 ga	3.42	3.18	77.9 K=1.00	17.376	0.5202	-0.11	9.04	0.012 ✔
T5	120 - 100	L2x2x1/4	3.42	2.70	101.4 K=1.22	12.799	0.9380	-1.91	12.01	0.159 ✔
T7	80 - 60	ROHN TS1.5x11 ga	3.42	3.13	76.6 K=1.00	17.559	0.5202	-0.71	9.13	0.078 ✔

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 $\frac{P}{P_a}$
T9	40 - 20	ROHN TS1.5x16 ga	3.42	3.13	73.5 K=1.00	17.993	0.2627	-0.17	4.73	0.037 ✔
T11	5 - 0	L3x3x1/2	0.34	0.05	60.5 K=58.86	17.380	2.7500	-3.15	47.80	0.066 ✔

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T11	5 - 0	L3x3x1/2	2.32	2.02	80.8 K=1.94	15.266	2.7500	-0.65	41.98	0.016 ✔

Torque-Arm Top Design Data

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 $\frac{P}{P_a}$
T2	180 - 160 (588)	C15x50	3.42	3.30	124.9 K=1.00	9.563	14.7000	-9.11	140.57	0.065
T2	180 - 160 (589)	C15x50	3.42	3.30	124.9 K=1.00	9.563	14.7000	-9.11	140.57	0.065
T2	180 - 160 (592)	C15x50	3.42	3.30	124.9 K=1.00	9.563	14.7000	-9.02	140.57	0.064
T2	180 - 160 (593)	C15x50	3.42	3.30	124.9 K=1.00	9.563	14.7000	-9.03	140.57	0.064
T2	180 - 160 (596)	C15x50	3.42	3.30	124.9 K=1.00	9.563	14.7000	-9.03	140.57	0.064
T2	180 - 160 (597)	C15x50	3.42	3.30	124.9 K=1.00	9.563	14.7000	-9.04	140.57	0.064
T5	120 - 100 (600)	C15x33.9	3.42	3.27	113.6 K=1.00	11.186	9.9600	-5.86	111.41	0.053
T5	120 - 100 (601)	C15x33.9	3.42	3.27	113.6 K=1.00	11.186	9.9600	-5.88	111.41	0.053
T5	120 - 100 (604)	C15x33.9	3.42	3.27	113.6 K=1.00	11.186	9.9600	-5.86	111.41	0.053
T5	120 - 100 (605)	C15x33.9	3.42	3.27	113.6 K=1.00	11.186	9.9600	-5.86	111.41	0.053
T5	120 - 100 (608)	C15x33.9	3.42	3.27	113.6 K=1.00	11.186	9.9600	-5.74	111.41	0.052
T5	120 - 100 (609)	C15x33.9	3.42	3.27	113.6 K=1.00	11.186	9.9600	-5.76	111.41	0.052
T7	80 - 60 (612)	C12x25	3.42	3.27	107.1 K=1.00	12.063	7.3500	-4.44	88.66	0.050
T7	80 - 60 (613)	C12x25	3.42	3.27	107.1 K=1.00	12.063	7.3500	-4.44	88.66	0.050
T7	80 - 60 (616)	C12x25	3.42	3.27	107.1 K=1.00	12.063	7.3500	-4.60	88.66	0.052
T7	80 - 60 (617)	C12x25	3.42	3.27	107.1 K=1.00	12.063	7.3500	-4.60	88.66	0.052
T7	80 - 60 (620)	C12x25	3.42	3.27	107.1	12.063	7.3500	-4.32	88.66	0.049

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 $\frac{P}{P_a}$
T7	80 - 60 (621)	C12x25	3.42	3.27	K=1.00 107.1 K=1.00	12.063	7.3500	-4.32	88.66	0.049

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T2	180 - 160 (588)	C15x50	-74.54	-16.626	21.600	0.770	0.00	-0.000	21.600	0.000
T2	180 - 160 (589)	C15x50	-74.49	-16.616	21.600	0.769	-0.00	-0.000	21.600	0.000
T2	180 - 160 (592)	C15x50	-74.13	-16.534	21.600	0.765	0.00	-0.000	21.600	0.000
T2	180 - 160 (593)	C15x50	-74.20	-16.549	21.600	0.766	-0.00	-0.000	21.600	0.000
T2	180 - 160 (596)	C15x50	-74.14	-16.537	21.600	0.766	-0.00	-0.000	21.600	0.000
T2	180 - 160 (597)	C15x50	-74.15	-16.539	21.600	0.766	0.00	-0.000	21.600	0.000
T5	120 - 100 (600)	C15x33.9	-41.60	-11.887	21.600	0.550	0.00	-0.000	21.600	0.000
T5	120 - 100 (601)	C15x33.9	-41.69	-11.913	21.600	0.552	-0.00	-0.000	21.600	0.000
T5	120 - 100 (604)	C15x33.9	-41.59	-11.882	21.600	0.550	-0.00	-0.000	21.600	0.000
T5	120 - 100 (605)	C15x33.9	-41.56	-11.873	21.600	0.550	0.00	-0.000	21.600	0.000
T5	120 - 100 (608)	C15x33.9	-41.04	-11.727	21.600	0.543	-0.00	-0.000	21.600	0.000
T5	120 - 100 (609)	C15x33.9	-41.09	-11.741	21.600	0.544	0.00	-0.000	21.600	0.000
T7	80 - 60 (612)	C12x25	-17.61	-8.768	21.600	0.406	0.00	-0.000	21.600	0.000
T7	80 - 60 (613)	C12x25	-17.62	-8.771	21.600	0.406	-0.00	-0.000	21.600	0.000
T7	80 - 60 (616)	C12x25	-18.15	-9.038	21.600	0.418	-0.00	-0.000	21.600	0.000
T7	80 - 60 (617)	C12x25	-18.14	-9.034	21.600	0.418	0.00	-0.000	21.600	0.000
T7	80 - 60 (620)	C12x25	-17.25	-8.587	21.600	0.398	-0.00	-0.000	21.600	0.000
T7	80 - 60 (621)	C12x25	-17.23	-8.581	21.600	0.397	0.00	-0.000	21.600	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	180 - 160 (588)	C15x50	0.065	0.770	0.000	0.835 ✔	1.333	H1-3 ✔
T2	180 - 160 (589)	C15x50	0.065	0.769	0.000	0.834 ✔	1.333	H1-3 ✔
T2	180 - 160 (592)	C15x50	0.064	0.765	0.000	0.830 ✔	1.333	H1-3 ✔
T2	180 - 160 (593)	C15x50	0.064	0.766	0.000	0.830 ✔	1.333	H1-3 ✔
T2	180 - 160 (596)	C15x50	0.064	0.766	0.000	0.830 ✔	1.333	H1-3 ✔
T2	180 - 160 (597)	C15x50	0.064	0.766	0.000	0.830 ✔	1.333	H1-3 ✔
T5	120 - 100 (600)	C15x33.9	0.053	0.550	0.000	0.603 ✔	1.333	H1-3 ✔
T5	120 - 100 (601)	C15x33.9	0.053	0.552	0.000	0.604 ✔	1.333	H1-3 ✔

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T5	120 - 100 (604)	C15x33.9	0.053	0.550	0.000	0.603	1.333	H1-3
T5	120 - 100 (605)	C15x33.9	0.053	0.550	0.000	0.602	1.333	H1-3
T5	120 - 100 (608)	C15x33.9	0.052	0.543	0.000	0.594	1.333	H1-3
T5	120 - 100 (609)	C15x33.9	0.052	0.544	0.000	0.595	1.333	H1-3
T7	80 - 60 (612)	C12x25	0.050	0.406	0.000	0.456	1.333	H1-3
T7	80 - 60 (613)	C12x25	0.050	0.406	0.000	0.456	1.333	H1-3
T7	80 - 60 (616)	C12x25	0.052	0.418	0.000	0.470	1.333	H1-3
T7	80 - 60 (617)	C12x25	0.052	0.418	0.000	0.470	1.333	H1-3
T7	80 - 60 (620)	C12x25	0.049	0.398	0.000	0.446	1.333	H1-3
T7	80 - 60 (621)	C12x25	0.049	0.397	0.000	0.446	1.333	H1-3

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	193 - 180	P2.5x.276	13.00	2.57	33.3	30.000	2.2535	10.62	67.61	0.157
T2	180 - 160	ROHN 2.5 EH w/plate	20.00	1.21	16.0	30.000	2.6593	73.00	79.78	0.915
T3	160 - 140	ROHN 2.5 EH w/plate	20.00	1.21	16.0	30.000	2.6593	28.54	79.78	0.358
T5	120 - 100	P3x.3	20.00	1.21	12.7	30.000	3.0159	21.32	90.48	0.236

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	193 - 180	L2x2x1/4	4.27	1.77	39.2	29.000	0.5629	2.21	16.32	0.136
T2	180 - 160	L2x2x1/4	4.18	1.73	38.3	29.000	0.5629	8.12	16.32	0.498

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 $\frac{P}{P_a}$
T3	160 - 140	L2x2x1/4	4.18	1.81	38.3	29.000	0.5629	5.21	16.32	0.319 ✓
T4	140 - 120	ROHN TS1.5x11 ga	4.18	3.89	95.3	25.200	0.5202	1.96	13.11	0.150 ✓
T5	120 - 100	L2x2x1/4	4.18	1.70	37.7	29.000	0.5629	4.16	16.32	0.255 ✓
T6	100 - 80	ROHN TS1.5x16 ga	4.18	3.83	90.0	25.200	0.2627	2.15	6.62	0.324 ✓
T7	80 - 60	L1 3/4x1 3/4x3/16	4.18	1.78	42.8	29.000	0.3604	4.24	10.45	0.406 ✓
T8	60 - 40	ROHN TS1.5x11 ga	4.18	3.83	93.7	21.600	0.5202	3.46	11.24	0.308 ✓
T9	40 - 20	ROHN TS1.5x16 ga	4.18	3.83	90.0	25.200	0.2627	2.71	6.62	0.409 ✓
T10	20 - 5	ROHN TS1.5x11 ga	4.17	3.81	93.4	25.200	0.5202	3.34	13.11	0.255 ✓

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T2	180 - 160	L2x2x1/4	3.42	2.91	62.6	29.000	0.5629	5.12	16.32	0.314 ✓
T3	160 - 140	L2x2x1/4	3.42	2.91	62.6	29.000	0.5629	1.77	16.32	0.108 ✓
T5	120 - 100	L2x2x1/4	3.42	2.85	61.6	29.000	0.5629	4.79	16.32	0.294 ✓

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	193 - 180	L2x2x1/4	3.42	2.75	62.6	29.000	0.5629	0.11	16.32	0.007 ✓
T2	180 - 160	L2x2x1/4	3.42	2.75	62.6	29.000	0.5629	0.65	16.32	0.040 ✓
T3	160 - 140	ROHN TS1.5x11 ga	3.42	3.18	77.9	25.200	0.5202	0.80	13.11	0.061 ✓
T4	140 - 120	ROHN TS1.5x11 ga	3.42	3.18	77.9	25.200	0.5202	0.87	13.11	0.067 ✓
T5	120 - 100	L2x2x1/4	3.42	2.70	61.6	29.000	0.5629	1.18	16.32	0.072 ✓
T6	100 - 80	ROHN TS1.5x16 ga	3.42	3.13	73.5	25.200	0.2627	0.65	6.62	0.098 ✓

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 $\frac{P}{P_a}$
T7	80 - 60	ROHN TS1.5x11 ga	3.42	3.13	76.6	25.200	0.5202	1.00	13.11	0.076 ✔
T8	60 - 40	ROHN TS1.5x11 ga	3.42	3.13	76.6	25.200	0.5202	0.93	13.11	0.071 ✔
T9	40 - 20	ROHN TS1.5x16 ga	3.42	3.13	73.5	25.200	0.2627	0.99	6.62	0.150 ✔
T10	20 - 5	ROHN TS1.5x11 ga	3.42	3.13	76.6	25.200	0.5202	0.73	13.11	0.055 ✔
T11	5 - 0	L3x3x1/2	3.30	3.01	40.2	21.600	2.7500	11.55	59.40	0.194 ✔

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	193 - 180	L2x2x1/4	3.42	2.75	62.6	29.000	0.5629	0.76	16.32	0.046 ✔
T2	180 - 160	L2x2x1/4	3.42	2.75	62.6	29.000	0.5629	6.81	16.32	0.417 ✔
T3	160 - 140	ROHN TS1.5x11 ga	3.42	3.18	77.9	25.200	0.5202	0.62	13.11	0.047 ✔
T4	140 - 120	ROHN TS1.5x11 ga	3.42	3.18	77.9	25.200	0.5202	0.95	13.11	0.072 ✔
T5	120 - 100	L2x2x1/4	3.42	2.70	61.6	29.000	0.5629	3.45	16.32	0.212 ✔
T6	100 - 80	ROHN TS1.5x16 ga	3.42	3.13	73.5	25.200	0.2627	0.51	6.62	0.077 ✔
T7	80 - 60	ROHN TS1.5x11 ga	3.42	3.13	76.6	25.200	0.5202	2.09	13.11	0.160 ✔
T8	60 - 40	ROHN TS1.5x11 ga	3.42	3.13	76.6	25.200	0.5202	1.23	13.11	0.094 ✔
T9	40 - 20	ROHN TS1.5x16 ga	3.42	3.13	73.5	25.200	0.2627	0.38	6.62	0.058 ✔
T10	20 - 5	ROHN TS1.5x11 ga	3.42	3.13	76.6	25.200	0.5202	4.26	13.11	0.325 ✔

Mid 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 $\frac{P}{P_a}$
T11	5 - 0	L3x3x1/2	1.33	1.04	13.9	21.600	2.7500	0.11	59.40	0.002 ✔

Torque-Arm Top Design Data

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 $\frac{P}{P_a}$
T2	180 - 160 (588)	C15x50	3.42	3.30	45.6	21.600	14.7000	8.45	317.52	0.027
T2	180 - 160 (589)	C15x50	3.42	3.30	45.6	21.600	14.7000	8.37	317.52	0.026
T2	180 - 160 (592)	C15x50	3.42	3.30	45.6	21.600	14.7000	8.43	317.52	0.027
T2	180 - 160 (593)	C15x50	3.42	3.30	45.6	21.600	14.7000	8.47	317.52	0.027
T2	180 - 160 (596)	C15x50	3.42	3.30	45.6	21.600	14.7000	8.45	317.52	0.027
T2	180 - 160 (597)	C15x50	3.42	3.30	45.6	21.600	14.7000	8.41	317.52	0.026
T5	120 - 100 (600)	C15x33.9	3.42	3.27	43.4	21.600	9.9600	0.10	215.14	0.000
T5	120 - 100 (601)	C15x33.9	3.42	3.27	43.4	21.600	9.9600	4.60	215.14	0.021
T5	120 - 100 (604)	C15x33.9	3.42	3.27	43.4	21.600	9.9600	4.70	215.14	0.022
T5	120 - 100 (605)	C15x33.9	3.42	3.27	43.4	21.600	9.9600	0.05	215.14	0.000
T5	120 - 100 (608)	C15x33.9	3.42	3.27	43.4	21.600	9.9600	0.10	215.14	0.000
T5	120 - 100 (609)	C15x33.9	3.42	3.27	43.4	21.600	9.9600	4.76	215.14	0.022
T7	80 - 60 (612)	C12x25	3.42	3.27	50.3	21.600	7.3500	0.06	158.76	0.000
T7	80 - 60 (613)	C12x25	3.42	3.27	50.3	21.600	7.3500	3.00	158.76	0.019
T7	80 - 60 (616)	C12x25	3.42	3.27	50.3	21.600	7.3500	3.22	158.76	0.020
T7	80 - 60 (617)	C12x25	3.42	3.27	50.3	21.600	7.3500	3.55	158.76	0.022
T7	80 - 60 (620)	C12x25	3.42	3.27	50.3	21.600	7.3500	0.06	158.76	0.000
T7	80 - 60 (621)	C12x25	3.42	3.27	50.3	21.600	7.3500	3.16	158.76	0.020

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T2	180 - 160 (588)	C15x50	-67.47	15.049	21.600	0.697	-0.00	0.000	27.000	0.000
T2	180 - 160 (589)	C15x50	-67.07	14.961	21.600	0.693	0.00	0.000	27.000	0.000
T2	180 - 160 (592)	C15x50	-67.39	15.032	21.600	0.696	0.00	0.000	27.000	0.000
T2	180 - 160 (593)	C15x50	-67.70	15.100	21.600	0.699	0.00	0.000	27.000	0.000
T2	180 - 160 (596)	C15x50	-67.41	15.037	21.600	0.696	0.00	0.000	27.000	0.000
T2	180 - 160 (597)	C15x50	-67.42	15.038	21.600	0.696	-0.00	0.000	27.000	0.000
T5	120 - 100 (600)	C15x33.9	-43.00	12.285	21.600	0.569	-0.00	0.000	27.000	0.000
T5	120 - 100 (601)	C15x33.9	-37.73	10.779	21.600	0.499	-0.00	0.000	27.000	0.000
T5	120 - 100 (604)	C15x33.9	-38.03	10.867	21.600	0.503	0.00	0.000	27.000	0.000
T5	120 - 100 (605)	C15x33.9	-42.93	12.267	21.600	0.568	0.00	0.000	27.000	0.000
T5	120 - 100 (608)	C15x33.9	-43.01	12.289	21.600	0.569	0.00	0.000	27.000	0.000
T5	120 - 100 (609)	C15x33.9	-38.20	10.916	21.600	0.505	0.00	0.000	27.000	0.000
T7	80 - 60 (612)	C12x25	-18.72	9.321	21.600	0.432	-0.00	0.000	27.000	0.000
T7	80 - 60 (613)	C12x25	-15.62	7.778	21.600	0.360	-0.00	0.000	27.000	0.000
T7	80 - 60 (616)	C12x25	-15.95	7.942	21.600	0.368	0.00	0.000	27.000	0.000
T7	80 - 60 (617)	C12x25	-16.40	8.168	21.600	0.378	0.00	0.000	27.000	0.000
T7	80 - 60 (620)	C12x25	-18.72	9.323	21.600	0.432	0.00	0.000	27.000	0.000
T7	80 - 60 (621)	C12x25	-15.86	7.898	21.600	0.366	0.00	0.000	27.000	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	180 - 160 (588)	C15x50	0.027	0.697	0.000	0.723	1.333	H2-1 ✓

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	180 - 160 (589)	C15x50	0.026	0.693	0.000	0.719	1.333	H2-1
T2	180 - 160 (592)	C15x50	0.027	0.696	0.000	0.722	1.333	H2-1
T2	180 - 160 (593)	C15x50	0.027	0.699	0.000	0.726	1.333	H2-1
T2	180 - 160 (596)	C15x50	0.027	0.696	0.000	0.723	1.333	H2-1
T2	180 - 160 (597)	C15x50	0.026	0.696	0.000	0.723	1.333	H2-1
T5	120 - 100 (600)	C15x33.9	0.000	0.569	0.000	0.569	1.333	H2-1
T5	120 - 100 (601)	C15x33.9	0.021	0.499	0.000	0.520	1.333	H2-1
T5	120 - 100 (604)	C15x33.9	0.022	0.503	0.000	0.525	1.333	H2-1
T5	120 - 100 (605)	C15x33.9	0.000	0.568	0.000	0.568	1.333	H2-1
T5	120 - 100 (608)	C15x33.9	0.000	0.569	0.000	0.569	1.333	H2-1
T5	120 - 100 (609)	C15x33.9	0.022	0.505	0.000	0.527	1.333	H2-1
T7	80 - 60 (612)	C12x25	0.000	0.432	0.000	0.432	1.333	H2-1
T7	80 - 60 (613)	C12x25	0.019	0.360	0.000	0.379	1.333	H2-1
T7	80 - 60 (616)	C12x25	0.020	0.368	0.000	0.388	1.333	H2-1
T7	80 - 60 (617)	C12x25	0.022	0.378	0.000	0.400	1.333	H2-1
T7	80 - 60 (620)	C12x25	0.000	0.432	0.000	0.432	1.333	H2-1
T7	80 - 60 (621)	C12x25	0.020	0.366	0.000	0.386	1.333	H2-1

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	193 - 180	Leg	P2.5x.276	2	-13.10	80.30	16.3	Pass
T2	180 - 160	Leg	ROHN 2.5 EH w/plate	41	-82.96	101.77	81.5	Pass
T3	160 - 140	Leg	ROHN 2.5 EH w/plate	122	-76.00	98.79	76.9	Pass
T4	140 - 120	Leg	P2.5x.276	204	-48.28	78.70	61.3	Pass
T5	120 - 100	Leg	P3x.3	261	-98.10	111.36	88.1	Pass
T6	100 - 80	Leg	P3x.3	342	-98.10	110.74	88.6	Pass
T7	80 - 60	Leg	P3x.3	399	-102.49	110.70	92.6	Pass
T8	60 - 40	Leg	P3x.3	456	-96.51	106.69	90.5	Pass
T9	40 - 20	Leg	P3x.3	511	-73.46	97.29	75.5	Pass
T10	20 - 5	Leg	P3x.3	544	-73.14	97.68	74.9	Pass
T11	5 - 0	Leg	P3x.3	571	-73.22	105.38	69.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	193 - 180	Diagonal	L2x2x1/4	10	-2.34	20.44	11.4 13.6 (b)	Pass
T2	180 - 160	Diagonal	L2x2x1/4	53	-10.00	20.56	48.6 58.2 (b)	Pass
T3	160 - 140	Diagonal	L2x2x1/4	198	-6.51	20.33	32.0 53.1 (b)	Pass
T4	140 - 120	Diagonal	ROHN TS1.5x11 ga	216	-2.67	10.20	26.2 48.7 (b)	Pass
T5	120 - 100	Diagonal	L2x2x1/4	291	-6.05	20.66	29.3 35.2 (b)	Pass
T6	100 - 80	Diagonal	ROHN TS1.5x16 ga	391	-2.76	5.45	50.7	Pass
T7	80 - 60	Diagonal	L1 3/4x1 3/4x3/16	407	-5.61	13.02	43.1 52.0 (b)	Pass
T8	60 - 40	Diagonal	ROHN TS1.5x11 ga	506	-4.79	9.54	50.2 61.0 (b)	Pass
T9	40 - 20	Diagonal	ROHN TS1.5x16 ga	541	-3.09	5.45	56.6	Pass
T10	20 - 5	Diagonal	ROHN TS1.5x11 ga	555	-2.98	10.41	28.7 37.9 (b)	Pass
T2	180 - 160	Secondary Horizontal	L2x2x1/4	64	-4.64	17.88	25.9 59.6 (b)	Pass
T3	160 - 140	Secondary Horizontal	L2x2x1/4	200	1.77	21.76	8.1 20.6 (b)	Pass
T5	120 - 100	Secondary Horizontal	L2x2x1/4	283	4.79	21.76	22.0 55.8 (b)	Pass
T1	193 - 180	Top Girt	L2x2x1/4	6	-0.10	15.88	0.6	Pass
T2	180 - 160	Top Girt	L2x2x1/4	44	-0.67	15.88	4.2	Pass
T3	160 - 140	Top Girt	ROHN TS1.5x11 ga	124	0.80	17.48	4.6 14.5 (b)	Pass
T4	140 - 120	Top Girt	ROHN TS1.5x11 ga	206	0.87	17.48	5.0 15.9 (b)	Pass
T5	120 - 100	Top Girt	L2x2x1/4	262	1.18	21.76	5.4 6.9 (b)	Pass
T6	100 - 80	Top Girt	ROHN TS1.5x16 ga	343	0.65	8.83	7.3 15.2 (b)	Pass
T7	80 - 60	Top Girt	ROHN TS1.5x11 ga	400	1.00	17.48	5.7 18.2 (b)	Pass
T8	60 - 40	Top Girt	ROHN TS1.5x11 ga	457	0.93	17.48	5.4 17.0 (b)	Pass
T9	40 - 20	Top Girt	ROHN TS1.5x16 ga	514	0.99	8.83	11.3 23.3 (b)	Pass
T10	20 - 5	Top Girt	ROHN TS1.5x11 ga	548	0.73	17.48	4.2 13.2 (b)	Pass
T11	5 - 0	Top Girt	L3x3x1/2	574	11.55	79.18	14.6	Pass
T1	193 - 180	Bottom Girt	L2x2x1/4	9	-0.72	15.88	4.5	Pass
T2	180 - 160	Bottom Girt	L2x2x1/4	46	-5.40	15.88	34.0 39.6 (b)	Pass
T3	160 - 140	Bottom Girt	ROHN TS1.5x11 ga	129	0.62	17.48	3.5 11.2 (b)	Pass
T4	140 - 120	Bottom Girt	ROHN TS1.5x11 ga	209	0.95	17.48	5.4 17.3 (b)	Pass
T5	120 - 100	Bottom Girt	L2x2x1/4	265	3.45	21.76	15.9 20.1 (b)	Pass
T6	100 - 80	Bottom Girt	ROHN TS1.5x16 ga	348	0.51	8.83	5.8 12.0 (b)	Pass
T7	80 - 60	Bottom Girt	ROHN TS1.5x11 ga	405	2.09	17.48	12.0 38.1 (b)	Pass
T8	60 - 40	Bottom Girt	ROHN TS1.5x11 ga	460	1.23	17.48	7.0 22.4 (b)	Pass
T9	40 - 20	Bottom Girt	ROHN TS1.5x16 ga	519	0.38	8.83	4.4 9.0 (b)	Pass
T10	20 - 5	Bottom Girt	ROHN TS1.5x11 ga	550	4.26	17.48	24.4	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
							37.6 (b)	
T11	5 - 0	Bottom Girt	L3x3x1/2	578	-3.13	63.71	7.6	Pass
T11	5 - 0	Mid Girt	L3x3x1/2	583	-0.65	55.96	1.2	Pass
T2	180 - 160	Guy A@162.496	3/4	594	28.90	29.15	99.2	Pass
T5	120 - 100	Guy A@102.496	5/8	607	16.81	21.20	79.3	Pass
T7	80 - 60	Guy A@62.4961	1/2	619	9.60	13.45	71.4	Pass
T2	180 - 160	Guy B@162.496	3/4	590	28.89	29.15	99.1	Pass
T5	120 - 100	Guy B@102.496	5/8	602	16.79	21.20	79.2	Pass
T7	80 - 60	Guy B@62.4961	1/2	614	9.65	13.45	71.8	Pass
T2	180 - 160	Guy C@162.496	3/4	587	28.91	29.15	99.2	Pass
T5	120 - 100	Guy C@102.496	5/8	599	16.58	21.20	78.2	Pass
T7	80 - 60	Guy C@62.4961	1/2	611	9.65	13.45	71.7	Pass
T2	180 - 160	Torque Arm Top@162.496	C15x50	588	-9.11	187.39	62.6	Pass
T5	120 - 100	Torque Arm Top@102.496	C15x33.9	601	-5.88	148.51	45.3	Pass
T7	80 - 60	Torque Arm Top@62.4961	C12x25	616	-4.60	118.18	35.3	Pass
							Summary	
						Leg (T7)	92.6	Pass
						Diagonal (T8)	61.0	Pass
						Secondary Horizontal (T2)	59.6	Pass
						Top Girt (T9)	23.3	Pass
						Bottom Girt (T2)	39.6	Pass
						Mid Girt (T11)	1.2	Pass
						Guy A (T2)	99.2	Pass
						Guy B (T2)	99.1	Pass
						Guy C (T2)	99.2	Pass
						Torque Arm Top (T2)	62.6	Pass
						Bolt Checks	61.0	Pass
						RATING =	**99.2**	**Pass**

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Job :	Verizon ~ Montville 4: 193-ft Guyed Lattice Tower	**Project No.**	15001.044	**Sheet**	1 of
Address:	57 Cook Rd., Montville, CT	**Computed by**	TJL	**Date**	5/6
Description:	Guy Anchor Evaluation - 2005 CSBC 3108.4.2/TIA Req	**Checked by**	CFC	**Date**	

CHECK UPLIFT RESISTANCE

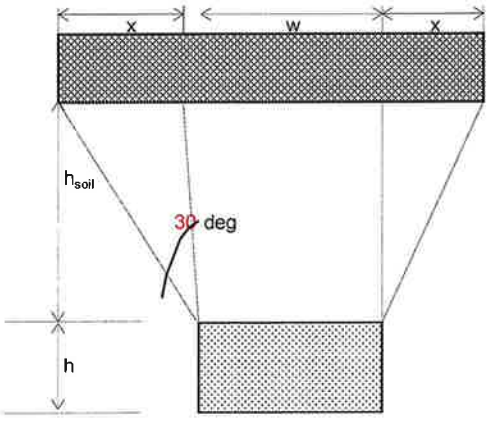
ANCHOR (C) AT 88.0ft RADIUS

RESULTS FROM COMPUTER ANALYSIS:

Uplift =	36	kips
Sliding =	36	kips
Wdepth =	6	ft

CONCRETE PARAMETERS:

γ_{conc} =	150	pcf
$\gamma_{conc.sub}$ =	87.6	pcf
w =	6	ft
h =	4	ft
d =	12	ft
Vol. =	*144.00*	ft^3
Vol.sub =	*144.00*	ft^3
Wc =	*34.21*	kips



Foundation Section

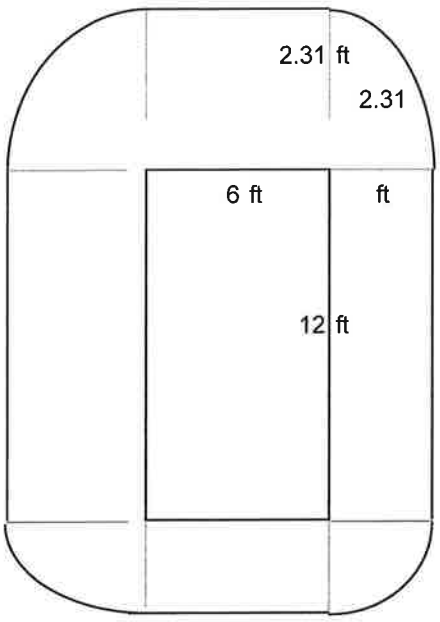
SOIL PARAMETERS:

γ_{soil} =	120	pcf
$\gamma_{soil.sub}$ =	60	pcf
h_{soil} =	4	ft
x =	*2.31*	ft

Soil Weight (Wr):

B1 =	72.00
B2 =	72.00
B3 =	176.47

W.soil =	57.79	kips
W.soil.sub =	0.00	kips
Total =	*57.79*	kips



Foundation Plan View

FO

CHECK UPLIFT (PER EIA/TIA-222-F STANDARD AND 2005 CT BUILDING CODE):

SF AGAINST SLIDING

2.56 > *2* ***OK***

→ ***GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE***

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Job :	Verizon ~ Montville 4: 193-ft Guyed Lattice Tower	**Project No.**	15001.044	**Sheet**	2 of
Address:	57 Cook Rd., Montville, CT	**Computed by**	TJL	**Date**	5/6
Description:	Guy Anchor Evaluation - 2005 CSBC 3108.4.2/TIA Req	**Checked by**	CFC	**Date**	

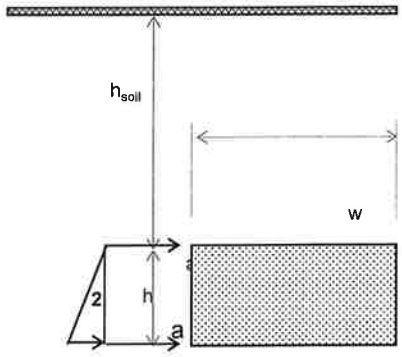
CHECK SLIDING RESISTANCE

SOIL PARAMETERS

γ soil =	120	pcf
γ soil =	60	pcf
h_{soil} =	4	ft
h =	4	ft
ϕ =	30	degrees

ANCHOR PARAMETERS

w =	6.0	ft
h =	4.0	ft
d =	12.0	ft



Foundation Elevation Vie

K_p = 3.00

HORIZONTAL FORCES

	1.44	ksf
	2.52	ksf
RESIST TO SLIDING =	95.04	k

SOIL & CONCRETE WEIGHT =	Wr + Wc =	92.01	k
UPLIFT REACTIONS =		-36	k
SUM =		56.01	k

COEF. OF FRICTION, (0.45) =	25.20	k
RESIST TO SLIDING =	95.04	k
SUM =	120.24	k

SF AGAINST SLIDING

SF = 3.3 > 2 OK

→ ***GUY ANCHORS AGAINST SLIDING ARE ADEQUATE***

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Job :	Verizon ~ Montville 4: 193-ft Guyed Lattice Tower	**Project No.**	15001.044	**Sheet**	1 of
Address:	57 Cook Rd., Montville, CT	**Computed by**	TJL	**Date**	5/6
Description:	Guy Anchor Evaluation - 2005 CSBC 3108.4.2/TIA Req	**Checked by**	CFC	**Date**	

CHECK UPLIFT RESISTANCE

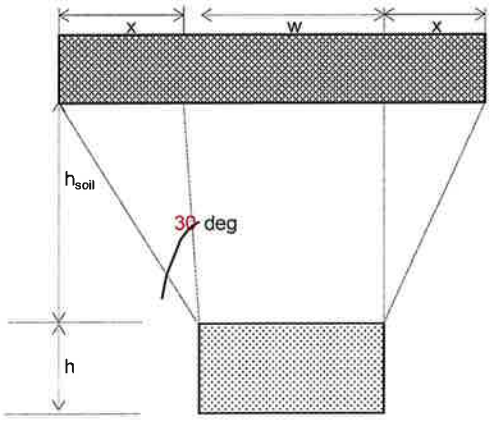
ANCHOR (C) AT 140.0ft RADIUS

RESULTS FROM COMPUTER ANALYSIS:

Uplift =	42	kips
Sliding =	37	kips
Wdepth =	6	ft

CONCRETE PARAMETERS:

γ_{conc} =	150	pcf
$\gamma_{conc.sub}$ =	87.6	pcf
w =	5	ft
h =	2	ft
d =	9	ft
Vol. =	*0.00*	ft^3
Vol.sub =	*90.00*	ft^3
Wc =	*7.88*	kips



Foundation Section

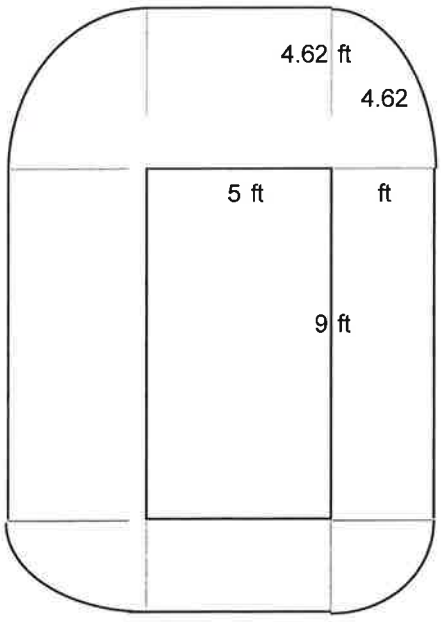
SOIL PARAMETERS:

γ_{soil} =	120	pcf
$\gamma_{soil.sub}$ =	60	pcf
h_{soil} =	8	ft
x =	*4.62*	ft

Soil Weight (Wr):

B1 =	45.00
B2 =	82.66
B3 =	259.66

W.soil =	117.32	kips
W.soil.sub =	7.55	kips
Total =	*124.87*	kips



Foundation Plan View

FO

CHECK UPLIFT (PER EIA/TIA-222-F STANDARD AND 2005 CT BUILDING CODE):

SF AGAINST SLIDING

3.16 > *2* ***OK***

→ ***GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE***

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Job :	Verizon ~ Montville 4: 193-ft Guyed Lattice Tower	**Project No.**	15001.044	**Sheet**	2 of
Address:	57 Cook Rd., Montville, CT	**Computed by**	TJL	**Date**	5/6
Description:	Guy Anchor Evaluation - 2005 CSBC 3108.4.2/TIA Req	**Checked by**	CFC	**Date**	

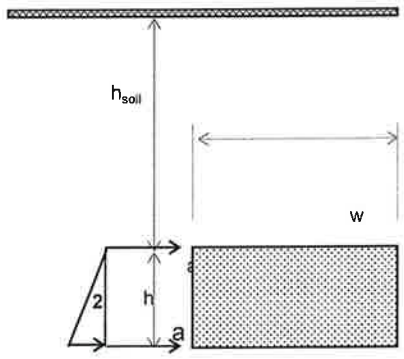
CHECK SLIDING RESISTANCE

SOIL PARAMETERS

γ soil =	120	pcf
γ soil =	60	pcf
h_{soil} =	8	ft
h =	2	ft
ϕ =	30	degrees

ANCHOR PARAMETERS

w =	5.0	ft
h =	2.0	ft
d =	9.0	ft



Foundation Elevation Vie

K_p = 3.00

HORIZONTAL FORCES

	2.52	ksf
	2.88	ksf
RESIST TO SLIDING =	48.60	k

SOIL & CONCRETE WEIGHT =	Wr + Wc = 132.75	k
UPLIFT REACTIONS =	-42	k
SUM =	90.75	k

COEF. OF FRICTION, (0.45) =	40.84	k
RESIST TO SLIDING =	48.60	k
SUM =	89.44	k

SF AGAINST SLIDING

SF = 2.4 > 2 OK

→ ***GUY ANCHORS AGAINST SLIDING ARE ADEQUATE***

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Subject:	Base Foundation Analysis
Location:	193-ft Guyed Lattice Tower Montville, CT
Rev. 0: 5/6/15	Prepared by: T.J.L. Checked by: C.F.C. Job No. 15001.044

Guyed Tower Foundation:

Input Data:

Tower Data

Shear Force =	Shear := 4·kip	(User Input from tnxTower)	
Axial Force =	Axial := 198·kip	(User Input from tnxTower)	
Axial Force =	Moment := 0·kip·ft	(User Input from tnxTower)	
Tower Height =	H_t := 193·ft	(User Input)	

Footing Data:

Overall Depth of Footing =	D_f := 5.0·ft	(User Input)	
Length of Pier =	L_p := 3.75·ft	(User Input)	
Extension of Pier Above Grade =	L_{pag} := 0.5·ft	(User Input)	
Width of Pier =	d_p := 2.5·ft	(User Input)	
Thickness of Footing =	T_f := 1.75·ft	(User Input)	
Width of Footing =	W_f := 7.0·ft	(User Input)	

Material Properties:

Concrete Compressive Strength =	f_c := 3000·psi	(User Input)	
Steel Reinforcement Yield Strength =	f_y := 60000·psi	(User Input)	
Internal Friction Angle of Soil =	Φ_s := 30·deg	(User Input)	
Allowable Soil Bearing Capacity =	q_s := 6000·psf	(User Input)	
Unit Weight of Soil =	γ_{soil} := 125·pcf	(User Input)	
Unit Weight of Concrete =	γ_{conc} := 150·pcf	(User Input)	
Foundation Bouyancy =	Bouyancy := 0	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	n := 1.0·ft	(User Input)	
Cohesion of Clay Type Soil =	c := 0·ksf	(User Input)	(Use 0 for Sandy Soil)
Coefficient of Friction Between Concrete =	μ := 0.45	(User Input)	
Overturning/Sliding Factor of Safety Required =	FS_{req} := 2	(User Input)	

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$$

Load Factor =

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

Stability of Footing:

Adjusted Concrete Unit Weight =

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

Adjusted Soil Unit Weight =

$$\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 125\cdot pcf$$

Passive Pressure =

$$P_{pn} := K_p\cdot\gamma_s\cdot n + c\cdot 2\cdot\sqrt{K_p} = 0.375\cdot ksf$$

$$P_{pt} := K_p\cdot\gamma_s\cdot(D_f - T_f) + c\cdot 2\cdot\sqrt{K_p} = 1.219\cdot ksf$$

$$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.219\cdot ksf$$

$$P_{bot} := K_p\cdot\gamma_s\cdot D_f + c\cdot 2\cdot\sqrt{K_p} = 1.875\cdot ksf$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.547\cdot ksf$$

$$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 1.75$$

$$A_p := W_f\cdot T_p = 12.25$$

Ultimate Shear =

$$S_u := P_{ave}\cdot A_p = 18.949\cdot kip$$

Weight of Concrete =

$$WT_c := \left[\left(W_f^2\cdot T_f\right) + d_p^2 L_p\right]\cdot\gamma_c = 16.38\cdot kip$$

Total Weight =

$$WT_{tot} := WT_c + Axial = 214.38\cdot kip$$

Resisting Moment =

$$M_r := (WT_{tot})\cdot\frac{W_f}{2} + S_u\cdot\frac{T_f}{3} = 761\cdot kip\cdot ft$$

Overturning Moment =

$$M_{ot} := Moment + Shear\cdot(L_p + T_f) = 22\cdot kip\cdot ft$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 34.61$$

Factor of Safety Required =

$$FS_{req} := 2$$

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

OverTurning_Moment_Check = "Okay"

Soil/Concrete Friction Resistance = $Sl_2 := \mu \cdot WT_{tot} = 96.47 \cdot kips$

Total Sliding Resistance = $Sl_{tot} := S_u + Sl_2 = 115.42 \cdot kips$

Factor of Safety Actual = $FS := \frac{Sl_{tot}}{Shear} = 28.85$

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

Sliding_Resistance_Check = "Okay"

Bearing Pressure Caused by Footing:

Overturning Moment = $M_{ot} := Moment + Shear \cdot (L_p + T_f) = 22 \cdot kip \cdot ft$

Area of the Mat = $A_{mat} := W_f^2 = 49$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 57.17 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 4.76 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = 3.99 \cdot ksf$

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

Min_Pressure_Check = "Okay"

SITE NAME	**MONTVILLE 4 CT**			**ECP - CELL #**		**2**	**325**	
LATITUDE	**41-28-29.95 N**			**LONGITUDE**		**72-06-18.18 W**		
Additional Comments: 2014 AWS ADD. 700 RRH has 4 ports. Utilize both low band ports on the AWS SBNHH antenna and the PCS SBNHH antenna				**SAVE BUTTON**				
				STRUCTURE TYPE		**MONOPOLE**		
AWS - LTE ANTENNA ADD	**ALPHA**			**BETA**		**GAMMA**		
EQUIPMENT TYPE	2100 MHz BBU			2100 MHz BBU		2100 MHz BBU		
ANTENNA TYPE	SBNHH-1D65B_PORT 6			SBNHH-1D65B_PORT 6		SBNHH-1D65B_PORT 6		
QTY OF ANTENNAS PER FACE	1			1		1		
ORIENTATION (DEG)	30			150		270		
DOWN TILT (MECH/ELEC)	0/4			0/4		0/4		
RAD CTR (FT AGL)	169			169		169		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
RRH - QTY/MODEL	1	ALU RH_2X60-AWS		1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS	
SECTOR DISTRIBUTION BOX								
MAIN DISTRIBUTION BOX	2					DB-T1-6Z-8AB-0Z		
2 ports shared with 700	2 low band ports for 700 RRH			2 low band ports for 700 RRH		2 low band ports for 700 RRH		
700 Mhz C - LTE Current Config	**ALPHA**			**BETA**		**GAMMA**		
EQUIPMENT TYPE	eNodeB			eNodeB		eNodeB		
ANTENNA TYPE	BXA-70063-6CF-2			BXA-70063-6CF-2		BXA-70063-6CF-2		
QTY OF ANTENNAS PER FACE	1			1		1		
ORIENTATION (DEG)	30			150		270		
DOWN TILT (MECH/DEG)	4			2		4		
RAD CTR (FT AGL)	169			169		169		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
MCPA BRICKS (QTY)								
700 Mhz C - LTE Future Config	**ALPHA**			**BETA**		**GAMMA**		
EQUIPMENT TYPE	eNodeB			eNodeB		eNodeB		
ANTENNA TYPE	SBNHH-1D65B_PORT 6			SBNHH-1D65B_PORT 6		SBNHH-1D65B_PORT 6		
QTY OF ANTENNAS PER FACE	0			0		0		
ORIENTATION (DEG)	30			150		270		
DOWN TILT (MECH/DEG)	0/6			0/2		0/2		
RAD CTR (FT AGL)	169			169		169		
TMA - QTY / MODEL	1	RRH 2X60 700		1	RRH 2X60 700	1	RRH 2X60 700	
DIPLEXER - QTY / MODEL								
	Use low band ports on PCS and AWS			Use low band ports on PCS and AWS		Use low band ports on PCS and AWS		
850 Celluar - Current Config	**ALPHA**			**BETA**		**GAMMA**		
EQUIPMENT TYPE	BTS8440			BTS8440		BTS8440		
ANTENNA TYPE	LPA-80080/4CF			LPA-80080/4CF		LPA-80080/4CF		
QTY OF ANTENNAS PER FACE	2			2		2		
ORIENTATION (DEG)	30			150		270		
DOWN TILT (MECH/DEG)	4			0		4		
RAD CTR (FT AGL)	169			169		169		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
DIPLEXER KIT - QTY / MODEL								
MCPA BRICKS (QTY)								
850 Celluar - Future Config	**ALPHA**			**BETA**		**GAMMA**		
EQUIPMENT TYPE	BTS8440			BTS8440		BTS8440		
ANTENNA TYPE	LPA-80080/4CF			LPA-80080/4CF		LPA-80080/4CF		
QTY OF ANTENNAS PER FACE	2			2		2		
ORIENTATION (DEG)	30			150		270		
DOWN TILT (MECH/DEG)	4			0		4		
RAD CTR (FT AGL)	169			169		169		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
DIPLEXER KIT - QTY / MODEL								
MCPA BRICKS (QTY)								

1900 PCS - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0B	PCS Modcell 4.0B	PCS Modcell 4.0B
ANTENNA TYPE	BXA-171085_8BF_2	BXA-171085_8BF_2	BXA-171085_8BF_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)	169	169	169
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
DIPLEXER KIT - QTY / MODEL			
MCPA BRICKS (QTY)			
1900 PCS - Future Config	**ALPHA**	**BETA**	**GAMMA**
EQUIPMENT TYPE	PCS Modcell 4.0B	PCS Modcell 4.0B	PCS Modcell 4.0B
ANTENNA TYPE	SBNHH-1D65B_PORT 6	SBNHH-1D65B_PORT 6	SBNHH-1D65B_PORT 6
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/ELEC)	0/3	0/3	0/3
RAD CTR (FT AGL)	169	169	169
TMA - QTY / MODEL	1 RRH 2 X60 PCS	1 RRH 2 X60 PCS	1 RRH 2 X60 PCS
DIPLEX WITH CELLULAR CABLE			
2 Ports Shared with 700	2 low band ports for 700 RRH	2 low band ports for 700 RRH	2 low band ports for 700 RRH

NUMBER OF CABLE'S NEEDED						ESTIMATED CABLE LENGTH			
MAINLINE SIZE	1 5/8"	TOTAL # OF MAINLINES			12	MAINLINE (FT)			
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS			12	TOP JUMPER (FT)			18
Equipment Cable Ordering		MAIN CABLE :	18	+	-6	TOP JUMPER #	18	+	0
FIBER LINE SIZE	1 5/8"	TOTAL # OF FIBER LINES			2	FIBER LINE MODEL #			158-1-08U8-S8
JUMPER SIZE	5/8"	TOTAL # OF TOP JUMPERS			6	TOP JUMPER MODEL #			058-1-08U1-S1
Fiber Cable Ordering		FIBER CABLE	0	+	2	TOP JUMPER #	0	+	6

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular A-Band	PCS F-Band		Cellular (Watts)	20
TX - 869-880,890-891.5 MHz	TX - 1970-1975		PCS (Watts)	16
RX - 824-835,845-846.5 MHz	RX - 1890-1895		LTE (Watts) 700 / AWS	40/60
700 MHz A - Block	700 MHz C - Block		AWS F - Block	
TX - 698 - 704 MHz	TX - 746-757		TX - 2145-2155	
RX - 728 - 734 MHz	RX - 776-787		RX - 1745-1755	

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 : Maria Montrose	Rob Hesselbach	MMM	6/6/2014
Revised By : Ray Paradis	Rob Hesselbach	MMM	3/6/2015

Site Configuration

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.

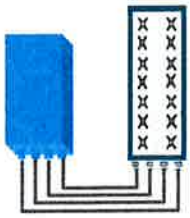
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

TECHNICAL SPECIFICATIONS

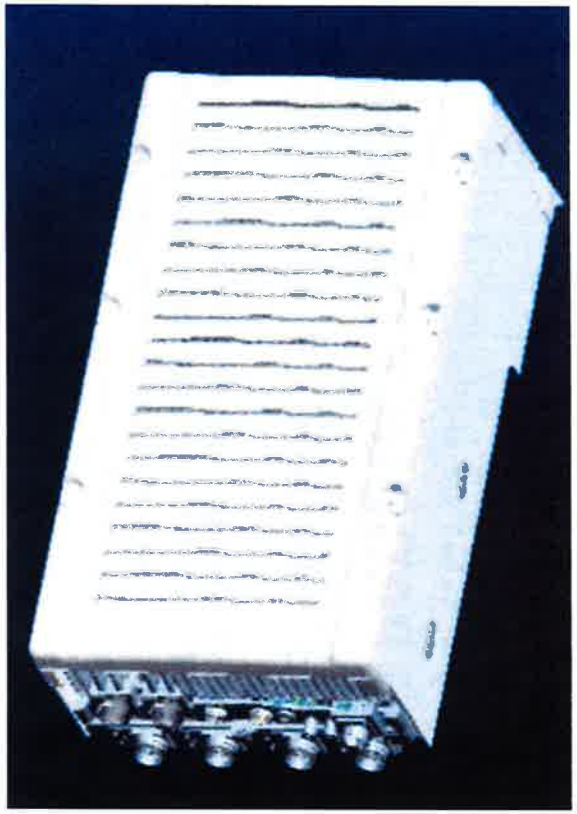
Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (In 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W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

NEW PCS RF MODULES FOR VZW

RRH2X60 - HW CHARACTERISTICS

LR14.3

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



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

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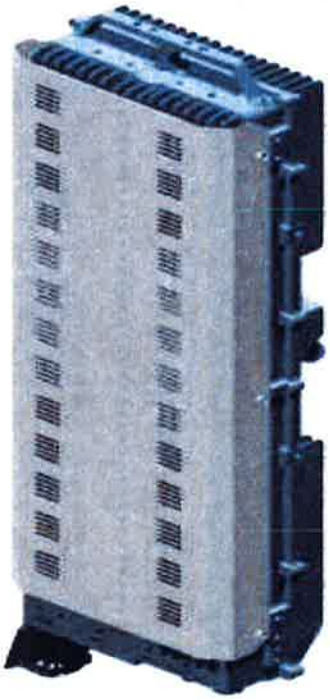
ALCATEL-LUCENT WIRELESS PRODUCT DATASHEET

RRH2X60-AWS FOR BAND 4 APPLICATIONS

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



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

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

SUPERIOR RF PERFORMANCE

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

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

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

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

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

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

OPTIMIZED TCO

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

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

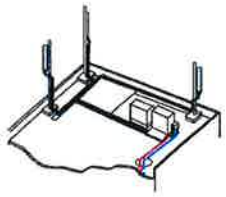
EASY INSTALLATION

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

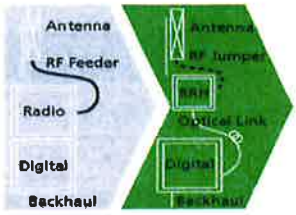
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

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

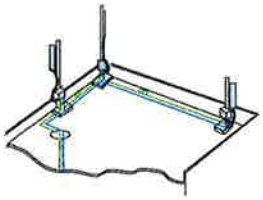
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

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

BENEFITS

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

TECHNICAL SPECIFICATIONS

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

Dimensions and weights

36.7"x10.6"x5.8"

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

Electrical Data

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

RF Characteristics

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

Connectivity

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

Environmental specifications

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

Safety and Regulatory Data

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

Alcatel·Lucent

AT THE SPEED OF IDEAS™

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.