Robinson+Cole

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July 8, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
1192 Wolcott Road, Wolcott, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 135-foot level of the existing 180-foot tower at 1192 Wolcott Road in Wolcott, Connecticut (the "Property"). The tower and underlying property are owned by American Tower Corporation. The Council approved Cellco's use of this tower in 1997. Cellco now intends to modify its facility by removing six (6) 850 MHz antennas and replacing them with two (2) model LNX-8513DS, 850 MHz antennas; one (1) model LNX-6514DS, 850 MHz antenna; and three (3) model HBX-6517DS, 2100 MHz antennas, all at the same level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable outside the lattice tower. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

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 Thomas G. Dunn, Mayor for the Town of Wolcott.

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

Robinson+Cole

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's new antennas and RRHs will be installed at a centerline height of 135 feet on the existing 180-foot tower.

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

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

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

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

6. The tower and its foundation, with certain reinforcements, can support Cellco's proposed modifications. (*See* Structural Analysis Report and Tower Reinforcement Design 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:
Thomas G. Dunn, Mayor
Sandy M. Carter

ATTACHMENT 1

Product Specifications

COMMSCOPE®

LNX-8513DS-VTM

Andrew® Teletilt® Antenna, 698–896 MHz, 85° horizontal beamwidth, RET compatible

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	14.6	15.3
Beamwidth, Horizontal, degrees	85	85
Beamwidth, Vertical, degrees	12.2	11.0
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	17
Front-to-Back Ratio at 180°, dB	25	26
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°

Mechanical Specifications

Color | Radome Material	Light gray | Fiberglass, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1847.0 mm x 301.0 mm x 181.0 mm | 72.7 in x 11.9 in x 7.1 in
Net Weight	17.8 kg | 39.2 lb
Model with factory installed AISG 2.0 RET	LNX-8513DS-A1M

Product Specifications

COMMSCOPE®

LNX-6514DS-VTM

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

POWERED BY ANDREW.

Electrical Specifications

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

Mechanical Specifications

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

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

HBX-6517DS-VTM

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

- Superior azimuth tracking and pattern symmetry to minimize any sector overlap
- Rugged, reliable design with excellent passive intermodulation suppression
- The values presented on this datasheet have been calculated based on N-P-BASTA White Paper version 9.6 by the NGMN Alliance

Electrical Specifications

Frequency Band, MHz	**1710–1880**	**1850–1990**	**1920–2180**
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.9
Gain by all Beam Tilts Tolerance, dB	±0.2	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.3	0 ° | 18.4	0 ° | 18.8
	3 ° | 18.6	3 ° | 18.7	3 ° | 19.1
	6 ° | 18.4	6 ° | 18.6	6 ° | 18.7
Beamwidth, Horizontal, degrees	67	66	64
Beamwidth, Horizontal Tolerance, degrees	±1.8	±0.9	±2.8
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beamwidth, Vertical Tolerance, degrees	±0.2	±0.2	±0.3
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	19	19	18
Front-to-Back Total Power at 180° ± 30°, dB	26	26	26
CPR at Boresight, dB	22	22	22
CPR at Sector, dB	11	11	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2180 MHz
Number of Ports, all types	2

Mechanical Specifications

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

Product Specifications

HBX-6517DS-VTM

RF Connector Quantity, total	2
Wind Loading, maximum	393.0 N @ 150 km/h 88.3 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	83.0 mm | 3.3 in
Length	1902.0 mm | 74.9 in
Width	166.0 mm | 6.5 in
Net Weight	6.2 kg | 13.7 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	HBX-6517DS-R2M
Model with Factory Installed AISG 2.0 Actuator	HBX-6517DS-A1M
RET System	Teletilt®

Regulatory Compliance/Certifications

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

Included Products

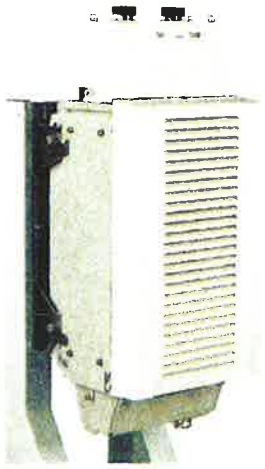
DB390 — Pipe Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Use for narrow panel antennas. Includes two pipe mounts.

DB5098E — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

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



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

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

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

Fast, low-cost installation and deployment

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

Excellent RF performance

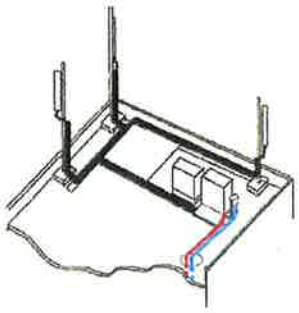
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

Features

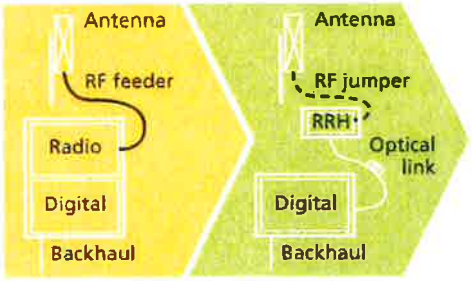
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

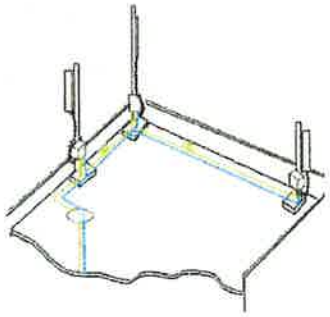
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

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

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
  - ¬ With solar load: -40°C to +50°C (-40°F to +122°F)
  - ¬ Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)
- Enclosure protection
  - ¬ IP65 (International Protection rating)

RF characteristics

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

Optical characteristics

Type/number of fibers

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

Optical fiber length

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

Digital Ports and Alarms

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

Alcatel·Lucent

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.

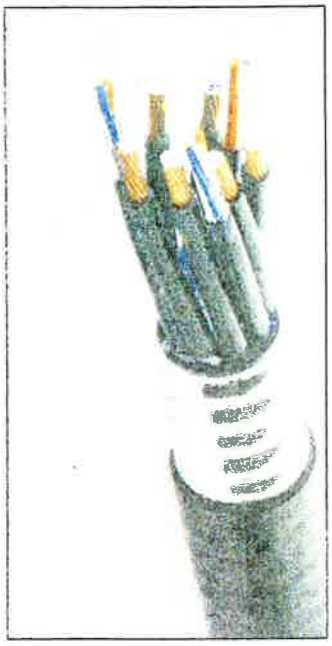


Figure 1: HYBRIFLEX Series

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-93-638 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)

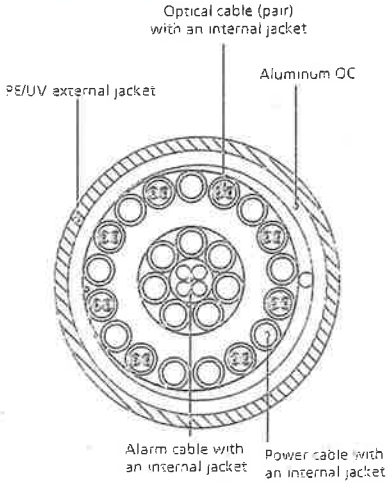


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Wolcott N								
Tower Height: 180'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*2-way radio			180				0.40%	
*T-Mobile LTE	2	24	162	0.0007	2100	1.0000	0.07%	
*T-Mobile GSM/UMTS	2	12	162	0.0003	1950	1.0000	0.03%	
*T-Mobile UMTS	2	12	162	0.0003	2100	1.0000	0.03%	
Verizon	**7**	**322**	**135**	**0.0445**	**1970**	**1.0000**	**4.45%**	
Verizon	**9**	**362**	**135**	**0.0643**	**869**	**0.5793**	**11.10%**	
Verizon	**1**	**1918**	**135**	**0.0378**	**2145**	**1.0000**	**3.78%**	
Verizon	**1**	**819**	**135**	**0.0162**	**698**	**0.4973**	**3.25%**	
								23.1%
* Source: Siting Council								

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

180' Existing ROHN Lattice Tower

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Wolcott North

1192 Wolcott Road
Wolcott, CT

Centek Project No. 14001.048

Date: May 28, 2014

Prepared for:

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

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

Table of Contents

SECTION 5 - REINFORCEMENT DRAWINGS

SECTION 6 – REFERENCE MATERIALS

Introduction

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

The host tower is a 180-ft, three legged, tapered lattice tower originally designed and manufactured by ROHN, eng. file no. 23963DB dated November 28 1988. The tower geometry, structure member sizes and foundation information were taken from a previous structural analysis report Centek Engineering job no. 11001.CO1 dated November 10, 2011.

Antenna and appurtenance inventory were taken from the aforementioned Centek structural report and a Verizon RF data sheet.

The tower consists of nine (9) vertical sections consisting of steel pipe legs conforming to ASTM A572 Gr. 50 and steel angle diagonal and horizontal lateral support bracing conforming to ASTM A36. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 6.52-ft at the top and 20.78-ft at the base.

Verizon proposes the replacement of six (6) of the existing twelve (12) panel antennas and the installation of three (3) remote radio heads and one (1) main distribution box mounted to the existing T-Frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

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

- UNKNOWN (Existing):
  Antenna: One (1) 2-Bay Dipole and two (2) 10' Omni-Directional whips mounted on three (3) 3' stand-offs and one (1) 10' Omni-Directional whip flush mounted to a leg of the existing tower with a RAD center elevation of ±185-ft above grade level.
  Coax Cable: Three (3) 7/8" ∅ and one (1) 1-1/4" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 10' Omni-Directional whip mounted on one (1) 3' stand-off with a RAD center elevation of ±155-ft above grade level.
  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: Two (2) empty 3' stand-offs with an elevation of ±150-ft above grade level.
- UNKNOWN (Existing):
  Antenna: One (1) 8' Omni-Directional whip mounted on one (1) 2' stand-off with a RAD center elevation of ±144-ft above grade level.
  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) 8' Omni-Directional whip mounted on one (1) 2' stand-off with a RAD center elevation of ±104-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remain):
  Antennas: Three (3) Antel BXA-70063/6CF panel antennas, two (2) RFS APX18-206516L-T0 panel antennas, one (1) Antel BXA-171063-8BF panel antenna and six (6) FD9R6004/2C-3L Diplexers mounted on three (3) existing PiROD 13' KD T-Frames with a RAD center elevation of ±135-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remove):
  Antennas: Four (4) RFS APL868013 and two (2) RFS APL866513 panel antennas mounted on three (3) existing PiROD 13' KD T-Frames with a RAD center elevation of ±135-ft above grade level.
- **VERIZON (Proposed):**
  Antennas: Three (3) Andrew HBX-6517DS panel antennas, two (2) Andrew LNX-8513DS panel antennas, one (1) Andrew LNX-6514DS panel antenna, three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on three (3) existing PiROD 13' KD T-Frames with a RAD center elevation of ±135-ft above grade level.
  Coax Cables: One (1) 1-5/8" ∅ fiber cables running on a leg/face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

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

Analysis

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

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

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

Tower Loading

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

Basic Wind Speed:	New Haven; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Wolcott; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	TIA/EIA wind speed controls.	
Load Cases:	Load Case 1; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 74 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 74 mph wind speed velocity represents 75% of the wind pressure generated by the 85 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	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 **with the proposed reinforcements outlined in the drawings within section 5 of this report were found** to be within allowable limits. In Load Case 1, per tnxtower "Section Capacity Table", this tower was found to be at **99.7%** of its total capacity.

Condition	Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Unreinforced Tower	Diagonal (T10)	20'-0"-40'-0"	86.2%	**PASS**
	Horizontal (T5)	106.6'-0"-113'-3"	11.1%	**PASS**
	Leg (T10)	20'-0"-40'-0"	**103.4%**	**FAIL**
Reinforced Tower	Diagonal (T10)	20'-0"-40'-0"	90.3%	**PASS**
	Horizontal (T5)	106.6'-0"-113'-3"	11.1%	**PASS**
	Leg (T8)	60'-0"-80'-0"	99.7%	**PASS**

Foundation and Anchors

The existing foundation consists of a 28.5-ft wide by 4.0-ft deep reinforced concrete mat footing. The sub grade conditions used in the analysis of the existing foundation were derived from the aforementioned Centek structural report.

Tower legs are connected to the concrete mat by means of (4) 1.00"∅, ASTM A354 Gr. BC anchor bolts per leg, embedded into the concrete mat.

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

Reactions	Vector	Proposed Base Reactions
Base	Shear	**25 kips**
	Compression	**17 kips**
	Moment	**2302 kip-ft**
Leg	Shear	**16 kips**
	Compression	**134 kips**
	Uplift	**113 kips**

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	58.3%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Mat	OTM[2]	2.0	3.03	**PASS**

Note 1: FS denotes Factor of Safety.

Conclusion

This analysis shows that the subject tower **with the proposed reinforcements outlined in the drawings within section 5 of this report is adequate** to support the proposed modified antenna configuration.

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 18894
LICENSED
PROFESSIONAL ENGINEER

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

General Description of Structural Analysis Program

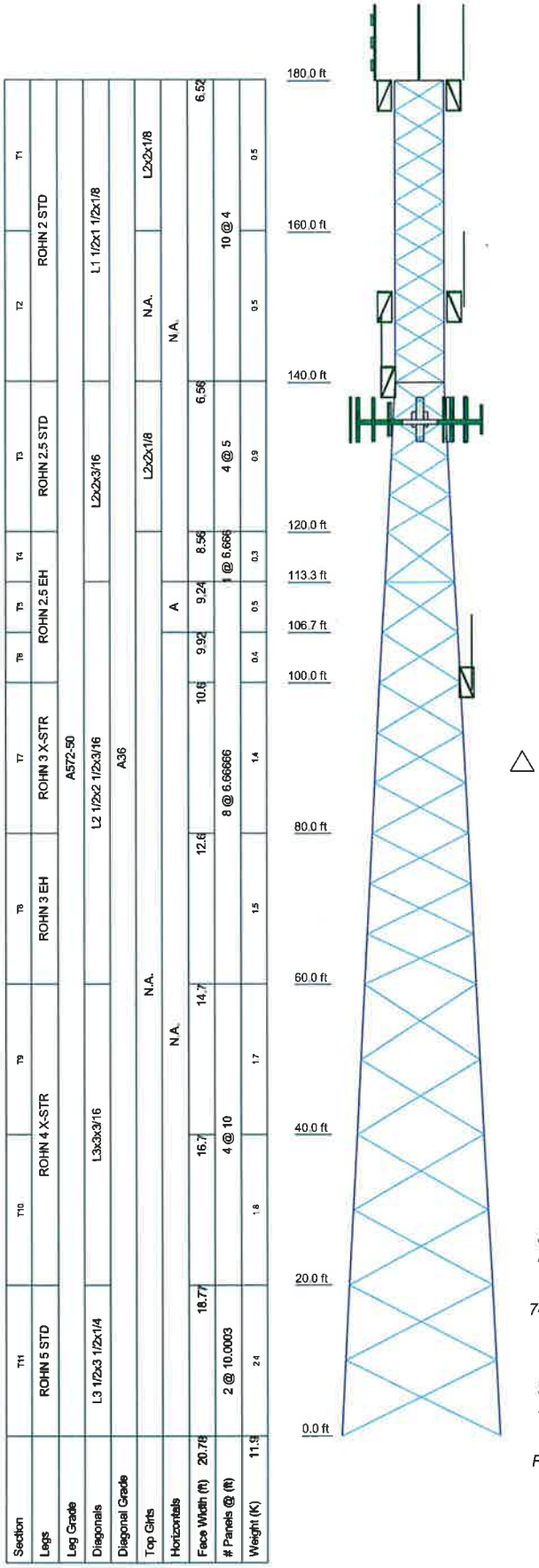
tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

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

Section 3.0

Unreinforced Tower Calculations



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
2 Bay Dipole	185	BXA-70063/6CF (Verizon - Existing)	135
2" Dia 10' Omni	185	APX18-206516L-T0 (Verizon - Existing)	135
2" Dia 10' Omni	185	(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	135
2" Dia 10' Omni	185		
3' Side Mount Standoff	178	BXA-70063/6CF (Verizon - Existing)	135
3' Side Mount Standoff	178	APX18-206516L-T0 (Verizon - Existing)	135
3' Side Mount Standoff	178	BXA-70063/6CF (Verizon - Existing)	135
2" Dia 10' Omni	155	BXA-171063/8BF (Verizon - Existing)	135
3' Side Mount Standoff	150	(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	135
3' Side Mount Standoff	150		
3' Side Mount Standoff	150	HBX-6517DS (Verizon - Proposed)	135
2" Dia 8' Omni	144	LNX-8513DS (Verizon - Proposed)	135
2' Side Mount Standoff	140	(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	135
HBX-6517DS (Verizon - Proposed)	135		
LNX-6514DS-VTM (Verizon - Proposed)	135	LNX-8513DS (Verizon - Proposed)	135
		HBX-6517DS (Verizon - Proposed)	135
RRH2x40-AWS (Verizon - Proposed)	135	Pirod 13' KD T-Frame	135
RRH2x40-AWS (Verizon - Proposed)	135	Pirod 13' KD T-Frame	135
RRH2x40-AWS (Verizon - Proposed)	135	Pirod 13' KD T-Frame	135
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	135	2" Dia 8' Omni	104
		2' Side Mount Standoff	100

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L3x3x3/16		

MATERIAL STRENGTH

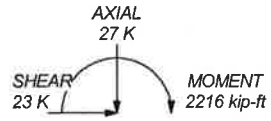
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

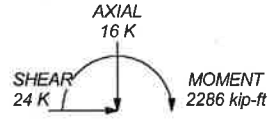
1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 103.4%

△

MAX. CORNER REACTIONS AT BASE:
DOWN: 132 K
UPLIFT: -112 K
SHEAR: 15 K



TORQUE 17 kip-ft
74 mph WIND - 0.5000 in ICE



TORQUE 20 kip-ft
REACTIONS - 85 mph WIND

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

Job: 14001.048 - Wolcott North		
Project: 180' Self-Support Lattice 1192 Wolcott Road., Wolcott, CT		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 05/28/14	Scale: NTS
Path:		Dwg No. E-1

tnxTower	Job	Page
	14001.048 - Wolcott North	1 of 31
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	**Project** 180' Self-Support Lattice 1192 Wolcott Road., Wolcott, CT	**Date** 08:07:42 05/28/14
	Client Verizon Wireless	**Designed by** TJL

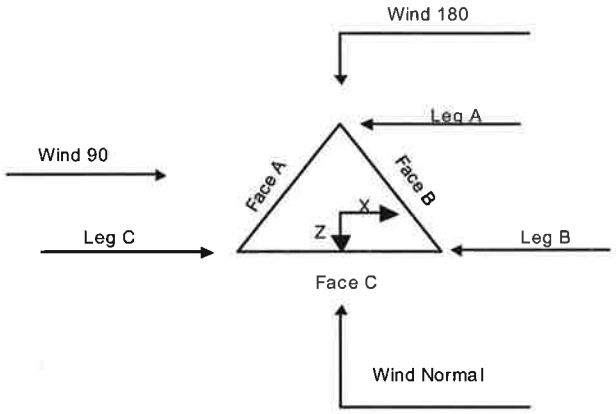
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 6.52 ft at the top and 20.78 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	√ Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
Use Code Safety Factors - Guys	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		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.00-160.00			6.52	1	20.00
T2	160.00-140.00			6.52	1	20.00
T3	140.00-120.00			6.56	1	20.00
T4	120.00-113.33			8.56	1	6.67
T5	113.33-106.67			9.24	1	6.67
T6	106.67-100.00			9.92	1	6.67
T7	100.00-80.00			10.60	1	20.00
T8	80.00-60.00			12.60	1	20.00
T9	60.00-40.00			14.70	1	20.00
T10	40.00-20.00			16.70	1	20.00
T11	20.00-0.00			18.77	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.00-160.00	4.00	X Brace	No	No	0.0000	0.0000
T2	160.00-140.00	4.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	5.00	X Brace	No	No	0.0000	0.0000
T4	120.00-113.33	6.67	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T5	113.33-106.67	6.67	X Brace	No	Yes	0.0000	0.0000
T6	106.67-100.00	6.67	X Brace	No	No	0.0000	0.0000
T7	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T8	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000
T9	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T10	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T11	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T2 160.00-140.00	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T3 140.00-120.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T4 120.00-113.33	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T5 113.33-106.67	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 106.67-100.00	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 100.00-80.00	Pipe	ROHN 3 X-STR	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T8 80.00-60.00	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T9 60.00-40.00	Pipe	ROHN 4 X-STR	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T10 40.00-20.00	Pipe	ROHN 4 X-STR	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T11 20.00-0.00	Pipe	ROHN 5 STD	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	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 180.00-160.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)
T3 140.00-120.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Solid Round		A572-50 (50 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
T5 113.33-106.67	None	Single Angle		A36 (36 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 120.00-113.33	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 113.33-106.67	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 106.67-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T11 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 180.00-160.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 160.00-140.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 140.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 120.00-113.33	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 113.33-106.67	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T6	Yes	Yes	1	1		1		1		1		1		1		1	
106.67-100.00				1		1		1		1		1		1		1	
T7	Yes	Yes	1	1		1		1		1		1		1		1	
100.00-80.00				1		1		1		1		1		1		1	
T8	Yes	Yes	1	1		1		1		1		1		1		1	
80.00-60.00				1		1		1		1		1		1		1	
T9	Yes	Yes	1	1		1		1		1		1		1		1	
60.00-40.00				1		1		1		1		1		1		1	
T10	Yes	Yes	1	1		1		1		1		1		1		1	
40.00-20.00				1		1		1		1		1		1		1	
T11	Yes	Yes	1	1		1		1		1		1		1		1	
20.00-0.00				1		1		1		1		1		1		1	

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
180.00-160.00														
T2	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
160.00-140.00														
T3	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
140.00-120.00														
T4	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
120.00-113.33														
T5	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
113.33-106.67														
T6	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
106.67-100.00														
T7	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
100.00-80.00														
T8 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T10	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
40.00-20.00														
T11 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg 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.
T1 180.00-160.00	Flange	0.6250 A325N	0	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T2 160.00-140.00	Flange	0.6250 A325N	4	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	0.6250 A325N	4	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T4 120.00-113.33	Flange	0.6250 A325N	4	0.6250 A325N	1	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T5 113.33-106.67	Flange	0.7500 A325N	0	0.6250 A325N	1	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T6 106.67-100.00	Flange	0.7500 A325N	0	0.6250 A325N	1	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T7 100.00-80.00	Flange	0.7500 A325N	4	0.6250 A325N	1	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T8 80.00-60.00	Flange	0.8750 A325N	4	0.6250 A325N	1	1.2500 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T9 60.00-40.00	Flange	0.8750 A325N	4	0.6250 A325N	1	1.2500 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T10 40.00-20.00	Flange	0.8750 A325N	4	0.6250 A325N	1	1.2500 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T11 20.00-0.00	Flange	1.0000 A325N	4	0.6250 A325N	1	1.2500 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
7/8	C	Yes	Ar (CfAe)	180.00 - 6.00	2.0000	0.41	3	3	1.1100 1.0000	1.1100		0.54
7/8	C	Yes	Ar (CfAe)	150.00 - 6.00	2.0000	0.43	1	1	1.1100	1.1100		0.54
7/8	C	Yes	Ar (CfAe)	140.00 - 6.00	2.0000	0.44	1	1	1.1100 1.0000	1.1100		0.54
1 1/4	C	Yes	Ar (CfAe)	180.00 - 6.00	2.0000	0.39	1	1	1.5500	1.5500		0.66
1/2	C	Yes	Ar (CfAe)	100.00 - 6.00	2.0000	0.35	1	1	0.5800	0.5800		0.58
1 5/8 (Verizon - Existing)	B	Yes	Ar (CfAe)	130.00 - 6.00	2.0000	-0.38	6	6	1.9800	1.9800		1.04
1 5/8 (Verizon - Existing)	A	Yes	Ar (CfAe)	130.00 - 6.00	2.0000	0.38	6	6	1.9800	1.9800		1.04
HYBRIFLEX 1-5/8" (Verizon - Proposed)	A	Yes	Ar (CfAe)	130.00 - 6.00	4.0000	0.42	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	180.00-160.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	8.133	0.000	0.000	0.000	0.05
T2	160.00-140.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	9.058	0.000	0.000	0.000	0.05
T3	140.00-120.00	A	11.550	0.000	0.000	0.000	0.08
		B	9.900	0.000	0.000	0.000	0.06
		C	11.833	0.000	0.000	0.000	0.07
T4	120.00-113.33	A	7.699	0.000	0.000	0.000	0.05
		B	6.599	0.000	0.000	0.000	0.04
		C	3.944	0.000	0.000	0.000	0.02
T5	113.33-106.67	A	7.700	0.000	0.000	0.000	0.05
		B	6.600	0.000	0.000	0.000	0.04
		C	3.944	0.000	0.000	0.000	0.02
T6	106.67-100.00	A	7.700	0.000	0.000	0.000	0.05
		B	6.600	0.000	0.000	0.000	0.04
		C	3.944	0.000	0.000	0.000	0.02
T7	100.00-80.00	A	23.100	0.000	0.000	0.000	0.16
		B	19.800	0.000	0.000	0.000	0.12
		C	12.800	0.000	0.000	0.000	0.08
T8	80.00-60.00	A	23.100	0.000	0.000	0.000	0.16
		B	19.800	0.000	0.000	0.000	0.12
		C	12.800	0.000	0.000	0.000	0.08
T9	60.00-40.00	A	23.100	0.000	0.000	0.000	0.16
		B	19.800	0.000	0.000	0.000	0.12
		C	12.800	0.000	0.000	0.000	0.08
T10	40.00-20.00	A	23.100	0.000	0.000	0.000	0.16
		B	19.800	0.000	0.000	0.000	0.12
		C	12.800	0.000	0.000	0.000	0.08
T11	20.00-0.00	A	16.171	0.000	0.000	0.000	0.11
		B	13.861	0.000	0.000	0.000	0.09
		C	8.960	0.000	0.000	0.000	0.06

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	180.00-160.00	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		14.800	0.000	0.000	0.000	0.13
T2	160.00-140.00	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		16.558	0.000	0.000	0.000	0.14
T3	140.00-120.00	A	0.500	17.383	0.000	0.000	0.000	0.19
		B		14.900	0.000	0.000	0.000	0.15
		C		21.833	0.000	0.000	0.000	0.19
T4	120.00-113.33	A	0.500	11.588	0.000	0.000	0.000	0.12
		B		9.932	0.000	0.000	0.000	0.10
		C		7.277	0.000	0.000	0.000	0.06
T5	113.33-106.67	A	0.500	11.589	0.000	0.000	0.000	0.12
		B		9.933	0.000	0.000	0.000	0.10
		C		7.278	0.000	0.000	0.000	0.06
T6	106.67-100.00	A	0.500	11.589	0.000	0.000	0.000	0.12
		B		9.933	0.000	0.000	0.000	0.10
		C		7.278	0.000	0.000	0.000	0.06
T7	100.00-80.00	A	0.500	34.767	0.000	0.000	0.000	0.37

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		29.800	0.000	0.000	0.000	0.31
		C		24.467	0.000	0.000	0.000	0.22
T8	80.00-60.00	A	0.500	34.767	0.000	0.000	0.000	0.37
		B		29.800	0.000	0.000	0.000	0.31
		C		24.467	0.000	0.000	0.000	0.22
T9	60.00-40.00	A	0.500	34.767	0.000	0.000	0.000	0.37
		B		29.800	0.000	0.000	0.000	0.31
		C		24.467	0.000	0.000	0.000	0.22
T10	40.00-20.00	A	0.500	34.767	0.000	0.000	0.000	0.37
		B		29.800	0.000	0.000	0.000	0.31
		C		24.467	0.000	0.000	0.000	0.22
T11	20.00-0.00	A	0.500	24.338	0.000	0.000	0.000	0.26
		B		20.861	0.000	0.000	0.000	0.21
		C		17.127	0.000	0.000	0.000	0.15

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	180.00-160.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.785	0.664	1.209
T2	160.00-140.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.809	0.664	1.213
T3	140.00-120.00	A	0.000	0.769	1.021	1.537
		B	0.000	0.659	0.876	1.318
		C	0.000	0.965	1.047	1.931
T4	120.00-113.33	A	0.000	0.362	0.481	0.724
		B	0.000	0.310	0.412	0.620
		C	0.000	0.227	0.246	0.455
T5	113.33-106.67	A	0.000	0.498	0.875	1.317
		B	0.000	0.427	0.750	1.129
		C	0.000	0.313	0.448	0.827
T6	106.67-100.00	A	0.000	0.345	0.574	0.864
		B	0.000	0.296	0.492	0.740
		C	0.000	0.217	0.294	0.542
T7	100.00-80.00	A	0.000	1.003	1.666	2.508
		B	0.000	0.860	1.428	2.150
		C	0.000	0.706	0.923	1.765
T8	80.00-60.00	A	0.000	0.968	1.607	2.419
		B	0.000	0.829	1.378	2.074
		C	0.000	0.681	0.891	1.703
T9	60.00-40.00	A	0.000	0.687	1.370	2.062
		B	0.000	0.589	1.174	1.767
		C	0.000	0.484	0.759	1.451
T10	40.00-20.00	A	0.000	0.665	1.326	1.996
		B	0.000	0.570	1.137	1.711
		C	0.000	0.468	0.735	1.405
T11	20.00-0.00	A	0.000	0.455	1.057	1.591
		B	0.000	0.390	0.906	1.364
		C	0.000	0.320	0.586	1.120

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	180.00-160.00	-3.7928	3.0277	-4.1478	3.3053
T2	160.00-140.00	-4.4607	3.5351	-4.9011	3.8769
T3	140.00-120.00	-4.2772	-6.3661	-5.0898	-5.5024
T4	120.00-113.33	-4.5874	-15.4318	-5.5114	-14.5086
T5	113.33-106.67	-3.7408	-12.5892	-4.6065	-12.1302
T6	106.67-100.00	-4.7131	-15.8676	-5.8021	-15.2829
T7	100.00-80.00	-5.2017	-16.1578	-6.6666	-15.4792
T8	80.00-60.00	-5.8225	-18.0975	-7.4782	-17.3723
T9	60.00-40.00	-6.3383	-19.7101	-8.4956	-19.7431
T10	40.00-20.00	-6.9209	-21.5295	-9.2933	-21.6031
T11	20.00-0.00	-4.9359	-15.3581	-6.9735	-16.2136

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
BXA-70063/6CF	A	From Leg	3.00	0.0000	135.00	No Ice	7.73	4.16	0.02
(Verizon - Existing)			0.00			1/2" Ice	8.27	4.60	0.06
			0.00						
APX18-206516L-T0	A	From Leg	3.00	0.0000	135.00	No Ice	3.51	2.00	0.02
(Verizon - Existing)			-4.00			1/2" Ice	3.85	2.33	0.04
			0.00						
BXA-70063/6CF	B	From Leg	3.00	0.0000	135.00	No Ice	7.73	4.16	0.02
(Verizon - Existing)			0.00			1/2" Ice	8.27	4.60	0.06
			0.00						
BXA-171063/8BF	B	From Leg	3.00	0.0000	135.00	No Ice	2.94	2.16	0.01
(Verizon - Existing)			-4.00			1/2" Ice	3.26	2.46	0.03
			0.00						
BXA-70063/6CF	C	From Leg	3.00	0.0000	135.00	No Ice	7.73	4.16	0.02
(Verizon - Existing)			0.00			1/2" Ice	8.27	4.60	0.06
			0.00						
APX18-206516L-T0	C	From Leg	3.00	0.0000	135.00	No Ice	3.51	2.00	0.02
(Verizon - Existing)			-4.00			1/2" Ice	3.85	2.33	0.04
			0.00						
(2) FD9R6004/2C-3L	A	From Leg	3.00	0.0000	135.00	No Ice	0.00	0.08	0.00
Diplexer			0.00			1/2" Ice	0.00	0.14	0.01
(Verizon - Existing)			0.00						
(2) FD9R6004/2C-3L	B	From Leg	3.00	0.0000	135.00	No Ice	0.00	0.08	0.00
Diplexer			0.00			1/2" Ice	0.00	0.14	0.01
(Verizon - Existing)			0.00						
(2) FD9R6004/2C-3L	C	From Leg	3.00	0.0000	135.00	No Ice	0.00	0.08	0.00
Diplexer			0.00			1/2" Ice	0.00	0.14	0.01
(Verizon - Existing)			0.00						
HBX-6517DS	A	From Leg	3.00	0.0000	135.00	No Ice	5.24	3.30	0.01
(Verizon - Proposed)			6.00			1/2" Ice	5.71	3.75	0.04
			0.00						
LNX-8513DS	A	From Leg	3.00	0.0000	135.00	No Ice	8.41	5.41	0.05
(Verizon - Proposed)			4.00			1/2" Ice	8.96	5.86	0.10

tnxTower	Job	Page
	14001.048 - Wolcott North	10 of 31
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	**Project** 180' Self-Support Lattice 1192 Wolcott Road., Wolcott, CT	**Date** 08:07:42 05/28/14
	Client Verizon Wireless	**Designed by** TJL

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		*C_AA_A Front* ft^2	*C_AA_A Side* ft^2	*Weight* K
			0.00						
HBX-6517DS	B	From Leg	3.00	0.0000	135.00	No Ice	5.24	3.30	0.01
(Verizon - Proposed)			6.00			1/2" Ice	5.71	3.75	0.04
			0.00						
LNX-8513DS	B	From Leg	3.00	0.0000	135.00	No Ice	8.41	5.41	0.05
(Verizon - Proposed)			4.00			1/2" Ice	8.96	5.86	0.10
			0.00						
HBX-6517DS	C	From Leg	3.00	0.0000	135.00	No Ice	5.24	3.30	0.01
(Verizon - Proposed)			6.00			1/2" Ice	5.71	3.75	0.04
			0.00						
LNX-6514DS-VTM	C	From Leg	3.00	0.0000	135.00	No Ice	8.41	5.41	0.04
(Verizon - Proposed)			4.00			1/2" Ice	8.96	5.86	0.09
			0.00						
RRH2x40-AWS	A	From Leg	3.00	0.0000	135.00	No Ice	2.52	1.59	0.04
(Verizon - Proposed)			4.00			1/2" Ice	2.75	1.80	0.06
			0.00						
RRH2x40-AWS	B	From Leg	3.00	0.0000	135.00	No Ice	2.52	1.59	0.04
(Verizon - Proposed)			4.00			1/2" Ice	2.75	1.80	0.06
			0.00						
RRH2x40-AWS	C	From Leg	3.00	0.0000	135.00	No Ice	2.52	1.59	0.04
(Verizon - Proposed)			4.00			1/2" Ice	2.75	1.80	0.06
			0.00						
DB-T1-6Z-8AB-0Z	A	From Leg	1.00	0.0000	135.00	No Ice	5.60	2.33	0.04
(Verizon - Proposed)			0.00			1/2" Ice	5.92	2.56	0.08
			0.00						
3' Side Mount Standoff	A	From Leg	1.50	0.0000	178.00	No Ice	2.64	2.64	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00						
3' Side Mount Standoff	B	From Leg	1.50	0.0000	178.00	No Ice	2.64	2.64	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00						
3' Side Mount Standoff	C	From Leg	1.50	0.0000	178.00	No Ice	2.64	2.64	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00						
2 Bay Dipole	C	From Leg	3.00	0.0000	185.00	No Ice	2.66	2.66	0.05
			0.00			1/2" Ice	4.44	4.44	0.07
			0.00						
2" Dia 10' Omni	A	From Leg	3.00	0.0000	185.00	No Ice	2.00	2.00	0.01
			0.00			1/2" Ice	3.03	3.03	0.03
			0.00						
2" Dia 10' Omni	B	From Leg	3.00	0.0000	185.00	No Ice	2.00	2.00	0.01
			0.00			1/2" Ice	3.03	3.03	0.03
			0.00						
2" Dia 10' Omni	C	None		0.0000	185.00	No Ice	2.00	2.00	0.01
						1/2" Ice	3.03	3.03	0.03
3' Side Mount Standoff	A	From Leg	1.50	0.0000	150.00	No Ice	2.64	2.64	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00						
3' Side Mount Standoff	B	From Leg	1.50	0.0000	150.00	No Ice	2.64	2.64	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00						
3' Side Mount Standoff	C	From Leg	1.50	0.0000	150.00	No Ice	2.64	2.64	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00						
2" Dia 10' Omni	B	From Leg	3.00	0.0000	155.00	No Ice	2.00	2.00	0.01
			0.00			1/2" Ice	3.03	3.03	0.03
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
2' Side Mount Standoff	C	From Leg	1.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	2.10 4.30	2.10 4.30	0.05 0.09
2" Dia 8' Omni	C	From Leg	2.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	2.00 3.03	2.00 3.03	0.01 0.02
2" Dia 8' Omni	B	From Leg	2.00 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice	2.00 3.03	2.00 3.03	0.01 0.02
2' Side Mount Standoff	B	From Leg	1.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.10 4.30	2.10 4.30	0.05 0.09
Pirod 13' KD T-Frame	A	From Leg	2.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice	11.07 15.53	11.07 15.53	0.24 0.35
Pirod 13' KD T-Frame	B	From Leg	2.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice	11.07 15.53	11.07 15.53	0.24 0.35
Pirod 13' KD T-Frame	C	From Leg	2.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice	11.07 15.53	11.07 15.53	0.24 0.35

Tower Pressures - No Ice

$G_H = 1.121$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % 	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1	170.00	1.597	30	134.358	A	10.325	7.917	7.917	43.40	0.000	0.000
180.00-160.00					B	10.325	7.917		43.40	0.000	0.000
					C	9.661	16.050		30.79	0.000	0.000
T2	150.00	1.541	29	134.758	A	9.293	7.917	7.917	46.00	0.000	0.000
160.00-140.00					B	9.293	7.917		46.00	0.000	0.000
					C	8.629	16.975		30.92	0.000	0.000
T3	130.00	1.48	27	155.998	A	11.757	21.149	9.599	29.17	0.000	0.000
140.00-120.00					B	11.903	19.499		30.57	0.000	0.000
					C	11.732	21.433		28.94	0.000	0.000
T4	116.67	1.434	27	60.927	A	3.126	10.899	3.200	22.81	0.000	0.000
120.00-113.33					B	3.195	9.799		24.62	0.000	0.000
					C	3.361	7.144		30.46	0.000	0.000
T5	110.00	1.411	26	65.466	A	6.117	10.900	3.200	18.80	0.000	0.000
113.33-106.67					B	6.242	9.800		19.95	0.000	0.000
					C	6.544	7.144		23.38	0.000	0.000
T6	103.33	1.386	26	69.999	A	4.406	10.900	3.200	20.91	0.000	0.000
106.67-100.00					B	4.488	9.800		22.40	0.000	0.000
					C	4.686	7.144		27.05	0.000	0.000
T7	90.00	1.332	25	237.841	A	14.655	34.786	11.686	23.64	0.000	0.000
100.00-80.00					B	14.893	31.486		25.20	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	15.398	24.486		29.30	0.000	0.000
T8 80.00-60.00	70.00	1.24	23	278.841	A	16.980	34.788	11.688	22.58	0.000	0.000
					B	17.209	31.488		24.00	0.000	0.000
					C	17.696	24.488		27.71	0.000	0.000
T9 60.00-40.00	50.00	1.126	21	321.509	A	16.829	38.125	15.025	27.34	0.000	0.000
					B	17.024	34.825		28.98	0.000	0.000
					C	17.440	27.825		33.19	0.000	0.000
T10	30.00	1	18	362.210	A	18.607	38.127	15.027	26.49	0.000	0.000
40.00-20.00					B	18.796	34.827		28.02	0.000	0.000
					C	19.198	27.827		31.95	0.000	0.000
T11 20.00-0.00	10.00	1	18	404.797	A	24.222	34.746	18.575	31.50	0.000	0.000
					B	24.373	32.436		32.70	0.000	0.000
					C	24.694	27.536		35.56	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.121$

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	170.00	1.597	22	0.5000	136.025	A	10.325	17.958	11.250	39.78	0.000	0.000
180.00-160.00						B	10.325	17.958		39.78	0.000	0.000
						C	9.116	31.973		27.38	0.000	0.000
T2	150.00	1.541	22	0.5000	136.425	A	9.293	17.445	11.250	42.07	0.000	0.000
160.00-140.00						B	9.293	17.445		42.07	0.000	0.000
						C	8.080	33.195		27.26	0.000	0.000
T3	130.00	1.48	21	0.5000	157.666	A	11.241	35.942	12.938	27.42	0.000	0.000
140.00-120.00						B	11.461	33.569		28.73	0.000	0.000
						C	10.848	40.195		25.35	0.000	0.000
T4	116.67	1.434	20	0.5000	61.483	A	2.883	17.342	4.313	21.32	0.000	0.000
120.00-113.33						B	2.987	15.738		23.03	0.000	0.000
						C	3.153	13.166		26.43	0.000	0.000
T5	110.00	1.411	20	0.5000	66.022	A	5.675	18.051	4.313	18.18	0.000	0.000
113.33-106.67						B	5.863	16.467		19.31	0.000	0.000
						C	6.165	13.925		21.47	0.000	0.000
T6	103.33	1.386	19	0.5000	70.556	A	4.116	17.548	4.313	19.91	0.000	0.000
106.67-100.00						B	4.239	15.942		21.37	0.000	0.000
						C	4.437	13.366		24.23	0.000	0.000
T7 100.00-80.00	90.00	1.332	19	0.5000	239.509	A	13.813	55.317	15.025	21.73	0.000	0.000
						B	14.171	50.494		23.24	0.000	0.000
						C	14.556	45.314		25.10	0.000	0.000
T8 80.00-60.00	70.00	1.24	17	0.5000	280.510	A	16.168	56.261	15.028	20.75	0.000	0.000
						B	16.513	51.433		22.12	0.000	0.000
						C	16.885	46.248		23.80	0.000	0.000
T9 60.00-40.00	50.00	1.126	16	0.5000	323.178	A	16.137	58.509	18.364	24.60	0.000	0.000
						B	16.431	53.641		26.21	0.000	0.000
						C	16.748	48.413		28.18	0.000	0.000
T10 40.00-20.00	30.00	1	14	0.5000	363.879	A	17.937	59.112	18.366	23.84	0.000	0.000
						B	18.222	54.240		25.35	0.000	0.000
						C	18.528	49.009		27.19	0.000	0.000
T11 20.00-0.00	10.00	1	14	0.5000	406.466	A	23.688	53.020	21.914	28.57	0.000	0.000
						B	23.916	49.608		29.81	0.000	0.000
						C	24.160	45.945		31.26	0.000	0.000

Tower Pressure - Service

$G_H = 1.121$

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	170.00	1.597	10	134.358	A	10.325	7.917	7.917	43.40	0.000	0.000
180.00-160.00					B	10.325	7.917		43.40	0.000	0.000
					C	9.661	16.050		30.79	0.000	0.000
T2	150.00	1.541	10	134.758	A	9.293	7.917	7.917	46.00	0.000	0.000
160.00-140.00					B	9.293	7.917		46.00	0.000	0.000
					C	8.629	16.975		30.92	0.000	0.000
T3	130.00	1.48	9	155.998	A	11.757	21.149	9.599	29.17	0.000	0.000
140.00-120.00					B	11.903	19.499		30.57	0.000	0.000
					C	11.732	21.433		28.94	0.000	0.000
T4	116.67	1.434	9	60.927	A	3.126	10.899	3.200	22.81	0.000	0.000
120.00-113.33					B	3.195	9.799		24.62	0.000	0.000
					C	3.361	7.144		30.46	0.000	0.000
T5	110.00	1.411	9	65.466	A	6.117	10.900	3.200	18.80	0.000	0.000
113.33-106.67					B	6.242	9.800		19.95	0.000	0.000
					C	6.544	7.144		23.38	0.000	0.000
T6	103.33	1.386	9	69.999	A	4.406	10.900	3.200	20.91	0.000	0.000
106.67-100.00					B	4.488	9.800		22.40	0.000	0.000
					C	4.686	7.144		27.05	0.000	0.000
T7	90.00	1.332	9	237.841	A	14.655	34.786	11.686	23.64	0.000	0.000
100.00-80.00					B	14.893	31.486		25.20	0.000	0.000
					C	15.398	24.486		29.30	0.000	0.000
T8 80.00-60.00	70.00	1.24	8	278.841	A	16.980	34.788	11.688	22.58	0.000	0.000
					B	17.209	31.488		24.00	0.000	0.000
					C	17.696	24.488		27.71	0.000	0.000
T9 60.00-40.00	50.00	1.126	7	321.509	A	16.829	38.125	15.025	27.34	0.000	0.000
					B	17.024	34.825		28.98	0.000	0.000
					C	17.440	27.825		33.19	0.000	0.000
T10	30.00	1	6	362.210	A	18.607	38.127	15.027	26.49	0.000	0.000
40.00-20.00					B	18.796	34.827		28.02	0.000	0.000
					C	19.198	27.827		31.95	0.000	0.000
T11 20.00-0.00	10.00	1	6	404.797	A	24.222	34.746	18.575	31.50	0.000	0.000
					B	24.373	32.436		32.70	0.000	0.000
					C	24.694	27.536		35.56	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	0.05	0.53	A	0.136	2.825	0.579	1	1	14.912	1.66	83.06	C
180.00-160.00			B	0.136	2.825	0.579	1	1	14.912			
			C	0.191	2.625	0.589	1	1	19.109			
T2	0.05	0.50	A	0.128	2.855	0.578	1	1	13.871	1.56	78.22	C
160.00-140.00			B	0.128	2.855	0.578	1	1	13.871			
			C	0.19	2.63	0.588	1	1	18.617			
T3	0.21	0.91	A	0.211	2.56	0.593	1	1	24.292	1.92	95.76	C
140.00-120.00			B	0.201	2.592	0.591	1	1	23.421			
			C	0.213	2.554	0.593	1	1	24.443			

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
T4	0.12	0.32	A	0.23	2.498	0.597	1	1	9.633	0.72	107.37	A
120.00-113.33			B	0.213	2.552	0.593	1	1	9.008			
			C	0.172	2.691	0.585	1	1	7.541			
T5	0.12	0.47	A	0.26	2.408	0.604	1	1	12.706	0.89	134.21	A
113.33-106.67			B	0.245	2.452	0.601	1	1	12.128			
			C	0.209	2.566	0.592	1	1	10.776			
T6	0.12	0.38	A	0.219	2.535	0.594	1	1	10.885	0.79	118.89	A
106.67-100.00			B	0.204	2.582	0.591	1	1	10.282			
			C	0.169	2.703	0.585	1	1	8.862			
T7	0.37	1.36	A	0.208	2.57	0.592	1	1	35.249	2.50	125.07	A
100.00-80.00			B	0.195	2.613	0.589	1	1	33.450			
			C	0.168	2.707	0.584	1	1	29.706			
T8	0.37	1.46	A	0.186	2.645	0.588	1	1	37.420	2.54	127.17	A
80.00-60.00			B	0.175	2.683	0.586	1	1	35.647			
			C	0.151	2.767	0.582	1	1	31.940			
T9	0.37	1.73	A	0.171	2.696	0.585	1	1	39.128	2.46	123.13	A
60.00-40.00			B	0.161	2.73	0.583	1	1	37.337			
			C	0.141	2.806	0.58	1	1	33.581			
T10	0.37	1.81	A	0.157	2.747	0.583	1	1	40.816	2.32	116.23	A
40.00-20.00			B	0.148	2.779	0.581	1	1	39.037			
			C	0.13	2.847	0.579	1	1	35.299			
T11	0.26	2.41	A	0.146	2.787	0.581	1	1	44.404	2.57	128.30	A
20.00-0.00			B	0.14	2.807	0.58	1	1	43.188			
			C	0.129	2.85	0.578	1	1	40.623			
Sum Weight:	2.38	11.87						OTM	1651.57 kip-ft	19.94		

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	0.05	0.53	A	0.136	2.825	0.579	0.8	1	12.847	1.49	74.66	C
180.00-160.00			B	0.136	2.825	0.579	0.8	1	12.847			
			C	0.191	2.625	0.589	0.8	1	17.177			
T2	0.05	0.50	A	0.128	2.855	0.578	0.8	1	12.013	1.42	70.97	C
160.00-140.00			B	0.128	2.855	0.578	0.8	1	12.013			
			C	0.19	2.63	0.588	0.8	1	16.892			
T3	0.21	0.91	A	0.211	2.56	0.593	0.8	1	21.941	1.73	86.57	C
140.00-120.00			B	0.201	2.592	0.591	0.8	1	21.040			
			C	0.213	2.554	0.593	0.8	1	22.096			
T4	0.12	0.32	A	0.23	2.498	0.597	0.8	1	9.008	0.67	100.40	A
120.00-113.33			B	0.213	2.552	0.593	0.8	1	8.369			
			C	0.172	2.691	0.585	0.8	1	6.869			
T5	0.12	0.47	A	0.26	2.408	0.604	0.8	1	11.482	0.81	121.29	A
113.33-106.67			B	0.245	2.452	0.601	0.8	1	10.880			
			C	0.209	2.566	0.592	0.8	1	9.467			
T6	0.12	0.38	A	0.219	2.535	0.594	0.8	1	10.004	0.73	109.26	A
106.67-100.00			B	0.204	2.582	0.591	0.8	1	9.385			
			C	0.169	2.703	0.585	0.8	1	7.925			
T7	0.37	1.36	A	0.208	2.57	0.592	0.8	1	32.318	2.29	114.67	A
100.00-80.00			B	0.195	2.613	0.589	0.8	1	30.472			
			C	0.168	2.707	0.584	0.8	1	26.626			
T8	0.37	1.46	A	0.186	2.645	0.588	0.8	1	34.024	2.31	115.63	A
80.00-60.00			B	0.175	2.683	0.586	0.8	1	32.205			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.151	2.767	0.582	0.8	1	28.401			
T9	0.37	1.73	A	0.171	2.696	0.585	0.8	1	35.762	2.25	112.54	A
60.00-40.00			B	0.161	2.73	0.583	0.8	1	33.932			
			C	0.141	2.806	0.58	0.8	1	30.093			
T10	0.37	1.81	A	0.157	2.747	0.583	0.8	1	37.095	2.11	105.64	A
40.00-20.00			B	0.148	2.779	0.581	0.8	1	35.278			
			C	0.13	2.847	0.579	0.8	1	31.459			
T11	0.26	2.41	A	0.146	2.787	0.581	0.8	1	39.559	2.29	114.30	A
20.00-0.00			B	0.14	2.807	0.58	0.8	1	38.313			
			C	0.129	2.85	0.578	0.8	1	35.684			
Sum Weight:	2.38	11.87						OTM	1501.21 kip-ft	18.11		

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	0.05	0.53	A	0.136	2.825	0.579	0.85	1	13.363	1.54	76.76	C
180.00-160.00			B	0.136	2.825	0.579	0.85	1	13.363			
			C	0.191	2.625	0.589	0.85	1	17.660			
T2	0.05	0.50	A	0.128	2.855	0.578	0.85	1	12.477	1.46	72.78	C
160.00-140.00			B	0.128	2.855	0.578	0.85	1	12.477			
			C	0.19	2.63	0.588	0.85	1	17.323			
T3	0.21	0.91	A	0.211	2.56	0.593	0.85	1	22.529	1.78	88.86	C
140.00-120.00			B	0.201	2.592	0.591	0.85	1	21.635			
			C	0.213	2.554	0.593	0.85	1	22.683			
T4	0.12	0.32	A	0.23	2.498	0.597	0.85	1	9.164	0.68	102.14	A
120.00-113.33			B	0.213	2.552	0.593	0.85	1	8.529			
			C	0.172	2.691	0.585	0.85	1	7.037			
T5	0.12	0.47	A	0.26	2.408	0.604	0.85	1	11.788	0.83	124.52	A
113.33-106.67			B	0.245	2.452	0.601	0.85	1	11.192			
			C	0.209	2.566	0.592	0.85	1	9.794			
T6	0.12	0.38	A	0.219	2.535	0.594	0.85	1	10.224	0.74	111.67	A
106.67-100.00			B	0.204	2.582	0.591	0.85	1	9.609			
			C	0.169	2.703	0.585	0.85	1	8.159			
T7	0.37	1.36	A	0.208	2.57	0.592	0.85	1	33.051	2.35	117.27	A
100.00-80.00			B	0.195	2.613	0.589	0.85	1	31.217			
			C	0.168	2.707	0.584	0.85	1	27.396			
T8	0.37	1.46	A	0.186	2.645	0.588	0.85	1	34.873	2.37	118.51	A
80.00-60.00			B	0.175	2.683	0.586	0.85	1	33.066			
			C	0.151	2.767	0.582	0.85	1	29.286			
T9	0.37	1.73	A	0.171	2.696	0.585	0.85	1	36.604	2.30	115.19	A
60.00-40.00			B	0.161	2.73	0.583	0.85	1	34.783			
			C	0.141	2.806	0.58	0.85	1	30.965			
T10	0.37	1.81	A	0.157	2.747	0.583	0.85	1	38.025	2.17	108.29	A
40.00-20.00			B	0.148	2.779	0.581	0.85	1	36.217			
			C	0.13	2.847	0.579	0.85	1	32.419			
T11	0.26	2.41	A	0.146	2.787	0.581	0.85	1	40.770	2.36	117.80	A
20.00-0.00			B	0.14	2.807	0.58	0.85	1	39.532			
			C	0.129	2.85	0.578	0.85	1	36.919			
Sum Weight:	2.38	11.87						OTM	1538.80 kip-ft	18.56		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.13	1.03	A	0.208	2.57	0.592	1	1	20.957	1.66	82.87	C
180.00-160.00			B	0.208	2.57	0.592	1	1	20.957			
			C	0.302	2.291	0.617	1	1	28.829			
T2	0.14	0.96	A	0.196	2.609	0.59	1	1	19.578	1.58	79.14	C
160.00-140.00			B	0.196	2.609	0.59	1	1	19.578			
			C	0.303	2.289	0.617	1	1	28.550			
T3	0.53	1.49	A	0.299	2.298	0.616	1	1	33.370	1.87	93.28	C
140.00-120.00			B	0.286	2.335	0.612	1	1	31.992			
			C	0.324	2.235	0.623	1	1	35.908			
T4	0.29	0.49	A	0.329	2.222	0.625	1	1	13.726	0.69	103.12	A
120.00-113.33			B	0.305	2.284	0.617	1	1	12.702			
			C	0.265	2.392	0.606	1	1	11.130			
T5	0.29	0.75	A	0.359	2.15	0.636	1	1	17.153	0.82	122.61	A
113.33-106.67			B	0.338	2.199	0.628	1	1	16.210			
			C	0.304	2.285	0.617	1	1	14.760			
T6	0.29	0.59	A	0.307	2.277	0.618	1	1	14.962	0.74	111.28	A
106.67-100.00			B	0.286	2.334	0.612	1	1	13.992			
			C	0.252	2.431	0.602	1	1	12.490			
T7	0.90	2.06	A	0.289	2.327	0.612	1	1	47.694	2.32	116.12	A
100.00-80.00			B	0.27	2.379	0.607	1	1	44.830			
			C	0.25	2.438	0.602	1	1	41.829			
T8	0.90	2.24	A	0.258	2.413	0.604	1	1	50.150	2.36	117.87	A
80.00-60.00			B	0.242	2.461	0.6	1	1	47.369			
			C	0.225	2.514	0.596	1	1	44.441			
T9	0.90	2.52	A	0.231	2.496	0.597	1	1	51.079	2.26	112.78	A
60.00-40.00			B	0.217	2.541	0.594	1	1	48.293			
			C	0.202	2.591	0.591	1	1	45.347			
T10	0.90	2.65	A	0.212	2.557	0.593	1	1	52.982	2.13	106.45	A
40.00-20.00			B	0.199	2.599	0.59	1	1	50.236			
			C	0.186	2.645	0.588	1	1	47.325			
T11	0.63	3.46	A	0.189	2.634	0.588	1	1	54.873	2.27	113.55	A
20.00-0.00			B	0.181	2.661	0.587	1	1	53.020			
			C	0.172	2.691	0.585	1	1	51.045			
Sum Weight:	5.89	18.25						OTM	1581.88 kip-ft	18.69		

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	0.13	1.03	A	0.208	2.57	0.592	0.8	1	18.892	1.55	77.63	C
180.00-160.00			B	0.208	2.57	0.592	0.8	1	18.892			
			C	0.302	2.291	0.617	0.8	1	27.005			
T2	0.14	0.96	A	0.196	2.609	0.59	0.8	1	17.720	1.49	74.66	C
160.00-140.00			B	0.196	2.609	0.59	0.8	1	17.720			
			C	0.303	2.289	0.617	0.8	1	26.934			
T3	0.53	1.49	A	0.299	2.298	0.616	0.8	1	31.122	1.75	87.64	C
140.00-120.00			B	0.286	2.335	0.612	0.8	1	29.700			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.324	2.235	0.623	0.8	1	33.738			
T4	0.29	0.49	A	0.329	2.222	0.625	0.8	1	13.149	0.66	98.78	A
120.00-113.33			B	0.305	2.284	0.617	0.8	1	12.105			
			C	0.265	2.392	0.606	0.8	1	10.500			
T5	0.29	0.75	A	0.359	2.15	0.636	0.8	1	16.018	0.76	114.50	A
113.33-106.67			B	0.338	2.199	0.628	0.8	1	15.037			
			C	0.304	2.285	0.617	0.8	1	13.527			
T6	0.29	0.59	A	0.307	2.277	0.618	0.8	1	14.139	0.70	105.16	A
106.67-100.00			B	0.286	2.334	0.612	0.8	1	13.144			
			C	0.252	2.431	0.602	0.8	1	11.602			
T7	0.90	2.06	A	0.289	2.327	0.612	0.8	1	44.931	2.19	109.40	A
100.00-80.00			B	0.27	2.379	0.607	0.8	1	41.996			
			C	0.25	2.438	0.602	0.8	1	38.918			
T8	0.90	2.24	A	0.258	2.413	0.604	0.8	1	46.916	2.21	110.27	A
80.00-60.00			B	0.242	2.461	0.6	0.8	1	44.067			
			C	0.225	2.514	0.596	0.8	1	41.064			
T9	0.90	2.52	A	0.231	2.496	0.597	0.8	1	47.852	2.11	105.66	A
60.00-40.00			B	0.217	2.541	0.594	0.8	1	45.007			
			C	0.202	2.591	0.591	0.8	1	41.997			
T10	0.90	2.65	A	0.212	2.557	0.593	0.8	1	49.395	1.98	99.24	A
40.00-20.00			B	0.199	2.599	0.59	0.8	1	46.592			
			C	0.186	2.645	0.588	0.8	1	43.619			
T11	0.63	3.46	A	0.189	2.634	0.588	0.8	1	50.135	2.08	103.75	A
20.00-0.00			B	0.181	2.661	0.587	0.8	1	48.237			
			C	0.172	2.691	0.585	0.8	1	46.213			
Sum Weight:	5.89	18.25						OTM	1486.27 kip-ft	17.49		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.13	1.03	A	0.208	2.57	0.592	0.85	1	19.408	1.58	78.94	C
180.00-160.00			B	0.208	2.57	0.592	0.85	1	19.408			
			C	0.302	2.291	0.617	0.85	1	27.461			
T2	0.14	0.96	A	0.196	2.609	0.59	0.85	1	18.184	1.52	75.78	C
160.00-140.00			B	0.196	2.609	0.59	0.85	1	18.184			
			C	0.303	2.289	0.617	0.85	1	27.338			
T3	0.53	1.49	A	0.299	2.298	0.616	0.85	1	31.684	1.78	89.05	C
140.00-120.00			B	0.286	2.335	0.612	0.85	1	30.273			
			C	0.324	2.235	0.623	0.85	1	34.281			
T4	0.29	0.49	A	0.329	2.222	0.625	0.85	1	13.293	0.67	99.87	A
120.00-113.33			B	0.305	2.284	0.617	0.85	1	12.254			
			C	0.265	2.392	0.606	0.85	1	10.657			
T5	0.29	0.75	A	0.359	2.15	0.636	0.85	1	16.302	0.78	116.53	A
113.33-106.67			B	0.338	2.199	0.628	0.85	1	15.331			
			C	0.304	2.285	0.617	0.85	1	13.835			
T6	0.29	0.59	A	0.307	2.277	0.618	0.85	1	14.345	0.71	106.69	A
106.67-100.00			B	0.286	2.334	0.612	0.85	1	13.356			
			C	0.252	2.431	0.602	0.85	1	11.824			
T7	0.90	2.06	A	0.289	2.327	0.612	0.85	1	45.622	2.22	111.08	A
100.00-80.00			B	0.27	2.379	0.607	0.85	1	42.704			
			C	0.25	2.438	0.602	0.85	1	39.646			
T8	0.90	2.24	A	0.258	2.413	0.604	0.85	1	47.725	2.24	112.17	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
80.00-60.00			B	0.242	2.461	0.6	0.85	1	44.892			
			C	0.225	2.514	0.596	0.85	1	41.908			
T9	0.90	2.52	A	0.231	2.496	0.597	0.85	1	48.659	2.15	107.44	A
60.00-40.00			B	0.217	2.541	0.594	0.85	1	45.828			
			C	0.202	2.591	0.591	0.85	1	42.835			
T10	0.90	2.65	A	0.212	2.557	0.593	0.85	1	50.292	2.02	101.04	A
40.00-20.00			B	0.199	2.599	0.59	0.85	1	47.503			
			C	0.186	2.645	0.588	0.85	1	44.545			
T11	0.63	3.46	A	0.189	2.634	0.588	0.85	1	51.320	2.12	106.20	A
20.00-0.00			B	0.181	2.661	0.587	0.85	1	49.433			
			C	0.172	2.691	0.585	0.85	1	47.421			
Sum Weight:	5.89	18.25						OTM	1510.18 kip-ft	17.79		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.05	0.53	A	0.136	2.825	0.579	1	1	14.912	0.57	28.74	C
180.00-160.00			B	0.136	2.825	0.579	1	1	14.912			
			C	0.191	2.625	0.589	1	1	19.109			
T2	0.05	0.50	A	0.128	2.855	0.578	1	1	13.871	0.54	27.07	C
160.00-140.00			B	0.128	2.855	0.578	1	1	13.871			
			C	0.19	2.63	0.588	1	1	18.617			
T3	0.21	0.91	A	0.211	2.56	0.593	1	1	24.292	0.66	33.13	C
140.00-120.00			B	0.201	2.592	0.591	1	1	23.421			
			C	0.213	2.554	0.593	1	1	24.443			
T4	0.12	0.32	A	0.23	2.498	0.597	1	1	9.633	0.25	37.15	A
120.00-113.33			B	0.213	2.552	0.593	1	1	9.008			
			C	0.172	2.691	0.585	1	1	7.541			
T5	0.12	0.47	A	0.26	2.408	0.604	1	1	12.706	0.31	46.44	A
113.33-106.67			B	0.245	2.452	0.601	1	1	12.128			
			C	0.209	2.566	0.592	1	1	10.776			
T6	0.12	0.38	A	0.219	2.535	0.594	1	1	10.885	0.27	41.14	A
106.67-100.00			B	0.204	2.582	0.591	1	1	10.282			
			C	0.169	2.703	0.585	1	1	8.862			
T7	0.37	1.36	A	0.208	2.57	0.592	1	1	35.249	0.87	43.28	A
100.00-80.00			B	0.195	2.613	0.589	1	1	33.450			
			C	0.168	2.707	0.584	1	1	29.706			
T8	0.37	1.46	A	0.186	2.645	0.588	1	1	37.420	0.88	44.00	A
80.00-60.00			B	0.175	2.683	0.586	1	1	35.647			
			C	0.151	2.767	0.582	1	1	31.940			
T9	0.37	1.73	A	0.171	2.696	0.585	1	1	39.128	0.85	42.61	A
60.00-40.00			B	0.161	2.73	0.583	1	1	37.337			
			C	0.141	2.806	0.58	1	1	33.581			
T10	0.37	1.81	A	0.157	2.747	0.583	1	1	40.816	0.80	40.22	A
40.00-20.00			B	0.148	2.779	0.581	1	1	39.037			
			C	0.13	2.847	0.579	1	1	35.299			
T11	0.26	2.41	A	0.146	2.787	0.581	1	1	44.404	0.89	44.39	A
20.00-0.00			B	0.14	2.807	0.58	1	1	43.188			
			C	0.129	2.85	0.578	1	1	40.623			
Sum Weight:	2.38	11.87						OTM	571.48 kip-ft	6.90		

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	0.05	0.53	A	0.136	2.825	0.579	0.8	1	12.847	0.52	25.83	C
180.00-160.00			B	0.136	2.825	0.579	0.8	1	12.847			
			C	0.191	2.625	0.589	0.8	1	17.177			
T2	0.05	0.50	A	0.128	2.855	0.578	0.8	1	12.013	0.49	24.56	C
160.00-140.00			B	0.128	2.855	0.578	0.8	1	12.013			
			C	0.19	2.63	0.588	0.8	1	16.892			
T3	0.21	0.91	A	0.211	2.56	0.593	0.8	1	21.941	0.60	29.95	C
140.00-120.00			B	0.201	2.592	0.591	0.8	1	21.040			
			C	0.213	2.554	0.593	0.8	1	22.096			
T4	0.12	0.32	A	0.23	2.498	0.597	0.8	1	9.008	0.23	34.74	A
120.00-113.33			B	0.213	2.552	0.593	0.8	1	8.369			
			C	0.172	2.691	0.585	0.8	1	6.869			
T5	0.12	0.47	A	0.26	2.408	0.604	0.8	1	11.482	0.28	41.97	A
113.33-106.67			B	0.245	2.452	0.601	0.8	1	10.880			
			C	0.209	2.566	0.592	0.8	1	9.467			
T6	0.12	0.38	A	0.219	2.535	0.594	0.8	1	10.004	0.25	37.81	A
106.67-100.00			B	0.204	2.582	0.591	0.8	1	9.385			
			C	0.169	2.703	0.585	0.8	1	7.925			
T7	0.37	1.36	A	0.208	2.57	0.592	0.8	1	32.318	0.79	39.68	A
100.00-80.00			B	0.195	2.613	0.589	0.8	1	30.472			
			C	0.168	2.707	0.584	0.8	1	26.626			
T8	0.37	1.46	A	0.186	2.645	0.588	0.8	1	34.024	0.80	40.01	A
80.00-60.00			B	0.175	2.683	0.586	0.8	1	32.205			
			C	0.151	2.767	0.582	0.8	1	28.401			
T9	0.37	1.73	A	0.171	2.696	0.585	0.8	1	35.762	0.78	38.94	A
60.00-40.00			B	0.161	2.73	0.583	0.8	1	33.932			
			C	0.141	2.806	0.58	0.8	1	30.093			
T10	0.37	1.81	A	0.157	2.747	0.583	0.8	1	37.095	0.73	36.55	A
40.00-20.00			B	0.148	2.779	0.581	0.8	1	35.278			
			C	0.13	2.847	0.579	0.8	1	31.459			
T11	0.26	2.41	A	0.146	2.787	0.581	0.8	1	39.559	0.79	39.55	A
20.00-0.00			B	0.14	2.807	0.58	0.8	1	38.313			
			C	0.129	2.85	0.578	0.8	1	35.684			
Sum Weight:	2.38	11.87						OTM	519.45 kip-ft	6.27		

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	0.05	0.53	A	0.136	2.825	0.579	0.85	1	13.363	0.53	26.56	C
180.00-160.00			B	0.136	2.825	0.579	0.85	1	13.363			
			C	0.191	2.625	0.589	0.85	1	17.660			
T2	0.05	0.50	A	0.128	2.855	0.578	0.85	1	12.477	0.50	25.18	C
160.00-140.00			B	0.128	2.855	0.578	0.85	1	12.477			
			C	0.19	2.63	0.588	0.85	1	17.323			
T3	0.21	0.91	A	0.211	2.56	0.593	0.85	1	22.529	0.61	30.75	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
140.00-120.00			B	0.201	2.592	0.591	0.85	1	21.635			
			C	0.213	2.554	0.593	0.85	1	22.683			
T4	0.12	0.32	A	0.23	2.498	0.597	0.85	1	9.164	0.24	35.34	A
120.00-113.33			B	0.213	2.552	0.593	0.85	1	8.529			
			C	0.172	2.691	0.585	0.85	1	7.037			
T5	0.12	0.47	A	0.26	2.408	0.604	0.85	1	11.788	0.29	43.09	A
113.33-106.67			B	0.245	2.452	0.601	0.85	1	11.192			
			C	0.209	2.566	0.592	0.85	1	9.794			
T6	0.12	0.38	A	0.219	2.535	0.594	0.85	1	10.224	0.26	38.64	A
106.67-100.00			B	0.204	2.582	0.591	0.85	1	9.609			
			C	0.169	2.703	0.585	0.85	1	8.159			
T7	0.37	1.36	A	0.208	2.57	0.592	0.85	1	33.051	0.81	40.58	A
100.00-80.00			B	0.195	2.613	0.589	0.85	1	31.217			
			C	0.168	2.707	0.584	0.85	1	27.396			
T8	0.37	1.46	A	0.186	2.645	0.588	0.85	1	34.873	0.82	41.01	A
80.00-60.00			B	0.175	2.683	0.586	0.85	1	33.066			
			C	0.151	2.767	0.582	0.85	1	29.286			
T9	0.37	1.73	A	0.171	2.696	0.585	0.85	1	36.604	0.80	39.86	A
60.00-40.00			B	0.161	2.73	0.583	0.85	1	34.783			
			C	0.141	2.806	0.58	0.85	1	30.965			
T10	0.37	1.81	A	0.157	2.747	0.583	0.85	1	38.025	0.75	37.47	A
40.00-20.00			B	0.148	2.779	0.581	0.85	1	36.217			
			C	0.13	2.847	0.579	0.85	1	32.419			
T11	0.26	2.41	A	0.146	2.787	0.581	0.85	1	40.770	0.82	40.76	A
20.00-0.00			B	0.14	2.807	0.58	0.85	1	39.532			
			C	0.129	2.85	0.578	0.85	1	36.919			
Sum Weight:	2.38	11.87						OTM	532.46 kip-ft	6.42		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	5.16					
Bracing Weight	6.70					
Total Member Self-Weight	11.87			-9.47	3.32	
Total Weight	15.87			-9.47	3.32	
Wind 0 deg - No Ice		0.01	-24.32	-2279.76	2.02	-8.25
Wind 90 deg - No Ice		22.83	-0.01	-10.77	-2139.03	-19.49
Wind 180 deg - No Ice		-0.01	22.48	2110.46	4.62	7.46
Member Ice	6.38					
Total Weight Ice	26.87			-21.68	8.74	
Wind 0 deg - Ice		0.01	-22.92	-2206.14	7.74	-9.87
Wind 90 deg - Ice		21.94	-0.01	-22.67	-2092.21	-17.37
Wind 180 deg - Ice		-0.01	21.72	2067.17	9.74	9.20
Total Weight	15.87			-9.47	3.32	
Wind 0 deg - Service		0.00	-8.41	-785.27	-0.38	-2.86
Wind 90 deg - Service		7.90	-0.00	-0.15	-741.23	-6.74
Wind 180 deg - Service		-0.00	7.78	733.84	0.52	2.58

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 90 deg - No Ice
4	Dead+Wind 180 deg - No Ice
5	Dead+Ice+Temp
6	Dead+Wind 0 deg+Ice+Temp
7	Dead+Wind 90 deg+Ice+Temp
8	Dead+Wind 180 deg+Ice+Temp
9	Dead+Wind 0 deg - Service
10	Dead+Wind 90 deg - Service
11	Dead+Wind 180 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	8	4.13	0.00	-0.01
			Max. Compression	6	-5.02	-0.01	0.01
			Max. Mx	7	-0.55	0.09	0.00
			Max. My	6	0.01	-0.00	-0.09
			Max. Vy	7	-0.18	0.00	0.00
			Max. Vx	8	-0.19	0.00	0.00
		Diagonal	Max Tension	7	0.88	0.00	0.00
			Max. Compression	7	-0.88	0.00	0.00
			Max. Mx	7	0.36	0.01	-0.00
			Max. My	6	-0.06	0.01	0.00
			Max. Vy	7	0.01	0.01	-0.00
			Max. Vx	6	0.00	0.00	0.00
		Top Girt	Max Tension	6	0.04	0.00	0.00
			Max. Compression	8	-0.07	0.00	0.00
			Max. Mx	5	-0.01	-0.02	0.00
			Max. My	6	-0.04	0.00	-0.00
			Max. Vy	5	0.01	0.00	0.00
			Max. Vx	6	0.00	0.00	0.00
T2	160 - 140	Leg	Max Tension	8	14.16	-0.01	-0.00
			Max. Compression	6	-16.22	0.06	0.01
			Max. Mx	6	-16.22	0.06	0.01
			Max. My	7	-0.54	-0.00	-0.06
			Max. Vy	6	-0.06	0.06	0.01
			Max. Vx	6	0.07	-0.00	0.03
		Diagonal	Max Tension	7	1.70	0.00	0.00
			Max. Compression	7	-1.73	0.00	0.00
			Max. Mx	6	1.47	0.01	0.00
			Max. My	6	-1.31	0.00	0.00
			Max. Vy	6	-0.01	0.01	0.00
			Max. Vx	6	-0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	8	28.08	-0.07	-0.01
			Max. Compression	6	-33.68	0.02	0.01
			Max. Mx	2	-27.32	0.09	0.00
			Max. My	3	-1.28	-0.01	0.17
			Max. Vy	4	-1.13	-0.04	-0.00
			Max. Vx	3	1.08	0.00	0.00
		Diagonal	Max Tension	7	2.56	0.00	0.00
			Max. Compression	7	-2.56	0.00	0.00
			Max. Mx	7	0.98	0.03	-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. My	8	-2.32	0.01	-0.01
			Max. Vy	7	0.01	0.03	-0.00
			Max. Vx	8	0.00	0.00	0.00
		Top Girt	Max Tension	4	0.47	0.00	0.00
			Max. Compression	2	-0.45	0.00	0.00
			Max. Mx	5	0.02	-0.02	0.00
			Max. My	8	-0.20	0.00	0.00
			Max. Vy	5	0.01	0.00	0.00
			Max. Vx	8	-0.00	0.00	0.00
T4	120 - 113.334	Leg	Max Tension	4	32.51	-0.04	-0.01
			Max. Compression	6	-38.59	0.10	0.02
			Max. Mx	2	-37.24	0.11	0.01
			Max. My	3	-1.34	-0.01	0.17
			Max. Vy	8	0.04	-0.10	-0.01
			Max. Vx	3	0.08	-0.01	0.17
		Diagonal	Max Tension	8	2.62	0.00	0.00
			Max. Compression	2	-2.82	0.00	0.00
			Max. Mx	6	1.87	0.03	0.00
			Max. My	8	2.16	0.02	-0.00
			Max. Vy	6	-0.01	0.03	0.00
			Max. Vx	8	0.00	0.00	0.00
T5	113.334 - 106.667	Leg	Max Tension	4	37.62	-0.10	-0.01
			Max. Compression	6	-44.38	0.05	-0.00
			Max. Mx	2	-43.00	0.11	0.01
			Max. My	3	-1.67	-0.01	0.18
			Max. Vy	8	-0.04	-0.10	-0.01
			Max. Vx	3	-0.08	-0.01	0.18
		Diagonal	Max Tension	4	2.66	0.00	0.00
			Max. Compression	6	-2.94	0.00	0.00
			Max. Mx	7	1.56	0.05	-0.00
			Max. My	8	-2.44	0.01	-0.01
			Max. Vy	8	0.02	0.05	-0.00
			Max. Vx	8	0.00	0.00	0.00
		Horizontal	Max Tension	8	0.61	0.00	0.00
			Max. Compression	2	-0.55	0.00	0.00
			Max. Mx	5	0.11	-0.07	0.00
			Max. My	7	0.11	0.00	0.00
			Max. Vy	5	0.03	0.00	0.00
			Max. Vx	7	-0.00	0.00	0.00
T6	106.667 - 100.001	Leg	Max Tension	4	42.89	-0.06	0.00
			Max. Compression	6	-50.62	0.10	-0.00
			Max. Mx	8	42.00	-0.13	0.00
			Max. My	3	-1.82	-0.01	0.18
			Max. Vy	8	0.05	-0.13	0.00
			Max. Vx	3	0.08	-0.01	0.18
		Diagonal	Max Tension	6	2.82	0.00	0.00
			Max. Compression	2	-2.68	0.00	0.00
			Max. Mx	6	2.81	0.05	-0.00
			Max. My	8	2.13	0.04	-0.01
			Max. Vy	6	-0.02	0.05	-0.00
			Max. Vx	8	0.00	0.00	0.00
T7	100.001 - 80.0007	Leg	Max Tension	4	57.49	-0.11	-0.01
			Max. Compression	6	-67.20	0.19	0.01
			Max. Mx	6	-67.20	0.19	0.01
			Max. My	3	-2.11	-0.01	0.17
			Max. Vy	8	-0.07	-0.13	0.00
			Max. Vx	3	-0.08	-0.01	0.17
		Diagonal	Max Tension	6	2.94	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	6	-3.17	0.00	0.00
			Max. Mx	6	2.28	0.05	0.00
			Max. My	8	-2.63	0.02	-0.01
			Max. Vy	8	0.02	0.05	-0.00
			Max. Vx	8	0.00	0.00	0.00
T8	80.0007 - 60.0007	Leg	Max Tension	4	71.26	-0.10	-0.01
			Max. Compression	6	-83.55	-0.02	0.02
			Max. Mx	8	68.53	-0.35	-0.02
			Max. My	7	-6.11	-0.19	0.19
			Max. Vy	8	0.09	-0.35	-0.02
			Max. Vx	3	-0.07	0.00	0.19
		Diagonal	Max Tension	6	3.27	0.00	0.00
			Max. Compression	6	-3.30	0.00	0.00
			Max. Mx	6	2.31	0.06	0.00
			Max. My	8	-2.76	0.02	-0.01
			Max. Vy	8	0.03	0.06	-0.01
			Max. Vx	8	0.00	0.00	0.00
T9	60.0007 - 40.0007	Leg	Max Tension	4	83.64	-0.22	-0.02
			Max. Compression	6	-98.23	-0.11	0.02
			Max. Mx	8	79.71	-0.62	-0.02
			Max. My	3	-3.69	-0.03	0.39
			Max. Vy	8	0.12	-0.62	-0.02
			Max. Vx	3	0.11	-0.03	0.39
		Diagonal	Max Tension	8	4.02	0.00	0.00
			Max. Compression	2	-4.11	0.00	0.00
			Max. Mx	8	2.66	0.09	-0.01
			Max. My	8	-3.76	0.06	-0.01
			Max. Vy	8	0.04	0.09	-0.01
			Max. Vx	8	0.00	0.00	0.00
T10	40.0007 - 20.0007	Leg	Max Tension	4	96.61	-0.16	-0.02
			Max. Compression	6	-113.72	-0.28	0.03
			Max. Mx	8	91.44	-1.01	-0.02
			Max. My	3	-4.48	-0.04	0.45
			Max. Vy	8	0.18	-1.01	-0.02
			Max. Vx	3	0.12	-0.04	0.45
		Diagonal	Max Tension	8	4.34	0.00	0.00
			Max. Compression	2	-4.30	0.00	0.00
			Max. Mx	8	2.56	0.11	-0.01
			Max. My	8	-4.07	0.08	-0.02
			Max. Vy	8	0.04	0.11	-0.01
			Max. Vx	8	0.00	0.00	0.00
T11	20.0007 - 0	Leg	Max Tension	4	109.15	-0.35	-0.01
			Max. Compression	6	-128.95	-0.00	-0.00
			Max. Mx	6	-120.40	1.02	0.01
			Max. My	3	-5.28	-0.04	0.81
			Max. Vy	8	-0.20	-1.01	-0.02
			Max. Vx	3	0.16	-0.04	0.81
		Diagonal	Max Tension	8	5.15	0.00	0.00
			Max. Compression	2	-4.97	0.00	0.00
			Max. Mx	8	2.36	0.23	-0.01
			Max. My	8	-4.81	0.15	-0.03
			Max. Vy	8	0.06	0.23	-0.01
			Max. Vx	8	0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	8	67.11	4.36	-4.34
	Max. H_x	4	64.30	5.30	-4.98
	Max. H_z	7	-92.80	-10.44	5.73
	Min. Vert	3	-98.21	-9.91	5.40
	Min. H_x	7	-92.80	-10.44	5.73
	Min. H_z	4	64.30	5.30	-4.98
Leg B	Max. Vert	7	109.44	-9.50	-5.17
	Max. H_x	6	-52.98	5.91	4.63
	Max. H_z	6	-52.98	5.91	4.63
	Min. Vert	2	-58.31	5.24	4.52
	Min. H_x	3	108.19	-10.68	-5.80
	Min. H_z	3	108.19	-10.68	-5.80
Leg A	Max. Vert	2	132.30	-0.23	14.87
	Max. H_x	8	-106.41	0.25	-13.51
	Max. H_z	2	132.30	-0.23	14.87
	Min. Vert	4	-112.28	0.21	-12.88
	Min. H_x	3	5.89	-2.23	0.41
	Min. H_z	8	-106.41	0.25	-13.51

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	15.87	0.00	0.00	-9.47	3.32	-0.00
Dead+Wind 0 deg - No Ice	15.87	0.01	-24.32	-2285.58	2.05	-8.28
Dead+Wind 90 deg - No Ice	15.87	22.83	-0.01	-10.84	-2144.50	-19.53
Dead+Wind 180 deg - No Ice	15.87	-0.01	22.48	2115.88	4.66	7.48
Dead+Ice+Temp	26.87	0.00	0.00	-21.75	8.77	0.00
Dead+Wind 0 deg+Ice+Temp	26.87	0.01	-22.92	-2215.63	7.85	-9.93
Dead+Wind 90 deg+Ice+Temp	26.87	21.94	-0.01	-22.80	-2101.26	-17.46
Dead+Wind 180 deg+Ice+Temp	26.87	-0.01	21.72	2076.14	9.81	9.25
Dead+Wind 0 deg - Service	15.87	0.00	-8.41	-797.08	2.88	-2.86
Dead+Wind 90 deg - Service	15.87	7.90	-0.00	-9.95	-739.88	-6.76
Dead+Wind 180 deg - Service	15.87	-0.00	7.78	725.94	3.78	2.59

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	-15.87	0.00	0.00	15.87	0.00	0.000%
2	0.01	-15.87	-24.32	-0.01	15.87	24.32	0.000%
3	22.83	-15.87	-0.01	-22.83	15.87	0.01	0.000%
4	-0.01	-15.87	22.48	0.01	15.87	-22.48	0.000%
5	0.00	-26.87	0.00	0.00	26.87	0.00	0.000%
6	0.01	-26.87	-22.92	-0.01	26.87	22.92	0.000%
7	21.94	-26.87	-0.01	-21.94	26.87	0.01	0.000%
8	-0.01	-26.87	21.72	0.01	26.87	-21.72	0.000%
9	0.00	-15.87	-8.41	-0.00	15.87	8.41	0.000%
10	7.90	-15.87	-0.00	-7.90	15.87	0.00	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
11	-0.00	-15.87	7.78	0.00	15.87	-7.78	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000235
3	Yes	4	0.00000001	0.00000307
4	Yes	4	0.00000001	0.00000355
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000557
7	Yes	4	0.00000001	0.00000403
8	Yes	4	0.00000001	0.00000331
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	6.244	9	0.3037	0.0179
T2	160 - 140	4.971	9	0.2968	0.0161
T3	140 - 120	3.763	9	0.2632	0.0127
T4	120 - 113.334	2.721	9	0.2208	0.0142
T5	113.334 - 106.667	2.417	9	0.2071	0.0142
T6	106.667 - 100.001	2.129	9	0.1919	0.0139
T7	100.001 - 80.0007	1.868	9	0.1760	0.0134
T8	80.0007 - 60.0007	1.188	9	0.1371	0.0112
T9	60.0007 - 40.0007	0.675	9	0.0949	0.0080
T10	40.0007 - 20.0007	0.317	9	0.0646	0.0052
T11	20.0007 - 0	0.087	9	0.0332	0.0021

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.00	2 Bay Dipole	9	6.244	0.3037	0.0179	351816
178.00	3' Side Mount Standoff	9	6.115	0.3036	0.0178	351816
155.00	2" Dia 10' Omni	9	4.659	0.2907	0.0153	56645
150.00	3' Side Mount Standoff	9	4.352	0.2828	0.0144	41050
144.00	2" Dia 8' Omni	9	3.994	0.2715	0.0134	30863
140.00	2' Side Mount Standoff	9	3.763	0.2632	0.0127	27071
135.00	BXA-70063/6CF	9	3.484	0.2526	0.0134	25330
104.00	2" Dia 8' Omni	9	2.022	0.1855	0.0137	21446

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	2' Side Mount Standoff	9	1.868	0.1760	0.0134	31240

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	17.941	2	0.8762	0.0621
T2	160 - 140	14.274	2	0.8545	0.0553
T3	140 - 120	10.799	2	0.7566	0.0436
T4	120 - 113.334	7.805	2	0.6336	0.0412
T5	113.334 - 106.667	6.933	2	0.5941	0.0410
T6	106.667 - 100.001	6.109	2	0.5505	0.0401
T7	100.001 - 80.0007	5.359	2	0.5047	0.0387
T8	80.0007 - 60.0007	3.409	2	0.3930	0.0325
T9	60.0007 - 40.0007	1.936	2	0.2719	0.0232
T10	40.0007 - 20.0007	0.911	2	0.1851	0.0150
T11	20.0007 - 0	0.251	2	0.0951	0.0060

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.00	2 Bay Dipole	2	17.941	0.8762	0.0621	113619
178.00	3' Side Mount Standoff	2	17.572	0.8759	0.0616	113619
155.00	2" Dia 10' Omni	2	13.376	0.8367	0.0527	18287
150.00	3' Side Mount Standoff	2	12.494	0.8135	0.0498	13336
144.00	2" Dia 8' Omni	2	11.464	0.7805	0.0461	10068
140.00	2' Side Mount Standoff	2	10.799	0.7566	0.0436	8867
135.00	BXA-70063/6CF	2	9.998	0.7258	0.0407	8401
104.00	2" Dia 8' Omni	2	5.801	0.5319	0.0395	7458
100.00	2' Side Mount Standoff	2	5.359	0.5047	0.0387	10852

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	180	Diagonal	A325N	0.6250	1	0.88	4.08	0.215 ✔	1.333	Member Bearing
T2	160	Leg	A325N	0.6250	4	1.40	13.50	0.104 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	1.70	4.08	0.418 ✔	1.333	Member Bearing
T3	140	Leg	A325N	0.6250	4	4.08	13.50	0.302 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2.56	6.12	0.418 ✔	1.333	Member Bearing

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
T4	120	Leg	A325N	0.6250	4	8.13	13.50	0.602 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2.82	6.44	0.438 ✓	1.333	Bolt Shear
T5	113.334	Diagonal	A325N	0.6250	1	2.94	6.44	0.457 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.5000	1	0.61	4.12	0.149 ✓	1.333	Bolt Shear
T6	106.667	Diagonal	A325N	0.6250	1	2.82	6.12	0.462 ✓	1.333	Member Bearing
T7	100.001	Leg	A325N	0.7500	4	11.92	19.44	0.613 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	3.17	6.44	0.492 ✓	1.333	Bolt Shear
T8	80.0007	Leg	A325N	0.8750	4	15.56	26.46	0.588 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	3.27	6.12	0.535 ✓	1.333	Member Bearing
T9	60.0007	Leg	A325N	0.8750	4	19.22	26.46	0.727 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	4.02	6.12	0.656 ✓	1.333	Member Bearing
T10	40.0007	Leg	A325N	0.8750	4	22.58	26.46	0.853 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	4.34	6.12	0.709 ✓	1.333	Member Bearing
T11	20.0007	Leg	A325N	1.0000	4	25.78	34.56	0.746 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	5.15	6.44	0.799 ✓	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 2 STD	20.00	4.00	61.0 K=1.00	22.549	1.0745	-5.02	24.23	0.207 ✓
T2	160 - 140	ROHN 2 STD	20.00	4.00	61.0 K=1.00	22.549	1.0745	-16.22	24.23	0.670 ✓
T3	140 - 120	ROHN 2.5 STD	20.03	5.01	63.4 K=1.00	22.122	1.7040	-33.68	37.70	0.893 ✓
T4	120 - 113.334	ROHN 2.5 EH	6.68	6.68	86.7 K=1.00	17.636	2.2535	-38.59	39.74	0.971 ✓
T5	113.334 - 106.667	ROHN 2.5 EH	6.68	6.68	86.7 K=1.00	17.634	2.2535	-44.38	39.74	1.117 ✓
T6	106.667 - 100.001	ROHN 2.5 EH	6.68	6.68	86.7 K=1.00	17.634	2.2535	-50.62	39.74	1.274 ✓
T7	100.001 - 80.0007	ROHN 3 X-STR	20.03	6.68	70.5 K=1.00	20.841	3.0159	-67.20	62.86	1.069 ✓
T8	80.0007 - 60.0007	ROHN 3 EH	20.04	6.68	70.5 K=1.00	20.839	3.0159	-83.55	62.85	1.329 ✓
T9	60.0007 - 40.0007	ROHN 4 X-STR	20.03	10.02	81.4 K=1.00	18.731	4.4074	-98.23	82.56	1.190 ✓
T10	40.0007 -	ROHN 4 X-STR	20.04	10.02	81.4	18.729	4.4074	-113.72	82.55	1.378

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 $\frac{P}{P_a}$
	20.0007				K=1.00					✗
T11	20.0007 - 0	H1-3 (1.38 CR) - 189 ROHN 5 STD H1-3 (1.36 CR) - 204	20.03	10.02	64.0 K=1.00	22.021	4.2999	-128.95	94.69	1.362 ✗

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	180 - 160	L1 1/2x1 1/2x1/8	7.65	3.57	144.8 K=1.00	7.126	0.3594	-0.88	2.56	0.343 ✓
T2	160 - 140	L1 1/2x1 1/2x1/8	7.68	3.59	145.5 K=1.00	7.055	0.3594	-1.73	2.54	0.683 ✓
T3	140 - 120	L2x2x3/16	9.70	4.72	143.8 K=1.00	7.225	0.7150	-2.45	5.17	0.475 ✓
T4	120 - 113.334	L2x2x3/16	11.12	5.49	167.1 K=1.00	5.345	0.7150	-2.82	3.82	0.739 ✓
T5	113.334 - 106.667	L2 1/2x2 1/2x3/16	11.67	5.76	139.7 K=1.00	7.653	0.9020	-2.94	6.90	0.426 ✓
T6	106.667 - 100.001	L2 1/2x2 1/2x3/16	12.24	6.04	146.5 K=1.00	6.958	0.9020	-2.68	6.28	0.426 ✓
T7	100.001 - 80.0007	L2 1/2x2 1/2x3/16	13.96	6.87	166.5 K=1.00	5.384	0.9020	-3.17	4.86	0.653 ✓
T8	80.0007 - 60.0007	L2 1/2x2 1/2x3/16	15.82	7.81	189.3 K=1.00	4.167	0.9020	-3.25	3.76	0.865 ✓
T9	60.0007 - 40.0007	L3x3x3/16	19.04	9.46	190.4 K=1.00	4.118	1.0900	-4.11	4.49	0.915 ✓
T10	40.0007 - 20.0007	L3x3x3/16	20.81	10.35	208.5 K=1.00	3.437	1.0900	-4.30	3.75	1.149 ✓
T11	20.0007 - 0	KL/R > 200 (C) - 194 L3 1/2x3 1/2x1/4	22.61	11.19	193.5 K=1.00	3.987	1.6900	-4.97	6.74	0.737 ✓

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 $\frac{P}{P_a}$
T5	113.334 - 106.667	L3x3x3/16	9.24	8.77	176.6 K=1.00	4.788	1.0900	-0.55	5.22	0.105 ✓

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	180 - 160	L2x2x1/8	6.52	6.32	163.6 K=0.86	5.582	0.4844	-0.07	2.70	0.025 ✔
T3	140 - 120	L2x2x1/8	6.56	6.36	164.3 K=0.86	5.532	0.4844	-0.45	2.68	0.167 ✔

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	180 - 160	ROHN 2 STD	20.00	4.00	61.0	30.000	1.0745	4.13	32.24	0.128 ✔
T2	160 - 140	ROHN 2 STD	20.00	4.00	61.0	30.000	1.0745	14.16	32.24	0.439 ✔
T3	140 - 120	ROHN 2.5 STD	20.03	5.01	63.4	30.000	1.7040	28.08	51.12	0.549 ✔
T4	120 - 113.334	ROHN 2.5 EH	6.68	6.68	86.7	30.000	2.2535	32.51	67.61	0.481 ✔
T5	113.334 - 106.667	ROHN 2.5 EH	6.68	6.68	86.7	30.000	2.2535	37.62	67.61	0.556 ✔
T6	106.667 - 100.001	ROHN 2.5 EH	6.68	6.68	86.7	30.000	2.2535	42.89	67.61	0.634 ✔
T7	100.001 - 80.0007	ROHN 3 X-STR	20.03	6.68	70.5	30.000	3.0159	57.49	90.48	0.635 ✔
T8	80.0007 - 60.0007	ROHN 3 EH	20.04	6.68	70.5	30.000	3.0159	71.26	90.48	0.788 ✔
T9	60.0007 - 40.0007	ROHN 4 X-STR	20.03	10.02	81.4	30.000	4.4074	83.64	132.22	0.633 ✔
T10	40.0007 - 20.0007	ROHN 4 X-STR	20.04	10.02	81.4	30.000	4.4074	96.61	132.22	0.731 ✔
T11	20.0007 - 0	H1-3 (1.38 CR) - 189 ROHN 5 STD H1-3 (1.36 CR) - 204	20.03	10.02	64.0	30.000	4.2999	109.15	129.00	0.846 ✔

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	180 - 160	L1 1/2x1 1/2x1/8	7.65	3.57	95.7	29.000	0.2656	0.88	7.70	0.114 ✔
T2	160 - 140	L1 1/2x1 1/2x1/8	7.68	3.59	96.1	29.000	0.2656	1.70	7.70	0.221 ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T3	140 - 120	L2x2x3/16	8.86	4.31	86.4	21.600	0.7150	2.56	15.44	0.166 ✔
T4	120 - 113.334	L2x2x3/16	11.12	5.49	109.4	21.600	0.7150	2.62	15.44	0.170 ✔
T5	113.334 - 106.667	L2 1/2x2 1/2x3/16	11.67	5.76	91.0	21.600	0.9020	2.66	19.48	0.136 ✔
T6	106.667 - 100.001	L2 1/2x2 1/2x3/16	12.24	6.04	95.3	21.600	0.9020	2.82	19.48	0.145 ✔
T7	100.001 - 80.0007	L2 1/2x2 1/2x3/16	13.38	6.58	103.6	21.600	0.9020	2.94	19.48	0.151 ✔
T8	80.0007 - 60.0007	L2 1/2x2 1/2x3/16	15.82	7.81	122.5	21.600	0.9020	3.27	19.48	0.168 ✔
T9	60.0007 - 40.0007	L3x3x3/16	19.04	9.46	122.6	21.600	1.0900	4.02	23.54	0.171 ✔
T10	40.0007 - 20.0007	L3x3x3/16	20.81	10.35	134.0	21.600	1.0900	4.34	23.54	0.184 ✔
T11	20.0007 - 0	L3 1/2x3 1/2x1/4	22.61	11.19	124.7	21.600	1.6900	5.15	36.50	0.141 ✔

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 P / P_a
T5	113.334 - 106.667	L3x3x3/16	9.24	8.77	115.0	21.600	1.0900	0.61	23.54	0.026 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	180 - 160	L2x2x1/8	6.52	6.32	121.1	21.600	0.4844	0.04	10.46	0.004 ✔
T3	140 - 120	L2x2x1/8	6.56	6.36	121.9	21.600	0.4844	0.47	10.46	0.045 ✔

Section Capacity Table

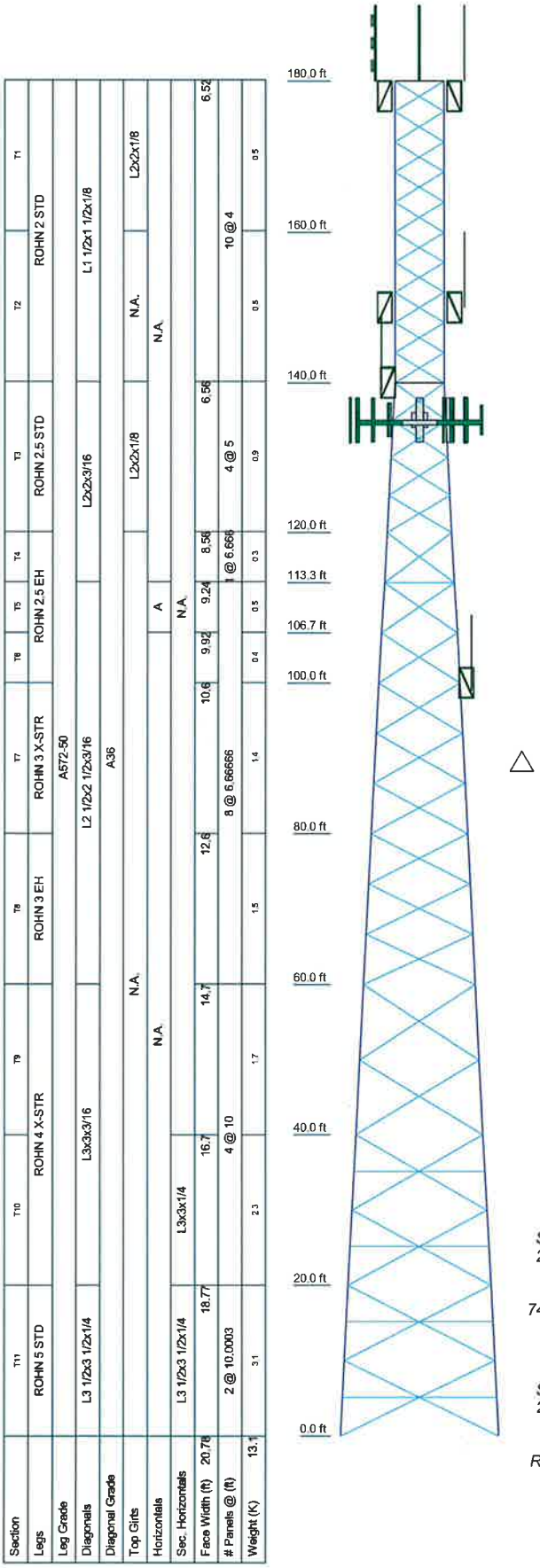
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	180 - 160	Leg	ROHN 2 STD	3	-5.02	32.30	15.5	Pass
T2	160 - 140	Leg	ROHN 2 STD	39	-16.22	32.30	50.2	Pass
T3	140 - 120	Leg	ROHN 2.5 STD	72	-33.68	50.25	67.0	Pass
T4	120 - 113.334	Leg	ROHN 2.5 EH	102	-38.59	52.98	72.9	Pass

tnxTower	Job	Page
	14001.048 - Wolcott North	31 of 31
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	**Project** 180' Self-Support Lattice 1192 Wolcott Road., Wolcott, CT	**Date** 08:07:42 05/28/14
	Client Verizon Wireless	**Designed by** TJL

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T5	113.334 - 106.667	Leg	ROHN 2.5 EH	111	-44.38	52.97	83.8	Pass
T6	106.667 - 100.001	Leg	ROHN 2.5 EH	123	-50.62	52.97	95.6	Pass
T7	100.001 - 80.0007	Leg	ROHN 3 X-STR	132	-67.20	83.79	80.2	Pass
T8	80.0007 - 60.0007	Leg	ROHN 3 EH	153	-83.55	83.78	99.7	Pass
T9	60.0007 - 40.0007	Leg	ROHN 4 X-STR	174	-98.23	110.05	89.3	Pass
T10	40.0007 - 20.0007	Leg	ROHN 4 X-STR	189	-113.72	110.04	103.4	Fail ✗
T11	20.0007 - 0	Leg	ROHN 5 STD	204	-128.95	126.22	102.2	Fail ✗
T1	180 - 160	Diagonal	L1 1/2x1 1/2x1/8	8	-0.88	3.41	25.7	Pass
T2	160 - 140	Diagonal	L1 1/2x1 1/2x1/8	41	-1.73	3.38	51.3	Pass
T3	140 - 120	Diagonal	L2x2x3/16	77	-2.45	6.89	35.6	Pass
T4	120 - 113.334	Diagonal	L2x2x3/16	107	-2.82	5.09	55.4	Pass
T5	113.334 - 106.667	Diagonal	L2 1/2x2 1/2x3/16	119	-2.94	9.20	32.0 34.3 (b)	Pass
T6	106.667 - 100.001	Diagonal	L2 1/2x2 1/2x3/16	128	-2.68	8.37	32.0 34.6 (b)	Pass
T7	100.001 - 80.0007	Diagonal	L2 1/2x2 1/2x3/16	137	-3.17	6.47	49.0	Pass
T8	80.0007 - 60.0007	Diagonal	L2 1/2x2 1/2x3/16	158	-3.25	5.01	64.9	Pass
T9	60.0007 - 40.0007	Diagonal	L3x3x3/16	179	-4.11	5.98	68.7	Pass
T10	40.0007 - 20.0007	Diagonal	L3x3x3/16	194	-4.30	4.99	86.2	Pass
T11	20.0007 - 0	Diagonal	L3 1/2x3 1/2x1/4	209	-4.97	8.98	55.3 59.9 (b)	Pass
T5	113.334 - 106.667	Horizontal	L3x3x3/16	112	-0.55	6.96	7.9 11.1 (b)	Pass
T1	180 - 160	Top Girt	L2x2x1/8	4	-0.07	3.60	1.8	Pass
T3	140 - 120	Top Girt	L2x2x1/8	73	-0.45	3.57	12.5	Pass
							Summary	
						Leg (T10)	103.4	Fail ✗
						Diagonal (T10)	86.2	Pass
						Horizontal (T5)	11.1	Pass
						Top Girt (T3)	12.5	Pass
						Bolt Checks	64.0	Pass
						RATING =	**103.4**	**Fail ✗**

Section 4.0

Reinforced Tower Calculations



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
2 Bay Dipole	185	BXA-70063/6CF (Verizon - Existing)	135
2" Dia 10' Omni	185	APX18-206516L-T0 (Verizon - Existing)	135
2" Dia 10' Omni	185	(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	135
2" Dia 10' Omni	185		
3' Side Mount Standoff	178	BXA-70063/6CF (Verizon - Existing)	135
3' Side Mount Standoff	178	APX18-206516L-T0 (Verizon - Existing)	135
3' Side Mount Standoff	178	BXA-70063/6CF (Verizon - Existing)	135
2" Dia 10' Omni	155	BXA-171063/8BF (Verizon - Existing)	135
3' Side Mount Standoff	150	(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	135
3' Side Mount Standoff	150		
3' Side Mount Standoff	150	HBX-6517DS (Verizon - Proposed)	135
2" Dia 8' Omni	144	LNX-8513DS (Verizon - Proposed)	135
2' Side Mount Standoff	140	(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	135
HBX-6517DS (Verizon - Proposed)	135	LNX-8513DS (Verizon - Proposed)	135
LNX-6514DS-VTM (Verizon - Proposed)	135	HBX-6517DS (Verizon - Proposed)	135
RRH2x40-AWS (Verizon - Proposed)	135	Pirod 13' KD T-Frame	135
RRH2x40-AWS (Verizon - Proposed)	135	Pirod 13' KD T-Frame	135
RRH2x40-AWS (Verizon - Proposed)	135	Pirod 13' KD T-Frame	135
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	135	2" Dia 8' Omni	104
		2' Side Mount Standoff	100

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L3x3x3/16		

MATERIAL STRENGTH

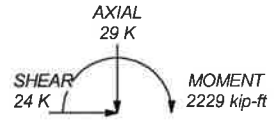
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

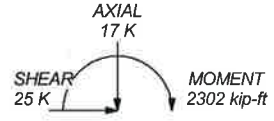
1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 99.7%

△

MAX. CORNER REACTIONS AT BASE:
DOWN: 134 K
UPLIFT: -113 K
SHEAR: 16 K



TORQUE 17 kip-ft
74 mph WIND - 0.5000 in ICE



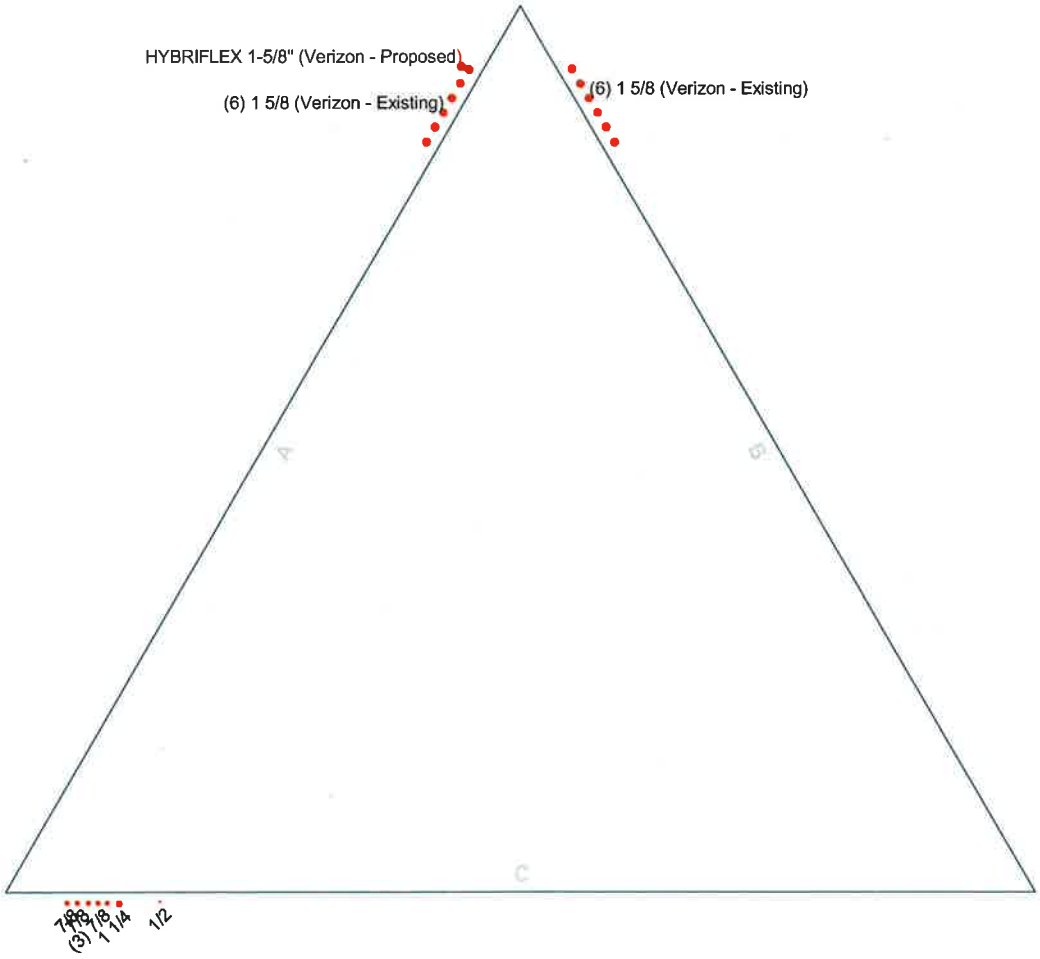
TORQUE 19 kip-ft
REACTIONS - 85 mph WIND

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

Job: *14001.048 - Wolcott North*			
Project: *180' Self-Support Lattice 1192 Wolcott Road., Wolcott, CT*			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 05/28/14	Scale: NTS	
Path:		Dwg No. E-1	

Feedline Plan

Round Flat App In Face App Out Face



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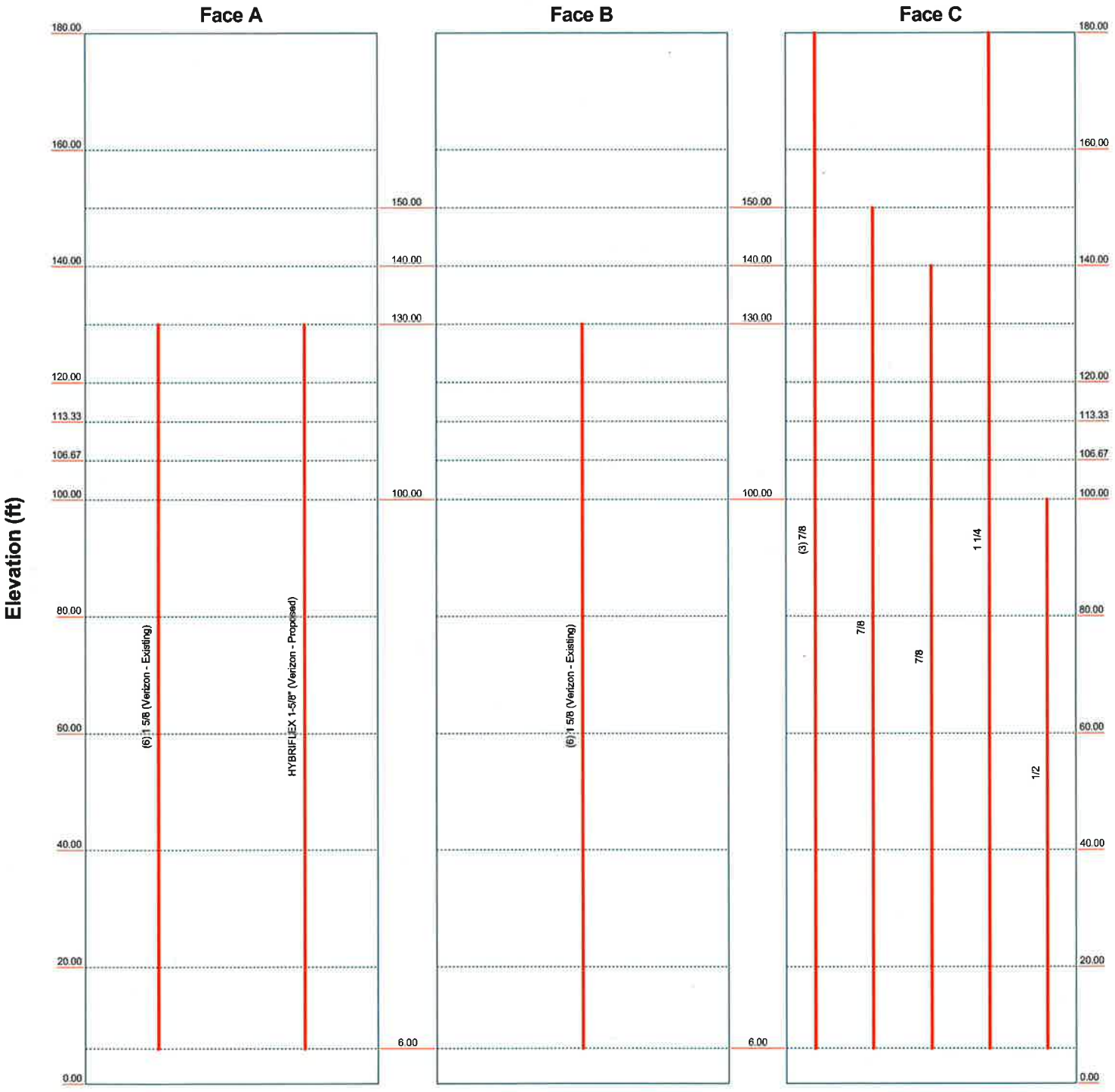
Code: TIA/EIA-222-F	Date: 05/28/14	Scale: NTS
Path:		Dwg No. E-7

Feedline Distribution Chart
0' - 180'

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



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***14001.048 - Wolcott North***		
	Project: ***180' Self-Support Lattice 1192 Wolcott Road., Wolcott, CT***		
	Client: Verizon Wireless	Drawn by: TJL	App'd:
	Code: TIA/EIA-222-F	Date: 05/28/14	Scale: NTS
	Path:		Dwg No. E-7

tnxTower	Job	Page
	14001.048 - Wolcott North	1 of 32
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	**Project** 180' Self-Support Lattice 1192 Wolcott Road., Wolcott, CT	**Date** 08:09:28 05/28/14
	Client Verizon Wireless	**Designed by** TJL

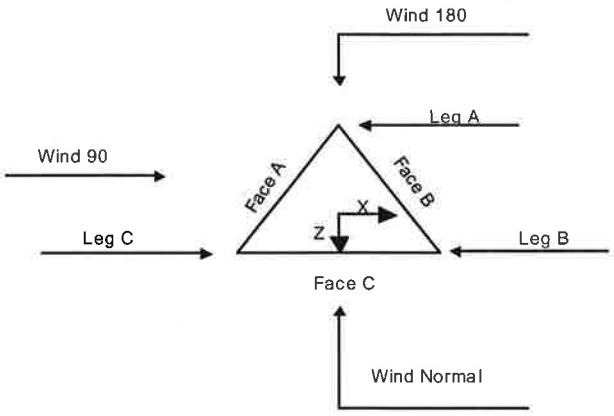
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 6.52 ft at the top and 20.78 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	√ Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
Use Code Safety Factors - Guys	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		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.00-160.00			6.52	1	20.00
T2	160.00-140.00			6.52	1	20.00
T3	140.00-120.00			6.56	1	20.00
T4	120.00-113.33			8.56	1	6.67
T5	113.33-106.67			9.24	1	6.67
T6	106.67-100.00			9.92	1	6.67
T7	100.00-80.00			10.60	1	20.00
T8	80.00-60.00			12.60	1	20.00
T9	60.00-40.00			14.70	1	20.00
T10	40.00-20.00			16.70	1	20.00
T11	20.00-0.00			18.77	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.00-160.00	4.00	X Brace	No	No	0.0000	0.0000
T2	160.00-140.00	4.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	5.00	X Brace	No	No	0.0000	0.0000
T4	120.00-113.33	6.67	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T5	113.33-106.67	6.67	X Brace	No	Yes	0.0000	0.0000
T6	106.67-100.00	6.67	X Brace	No	No	0.0000	0.0000
T7	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T8	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000
T9	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T10	40.00-20.00	10.00	X Brace	No	Yes	0.0000	0.0000
T11	20.00-0.00	10.00	X Brace	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T2 160.00-140.00	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T3 140.00-120.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T4 120.00-113.33	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T5 113.33-106.67	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 106.67-100.00	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 100.00-80.00	Pipe	ROHN 3 X-STR	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T8 80.00-60.00	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T9 60.00-40.00	Pipe	ROHN 4 X-STR	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T10 40.00-20.00	Pipe	ROHN 4 X-STR	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T11 20.00-0.00	Pipe	ROHN 5 STD	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	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 180.00-160.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)
T3 140.00-120.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Solid Round		A572-50 (50 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
T5 113.33-106.67	None	Single Angle		A36 (36 ksi)	Single Angle	L3x3x3/16	A36 (36 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
T10 40.00-20.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T11 20.00-0.00	Single Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 120.00-113.33	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 113.33-106.67	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 106.67-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T11 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

K Factors[1]

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
120.00-113.33				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
113.33-106.67				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
106.67-100.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1	1	1	1	1	1	1	1
T11	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20.00-0.00				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	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
180.00-160.00														
T2	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
160.00-140.00														
T3	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
140.00-120.00														
T4	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
120.00-113.33														
T5	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
113.33-106.67														
T6	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
106.67-100.00														
T7	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
100.00-80.00														
T8 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T10	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
40.00-20.00														
T11 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.00-160.00	Flange	0.6250 A325N	0	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T2 160.00-140.00	Flange	0.6250 A325N	4	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	0.6250 A325N	4	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T4 120.00-113.33	Flange	0.6250 A325N	4	0.6250 A325N	1	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T5 113.33-106.67	Flange	0.7500 A325N	0	0.6250 A325N	1	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T6 106.67-100.00	Flange	0.7500 A325N	0	0.6250 A325N	1	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T7 100.00-80.00	Flange	0.7500 A325N	4	0.6250 A325N	1	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T8 80.00-60.00	Flange	0.8750 A325N	4	0.6250 A325N	1	1.2500 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T9 60.00-40.00	Flange	0.8750 A325N	4	0.6250 A325N	1	1.2500 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T10 40.00-20.00	Flange	0.8750 A325N	4	0.6250 A325N	1	1.2500 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T11 20.00-0.00	Flange	1.0000 A325N	4	0.6250 A325N	1	1.2500 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
7/8	C	Yes	Ar (CfAe)	180.00 - 6.00	2.0000	0.41	3	3	1.1100 1.0000	1.1100		0.54
7/8	C	Yes	Ar (CfAe)	150.00 - 6.00	2.0000	0.43	1	1	1.1100	1.1100		0.54
7/8	C	Yes	Ar (CfAe)	140.00 - 6.00	2.0000	0.44	1	1	1.1100 1.0000	1.1100		0.54
1 1/4	C	Yes	Ar (CfAe)	180.00 - 6.00	2.0000	0.39	1	1	1.5500	1.5500		0.66
1/2	C	Yes	Ar (CfAe)	100.00 - 6.00	2.0000	0.35	1	1	0.5800	0.5800		0.58
1 5/8 (Verizon - Existing)	B	Yes	Ar (CfAe)	130.00 - 6.00	2.0000	-0.38	6	6	1.9800	1.9800		1.04
1 5/8 (Verizon - Existing)	A	Yes	Ar (CfAe)	130.00 - 6.00	2.0000	0.38	6	6	1.9800	1.9800		1.04
HYBRIFLEX 1-5/8" (Verizon - Proposed)	A	Yes	Ar (CfAe)	130.00 - 6.00	4.0000	0.42	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	180.00-160.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	8.133	0.000	0.000	0.000	0.05
T2	160.00-140.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	9.058	0.000	0.000	0.000	0.05
T3	140.00-120.00	A	11.550	0.000	0.000	0.000	0.08
		B	9.900	0.000	0.000	0.000	0.06
		C	11.833	0.000	0.000	0.000	0.07
T4	120.00-113.33	A	7.699	0.000	0.000	0.000	0.05
		B	6.599	0.000	0.000	0.000	0.04
		C	3.944	0.000	0.000	0.000	0.02
T5	113.33-106.67	A	7.700	0.000	0.000	0.000	0.05
		B	6.600	0.000	0.000	0.000	0.04
		C	3.944	0.000	0.000	0.000	0.02
T6	106.67-100.00	A	7.700	0.000	0.000	0.000	0.05
		B	6.600	0.000	0.000	0.000	0.04
		C	3.944	0.000	0.000	0.000	0.02
T7	100.00-80.00	A	23.100	0.000	0.000	0.000	0.16
		B	19.800	0.000	0.000	0.000	0.12
		C	12.800	0.000	0.000	0.000	0.08
T8	80.00-60.00	A	23.100	0.000	0.000	0.000	0.16
		B	19.800	0.000	0.000	0.000	0.12
		C	12.800	0.000	0.000	0.000	0.08
T9	60.00-40.00	A	23.100	0.000	0.000	0.000	0.16
		B	19.800	0.000	0.000	0.000	0.12
		C	12.800	0.000	0.000	0.000	0.08
T10	40.00-20.00	A	23.100	0.000	0.000	0.000	0.16
		B	19.800	0.000	0.000	0.000	0.12
		C	12.800	0.000	0.000	0.000	0.08
T11	20.00-0.00	A	16.171	0.000	0.000	0.000	0.11
		B	13.861	0.000	0.000	0.000	0.09
		C	8.960	0.000	0.000	0.000	0.06

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	180.00-160.00	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		14.800	0.000	0.000	0.000	0.13
T2	160.00-140.00	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		16.558	0.000	0.000	0.000	0.14
T3	140.00-120.00	A	0.500	17.383	0.000	0.000	0.000	0.19
		B		14.900	0.000	0.000	0.000	0.15
		C		21.833	0.000	0.000	0.000	0.19
T4	120.00-113.33	A	0.500	11.588	0.000	0.000	0.000	0.12
		B		9.932	0.000	0.000	0.000	0.10
		C		7.277	0.000	0.000	0.000	0.06
T5	113.33-106.67	A	0.500	11.589	0.000	0.000	0.000	0.12
		B		9.933	0.000	0.000	0.000	0.10
		C		7.278	0.000	0.000	0.000	0.06
T6	106.67-100.00	A	0.500	11.589	0.000	0.000	0.000	0.12

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		9.933	0.000	0.000	0.000	0.10
		C		7.278	0.000	0.000	0.000	0.06
T7	100.00-80.00	A	0.500	34.767	0.000	0.000	0.000	0.37
		B		29.800	0.000	0.000	0.000	0.31
		C		24.467	0.000	0.000	0.000	0.22
T8	80.00-60.00	A	0.500	34.767	0.000	0.000	0.000	0.37
		B		29.800	0.000	0.000	0.000	0.31
		C		24.467	0.000	0.000	0.000	0.22
T9	60.00-40.00	A	0.500	34.767	0.000	0.000	0.000	0.37
		B		29.800	0.000	0.000	0.000	0.31
		C		24.467	0.000	0.000	0.000	0.22
T10	40.00-20.00	A	0.500	34.767	0.000	0.000	0.000	0.37
		B		29.800	0.000	0.000	0.000	0.31
		C		24.467	0.000	0.000	0.000	0.22
T11	20.00-0.00	A	0.500	24.338	0.000	0.000	0.000	0.26
		B		20.861	0.000	0.000	0.000	0.21
		C		17.127	0.000	0.000	0.000	0.15

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	180.00-160.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.785	0.664	1.209
T2	160.00-140.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.809	0.664	1.213
T3	140.00-120.00	A	0.000	0.769	1.021	1.537
		B	0.000	0.659	0.876	1.318
		C	0.000	0.965	1.047	1.931
T4	120.00-113.33	A	0.000	0.362	0.481	0.724
		B	0.000	0.310	0.412	0.620
		C	0.000	0.227	0.246	0.455
T5	113.33-106.67	A	0.000	0.498	0.875	1.317
		B	0.000	0.427	0.750	1.129
		C	0.000	0.313	0.448	0.827
T6	106.67-100.00	A	0.000	0.345	0.574	0.864
		B	0.000	0.296	0.492	0.740
		C	0.000	0.217	0.294	0.542
T7	100.00-80.00	A	0.000	1.003	1.666	2.508
		B	0.000	0.860	1.428	2.150
		C	0.000	0.706	0.923	1.765
T8	80.00-60.00	A	0.000	0.968	1.607	2.419
		B	0.000	0.829	1.378	2.074
		C	0.000	0.681	0.891	1.703
T9	60.00-40.00	A	0.000	0.687	1.370	2.062
		B	0.000	0.589	1.174	1.767
		C	0.000	0.484	0.759	1.451
T10	40.00-20.00	A	0.000	0.955	1.904	2.865
		B	0.000	0.819	1.632	2.456
		C	0.000	0.672	1.055	2.016
T11	20.00-0.00	A	0.000	0.657	1.529	2.301
		B	0.000	0.563	1.310	1.972
		C	0.000	0.463	0.847	1.619

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	180.00-160.00	-3.7928	3.0277	-4.1478	3.3053
T2	160.00-140.00	-4.4607	3.5351	-4.9011	3.8769
T3	140.00-120.00	-4.2772	-6.3661	-5.0898	-5.5024
T4	120.00-113.33	-4.5874	-15.4318	-5.5114	-14.5086
T5	113.33-106.67	-3.7408	-12.5892	-4.6065	-12.1302
T6	106.67-100.00	-4.7131	-15.8676	-5.8021	-15.2829
T7	100.00-80.00	-5.2017	-16.1578	-6.6666	-15.4792
T8	80.00-60.00	-5.8225	-18.0975	-7.4782	-17.3723
T9	60.00-40.00	-6.3383	-19.7101	-8.4956	-19.7431
T10	40.00-20.00	-5.8258	-18.1229	-7.8156	-18.1680
T11	20.00-0.00	-4.0040	-12.4588	-5.6369	-13.1060

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-70063/6CF	A	From Leg	3.00	0.0000	135.00	No Ice	7.73	4.16	0.02
(Verizon - Existing)			0.00			1/2" Ice	8.27	4.60	0.06
			0.00						
APX18-206516L-T0	A	From Leg	3.00	0.0000	135.00	No Ice	3.51	2.00	0.02
(Verizon - Existing)			-4.00			1/2" Ice	3.85	2.33	0.04
			0.00						
BXA-70063/6CF	B	From Leg	3.00	0.0000	135.00	No Ice	7.73	4.16	0.02
(Verizon - Existing)			0.00			1/2" Ice	8.27	4.60	0.06
			0.00						
BXA-171063/8BF	B	From Leg	3.00	0.0000	135.00	No Ice	2.94	2.16	0.01
(Verizon - Existing)			-4.00			1/2" Ice	3.26	2.46	0.03
			0.00						
BXA-70063/6CF	C	From Leg	3.00	0.0000	135.00	No Ice	7.73	4.16	0.02
(Verizon - Existing)			0.00			1/2" Ice	8.27	4.60	0.06
			0.00						
APX18-206516L-T0	C	From Leg	3.00	0.0000	135.00	No Ice	3.51	2.00	0.02
(Verizon - Existing)			-4.00			1/2" Ice	3.85	2.33	0.04
			0.00						
(2) FD9R6004/2C-3L	A	From Leg	3.00	0.0000	135.00	No Ice	0.00	0.08	0.00
Diplexer			0.00			1/2" Ice	0.00	0.14	0.01
(Verizon - Existing)			0.00						
(2) FD9R6004/2C-3L	B	From Leg	3.00	0.0000	135.00	No Ice	0.00	0.08	0.00
Diplexer			0.00			1/2" Ice	0.00	0.14	0.01
(Verizon - Existing)			0.00						
(2) FD9R6004/2C-3L	C	From Leg	3.00	0.0000	135.00	No Ice	0.00	0.08	0.00
Diplexer			0.00			1/2" Ice	0.00	0.14	0.01
(Verizon - Existing)			0.00						
HBX-6517DS	A	From Leg	3.00	0.0000	135.00	No Ice	5.24	3.30	0.01
(Verizon - Proposed)			6.00			1/2" Ice	5.71	3.75	0.04

tnxTower	Job	Page
	14001.048 - Wolcott North	10 of 32
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	**Project** 180' Self-Support Lattice 1192 Wolcott Road., Wolcott, CT	**Date** 08:09:28 05/28/14
	Client Verizon Wireless	**Designed by** TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00							
LNX-8513DS	A	From Leg	3.00		0.0000	135.00	No Ice	8.41	5.41	0.05
(Verizon - Proposed)			4.00				1/2" Ice	8.96	5.86	0.10
			0.00							
HBX-6517DS	B	From Leg	3.00		0.0000	135.00	No Ice	5.24	3.30	0.01
(Verizon - Proposed)			6.00				1/2" Ice	5.71	3.75	0.04
			0.00							
LNX-8513DS	B	From Leg	3.00		0.0000	135.00	No Ice	8.41	5.41	0.05
(Verizon - Proposed)			4.00				1/2" Ice	8.96	5.86	0.10
			0.00							
HBX-6517DS	C	From Leg	3.00		0.0000	135.00	No Ice	5.24	3.30	0.01
(Verizon - Proposed)			6.00				1/2" Ice	5.71	3.75	0.04
			0.00							
LNX-6514DS-VTM	C	From Leg	3.00		0.0000	135.00	No Ice	8.41	5.41	0.04
(Verizon - Proposed)			4.00				1/2" Ice	8.96	5.86	0.09
			0.00							
RRH2x40-AWS	A	From Leg	3.00		0.0000	135.00	No Ice	2.52	1.59	0.04
(Verizon - Proposed)			4.00				1/2" Ice	2.75	1.80	0.06
			0.00							
RRH2x40-AWS	B	From Leg	3.00		0.0000	135.00	No Ice	2.52	1.59	0.04
(Verizon - Proposed)			4.00				1/2" Ice	2.75	1.80	0.06
			0.00							
RRH2x40-AWS	C	From Leg	3.00		0.0000	135.00	No Ice	2.52	1.59	0.04
(Verizon - Proposed)			4.00				1/2" Ice	2.75	1.80	0.06
			0.00							
DB-T1-6Z-8AB-0Z	A	From Leg	1.00		0.0000	135.00	No Ice	5.60	2.33	0.04
(Verizon - Proposed)			0.00				1/2" Ice	5.92	2.56	0.08
			0.00							
3' Side Mount Standoff	A	From Leg	1.50		0.0000	178.00	No Ice	2.64	2.64	0.04
			0.00				1/2" Ice	3.69	3.69	0.05
			0.00							
3' Side Mount Standoff	B	From Leg	1.50		0.0000	178.00	No Ice	2.64	2.64	0.04
			0.00				1/2" Ice	3.69	3.69	0.05
			0.00							
3' Side Mount Standoff	C	From Leg	1.50		0.0000	178.00	No Ice	2.64	2.64	0.04
			0.00				1/2" Ice	3.69	3.69	0.05
			0.00							
2 Bay Dipole	C	From Leg	3.00		0.0000	185.00	No Ice	2.66	2.66	0.05
			0.00				1/2" Ice	4.44	4.44	0.07
			0.00							
2" Dia 10' Omni	A	From Leg	3.00		0.0000	185.00	No Ice	2.00	2.00	0.01
			0.00				1/2" Ice	3.03	3.03	0.03
			0.00							
2" Dia 10' Omni	B	From Leg	3.00		0.0000	185.00	No Ice	2.00	2.00	0.01
			0.00				1/2" Ice	3.03	3.03	0.03
			0.00							
2" Dia 10' Omni	C	None			0.0000	185.00	No Ice	2.00	2.00	0.01
							1/2" Ice	3.03	3.03	0.03
3' Side Mount Standoff	A	From Leg	1.50		0.0000	150.00	No Ice	2.64	2.64	0.04
			0.00				1/2" Ice	3.69	3.69	0.05
			0.00							
3' Side Mount Standoff	B	From Leg	1.50		0.0000	150.00	No Ice	2.64	2.64	0.04
			0.00				1/2" Ice	3.69	3.69	0.05
			0.00							
3' Side Mount Standoff	C	From Leg	1.50		0.0000	150.00	No Ice	2.64	2.64	0.04
			0.00				1/2" Ice	3.69	3.69	0.05
			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
2" Dia 10' Omni	B	From Leg	3.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice	2.00 3.03	2.00 3.03	0.01 0.03
2' Side Mount Standoff	C	From Leg	1.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice	2.10 4.30	2.10 4.30	0.05 0.09
2" Dia 8' Omni	C	From Leg	2.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	2.00 3.03	2.00 3.03	0.01 0.02
2" Dia 8' Omni	B	From Leg	2.00 0.00 0.00	0.0000	104.00	No Ice 1/2" Ice	2.00 3.03	2.00 3.03	0.01 0.02
2' Side Mount Standoff	B	From Leg	1.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.10 4.30	2.10 4.30	0.05 0.09
Pirod 13' KD T-Frame	A	From Leg	2.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice	11.07 15.53	11.07 15.53	0.24 0.35
Pirod 13' KD T-Frame	B	From Leg	2.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice	11.07 15.53	11.07 15.53	0.24 0.35
Pirod 13' KD T-Frame	C	From Leg	2.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice	11.07 15.53	11.07 15.53	0.24 0.35

Tower Pressures - No Ice

$G_H = 1.121$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1	170.00	1.597	30	134.358	A	10.325	7.917	7.917	43.40	0.000	0.000
180.00-160.00					B	10.325	7.917		43.40	0.000	0.000
					C	9.661	16.050		30.79	0.000	0.000
T2	150.00	1.541	29	134.758	A	9.293	7.917	7.917	46.00	0.000	0.000
160.00-140.00					B	9.293	7.917		46.00	0.000	0.000
					C	8.629	16.975		30.92	0.000	0.000
T3	130.00	1.48	27	155.998	A	11.757	21.149	9.599	29.17	0.000	0.000
140.00-120.00					B	11.903	19.499		30.57	0.000	0.000
					C	11.732	21.433		28.94	0.000	0.000
T4	116.67	1.434	27	60.927	A	3.126	10.899	3.200	22.81	0.000	0.000
120.00-113.33					B	3.195	9.799		24.62	0.000	0.000
					C	3.361	7.144		30.46	0.000	0.000
T5	110.00	1.411	26	65.466	A	6.117	10.900	3.200	18.80	0.000	0.000
113.33-106.67					B	6.242	9.800		19.95	0.000	0.000
					C	6.544	7.144		23.38	0.000	0.000
T6	103.33	1.386	26	69.999	A	4.406	10.900	3.200	20.91	0.000	0.000
106.67-100.00					B	4.488	9.800		22.40	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	4.686	7.144		27.05	0.000	0.000
T7	90.00	1.332	25	237.841	A	14.655	34.786	11.686	23.64	0.000	0.000
100.00-80.00					B	14.893	31.486		25.20	0.000	0.000
					C	15.398	24.486		29.30	0.000	0.000
T8 80.00-60.00	70.00	1.24	23	278.841	A	16.980	34.788	11.688	22.58	0.000	0.000
					B	17.209	31.488		24.00	0.000	0.000
					C	17.696	24.488		27.71	0.000	0.000
T9 60.00-40.00	50.00	1.126	21	321.509	A	16.829	38.125	15.025	27.34	0.000	0.000
					B	17.024	34.825		28.98	0.000	0.000
					C	17.440	27.825		33.19	0.000	0.000
T10	30.00	1	18	362.210	A	26.702	38.127	15.027	23.18	0.000	0.000
40.00-20.00					B	26.974	34.827		24.31	0.000	0.000
					C	27.551	27.827		27.14	0.000	0.000
T11 20.00-0.00	10.00	1	18	404.797	A	35.008	34.746	18.575	26.63	0.000	0.000
					B	35.227	32.436		27.45	0.000	0.000
					C	35.690	27.536		29.38	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.121$

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	170.00	1.597	22	0.5000	136.025	A	10.325	17.958	11.250	39.78	0.000	0.000
180.00-160.00						B	10.325	17.958		39.78	0.000	0.000
						C	9.116	31.973		27.38	0.000	0.000
T2	150.00	1.541	22	0.5000	136.425	A	9.293	17.445	11.250	42.07	0.000	0.000
160.00-140.00						B	9.293	17.445		42.07	0.000	0.000
						C	8.080	33.195		27.26	0.000	0.000
T3	130.00	1.48	21	0.5000	157.666	A	11.241	35.942	12.938	27.42	0.000	0.000
140.00-120.00						B	11.461	33.569		28.73	0.000	0.000
						C	10.848	40.195		25.35	0.000	0.000
T4	116.67	1.434	20	0.5000	61.483	A	2.883	17.342	4.313	21.32	0.000	0.000
120.00-113.33						B	2.987	15.738		23.03	0.000	0.000
						C	3.153	13.166		26.43	0.000	0.000
T5	110.00	1.411	20	0.5000	66.022	A	5.675	18.051	4.313	18.18	0.000	0.000
113.33-106.67						B	5.863	16.467		19.31	0.000	0.000
						C	6.165	13.925		21.47	0.000	0.000
T6	103.33	1.386	19	0.5000	70.556	A	4.116	17.548	4.313	19.91	0.000	0.000
106.67-100.00						B	4.239	15.942		21.37	0.000	0.000
						C	4.437	13.366		24.23	0.000	0.000
T7 100.00-80.00	90.00	1.332	19	0.5000	239.509	A	13.813	55.317	15.025	21.73	0.000	0.000
						B	14.171	50.494		23.24	0.000	0.000
						C	14.556	45.314		25.10	0.000	0.000
T8 80.00-60.00	70.00	1.24	17	0.5000	280.510	A	16.168	56.261	15.028	20.75	0.000	0.000
						B	16.513	51.433		22.12	0.000	0.000
						C	16.885	46.248		23.80	0.000	0.000
T9 60.00-40.00	50.00	1.126	16	0.5000	323.178	A	16.137	58.509	18.364	24.60	0.000	0.000
						B	16.431	53.641		26.21	0.000	0.000
						C	16.748	48.413		28.18	0.000	0.000
T10 40.00-20.00	30.00	1	14	0.5000	363.879	A	25.740	61.713	18.366	21.00	0.000	0.000
						B	26.150	56.883		22.12	0.000	0.000
						C	26.589	51.696		23.46	0.000	0.000
T11 20.00-0.00	10.00	1	14	0.5000	406.466	A	34.236	56.034	21.914	24.28	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
						B	34.565	52.651		25.13	0.000	0.000
						C	34.918	49.018		26.11	0.000	0.000

Tower Pressure - Service

$G_H = 1.121$

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	170.00	1.597	10	134.358	A	10.325	7.917	7.917	43.40	0.000	0.000
180.00-160.00					B	10.325	7.917		43.40	0.000	0.000
					C	9.661	16.050		30.79	0.000	0.000
T2	150.00	1.541	10	134.758	A	9.293	7.917	7.917	46.00	0.000	0.000
160.00-140.00					B	9.293	7.917		46.00	0.000	0.000
					C	8.629	16.975		30.92	0.000	0.000
T3	130.00	1.48	9	155.998	A	11.757	21.149	9.599	29.17	0.000	0.000
140.00-120.00					B	11.903	19.499		30.57	0.000	0.000
					C	11.732	21.433		28.94	0.000	0.000
T4	116.67	1.434	9	60.927	A	3.126	10.899	3.200	22.81	0.000	0.000
120.00-113.33					B	3.195	9.799		24.62	0.000	0.000
					C	3.361	7.144		30.46	0.000	0.000
T5	110.00	1.411	9	65.466	A	6.117	10.900	3.200	18.80	0.000	0.000
113.33-106.67					B	6.242	9.800		19.95	0.000	0.000
					C	6.544	7.144		23.38	0.000	0.000
T6	103.33	1.386	9	69.999	A	4.406	10.900	3.200	20.91	0.000	0.000
106.67-100.00					B	4.488	9.800		22.40	0.000	0.000
					C	4.686	7.144		27.05	0.000	0.000
T7	90.00	1.332	9	237.841	A	14.655	34.786	11.686	23.64	0.000	0.000
100.00-80.00					B	14.893	31.486		25.20	0.000	0.000
					C	15.398	24.486		29.30	0.000	0.000
T8 80.00-60.00	70.00	1.24	8	278.841	A	16.980	34.788	11.688	22.58	0.000	0.000
					B	17.209	31.488		24.00	0.000	0.000
					C	17.696	24.488		27.71	0.000	0.000
T9 60.00-40.00	50.00	1.126	7	321.509	A	16.829	38.125	15.025	27.34	0.000	0.000
					B	17.024	34.825		28.98	0.000	0.000
					C	17.440	27.825		33.19	0.000	0.000
T10	30.00	1	6	362.210	A	26.702	38.127	15.027	23.18	0.000	0.000
40.00-20.00					B	26.974	34.827		24.31	0.000	0.000
					C	27.551	27.827		27.14	0.000	0.000
T11 20.00-0.00	10.00	1	6	404.797	A	35.008	34.746	18.575	26.63	0.000	0.000
					B	35.227	32.436		27.45	0.000	0.000
					C	35.690	27.536		29.38	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	0.05	0.53	A	0.136	2.825	0.579	1	1	14.912	1.66	83.06	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
180.00-160.00			B	0.136	2.825	0.579	1	1	14.912			
			C	0.191	2.625	0.589	1	1	19.109			
T2	0.05	0.50	A	0.128	2.855	0.578	1	1	13.871	1.56	78.22	C
160.00-140.00			B	0.128	2.855	0.578	1	1	13.871			
			C	0.19	2.63	0.588	1	1	18.617			
T3	0.21	0.91	A	0.211	2.56	0.593	1	1	24.292	1.92	95.76	C
140.00-120.00			B	0.201	2.592	0.591	1	1	23.421			
			C	0.213	2.554	0.593	1	1	24.443			
T4	0.12	0.32	A	0.23	2.498	0.597	1	1	9.633	0.72	107.37	A
120.00-113.33			B	0.213	2.552	0.593	1	1	9.008			
			C	0.172	2.691	0.585	1	1	7.541			
T5	0.12	0.47	A	0.26	2.408	0.604	1	1	12.706	0.89	134.21	A
113.33-106.67			B	0.245	2.452	0.601	1	1	12.128			
			C	0.209	2.566	0.592	1	1	10.776			
T6	0.12	0.38	A	0.219	2.535	0.594	1	1	10.885	0.79	118.89	A
106.67-100.00			B	0.204	2.582	0.591	1	1	10.282			
			C	0.169	2.703	0.585	1	1	8.862			
T7	0.37	1.36	A	0.208	2.57	0.592	1	1	35.249	2.50	125.07	A
100.00-80.00			B	0.195	2.613	0.589	1	1	33.450			
			C	0.168	2.707	0.584	1	1	29.706			
T8	0.37	1.46	A	0.186	2.645	0.588	1	1	37.420	2.54	127.17	A
80.00-60.00			B	0.175	2.683	0.586	1	1	35.647			
			C	0.151	2.767	0.582	1	1	31.940			
T9	0.37	1.73	A	0.171	2.696	0.585	1	1	39.128	2.46	123.13	A
60.00-40.00			B	0.161	2.73	0.583	1	1	37.337			
			C	0.141	2.806	0.58	1	1	33.581			
T10	0.37	2.33	A	0.179	2.668	0.586	1	1	49.057	2.71	135.66	A
40.00-20.00			B	0.171	2.697	0.585	1	1	47.342			
			C	0.153	2.761	0.582	1	1	43.744			
T11	0.26	3.09	A	0.172	2.691	0.585	1	1	55.340	3.09	154.36	A
20.00-0.00			B	0.167	2.709	0.584	1	1	54.177			
			C	0.156	2.749	0.582	1	1	51.728			
Sum Weight:	2.38	13.07						OTM	1668.44 kip-ft	20.85		

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	0.05	0.53	A	0.136	2.825	0.579	0.8	1	12.847	1.49	74.66	C
180.00-160.00			B	0.136	2.825	0.579	0.8	1	12.847			
			C	0.191	2.625	0.589	0.8	1	17.177			
T2	0.05	0.50	A	0.128	2.855	0.578	0.8	1	12.013	1.42	70.97	C
160.00-140.00			B	0.128	2.855	0.578	0.8	1	12.013			
			C	0.19	2.63	0.588	0.8	1	16.892			
T3	0.21	0.91	A	0.211	2.56	0.593	0.8	1	21.941	1.73	86.57	C
140.00-120.00			B	0.201	2.592	0.591	0.8	1	21.040			
			C	0.213	2.554	0.593	0.8	1	22.096			
T4	0.12	0.32	A	0.23	2.498	0.597	0.8	1	9.008	0.67	100.40	A
120.00-113.33			B	0.213	2.552	0.593	0.8	1	8.369			
			C	0.172	2.691	0.585	0.8	1	6.869			
T5	0.12	0.47	A	0.26	2.408	0.604	0.8	1	11.482	0.81	121.29	A
113.33-106.67			B	0.245	2.452	0.601	0.8	1	10.880			
			C	0.209	2.566	0.592	0.8	1	9.467			

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
T6	0.12	0.38	A	0.219	2.535	0.594	0.8	1	10.004	0.73	109.26	A
106.67-100.00			B	0.204	2.582	0.591	0.8	1	9.385			
			C	0.169	2.703	0.585	0.8	1	7.925			
T7	0.37	1.36	A	0.208	2.57	0.592	0.8	1	32.318	2.29	114.67	A
100.00-80.00			B	0.195	2.613	0.589	0.8	1	30.472			
			C	0.168	2.707	0.584	0.8	1	26.626			
T8	0.37	1.46	A	0.186	2.645	0.588	0.8	1	34.024	2.31	115.63	A
80.00-60.00			B	0.175	2.683	0.586	0.8	1	32.205			
			C	0.151	2.767	0.582	0.8	1	28.401			
T9	0.37	1.73	A	0.171	2.696	0.585	0.8	1	35.762	2.25	112.54	A
60.00-40.00			B	0.161	2.73	0.583	0.8	1	33.932			
			C	0.141	2.806	0.58	0.8	1	30.093			
T10	0.37	2.33	A	0.179	2.668	0.586	0.8	1	43.717	2.42	120.89	A
40.00-20.00			B	0.171	2.697	0.585	0.8	1	41.947			
			C	0.153	2.761	0.582	0.8	1	38.234			
T11	0.26	3.09	A	0.172	2.691	0.585	0.8	1	48.338	2.70	134.83	A
20.00-0.00			B	0.167	2.709	0.584	0.8	1	47.132			
			C	0.156	2.749	0.582	0.8	1	44.590			
Sum Weight:	2.38	13.07						OTM	1514.47 kip-ft	18.82		

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	0.05	0.53	A	0.136	2.825	0.579	0.85	1	13.363	1.54	76.76	C
180.00-160.00			B	0.136	2.825	0.579	0.85	1	13.363			
			C	0.191	2.625	0.589	0.85	1	17.660			
T2	0.05	0.50	A	0.128	2.855	0.578	0.85	1	12.477	1.46	72.78	C
160.00-140.00			B	0.128	2.855	0.578	0.85	1	12.477			
			C	0.19	2.63	0.588	0.85	1	17.323			
T3	0.21	0.91	A	0.211	2.56	0.593	0.85	1	22.529	1.78	88.86	C
140.00-120.00			B	0.201	2.592	0.591	0.85	1	21.635			
			C	0.213	2.554	0.593	0.85	1	22.683			
T4	0.12	0.32	A	0.23	2.498	0.597	0.85	1	9.164	0.68	102.14	A
120.00-113.33			B	0.213	2.552	0.593	0.85	1	8.529			
			C	0.172	2.691	0.585	0.85	1	7.037			
T5	0.12	0.47	A	0.26	2.408	0.604	0.85	1	11.788	0.83	124.52	A
113.33-106.67			B	0.245	2.452	0.601	0.85	1	11.192			
			C	0.209	2.566	0.592	0.85	1	9.794			
T6	0.12	0.38	A	0.219	2.535	0.594	0.85	1	10.224	0.74	111.67	A
106.67-100.00			B	0.204	2.582	0.591	0.85	1	9.609			
			C	0.169	2.703	0.585	0.85	1	8.159			
T7	0.37	1.36	A	0.208	2.57	0.592	0.85	1	33.051	2.35	117.27	A
100.00-80.00			B	0.195	2.613	0.589	0.85	1	31.217			
			C	0.168	2.707	0.584	0.85	1	27.396			
T8	0.37	1.46	A	0.186	2.645	0.588	0.85	1	34.873	2.37	118.51	A
80.00-60.00			B	0.175	2.683	0.586	0.85	1	33.066			
			C	0.151	2.767	0.582	0.85	1	29.286			
T9	0.37	1.73	A	0.171	2.696	0.585	0.85	1	36.604	2.30	115.19	A
60.00-40.00			B	0.161	2.73	0.583	0.85	1	34.783			
			C	0.141	2.806	0.58	0.85	1	30.965			
T10	0.37	2.33	A	0.179	2.668	0.586	0.85	1	45.052	2.49	124.58	A
40.00-20.00			B	0.171	2.697	0.585	0.85	1	43.296			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.153	2.761	0.582	0.85	1	39.611			
T11	0.26	3.09	A	0.172	2.691	0.585	0.85	1	50.088	2.79	139.72	A
20.00-0.00			B	0.167	2.709	0.584	0.85	1	48.893			
			C	0.156	2.749	0.582	0.85	1	46.374			
Sum Weight:	2.38	13.07						OTM	1552.96 kip-ft	19.33		

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	0.13	1.03	A	0.208	2.57	0.592	1	1	20.957	1.66	82.87	C
180.00-160.00			B	0.208	2.57	0.592	1	1	20.957			
			C	0.302	2.291	0.617	1	1	28.829			
T2	0.14	0.96	A	0.196	2.609	0.59	1	1	19.578	1.58	79.14	C
160.00-140.00			B	0.196	2.609	0.59	1	1	19.578			
			C	0.303	2.289	0.617	1	1	28.550			
T3	0.53	1.49	A	0.299	2.298	0.616	1	1	33.370	1.87	93.28	C
140.00-120.00			B	0.286	2.335	0.612	1	1	31.992			
			C	0.324	2.235	0.623	1	1	35.908			
T4	0.29	0.49	A	0.329	2.222	0.625	1	1	13.726	0.69	103.12	A
120.00-113.33			B	0.305	2.284	0.617	1	1	12.702			
			C	0.265	2.392	0.606	1	1	11.130			
T5	0.29	0.75	A	0.359	2.15	0.636	1	1	17.153	0.82	122.61	A
113.33-106.67			B	0.338	2.199	0.628	1	1	16.210			
			C	0.304	2.285	0.617	1	1	14.760			
T6	0.29	0.59	A	0.307	2.277	0.618	1	1	14.962	0.74	111.28	A
106.67-100.00			B	0.286	2.334	0.612	1	1	13.992			
			C	0.252	2.431	0.602	1	1	12.490			
T7	0.90	2.06	A	0.289	2.327	0.612	1	1	47.694	2.32	116.12	A
100.00-80.00			B	0.27	2.379	0.607	1	1	44.830			
			C	0.25	2.438	0.602	1	1	41.829			
T8	0.90	2.24	A	0.258	2.413	0.604	1	1	50.150	2.36	117.87	A
80.00-60.00			B	0.242	2.461	0.6	1	1	47.369			
			C	0.225	2.514	0.596	1	1	44.441			
T9	0.90	2.52	A	0.231	2.496	0.597	1	1	51.079	2.26	112.78	A
60.00-40.00			B	0.217	2.541	0.594	1	1	48.293			
			C	0.202	2.591	0.591	1	1	45.347			
T10	0.90	3.46	A	0.24	2.467	0.599	1	1	62.735	2.43	121.58	A
40.00-20.00			B	0.228	2.505	0.597	1	1	60.083			
			C	0.215	2.546	0.594	1	1	57.276			
T11	0.63	4.51	A	0.222	2.524	0.595	1	1	67.585	2.68	134.01	A
20.00-0.00			B	0.215	2.548	0.593	1	1	65.812			
			C	0.207	2.574	0.592	1	1	63.924			
Sum Weight:	5.89	20.11						OTM	1595.06 kip-ft	19.40		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.13	1.03	A	0.208	2.57	0.592	0.8	1	18.892	1.55	77.63	C
180.00-160.00			B	0.208	2.57	0.592	0.8	1	18.892			
			C	0.302	2.291	0.617	0.8	1	27.005			
T2	0.14	0.96	A	0.196	2.609	0.59	0.8	1	17.720	1.49	74.66	C
160.00-140.00			B	0.196	2.609	0.59	0.8	1	17.720			
			C	0.303	2.289	0.617	0.8	1	26.934			
T3	0.53	1.49	A	0.299	2.298	0.616	0.8	1	31.122	1.75	87.64	C
140.00-120.00			B	0.286	2.335	0.612	0.8	1	29.700			
			C	0.324	2.235	0.623	0.8	1	33.738			
T4	0.29	0.49	A	0.329	2.222	0.625	0.8	1	13.149	0.66	98.78	A
120.00-113.33			B	0.305	2.284	0.617	0.8	1	12.105			
			C	0.265	2.392	0.606	0.8	1	10.500			
T5	0.29	0.75	A	0.359	2.15	0.636	0.8	1	16.018	0.76	114.50	A
113.33-106.67			B	0.338	2.199	0.628	0.8	1	15.037			
			C	0.304	2.285	0.617	0.8	1	13.527			
T6	0.29	0.59	A	0.307	2.277	0.618	0.8	1	14.139	0.70	105.16	A
106.67-100.00			B	0.286	2.334	0.612	0.8	1	13.144			
			C	0.252	2.431	0.602	0.8	1	11.602			
T7	0.90	2.06	A	0.289	2.327	0.612	0.8	1	44.931	2.19	109.40	A
100.00-80.00			B	0.27	2.379	0.607	0.8	1	41.996			
			C	0.25	2.438	0.602	0.8	1	38.918			
T8	0.90	2.24	A	0.258	2.413	0.604	0.8	1	46.916	2.21	110.27	A
80.00-60.00			B	0.242	2.461	0.6	0.8	1	44.067			
			C	0.225	2.514	0.596	0.8	1	41.064			
T9	0.90	2.52	A	0.231	2.496	0.597	0.8	1	47.852	2.11	105.66	A
60.00-40.00			B	0.217	2.541	0.594	0.8	1	45.007			
			C	0.202	2.591	0.591	0.8	1	41.997			
T10	0.90	3.46	A	0.24	2.467	0.599	0.8	1	57.587	2.23	111.61	A
40.00-20.00			B	0.228	2.505	0.597	0.8	1	54.853			
			C	0.215	2.546	0.594	0.8	1	51.958			
T11	0.63	4.51	A	0.222	2.524	0.595	0.8	1	60.738	2.41	120.43	A
20.00-0.00			B	0.215	2.548	0.593	0.8	1	58.899			
			C	0.207	2.574	0.592	0.8	1	56.941			
Sum Weight:	5.89	20.11						OTM	1497.03 kip-ft	18.07		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.13	1.03	A	0.208	2.57	0.592	0.85	1	19.408	1.58	78.94	C
180.00-160.00			B	0.208	2.57	0.592	0.85	1	19.408			
			C	0.302	2.291	0.617	0.85	1	27.461			
T2	0.14	0.96	A	0.196	2.609	0.59	0.85	1	18.184	1.52	75.78	C
160.00-140.00			B	0.196	2.609	0.59	0.85	1	18.184			
			C	0.303	2.289	0.617	0.85	1	27.338			
T3	0.53	1.49	A	0.299	2.298	0.616	0.85	1	31.684	1.78	89.05	C
140.00-120.00			B	0.286	2.335	0.612	0.85	1	30.273			
			C	0.324	2.235	0.623	0.85	1	34.281			
T4	0.29	0.49	A	0.329	2.222	0.625	0.85	1	13.293	0.67	99.87	A
120.00-113.33			B	0.305	2.284	0.617	0.85	1	12.254			
			C	0.265	2.392	0.606	0.85	1	10.657			
T5	0.29	0.75	A	0.359	2.15	0.636	0.85	1	16.302	0.78	116.53	A
113.33-106.67			B	0.338	2.199	0.628	0.85	1	15.331			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.304	2.285	0.617	0.85	1	13.835			
T6	0.29	0.59	A	0.307	2.277	0.618	0.85	1	14.345	0.71	106.69	A
106.67-100.00			B	0.286	2.334	0.612	0.85	1	13.356			
			C	0.252	2.431	0.602	0.85	1	11.824			
T7	0.90	2.06	A	0.289	2.327	0.612	0.85	1	45.622	2.22	111.08	A
100.00-80.00			B	0.27	2.379	0.607	0.85	1	42.704			
			C	0.25	2.438	0.602	0.85	1	39.646			
T8	0.90	2.24	A	0.258	2.413	0.604	0.85	1	47.725	2.24	112.17	A
80.00-60.00			B	0.242	2.461	0.6	0.85	1	44.892			
			C	0.225	2.514	0.596	0.85	1	41.908			
T9	0.90	2.52	A	0.231	2.496	0.597	0.85	1	48.659	2.15	107.44	A
60.00-40.00			B	0.217	2.541	0.594	0.85	1	45.828			
			C	0.202	2.591	0.591	0.85	1	42.835			
T10	0.90	3.46	A	0.24	2.467	0.599	0.85	1	58.874	2.28	114.10	A
40.00-20.00			B	0.228	2.505	0.597	0.85	1	56.161			
			C	0.215	2.546	0.594	0.85	1	53.288			
T11	0.63	4.51	A	0.222	2.524	0.595	0.85	1	62.450	2.48	123.83	A
20.00-0.00			B	0.215	2.548	0.593	0.85	1	60.627			
			C	0.207	2.574	0.592	0.85	1	58.687			
Sum Weight:	5.89	20.11						OTM	1521.54 kip-ft	18.40		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.05	0.53	A	0.136	2.825	0.579	1	1	14.912	0.57	28.74	C
180.00-160.00			B	0.136	2.825	0.579	1	1	14.912			
			C	0.191	2.625	0.589	1	1	19.109			
T2	0.05	0.50	A	0.128	2.855	0.578	1	1	13.871	0.54	27.07	C
160.00-140.00			B	0.128	2.855	0.578	1	1	13.871			
			C	0.19	2.63	0.588	1	1	18.617			
T3	0.21	0.91	A	0.211	2.56	0.593	1	1	24.292	0.66	33.13	C
140.00-120.00			B	0.201	2.592	0.591	1	1	23.421			
			C	0.213	2.554	0.593	1	1	24.443			
T4	0.12	0.32	A	0.23	2.498	0.597	1	1	9.633	0.25	37.15	A
120.00-113.33			B	0.213	2.552	0.593	1	1	9.008			
			C	0.172	2.691	0.585	1	1	7.541			
T5	0.12	0.47	A	0.26	2.408	0.604	1	1	12.706	0.31	46.44	A
113.33-106.67			B	0.245	2.452	0.601	1	1	12.128			
			C	0.209	2.566	0.592	1	1	10.776			
T6	0.12	0.38	A	0.219	2.535	0.594	1	1	10.885	0.27	41.14	A
106.67-100.00			B	0.204	2.582	0.591	1	1	10.282			
			C	0.169	2.703	0.585	1	1	8.862			
T7	0.37	1.36	A	0.208	2.57	0.592	1	1	35.249	0.87	43.28	A
100.00-80.00			B	0.195	2.613	0.589	1	1	33.450			
			C	0.168	2.707	0.584	1	1	29.706			
T8	0.37	1.46	A	0.186	2.645	0.588	1	1	37.420	0.88	44.00	A
80.00-60.00			B	0.175	2.683	0.586	1	1	35.647			
			C	0.151	2.767	0.582	1	1	31.940			
T9	0.37	1.73	A	0.171	2.696	0.585	1	1	39.128	0.85	42.61	A
60.00-40.00			B	0.161	2.73	0.583	1	1	37.337			
			C	0.141	2.806	0.58	1	1	33.581			
T10	0.37	2.33	A	0.179	2.668	0.586	1	1	49.057	0.94	46.94	A

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
40.00-20.00			B	0.171	2.697	0.585	1	1	47.342			
			C	0.153	2.761	0.582	1	1	43.744			
T11	0.26	3.09	A	0.172	2.691	0.585	1	1	55.340	1.07	53.41	A
20.00-0.00			B	0.167	2.709	0.584	1	1	54.177			
			C	0.156	2.749	0.582	1	1	51.728			
Sum Weight:	2.38	13.07						OTM	577.31 kip-ft	7.22		

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	0.05	0.53	A	0.136	2.825	0.579	0.8	1	12.847	0.52	25.83	C
180.00-160.00			B	0.136	2.825	0.579	0.8	1	12.847			
			C	0.191	2.625	0.589	0.8	1	17.177			
T2	0.05	0.50	A	0.128	2.855	0.578	0.8	1	12.013	0.49	24.56	C
160.00-140.00			B	0.128	2.855	0.578	0.8	1	12.013			
			C	0.19	2.63	0.588	0.8	1	16.892			
T3	0.21	0.91	A	0.211	2.56	0.593	0.8	1	21.941	0.60	29.95	C
140.00-120.00			B	0.201	2.592	0.591	0.8	1	21.040			
			C	0.213	2.554	0.593	0.8	1	22.096			
T4	0.12	0.32	A	0.23	2.498	0.597	0.8	1	9.008	0.23	34.74	A
120.00-113.33			B	0.213	2.552	0.593	0.8	1	8.369			
			C	0.172	2.691	0.585	0.8	1	6.869			
T5	0.12	0.47	A	0.26	2.408	0.604	0.8	1	11.482	0.28	41.97	A
113.33-106.67			B	0.245	2.452	0.601	0.8	1	10.880			
			C	0.209	2.566	0.592	0.8	1	9.467			
T6	0.12	0.38	A	0.219	2.535	0.594	0.8	1	10.004	0.25	37.81	A
106.67-100.00			B	0.204	2.582	0.591	0.8	1	9.385			
			C	0.169	2.703	0.585	0.8	1	7.925			
T7	0.37	1.36	A	0.208	2.57	0.592	0.8	1	32.318	0.79	39.68	A
100.00-80.00			B	0.195	2.613	0.589	0.8	1	30.472			
			C	0.168	2.707	0.584	0.8	1	26.626			
T8	0.37	1.46	A	0.186	2.645	0.588	0.8	1	34.024	0.80	40.01	A
80.00-60.00			B	0.175	2.683	0.586	0.8	1	32.205			
			C	0.151	2.767	0.582	0.8	1	28.401			
T9	0.37	1.73	A	0.171	2.696	0.585	0.8	1	35.762	0.78	38.94	A
60.00-40.00			B	0.161	2.73	0.583	0.8	1	33.932			
			C	0.141	2.806	0.58	0.8	1	30.093			
T10	0.37	2.33	A	0.179	2.668	0.586	0.8	1	43.717	0.84	41.83	A
40.00-20.00			B	0.171	2.697	0.585	0.8	1	41.947			
			C	0.153	2.761	0.582	0.8	1	38.234			
T11	0.26	3.09	A	0.172	2.691	0.585	0.8	1	48.338	0.93	46.66	A
20.00-0.00			B	0.167	2.709	0.584	0.8	1	47.132			
			C	0.156	2.749	0.582	0.8	1	44.590			
Sum Weight:	2.38	13.07						OTM	524.04 kip-ft	6.51		

Tower Forces - Service - Wind 90 To Face

tnxTower	Job: 14001.048 - Wolcott North	Page: 20 of 32
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Project: 180' Self-Support Lattice 1192 Wolcott Road., Wolcott, CT	Date: 08:09:28 05/28/14
	Client: Verizon Wireless	Designed by: TJL

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	0.05	0.53	A	0.136	2.825	0.579	0.85	1	13.363	0.53	26.56	C
180.00-160.00			B	0.136	2.825	0.579	0.85	1	13.363			
			C	0.191	2.625	0.589	0.85	1	17.660			
T2	0.05	0.50	A	0.128	2.855	0.578	0.85	1	12.477	0.50	25.18	C
160.00-140.00			B	0.128	2.855	0.578	0.85	1	12.477			
			C	0.19	2.63	0.588	0.85	1	17.323			
T3	0.21	0.91	A	0.211	2.56	0.593	0.85	1	22.529	0.61	30.75	C
140.00-120.00			B	0.201	2.592	0.591	0.85	1	21.635			
			C	0.213	2.554	0.593	0.85	1	22.683			
T4	0.12	0.32	A	0.23	2.498	0.597	0.85	1	9.164	0.24	35.34	A
120.00-113.33			B	0.213	2.552	0.593	0.85	1	8.529			
			C	0.172	2.691	0.585	0.85	1	7.037			
T5	0.12	0.47	A	0.26	2.408	0.604	0.85	1	11.788	0.29	43.09	A
113.33-106.67			B	0.245	2.452	0.601	0.85	1	11.192			
			C	0.209	2.566	0.592	0.85	1	9.794			
T6	0.12	0.38	A	0.219	2.535	0.594	0.85	1	10.224	0.26	38.64	A
106.67-100.00			B	0.204	2.582	0.591	0.85	1	9.609			
			C	0.169	2.703	0.585	0.85	1	8.159			
T7	0.37	1.36	A	0.208	2.57	0.592	0.85	1	33.051	0.81	40.58	A
100.00-80.00			B	0.195	2.613	0.589	0.85	1	31.217			
			C	0.168	2.707	0.584	0.85	1	27.396			
T8	0.37	1.46	A	0.186	2.645	0.588	0.85	1	34.873	0.82	41.01	A
80.00-60.00			B	0.175	2.683	0.586	0.85	1	33.066			
			C	0.151	2.767	0.582	0.85	1	29.286			
T9	0.37	1.73	A	0.171	2.696	0.585	0.85	1	36.604	0.80	39.86	A
60.00-40.00			B	0.161	2.73	0.583	0.85	1	34.783			
			C	0.141	2.806	0.58	0.85	1	30.965			
T10	0.37	2.33	A	0.179	2.668	0.586	0.85	1	45.052	0.86	43.11	A
40.00-20.00			B	0.171	2.697	0.585	0.85	1	43.296			
			C	0.153	2.761	0.582	0.85	1	39.611			
T11	0.26	3.09	A	0.172	2.691	0.585	0.85	1	50.088	0.97	48.34	A
20.00-0.00			B	0.167	2.709	0.584	0.85	1	48.893			
			C	0.156	2.749	0.582	0.85	1	46.374			
Sum Weight:	2.38	13.07						OTM	537.36 kip-ft	6.69		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	5.16					
Bracing Weight	7.91					
Total Member Self-Weight	13.07			-9.47	3.32	
Total Weight	17.07			-9.47	3.32	
Wind 0 deg - No Ice		0.01	-25.23	-2296.63	2.02	-8.21
Wind 90 deg - No Ice		23.59	-0.01	-10.77	-2153.19	-19.25
Wind 180 deg - No Ice		-0.01	23.20	2123.72	4.62	7.38
Member Ice	7.04					
Total Weight Ice	28.73			-21.68	8.74	
Wind 0 deg - Ice		0.01	-23.63	-2219.31	7.74	-9.75
Wind 90 deg - Ice		22.55	-0.01	-22.67	-2103.57	-17.02
Wind 180 deg - Ice		-0.01	22.30	2077.93	9.74	9.05
Total Weight	17.07			-9.47	3.32	
Wind 0 deg - Service		0.00	-8.73	-791.11	-0.38	-2.84

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 90 deg - Service		8.16	-0.00	-0.15	-746.13	-6.66
Wind 180 deg - Service		-0.00	8.03	738.42	0.52	2.55

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 90 deg - No Ice
4	Dead+Wind 180 deg - No Ice
5	Dead+Ice+Temp
6	Dead+Wind 0 deg+Ice+Temp
7	Dead+Wind 90 deg+Ice+Temp
8	Dead+Wind 180 deg+Ice+Temp
9	Dead+Wind 0 deg - Service
10	Dead+Wind 90 deg - Service
11	Dead+Wind 180 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	8	4.13	0.00	-0.01
			Max. Compression	6	-5.02	-0.01	0.01
			Max. Mx	7	-0.55	0.09	0.00
			Max. My	6	0.01	-0.00	-0.09
			Max. Vy	7	-0.18	0.00	0.00
			Max. Vx	8	-0.19	0.00	0.00
		Diagonal	Max Tension	7	0.88	0.00	0.00
			Max. Compression	7	-0.88	0.00	0.00
			Max. Mx	7	0.36	0.01	-0.00
			Max. My	6	-0.06	0.01	0.00
			Max. Vy	7	0.01	0.01	-0.00
			Max. Vx	6	0.00	0.00	0.00
		Top Girt	Max Tension	6	0.04	0.00	0.00
			Max. Compression	8	-0.07	0.00	0.00
			Max. Mx	5	-0.01	-0.02	0.00
			Max. My	6	-0.04	0.00	-0.00
			Max. Vy	5	0.01	0.00	0.00
			Max. Vx	6	0.00	0.00	0.00
T2	160 - 140	Leg	Max Tension	8	14.16	-0.01	-0.00
			Max. Compression	6	-16.22	0.06	0.01
			Max. Mx	6	-16.22	0.06	0.01
			Max. My	7	-0.54	-0.00	-0.06
			Max. Vy	6	-0.06	0.06	0.01
			Max. Vx	6	0.07	-0.00	0.03
		Diagonal	Max Tension	7	1.70	0.00	0.00
			Max. Compression	7	-1.73	0.00	0.00
			Max. Mx	6	1.47	0.01	0.00
			Max. My	6	-1.31	0.00	0.00
			Max. Vy	6	-0.01	0.01	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	6	-0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	8	28.08	-0.07	-0.01
			Max. Compression	6	-33.68	0.02	0.01
			Max. Mx	2	-27.32	0.09	0.00
			Max. My	3	-1.28	-0.01	0.17
			Max. Vy	4	-1.13	-0.04	-0.00
			Max. Vx	3	1.08	0.00	0.00
		Diagonal	Max Tension	7	2.56	0.00	0.00
			Max. Compression	7	-2.56	0.00	0.00
			Max. Mx	7	0.98	0.03	-0.00
			Max. My	8	-2.32	0.01	-0.01
			Max. Vy	7	0.01	0.03	-0.00
			Max. Vx	8	0.00	0.00	0.00
		Top Girt	Max Tension	4	0.47	0.00	0.00
			Max. Compression	2	-0.45	0.00	0.00
			Max. Mx	5	0.02	-0.02	0.00
			Max. My	8	-0.20	0.00	0.00
			Max. Vy	5	0.01	0.00	0.00
			Max. Vx	8	0.00	0.00	0.00
T4	120 - 113.334	Leg	Max Tension	4	32.51	-0.04	-0.01
			Max. Compression	6	-38.59	0.10	0.02
			Max. Mx	2	-37.24	0.11	0.01
			Max. My	3	-1.34	-0.01	0.17
			Max. Vy	8	0.04	-0.10	-0.01
			Max. Vx	3	0.08	-0.01	0.17
		Diagonal	Max Tension	8	2.62	0.00	0.00
			Max. Compression	2	-2.82	0.00	0.00
			Max. Mx	6	1.87	0.03	0.00
			Max. My	8	2.16	0.02	-0.00
			Max. Vy	6	-0.01	0.03	0.00
			Max. Vx	8	0.00	0.00	0.00
T5	113.334 - 106.667	Leg	Max Tension	4	37.62	-0.10	-0.01
			Max. Compression	6	-44.38	0.05	-0.00
			Max. Mx	2	-43.00	0.11	0.01
			Max. My	3	-1.67	-0.01	0.18
			Max. Vy	8	-0.04	-0.10	-0.01
			Max. Vx	3	-0.08	-0.01	0.18
		Diagonal	Max Tension	4	2.66	0.00	0.00
			Max. Compression	6	-2.94	0.00	0.00
			Max. Mx	7	1.55	0.05	-0.00
			Max. My	8	-2.44	0.01	-0.01
			Max. Vy	8	0.02	0.05	-0.00
			Max. Vx	8	0.00	0.00	0.00
		Horizontal	Max Tension	8	0.61	0.00	0.00
			Max. Compression	2	-0.55	0.00	0.00
			Max. Mx	5	0.11	-0.07	0.00
			Max. My	7	0.11	0.00	0.00
			Max. Vy	5	0.03	0.00	0.00
			Max. Vx	7	-0.00	0.00	0.00
T6	106.667 - 100.001	Leg	Max Tension	4	42.89	-0.06	0.00
			Max. Compression	6	-50.62	0.10	-0.00
			Max. Mx	8	42.00	-0.13	0.00
			Max. My	3	-1.82	-0.01	0.18
			Max. Vy	8	0.05	-0.13	0.00
			Max. Vx	3	0.08	-0.01	0.18
		Diagonal	Max Tension	6	2.82	0.00	0.00
			Max. Compression	2	-2.68	0.00	0.00
			Max. Mx	6	2.81	0.05	-0.00
			Max. My	8	2.13	0.04	-0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	6	-0.02	0.05	-0.00
			Max. Vx	8	0.00	0.00	0.00
T7	100.001 - 80.0007	Leg	Max Tension	4	57.49	-0.11	-0.01
			Max. Compression	6	-67.20	0.19	0.01
			Max. Mx	6	-67.20	0.19	0.01
			Max. My	3	-2.11	-0.01	0.17
			Max. Vy	8	-0.07	-0.13	0.00
			Max. Vx	3	-0.08	-0.01	0.17
		Diagonal	Max Tension	6	2.94	0.00	0.00
			Max. Compression	6	-3.17	0.00	0.00
			Max. Mx	6	2.28	0.05	0.00
			Max. My	8	-2.63	0.02	-0.01
			Max. Vy	8	0.02	0.05	-0.00
			Max. Vx	8	0.00	0.00	0.00
T8	80.0007 - 60.0007	Leg	Max Tension	4	71.26	-0.10	-0.01
			Max. Compression	6	-83.54	-0.03	0.02
			Max. Mx	8	68.53	-0.35	-0.02
			Max. My	7	-6.11	-0.19	0.19
			Max. Vy	8	0.09	-0.35	-0.02
			Max. Vx	3	-0.07	0.00	0.19
		Diagonal	Max Tension	6	3.27	0.00	0.00
			Max. Compression	6	-3.30	0.00	0.00
			Max. Mx	6	2.31	0.06	0.00
			Max. My	7	-1.67	0.03	0.01
			Max. Vy	8	0.03	0.06	-0.01
			Max. Vx	7	-0.00	0.00	0.00
T9	60.0007 - 40.0007	Leg	Max Tension	4	83.65	-0.26	-0.02
			Max. Compression	6	-98.24	-0.26	0.02
			Max. Mx	6	-89.67	0.49	0.02
			Max. My	3	-3.69	-0.03	0.35
			Max. Vy	6	0.11	0.49	0.02
			Max. Vx	3	-0.10	-0.03	0.35
		Diagonal	Max Tension	8	4.00	0.00	0.00
			Max. Compression	2	-4.09	0.00	0.00
			Max. Mx	8	2.65	0.09	-0.01
			Max. My	8	-3.76	0.06	-0.01
			Max. Vy	8	0.04	0.09	-0.01
			Max. Vx	8	0.00	0.00	0.00
T10	40.0007 - 20.0007	Leg	Max Tension	4	96.53	0.20	-0.02
			Max. Compression	6	-113.94	-1.04	0.02
			Max. Mx	6	-113.94	-1.04	0.02
			Max. My	3	-4.55	-0.05	0.85
			Max. Vy	6	0.38	0.83	-0.01
			Max. Vx	3	0.29	-0.05	0.85
		Diagonal	Max Tension	8	4.45	0.00	0.00
			Max. Compression	2	-4.51	0.00	0.00
			Max. Mx	8	2.73	0.11	-0.01
			Max. My	8	-3.94	0.08	-0.02
			Max. Vy	8	0.04	0.11	-0.01
			Max. Vx	8	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	6	1.98	0.00	0.00
			Max. Compression	6	-1.98	0.00	0.00
			Max. Mx	5	0.16	-0.32	0.00
			Max. My	7	1.64	0.00	0.01
			Max. Vy	5	0.07	0.00	0.00
			Max. Vx	7	-0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T11	20.0007 - 0	Leg	Max Tension	4	109.28	0.35	-0.01
			Max. Compression	6	-130.11	-0.00	-0.00
			Max. Mx	8	98.11	1.50	-0.02
			Max. My	3	-5.55	-0.09	1.58
			Max. Vy	8	-0.52	-1.00	0.00
			Max. Vx	3	0.47	-0.09	1.58
		Diagonal	Max Tension	8	5.64	0.00	0.00
			Max. Compression	2	-5.41	0.00	0.00
			Max. Mx	8	2.71	0.22	-0.01
			Max. My	8	-4.67	0.15	-0.03
			Max. Vy	8	0.06	0.22	-0.01
			Max. Vx	8	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	6	2.26	0.00	0.00
			Max. Compression	6	-2.26	0.00	0.00
			Max. Mx	5	0.20	-0.45	0.00
			Max. My	7	1.87	0.00	0.01
			Max. Vy	5	0.09	0.00	0.00
			Max. Vx	7	-0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	8	68.03	4.53	-4.35
	Max. H_x	4	65.07	5.60	-5.10
	Max. H_z	7	-92.73	-10.86	5.99
	Min. Vert	3	-98.49	-10.29	5.62
	Min. H_x	7	-92.73	-10.86	5.99
	Min. H_z	4	65.07	5.60	-5.10
Leg B	Max. Vert	7	110.61	-9.77	-5.36
	Max. H_x	6	-52.73	6.22	4.76
	Max. H_z	6	-52.73	6.22	4.76
	Min. Vert	2	-58.38	5.47	4.64
	Min. H_x	3	109.27	-11.12	-6.08
	Min. H_z	3	109.27	-11.12	-6.08
Leg A	Max. Vert	2	133.64	-0.23	15.54
	Max. H_x	8	-106.39	0.25	-14.05
	Max. H_z	2	133.64	-0.23	15.54
	Min. Vert	4	-112.62	0.20	-13.37
	Min. H_x	3	6.29	-2.18	0.47
	Min. H_z	8	-106.39	0.25	-14.05

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	17.07	0.00	0.00	-9.47	3.32	-0.00
Dead+Wind 0 deg - No Ice	17.07	0.01	-25.23	-2302.48	2.05	-8.23
Dead+Wind 90 deg - No Ice	17.07	23.59	-0.01	-10.84	-2158.69	-19.29
Dead+Wind 180 deg - No Ice	17.07	-0.01	23.20	2129.17	4.66	7.40

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Ice+Temp	28.73	0.00	0.00	-21.75	8.77	0.00
Dead+Wind 0 deg+Ice+Temp	28.73	0.01	-23.63	-2228.85	7.81	-9.80
Dead+Wind 90 deg+Ice+Temp	28.73	22.55	-0.01	-22.80	-2112.66	-17.12
Dead+Wind 180 deg+Ice+Temp	28.73	-0.01	22.30	2086.94	9.81	9.10
Dead+Wind 0 deg - Service	17.07	0.00	-8.73	-802.93	2.88	-2.85
Dead+Wind 90 deg - Service	17.07	8.16	-0.00	-9.95	-744.79	-6.68
Dead+Wind 180 deg - Service	17.07	-0.00	8.03	730.54	3.78	2.56

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	-17.07	0.00	0.00	17.07	0.00	0.000%
2	0.01	-17.07	-25.23	-0.01	17.07	25.23	0.000%
3	23.59	-17.07	-0.01	-23.59	17.07	0.01	0.000%
4	-0.01	-17.07	23.20	0.01	17.07	-23.20	0.000%
5	0.00	-28.73	0.00	0.00	28.73	-0.00	0.000%
6	0.01	-28.73	-23.63	-0.01	28.73	23.63	0.000%
7	22.55	-28.73	-0.01	-22.55	28.73	0.01	0.000%
8	-0.01	-28.73	22.30	0.01	28.73	-22.30	0.000%
9	0.00	-17.07	-8.73	-0.00	17.07	8.73	0.000%
10	8.16	-17.07	-0.00	-8.16	17.07	0.00	0.000%
11	-0.00	-17.07	8.03	0.00	17.07	-8.03	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000176
3	Yes	4	0.00000001	0.00000239
4	Yes	4	0.00000001	0.00000262
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000415
7	Yes	4	0.00000001	0.00000314
8	Yes	4	0.00000001	0.00000189
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	6.247	9	0.3038	0.0179
T2	160 - 140	4.974	9	0.2968	0.0161
T3	140 - 120	3.766	9	0.2633	0.0127

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T4	120 - 113.334	2.723	9	0.2208	0.0142
T5	113.334 - 106.667	2.420	9	0.2071	0.0141
T6	106.667 - 100.001	2.132	9	0.1920	0.0138
T7	100.001 - 80.0007	1.871	9	0.1760	0.0133
T8	80.0007 - 60.0007	1.190	9	0.1372	0.0112
T9	60.0007 - 40.0007	0.677	9	0.0950	0.0080
T10	40.0007 - 20.0007	0.319	9	0.0647	0.0052
T11	20.0007 - 0	0.089	9	0.0333	0.0021

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.00	2 Bay Dipole	9	6.247	0.3038	0.0179	351808
178.00	3' Side Mount Standoff	9	6.119	0.3037	0.0178	351808
155.00	2" Dia 10' Omni	9	4.662	0.2908	0.0153	56646
150.00	3' Side Mount Standoff	9	4.355	0.2828	0.0144	41051
144.00	2" Dia 8' Omni	9	3.997	0.2715	0.0134	30863
140.00	2' Side Mount Standoff	9	3.766	0.2633	0.0127	27071
135.00	BXA-70063/6CF	9	3.487	0.2527	0.0134	25329
104.00	2" Dia 8' Omni	9	2.025	0.1855	0.0136	21442
100.00	2' Side Mount Standoff	9	1.871	0.1760	0.0133	31275

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	17.952	2	0.8763	0.0621
T2	160 - 140	14.285	2	0.8547	0.0552
T3	140 - 120	10.809	2	0.7568	0.0436
T4	120 - 113.334	7.814	2	0.6338	0.0411
T5	113.334 - 106.667	6.942	2	0.5943	0.0409
T6	106.667 - 100.001	6.117	2	0.5507	0.0400
T7	100.001 - 80.0007	5.367	2	0.5049	0.0386
T8	80.0007 - 60.0007	3.416	2	0.3932	0.0324
T9	60.0007 - 40.0007	1.943	2	0.2721	0.0232
T10	40.0007 - 20.0007	0.917	2	0.1853	0.0149
T11	20.0007 - 0	0.255	2	0.0954	0.0060

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.00	2 Bay Dipole	2	17.952	0.8763	0.0621	113615
178.00	3' Side Mount Standoff	2	17.583	0.8760	0.0615	113615
155.00	2" Dia 10' Omni	2	13.387	0.8369	0.0526	18287

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	3' Side Mount Standoff	2	12.504	0.8137	0.0497	13336
144.00	2" Dia 8' Omni	2	11.474	0.7807	0.0460	10068
140.00	2' Side Mount Standoff	2	10.809	0.7568	0.0436	8867
135.00	BXA-70063/6CF	2	10.007	0.7260	0.0406	8401
104.00	2" Dia 8' Omni	2	5.809	0.5322	0.0395	7457
100.00	2' Side Mount Standoff	2	5.367	0.5049	0.0386	10863

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	180	Diagonal	A325N	0.6250	1	0.88	4.08	0.215 ✔	1.333	Member Bearing
T2	160	Leg	A325N	0.6250	4	1.40	13.50	0.104 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	1.70	4.08	0.418 ✔	1.333	Member Bearing
T3	140	Leg	A325N	0.6250	4	4.08	13.50	0.302 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2.56	6.12	0.418 ✔	1.333	Member Bearing
T4	120	Leg	A325N	0.6250	4	8.13	13.50	0.602 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2.82	6.44	0.438 ✔	1.333	Bolt Shear
T5	113.334	Diagonal	A325N	0.6250	1	2.94	6.44	0.457 ✔	1.333	Bolt Shear
		Horizontal	A325N	0.5000	1	0.61	4.12	0.148 ✔	1.333	Bolt Shear
T6	106.667	Diagonal	A325N	0.6250	1	2.82	6.12	0.462 ✔	1.333	Member Bearing
T7	100.001	Leg	A325N	0.7500	4	11.92	19.44	0.613 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	3.17	6.44	0.492 ✔	1.333	Bolt Shear
T8	80.0007	Leg	A325N	0.8750	4	15.56	26.46	0.588 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	3.27	6.12	0.535 ✔	1.333	Member Bearing
T9	60.0007	Leg	A325N	0.8750	4	19.22	26.46	0.727 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	4.00	6.12	0.653 ✔	1.333	Member Bearing
T10	40.0007	Leg	A325N	0.8750	4	22.55	26.46	0.852 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	4.45	6.12	0.728 ✔	1.333	Member Bearing
T11	20.0007	Leg	A325N	1.0000	4	25.77	34.56	0.746 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	5.64	6.44	0.875 ✔	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	180 - 160	ROHN 2 STD	20.00	4.00	61.0 K=1.00	22.549	1.0745	-5.02	24.23	0.207 ✔
T2	160 - 140	ROHN 2 STD	20.00	4.00	61.0 K=1.00	22.549	1.0745	-16.22	24.23	0.670 ✔
T3	140 - 120	ROHN 2.5 STD	20.03	5.01	63.4 K=1.00	22.122	1.7040	-33.68	37.70	0.893 ✔
T4	120 - 113.334	ROHN 2.5 EH	6.68	6.68	86.7 K=1.00	17.636	2.2535	-38.59	39.74	0.971 ✔
T5	113.334 - 106.667	ROHN 2.5 EH	6.68	6.68	86.7 K=1.00	17.634	2.2535	-44.38	39.74	1.117 ✔
T6	106.667 - 100.001	ROHN 2.5 EH	6.68	6.68	86.7 K=1.00	17.634	2.2535	-50.62	39.74	1.274 ✔
T7	100.001 - 80.0007	ROHN 3 X-STR	20.03	6.68	70.5 K=1.00	20.841	3.0159	-67.20	62.86	1.069 ✔
T8	80.0007 - 60.0007	ROHN 3 EH	20.04	6.68	70.5 K=1.00	20.839	3.0159	-83.54	62.85	1.329 ✔
T9	60.0007 - 40.0007	ROHN 4 X-STR	20.03	10.02	81.4 K=1.00	18.731	4.4074	-98.24	82.56	1.190 ✔
T10	40.0007 - 20.0007	ROHN 4 X-STR	20.04	5.16	41.9 K=1.00	25.559	4.4074	-113.94	112.65	1.011 ✔
T11	20.0007 - 0	ROHN 5 STD	20.03	5.14	32.8 K=1.00	26.795	4.2999	-130.11	115.21	1.129 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	180 - 160	L1 1/2x1 1/2x1/8	7.65	3.57	144.8 K=1.00	7.126	0.3594	-0.88	2.56	0.343 ✔
T2	160 - 140	L1 1/2x1 1/2x1/8	7.68	3.59	145.5 K=1.00	7.055	0.3594	-1.73	2.54	0.684 ✔
T3	140 - 120	L2x2x3/16	9.70	4.72	143.8 K=1.00	7.225	0.7150	-2.45	5.17	0.475 ✔
T4	120 - 113.334	L2x2x3/16	11.12	5.49	167.1 K=1.00	5.345	0.7150	-2.82	3.82	0.739 ✔
T5	113.334 - 106.667	L2 1/2x2 1/2x3/16	11.67	5.76	139.7 K=1.00	7.653	0.9020	-2.94	6.90	0.426 ✔
T6	106.667 - 100.001	L2 1/2x2 1/2x3/16	12.24	6.04	146.5 K=1.00	6.958	0.9020	-2.68	6.28	0.427 ✔
T7	100.001 - 80.0007	L2 1/2x2 1/2x3/16	13.96	6.87	166.5 K=1.00	5.384	0.9020	-3.17	4.86	0.653 ✔
T8	80.0007 - 60.0007	L2 1/2x2 1/2x3/16	15.82	7.81	189.3 K=1.00	4.167	0.9020	-3.26	3.76	0.867 ✔
T9	60.0007 - 40.0007	L3x3x3/16	19.04	9.46	190.4 K=1.00	4.118	1.0900	-4.09	4.49	0.912 ✔
T10	40.0007 - 20.0007	L3x3x3/16	20.81	10.35	208.5 K=1.00	3.437	1.0900	-4.51	3.75	1.204 ✔
T11	20.0007 - 0	KL/R > 200 (C) - 194 L3 1/2x3 1/2x1/4	22.61	11.19	193.5	3.987	1.6900	-5.41	6.74	0.803

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 $\frac{P}{P_a}$
					K=1.00					✔

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 $\frac{P}{P_a}$
T5	113.334 - 106.667	L3x3x3/16	9.24	8.77	176.6 K=1.00	4.788	1.0900	-0.55	5.22	0.104 ✔

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 $\frac{P}{P_a}$
T10	40.0007 - 20.0007	L3x3x1/4	18.24	17.86	279.3 K=0.77	1.914	1.4400	-1.98	2.76	0.717 ✔
T11	20.0007 - 0	KL/R > 250 (C) - 197 L3 1/2x3 1/2x1/4 KL/R > 250 (C) - 218	20.27	19.80	266.4 K=0.78	2.104	1.6900	-2.26	3.56	0.635 ✔

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	180 - 160	L2x2x1/8	6.52	6.32	163.6 K=0.86	5.582	0.4844	-0.07	2.70	0.025 ✔
T3	140 - 120	L2x2x1/8	6.56	6.36	164.3 K=0.86	5.532	0.4844	-0.45	2.68	0.167 ✔

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	180 - 160	ROHN 2 STD	20.00	4.00	61.0	30.000	1.0745	4.13	32.24	0.128

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	160 - 140	ROHN 2 STD	20.00	4.00	61.0	30.000	1.0745	14.16	32.24	0.439 ✔
T3	140 - 120	ROHN 2.5 STD	20.03	5.01	63.4	30.000	1.7040	28.08	51.12	0.549 ✔
T4	120 - 113.334	ROHN 2.5 EH	6.68	6.68	86.7	30.000	2.2535	32.51	67.61	0.481 ✔
T5	113.334 - 106.667	ROHN 2.5 EH	6.68	6.68	86.7	30.000	2.2535	37.62	67.61	0.556 ✔
T6	106.667 - 100.001	ROHN 2.5 EH	6.68	6.68	86.7	30.000	2.2535	42.89	67.61	0.634 ✔
T7	100.001 - 80.0007	ROHN 3 X-STR	20.03	6.68	70.5	30.000	3.0159	57.49	90.48	0.635 ✔
T8	80.0007 - 60.0007	ROHN 3 EH	20.04	6.68	70.5	30.000	3.0159	71.26	90.48	0.788 ✔
T9	60.0007 - 40.0007	ROHN 4 X-STR	20.03	10.02	81.4	30.000	4.4074	83.65	132.22	0.633 ✔
T10	40.0007 - 20.0007	ROHN 4 X-STR	20.04	5.16	41.9	30.000	4.4074	96.53	132.22	0.730 ✔
T11	20.0007 - 0	ROHN 5 STD	20.03	5.14	32.8	30.000	4.2999	109.28	129.00	0.847 ✔

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	180 - 160	L1 1/2x1 1/2x1/8	7.65	3.57	95.7	29.000	0.2656	0.88	7.70	0.114 ✔
T2	160 - 140	L1 1/2x1 1/2x1/8	7.68	3.59	96.1	29.000	0.2656	1.70	7.70	0.221 ✔
T3	140 - 120	L2x2x3/16	8.86	4.31	86.4	21.600	0.7150	2.56	15.44	0.166 ✔
T4	120 - 113.334	L2x2x3/16	11.12	5.49	109.4	21.600	0.7150	2.62	15.44	0.170 ✔
T5	113.334 - 106.667	L2 1/2x2 1/2x3/16	11.67	5.76	91.0	21.600	0.9020	2.66	19.48	0.136 ✔
T6	106.667 - 100.001	L2 1/2x2 1/2x3/16	12.24	6.04	95.3	21.600	0.9020	2.82	19.48	0.145 ✔
T7	100.001 - 80.0007	L2 1/2x2 1/2x3/16	13.38	6.58	103.6	21.600	0.9020	2.94	19.48	0.151 ✔
T8	80.0007 - 60.0007	L2 1/2x2 1/2x3/16	15.82	7.81	122.5	21.600	0.9020	3.27	19.48	0.168 ✔
T9	60.0007 - 40.0007	L3x3x3/16	19.04	9.46	122.6	21.600	1.0900	4.00	23.54	0.170 ✔
T10	40.0007 - 20.0007	L3x3x3/16	20.81	10.35	134.0	21.600	1.0900	4.45	23.54	0.189 ✔
T11	20.0007 - 0	L3 1/2x3 1/2x1/4	22.61	11.19	124.7	21.600	1.6900	5.64	36.50	0.154 ✔

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 $\frac{P}{P_a}$
T5	113.334 - 106.667	L3x3x3/16	9.24	8.77	115.0	21.600	1.0900	0.61	23.54	0.026 ✔

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 $\frac{P}{P_a}$
T10	40.0007 - 20.0007	L3x3x1/4	18.24	17.86	230.5	21.600	1.4400	1.98	31.10	0.064 ✔
T11	20.0007 - 0	L3 1/2x3 1/2x1/4	20.27	19.80	218.0	21.600	1.6900	2.26	36.50	0.062 ✔

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	180 - 160	L2x2x1/8	6.52	6.32	121.1	21.600	0.4844	0.04	10.46	0.004 ✔
T3	140 - 120	L2x2x1/8	6.56	6.36	121.9	21.600	0.4844	0.47	10.46	0.045 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	180 - 160	Leg	ROHN 2 STD	3	-5.02	32.30	15.5	Pass
T2	160 - 140	Leg	ROHN 2 STD	39	-16.22	32.30	50.2	Pass
T3	140 - 120	Leg	ROHN 2.5 STD	72	-33.68	50.25	67.0	Pass
T4	120 - 113.334	Leg	ROHN 2.5 EH	102	-38.59	52.98	72.9	Pass
T5	113.334 - 106.667	Leg	ROHN 2.5 EH	111	-44.38	52.97	83.8	Pass
T6	106.667 - 100.001	Leg	ROHN 2.5 EH	123	-50.62	52.97	95.6	Pass
T7	100.001 - 80.0007	Leg	ROHN 3 X-STR	132	-67.20	83.79	80.2	Pass
T8	80.0007 - 60.0007	Leg	ROHN 3 EH	153	-83.54	83.78	99.7	Pass
T9	60.0007 - 40.0007	Leg	ROHN 4 X-STR	174	-98.24	110.05	89.3	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P_{allow} K	% Capacity	Pass Fail
T10	40.0007 - 20.0007	Leg	ROHN 4 X-STR	189	-113.94	150.16	75.9	Pass
T11	20.0007 - 0	Leg	ROHN 5 STD	210	-130.11	153.58	84.7	Pass
T1	180 - 160	Diagonal	L1 1/2x1 1/2x1/8	8	-0.88	3.41	25.7	Pass
T2	160 - 140	Diagonal	L1 1/2x1 1/2x1/8	41	-1.73	3.38	51.3	Pass
T3	140 - 120	Diagonal	L2x2x3/16	77	-2.45	6.89	35.6	Pass
T4	120 - 113.334	Diagonal	L2x2x3/16	107	-2.82	5.09	55.4	Pass
T5	113.334 - 106.667	Diagonal	L2 1/2x2 1/2x3/16	119	-2.94	9.20	32.0 34.2 (b)	Pass
T6	106.667 - 100.001	Diagonal	L2 1/2x2 1/2x3/16	128	-2.68	8.37	32.0 34.6 (b)	Pass
T7	100.001 - 80.0007	Diagonal	L2 1/2x2 1/2x3/16	137	-3.17	6.47	49.0	Pass
T8	80.0007 - 60.0007	Diagonal	L2 1/2x2 1/2x3/16	158	-3.26	5.01	65.1	Pass
T9	60.0007 - 40.0007	Diagonal	L3x3x3/16	179	-4.09	5.98	68.4	Pass
T10	40.0007 - 20.0007	Diagonal	L3x3x3/16	194	-4.51	4.99	90.3	Pass
T11	20.0007 - 0	Diagonal	L3 1/2x3 1/2x1/4	215	-5.41	8.98	60.3 65.6 (b)	Pass
T5	113.334 - 106.667	Horizontal	L3x3x3/16	112	-0.55	6.96	7.8 11.1 (b)	Pass
T10	40.0007 - 20.0007	Secondary Horizontal	L3x3x1/4	197	-1.98	3.67	53.8	Pass
T11	20.0007 - 0	Secondary Horizontal	L3 1/2x3 1/2x1/4	218	-2.26	4.74	47.6	Pass
T1	180 - 160	Top Girt	L2x2x1/8	4	-0.07	3.60	1.8	Pass
T3	140 - 120	Top Girt	L2x2x1/8	73	-0.45	3.57	12.5	Pass
							Summary	
						Leg (T8)	99.7	Pass
						Diagonal (T10)	90.3	Pass
						Horizontal (T5)	11.1	Pass
						Secondary Horizontal (T10)	53.8	Pass
						Top Girt (T3)	12.5	Pass
						Bolt Checks	65.6	Pass
						RATING =	**99.7**	**Pass**

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Subject:	Anchor Bolt Analysis
Location:	Wolcott, CT
Rev. 0: 5/28/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14001.048

Tower Anchor Bolt Analysis

Max Leg Reactions:

Uplift = $Uplift := 113 \cdot kips$ (User Input)

Shear = $Shear := 16 \cdot kips$ (User Input)

Compression = $Compression := 134 \cdot kips$ (User Input)

Anchor Bolt Data:

Use ASTM A354 Gr. BC

Number of Anchor Bolts = $N := 4$ (User Input)

Bolt Ultimate Strength = $F_u := 125ksi$ (User Input)

Bolt Yield Strength = $F_y := 109ksi$ (User Input)

Diameter of Bolts = $D := 1.0in$ (User Input)

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

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

Anchor Bolt Area:

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

Check Anchor Bolt Area:

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

Required Area = $A_{s1} := \frac{Uplift}{F_y} + \frac{Shear}{\mu \cdot .85 \cdot F_y} = 1.4 \cdot in^2$

$A_{s2} := \left[\frac{Shear - (0.3 \cdot Compression)}{\mu \cdot .85 \cdot F_y}\right] = -0.475 \cdot in^2$

Provided Area = $A_{sprovided} := A_n \cdot N = 2.4 \cdot in^2$

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

Condition1 = "OK"

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

Condition2 = "OK"

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Subject:		FOUNDATION ANALYSIS
Location:		Wolcott, CT
Rev. 0: 5/28/14		Prepared by: T.J.L. Checked by: C.F.C. Job No. 14001.048

Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 2302 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 25 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 1 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 134 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 113 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 180 \cdot ft$	(User Input)	
Tower Width =	$W_t := 20.78 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 2$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 4.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 4.0 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 28.5 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 0 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 0 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 34 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 3000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 60 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 0$	(User Input)	
Bar Diameter =	$d_{bpier} := 0 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 0$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 0$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 0$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 7$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 0.875 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 29$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area =

$$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0 \cdot in^2$$

Pad Top Reinforcement Bar Area =

$$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =

$$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.601 \cdot in^2$$

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.537$$

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 = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 60 \cdot pcf$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

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

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 0.849 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0.424 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 4$

$A_p := W_f \cdot T_p = 114$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 48.388 \cdot kip$

Weight of Concrete Pad = $WT_{pad} := \left(W_f^2 \cdot T_f\right) \cdot \gamma_c = 487.35 \cdot kip$

Weight of Concrete Piers = $WT_{pier} := 3 \cdot \left[\left(L_p \cdot \frac{d_p^2 \cdot \pi}{4}\right) \cdot \gamma_c\right] = 0 \cdot kip$

Total Weight of Concrete = $WT_c := WT_{pad} + WT_{pier} = 487 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left(W_f^2 - 3 \cdot \frac{d_p^2 \cdot \pi}{4}\right) \cdot (L_p - L_{pag}) \cdot \gamma_s = 0 \cdot kip$

Weight of Soil Back Face = $WT_{s2} := \left[\frac{\tan(\Phi_s) \cdot (D_f)^2}{2} \cdot W_f\right] \cdot \gamma_s = 9 \cdot kip$

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

$X_t := if(Pos_t, X_{t1}, X_{t2}) = 5.252$

$X_{off} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 2.999$

Resisting Moment = $M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \cdot \left[W_f + \frac{\tan(\Phi_s) \cdot (L_p - L_{pag})}{3}\right] = 7272 \cdot kip$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 2402 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 3.03$

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

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

OverTurning_Moment_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load =

$Load_{tot} := WT_c + WT_{s1} + WT_t = 488 \cdot kip$

Area of the Mat =

$A_{mat} := W_f^{\,2} = 812.25$

Section Modulus of Mat =

$S := \frac{W_f^{\,3}}{6} = 3858.19 \cdot ft^3$

Maximum Pressure in Mat =

$P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.224 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat =

$P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.021 \cdot ksf$

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

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution =

$X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 9.337$

Distance to Kern =

$X_k := \frac{W_f}{6} = 4.75$

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

Eccentricity =

$e := \frac{M_{ot}}{Load_{tot}} = 4.919$

Adjusted Soil Pressure =

$P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.224 \cdot ksf$

$q_{adj} := if\left(P_{min} < 0, P_a, P_{max}\right) = 1.224 \cdot ksf$

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

Pressure_Check = "Okay"

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - \frac{d_{bbot}}{2} = 44.563 \cdot in$

$FL := \frac{C_t}{W_f^2} = 0.165 \cdot ksf$

$V_{req} := LF \cdot FL \cdot \left(X_t - 0.5 \cdot d_p - d\right) \cdot W_f = 9.642 \cdot kip$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 1419 \cdot kip$ (ACI-2008 11.2.1.1)

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

Beam_Shear_Check = "Okay"

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

Critical Perimeter of Punching Shear = $b_o := \left(d_p + d\right) \cdot \pi = 11.7$

Required Shear Strength = $V_{req} := LF \cdot FL \cdot \left[W_f^2 - \left(d_p + d\right)^2 \cdot \frac{\pi}{4}\right] = 176.2 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 1161.8 \cdot kip$ (ACI-2008 11.11.2.1)

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

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

$$M_{nT} := LF\cdot\left[U_t\cdot\left(W_t\cdot\sin(60\cdot deg) - \frac{d_p}{2}\right) + S_t\cdot\left(D_f + L_{pag}\right)\right] - WT_t\cdot X_{off} = 2841\cdot ft\cdot k$$

$$M_{nS} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left[\gamma_s\cdot\left(T_p - T_f\right)\right] + WT_{s2}\cdot\left[\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2} + \left(D_f - n\right)\cdot\tan\left(\Phi_s\right)\right]\right] = -2$$

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

Design Moment = $M_n := \dfrac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 81.44\cdot kips\cdot ft$

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

(ACI-200810.2.7.3)

$$b_{eff} := W_t\cdot\cos(30\cdot deg) + d_p = 215.952\cdot in$$

$$d := T_f - Cvr_{pad} - d_{bbot} = 44.125\cdot in$$

$$A_s := \frac{M_n}{\left(f_y\cdot d\right)} = 0.369\cdot in^2$$

$$a := \frac{A_s\cdot f_y}{\beta\cdot f_c\cdot b_{eff}} = 0.04\cdot in$$

$$A_s := \frac{M_n}{f_y\cdot\left(d - \frac{a}{2}\right)} = 0.369\cdot in^2$$

$$\rho := \frac{A_s}{b_{eff}\,d} = 3.87539\times 10^{-5}$$

Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$$As := \begin{cases} \left(\rho \cdot b_{eff} \cdot d\right) & \text{if } \left(\rho \cdot b_{eff} \cdot d\right) > \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \\ \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d & \text{otherwise} \end{cases} = 8.576 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 17.4 \cdot in^2$$

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

Pad_Reinforcement_Bot = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 11.09 \cdot in$$

Spacing or Cover Dimension =

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

Transverse Reinforcement Index =

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

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 21 \cdot in$$

Minimum Development Length =

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

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 43.32 \cdot in$$

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

Lpad_Check = "Okay"

Section 5.0

Tower Reinforcement Drawings

verizonwireless

TOWER REINFORCEMENT DESIGN

VERIZON SITE REF: WOLCOTT NORTH
1192 WOLCOTT ROAD
WOLCOTT, CT 06716

VICINITY MAP — NORTH

PROJECT SUMMARY

SITE ADDRESS:	1192 WOLCOTT ROAD WOLCOTT, CT 06716
PROJECT COORDINATES:	LAT: 41°-37'-05.05"N LON: 72°-58'-16.52"W ELEV:±1041' AMSL
VERIZON SITE REF.:	WOLCOTT NORTH
VERIZON CONTACT:	BRIAN RAGOZZINE 860.837.3121
ANTENNA CL HEIGHT:	135'-0"
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD ROAD BRANFORD, CT 06405
CENTEK CONTACT:	CARLO F. CENTORE, PE 203.488.0580 ext. 122

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	DESIGN BASIS & GENERAL NOTES	0
N-2	STRUCTURAL STEEL NOTES	0
MI-1	MODIFICATION INSPECTION REQUIREMENTS	0
S-1	TOWER ELEVATION & FEEDLINE PLAN	0
S-2	TOWER REINFORCEMENT DETAILS	0

0 5/28/14 T.A. CFC ISSUED FOR CONSTRUCTION
REV. DATE DRAWN BY CHECKED BY DESCRIPTION

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VERIZON WIRELESS
TOWER REINFORCEMENT DESIGN
WOLCOTT NORTH
1192 WOLCOTT ROAD
WOLCOTT, CT 06716

DATE: 5/28/14
SCALE: AS SHOWN
JOB NO. 14001.045

TITLE SHEET

SHEET NO.
T-1
Sheet No. 1 of 8

DESIGN BASIS

1. GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2005 CT STATE BUILDING CODE AND 2009 AMENDMENTS.

2. TIA/EIA-222-F-1996 "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES".

3. DESIGN CRITERIA

   WIND LOAD: (TIA/EIA-222-F-1996)
   BASIC WIND SPEED (V) = 85 MPH (FASTEST MILE)

   WIND LOAD: (2005 CT STATE BUILDING CODE APPENDIX K)
   BASIC WIND SPEED (V) = 95 MPH (3-SECOND GUST)
   EQUIVALENT TO (V) = 77.5 MPH (FASTEST MILE)

   TIA/EIA-222-F WIND SPEED CONTROLS

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN PREPARED BY CENTEK ENGINEERING, INC., MARKED DATED 5/28/14.

2. THE TOWER GEOMETRY, STRUCTURE MEMBER SIZES AND FOUNDATION INFORMATION WERE OBTAINED FROM A PREVIOUS STRUCTURAL REPORT PREPARED BY CENTEK JOB NO. 11001.C01, MARKED REVISION #1, DATED NOVEMBER 10, 2011.

3. ALL STEEL REINFORCEMENT SHOWN HEREIN APPLIES TO ALL SIDES OF THE TOWER.

4. PROVIDE TEMPORARY ANCHORS, GUYING AND/OR BRACING AS REQUIRED TO SAFELY CONDUCT THE WORK.

5. ALL WORK SHALL BE IN ACCORDANCE WITH TIA-222-F "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES".

6. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE TOWER STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIE-DOWNS, WHICH MIGHT BE NECESSARY.

7. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS SCOPE OF WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.

8. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.

9 ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.

10. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.

11. TOWER REINFORCING SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS AND SUPPORT STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.

12. EXISTING COAXIAL CABLES AND ALL ACCESSORIES SHALL BE RELOCATED AS NECESSARY AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH TOWER REINFORCEMENT.

13. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

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WOLCOTT NORTH

188 WOLCOTT ROAD
WOLCOTT, CT 06716

DATE: 5/28/14
SCALE: AS SHOWN
JOB NO. 14001.046

DESIGN BASIS AND GENERAL NOTES

SHEET NO.
N-1

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD).

2. MATERIAL SPECIFICATIONS

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI).
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 GRADE B (FY = 35 KSI)

3. FASTENER SPECIFICATIONS

   A. CONNECTION BOLTS---ASTM A325-N, UNLESS OTHERWISE SCHEDULED.
   B. U-BOLTS---ASTM A307
   C. ANCHOR RODS---ASTM F1554
   D. WELDING ELECTRODES---ASTM E70XX FOR A36 & A572_GR50 STEELS, ASTM E80XX FOR A572_GR65 STEEL.

4. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.

5. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.

6. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.

7. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.

8. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.

9. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.

10. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.

11. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".

12. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING THE SCHEDULED ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLET J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

13. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.

14. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.

15. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.

16. LOCK WASHER ARE NOT PERMITTED FOR A325 BOLTED STEEL ASSEMBLIES.

17. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.

18. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.

19. FABRICATE BEAMS WITH MILL CAMBER UP.

20. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.

21. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

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STRUCTURAL STEEL NOTES

SHEET NO.
N-2
Sheet No. 2 of 5

MODIFICATION INSPECTION REPORT REQUIREMENTS

PRE-CONSTUCTION		DURING CONSTRUCTION		POST-CONSTRUCTION	
SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM
X	EOR MODIFICATION INSPECTION DRAWING	–	FOUNDATIONS	X	MODIFICATION INSPECTOR RECORD REDLINE DRAWING
X	EOR APPROVED SHOP DRAWINGS	–	EARTHWORK: BACKFILL MATERIAL & COMPACTION	–	POST–INSTALLED ANCHOR ROD PULL–OUT TEST
–	EOR APPROVED POST–INSTALLED ANCHOR MPII	–	REBAR & FORMWORK GEOMETRY VERIFICATION	X	PHOTOGRAPHS
–	FABRICATION INSPECTION	–	CONCRETE TESTING		
–	FABRICATOR CERTIFIED WELDER INSPECTION	X	STEEL INSPECTION		
X	MATERIAL CERTIFICATIONS	–	POST INSTALLED ANCHOR ROD VERIFICATION		
		–	BASE PLATE GROUT VERIFICATION		
		–	CONTRACTOR'S CERTIFIED WELD INSPECTION		
		X	ON–SITE COLD GALVANIZING VERIFICATION		
		X	CONTRACTOR AS–BUILT REDLINE DRAWINGS		

NOTES:
1. REFER TO MODIFICATION INSPECTION NOTES FOR ADDITIONAL REQUIREMENTS
2. "X" DENOTES DOCUMENT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
3. "–" DENOTES DOCUMENT NOT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
4. EOR – ENGINEER OF RECORD
4. MPII – "MANUFACTURER'S PRINTED INSTALLATION GUIDELINES"

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS, TO INCLUDE A REVIEW AND COMPILATION OF SPECIFIED SUBMITTALS AND CONSTRUCTION INSPECTIONS, AS AN ASSURANCE OF COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS PREPARED UNDER THE DIRECTION OF THE ENGINEER OF RECORD (EOR).
2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND GENERAL WORKMANSHIP AND IS NOT A REVIEW OF THE MODIFICATION DESIGN. OWNERSHIP OF THE MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD.
3. TO ENSURE COMPLIANCE WITH THE MODIFICATION INSPECTION REQUIREMENTS THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR (MI) COMMENCE COMMUNICATION UPON AUTHORIZATION TO PROCEED BY THE CLIENT. EACH PARTY SHALL BE PROACTIVE IN CONTACTING THE OTHER. THE EOR SHALL BE CONTACTED IF SPECIFIC GC/MI CONTACT INFORMATION IS NOT MADE AVAILABLE.
4. THE GC SHALL PROVIDE THE MI WITH A MINIMUM OF 5 BUSINESS DAYS NOTICE OF IMPENDING INSPECTIONS.
5. WHEN POSSIBLE, THE GC AND MI SHALL BE ON SITE DURING THE MODIFICATION INSPECTION TO HAVE ANY NOTED DEFICIENCIES ADDRESSED DURING THE INITIAL MODIFICATION INSPECTION.

MODIFICATION INSPECTOR (MI)

1. THE MI SHALL CONTACT THE GC UPON AUTHORIZATION BY THE CLIENT TO:

   – REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   – WORK WITH THE GC IN DEVELOPMENT OF A SCHEDULE FOR ON–SITE INSPECTIONS.
   – DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE MI IS RESPONSIBLE FOR COLLECTION OF ALL INSPECTION AND TEST REPORTS, REVIEWING REPORTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING ON–SITE INSPECTIONS AND COMPILATION & SUBMISSION OF THE MODIFICATION INSPECTION REPORT TO THE CLIENT AND THE EOR.

GENERAL CONTRACTOR (GC)

1. THE GC IS REQUIRED TO CONTACT THE GC UPON AUTHORIZATION TO PROCEED WITH CONSTRUCTION BY THE CLIENT TO:

   – REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   – WORK WITH THE MI IN DEVELOPMENT OF A SCHEDULE FOR ON–SITE INSPECTIONS.
   – DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE GC IS RESPONSIBLE FOR COORDINATING AND SCHEDULING IN ADVANCE ALL REQUIRED INSPECTIONS AND TESTS WITH THE MI.

CORRECTION OF FAILING MODIFICATION INSPECTION

1. SHOULD THE STRUCTURAL MODIFICATION NOT COMPLY WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS, THE GC SHALL WORK WITH THE MODIFICATION INSPECTOR IN A VIABLE REMEDIATION PLAN AS FOLLOWS:

   – CORRECT ALL DEFICIENCIES TO COMPLY WITH THE CONTRACT DOCUMENTS AND COORDINATE WITH THE MI FOR A FOLLOW UP INSPECTION.
   – WITH CLIENT AUTHORIZATION, THE GC MAY WORK WITH THE EOR TO REANALYZE THE MODIFICATION USING THE AS–BUILT CONDITION.

REQUIRED PHOTOGRAPHS

1. THE GC AND MI SHALL AT MINIMUM PHOTO DOCUMENT THE FOLLOWING FOR INCLUSION IN THE MODIFICATION INSPECTION REPORT:

   – PRE–CONSTRUCTION: GENERAL CONDITION OF THE SITE.
   – DURING CONSTRUCTION: RAW MATERIALS, CRITICAL DETAILS, WELD PREPARATION, BOLT INSTALLATION & TORQUE, FINAL INSTALLED CONDITION & SURFACE COATING REPAIRS.
   – POST–CONSTRUCTION: FINAL CONDITION OF THE SITE

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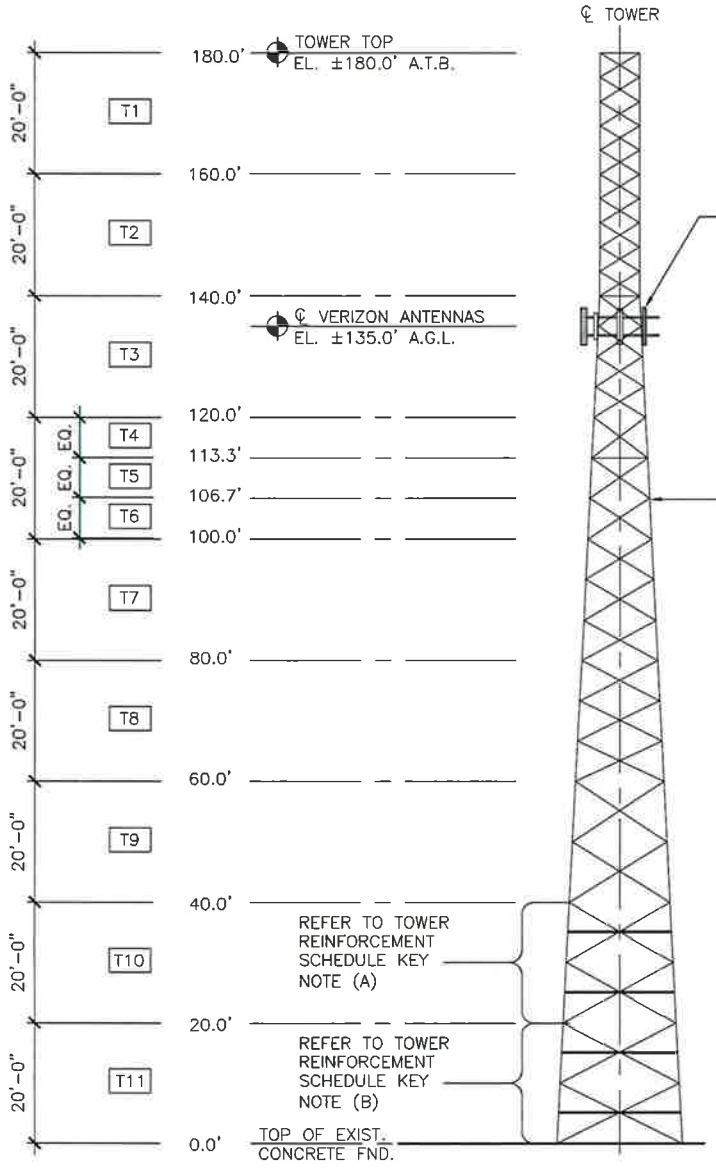
DATE: 5/28/14
SCALE: AS SHOWN
JOB NO. 14001.045

MODIFICATION INSPECTION REQUIREMENTS

SHEET NO
MI-1
Sheet No. 1 of 8



NOTE:
MISC. APPURTENANCES, CABLES, ETC. NOT SHOWN FOR CLARITY

PROPOSED THREE (3) ANDREW HBX-6517DS PANEL ANTENNAS, TWO (2) ANDREW LNX-8513DS PANEL ANTENNAS, ONE (1) ANDREW LNX-6514DS PANEL ANTENNA, THREE (3) ALCATEL-LUCENT RRH2X40-AWS REMOTE RADIO HEADS AND ONE (1) RFS DB-T1-6Z-8AB-0Z MAIN DISTRIBUTION BOX TO REPLACE EXISTING FOUR (4) RFS APL868013 AND TWO (2) RFS APL866513 PANEL ANTENNAS, MOUNTED ON THREE (3) EXISTING 13-ft T-FRAMES.

EXISTING 180-FT ROHN SSV LATTICE TOWER

REINFORCEMENT SCHEDULE KEY:

A. PRIMUS SUB HORIZONTAL AND CENTER PLATE P/N RSH-0617-19 (TYP. OF 6) W/ PRIMUS LEG BUTTERFLY BRACKETS P/N RSH-0568-68 (TYP. OF 6).

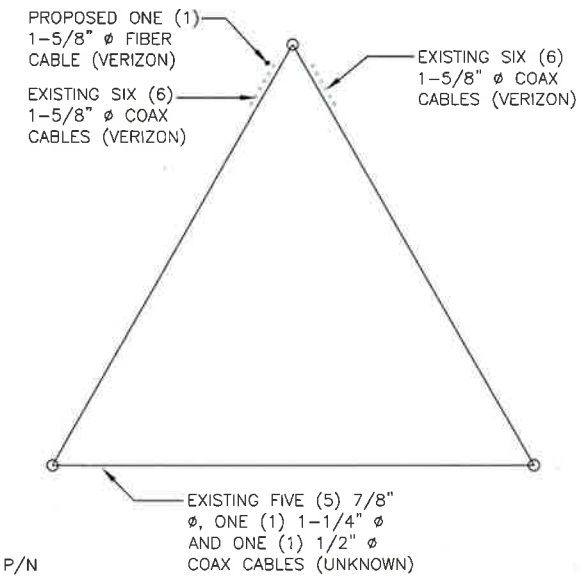
B. PRIMUS SUB HORIZONTAL AND CENTER PLATE P/N RSH-0619-21 (TYP. OF 6) W/ PRIMUS LEG BUTTERFLY BRACKETS P/N RSH-0568-68 (TYP. OF 6).

LEGEND:
1. A.G.L.= ABOVE GROUND LEVEL
2. A.T.B.= ABOVE TOWER BASE PLATE

TXX DENOTES RISA TOWER OUTPUT SECTION NUMBER

MAX. TOWER STEEL USAGE w/ ABOVE REINFORCEMENTS:
LOAD CASE #1 = 99.7%
(DIAGONAL T8 60'-0"-80'-0")

1 / S-1 **TOWER ELEVATION**
SCALE: 1/20" = 1'-0"



2 / S-1 **FEEDLINE PLAN**
SCALE: 1/4" = 1'-0"

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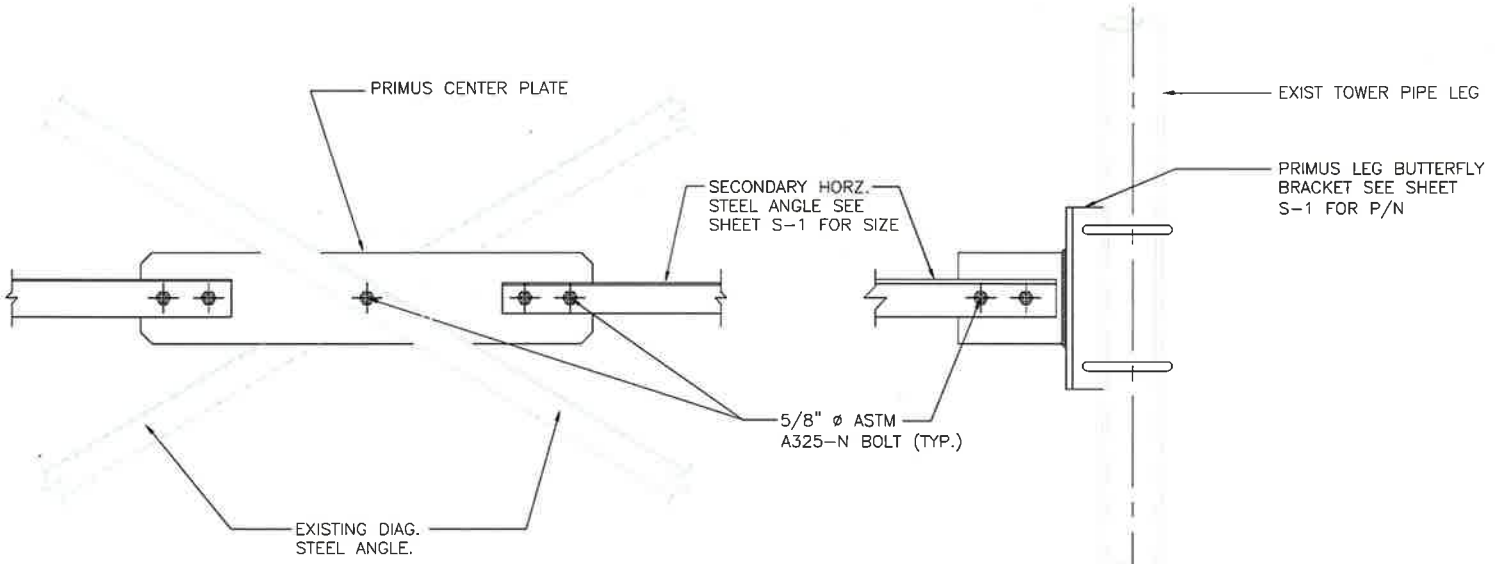
TOWER ELEVATION AND FEEDLINE PLAN

SHEET NO.
S-1



1 / S-2 **SECONDARY HORIZONTAL ELEVATION**

SCALE: 1-1/2" = 1'-0"

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TOWER REINFORCEMENT DETAILS

SHEET NO.
S-2
Sheet No. 5 of 8

SITE NAME	WOLCOTT N CT	ECP & CELL #	2	0343
Note: AWS Add (Root Metric Site).		LATITUDE	41-37-05.37 N	
		LONGITUDE	72-58-14.38 W	
		STRUCTURE TYPE	Lattice	

AWS - LTE ANTENNA ADD	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	2100 MHz BBU	2100 MHz BBU	2100 MHz BBU
ANTENNA TYPE	HBX-6517DS-VTM_03DT_2110	HBX-6517DS-VTM_03DT_2110	HBX-6517DS-VTM_03DT_2110
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	20	180	280
DOWN TILT (MECH/DEG)	2	3	3
RAD CTR (FT AGL)	135	135	135
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
RRH - QTY/MODEL	1 x ALU RH_2X40-AWS	1 x ALU RH_2X40-AWS	1 x ALU RH_2X40-AWS
SECTOR DISTRIBUTION BOX			
MAIN DISTRIBUTION BOX	1 x DB-T1-6Z-8AB-0Z		

700 LTE - CURRENT CONFIG	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	700 eNodeB	700 eNodeB	700 eNodeB
ANTENNA TYPE	BXA-70063-6CF-4-750MHZ	BXA-70063-6CF-6-750MHZ	BXA-70063-6CF-4-750MHZ
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	20	180	280
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	135	135	135
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

700 Mhz - LTE Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	700 eNodeB	700 eNodeB	700 eNodeB
ANTENNA TYPE	BXA-70063-6CF-4-750MHZ	BXA-70063-6CF-6-750MHZ	BXA-70063-6CF-4-750MHZ
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	20	180	280
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	135	135	135
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
RRH - QTY/MODEL			

850 CELLULAR - CURRENT CONFIG	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Mod 4.0B	Cellular Mod 4.0B	Cellular Mod 4.0B
ANTENNA TYPE	APL868013	APL868013	APL866513
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	20	180	280
DOWN TILT (MECH/DEG)	4	6	4
RAD CTR (FT AGL)	135	135	135
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	2 x FD9R6004/2C-3L	2 x FD9R6004/2C-3L	2 x FD9R6004/2C-3L

850 CELLULAR - FUTURE CONFIG	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Mod 4.0B	Cellular Mod 4.0B	Cellular Mod 4.0B
ANTENNA TYPE	LNX-8513DS-VTM_04DT_0850	LNX-8513DS-VTM_06DT_0850	LNX-8514DS-VTM_04DT_0850
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	20	180	280
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	135	135	135
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	2 x FD9R6004/2C-3L	2 x FD9R6004/2C-3L	2 x FD9R6004/2C-3L
DIPLEX WITH LTE CABLE			

1900 PCS - CURRENT CONFIG	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Mod 4.0B	PCS Mod 4.0B	PCS Mod 4.0B
ANTENNA TYPE	APX18-206516L-T0 1880MHZ	BXA-171063-8BF-EDIN-2	APX18-206516L-T0 1880MHZ
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	20	180	280
DOWN TILT (MECH/DEG)	2	3	3
RAD CTR (FT AGL)	135	135	135
TMA - QTY / MODEL			
DIPLEX WITH CELLULAR CABLE	YES	YES	YES

1900 PCS - FUTURE CONFIG	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Mod 4.0B	PCS Mod 4.0B	PCS Mod 4.0B
ANTENNA TYPE	APX18-206516L-T0 1880MHZ	BXA-171063-8BF-EDIN-2	APX18-206516L-T0 1880MHZ
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	20	180	280
DOWN TILT (MECH/DEG)	2	3	3
RAD CTR (FT AGL)	135	135	135
TMA - QTY / MODEL			
DIPLEX WITH CELLULAR CABLE	YES	YES	YES

NUMBER OF CABLES NEEDED				FIBER LINES MODEL NUMBER			
TOTAL # FIBER LINES	1	TOTAL # OF MAINLINES	12	FIBER LINE MODEL #			HB158-1-08U8-S8J18
TOTAL # TOP JUMPERS	3	TOTAL # OF TOP JUMPERS	18	FIBER TOP JUMPER MODEL #			HB114-1-08U4-S4J18
EQUIPMENT CABLE ORDERING		MAIN CABLE #	12	+	0	TOP JUMPER #	18	+	0

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular-A Band	PCS-F/AWS Band	700 MHz C-Block	Cellular (Watts)	20
TX: 869-880/890-891.5 MHz	TX: 1970-1975/2145-2155 MHz	TX: 746-757 MHz	PCS (Watts)	16
RX: 824-835/845-846.5 MHz	RX: 1690-1895/1745-1755 MHz	RX: 776-787 MHz	LTE/AWS (Watts)	40

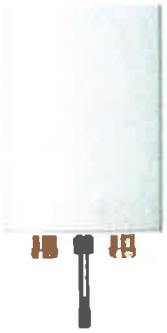
ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1-A	800	Tx1/Rx0	RED	A5-A	800	Tx2/Rx0	BLUE	A9-A	800	Tx3/Rx0	GREEN
A1-B	1900	Tx1/Rx0	RED/WHITE	A5-B	1900	Tx2/Rx0	BLUE/ WHITE	A9-B	1900	Tx3/Rx0	GREEN/WHITE
A2	700	Tx1/Rx0	RED/ORANGE	A6	700	Tx2/Rx0	BLUE/ ORANGE	A10	700	Tx3/Rx0	GREEN/ORANGE
A3	700	Tx4/Rx1	RED/RED/ORANGE	A7	700	Tx5/Rx1	BLUE/BLUE/ORANGE	A11	700	Tx6/Rx1	GREEN/GREEN/ORANGE
A4-B	1900	Tx4/Rx1	RED/RED/WHITE	A8-B	1900	Tx5/Rx1	BLUE/BLUE/WHITE	A12-B	1900	Tx6/Rx1	GREEN/GREEN/WHITE
A4-A	800	Tx4/Rx1	RED/RED	A8-A	800	Tx5/Rx1	BLUE/BLUE	A12-A	800	Tx6/Rx1	GREEN/GREEN
F1-A	1700	Tx/Rx	RED/BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN
F1-D	1700	Tx/Rx	RED/RED/BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BROWN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared by: Jaime Laredo	Robert Hesselbach	JL	5/28/2014

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.



HBX-6517DS-VTM

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

- Superior azimuth tracking and pattern symmetry to minimize any sector overlap
- Rugged, reliable design with excellent passive intermodulation suppression
- The values presented on this datasheet have been calculated based on N-P-BASTA White Paper version 9.6 by the NGMN Alliance

Electrical Specifications

Frequency Band, MHz	**1710–1880**	**1850–1990**	**1920–2180**
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.9
Gain by all Beam Tilts Tolerance, dB	±0.2	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.3 3 ° | 18.6 6 ° | 18.4	0 ° | 18.4 3 ° | 18.7 6 ° | 18.6	0 ° | 18.8 3 ° | 19.1 6 ° | 18.7
Beamwidth, Horizontal, degrees	67	66	64
Beamwidth, Horizontal Tolerance, degrees	±1.8	±0.9	±2.8
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beamwidth, Vertical Tolerance, degrees	±0.2	±0.2	±0.3
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	19	19	18
Front-to-Back Total Power at 180° ± 30°, dB	26	26	26
CPR at Boresight, dB	22	22	22
CPR at Sector, dB	11	11	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2180 MHz
Number of Ports	2

Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity, total	2
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board

Product Specifications

HBX-6517DS-VTM

Radome Material	PVC, UV resistant
Wind Loading, maximum	393.0 N @ 150 km/h 88.3 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	83.0 mm | 3.3 in
Length	1902.0 mm | 74.9 in
Width	166.0 mm | 6.5 in
Net Weight	6.2 kg | 13.7 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	HBX-6517DS-R2M
Model with Factory Installed AISG 2.0 Actuator	HBX-6517DS-A1M
RET System	Teletilt®

Regulatory Compliance/Certifications

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

Included Products

DB390 — Pipe Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Use for narrow panel antennas. Includes two pipe mounts.

DB5098E — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-8513DS-VTM

Andrew® Teletilt® Antenna, 698–896 MHz, 85° horizontal beamwidth, RET compatible

- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- Excellent front-to-back ratio, USLS, VSWR, and PIM specifications to enhance network quality
- Great solution to maximize network coverage and capacity
- Extended elevation tilt for maximum flexibility in urban core areas
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	14.6	15.3
Beamwidth, Horizontal, degrees	85	85
Beamwidth, Vertical, degrees	12.2	11.0
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	17
Front-to-Back Ratio at 180°, dB	25	26
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

General Specifications

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

Mechanical Specifications

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

Dimensions

Depth	181.0 mm | 7.1 in
Length	1847.0 mm | 72.7 in
Width	301.0 mm | 11.9 in

Product Specifications

LNX-8513DS-VTM

Net Weight	17.8 kg | 39.2 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	LNX-8513DS-R2M
Model with Factory Installed AISG 2.0 Actuator	LNX-8513DS-A1M
RET System	Teletilt®

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)

Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

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

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6514DS-VTM

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

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

Electrical Specifications

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

General Specifications

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

Mechanical Specifications

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

Product Specifications

LNX-6514DS-VTM

Dimensions

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

Remote Electrical Tilt (RET) Information

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

Regulatory Compliance/Certifications

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

Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

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

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

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

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

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

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

Fast, low-cost installation and deployment

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

Excellent RF performance

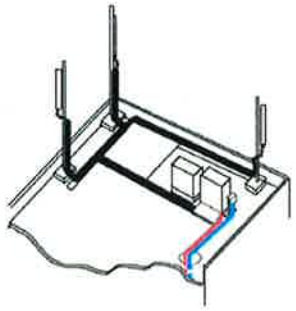
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

Features

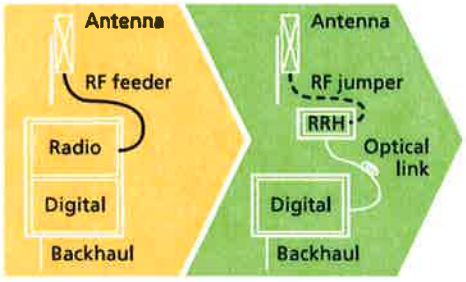
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

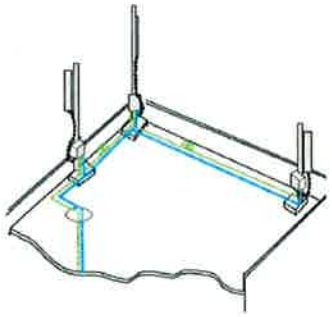
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

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

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
  - ¬ With solar load: -40°C to +50°C (-40°F to +122°F)
  - ¬ Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)
- Enclosure protection
  - ¬ IP65 (International Protection rating)

RF characteristics

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

Optical characteristics

Type/number of fibers

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

Optical fiber length

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

Digital Ports and Alarms

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

CPG2809100912 (09)

Alcatel·Lucent

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.